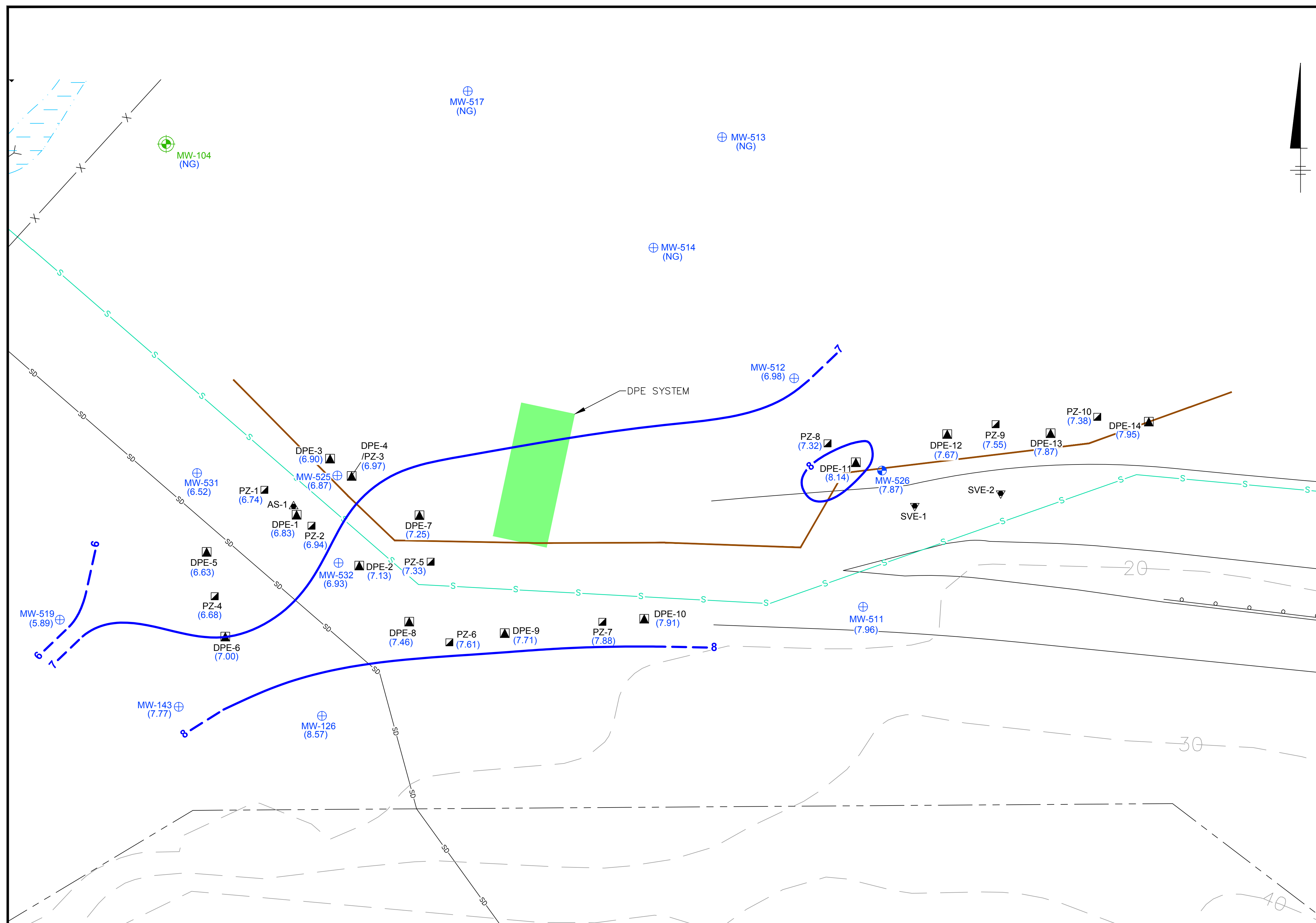


APPENDIX G

Potentiometric Surface Maps – November 28, 2017 to November 13, 2018

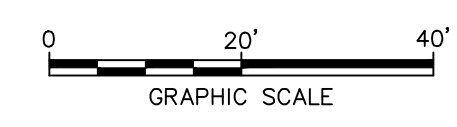


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- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▣ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
 - (8.57) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 8 - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

- NOTES:**
1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98). VERTICAL DATUM: N.A.V.D. '88. UNITS: U.S. SURVEY FEET. HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



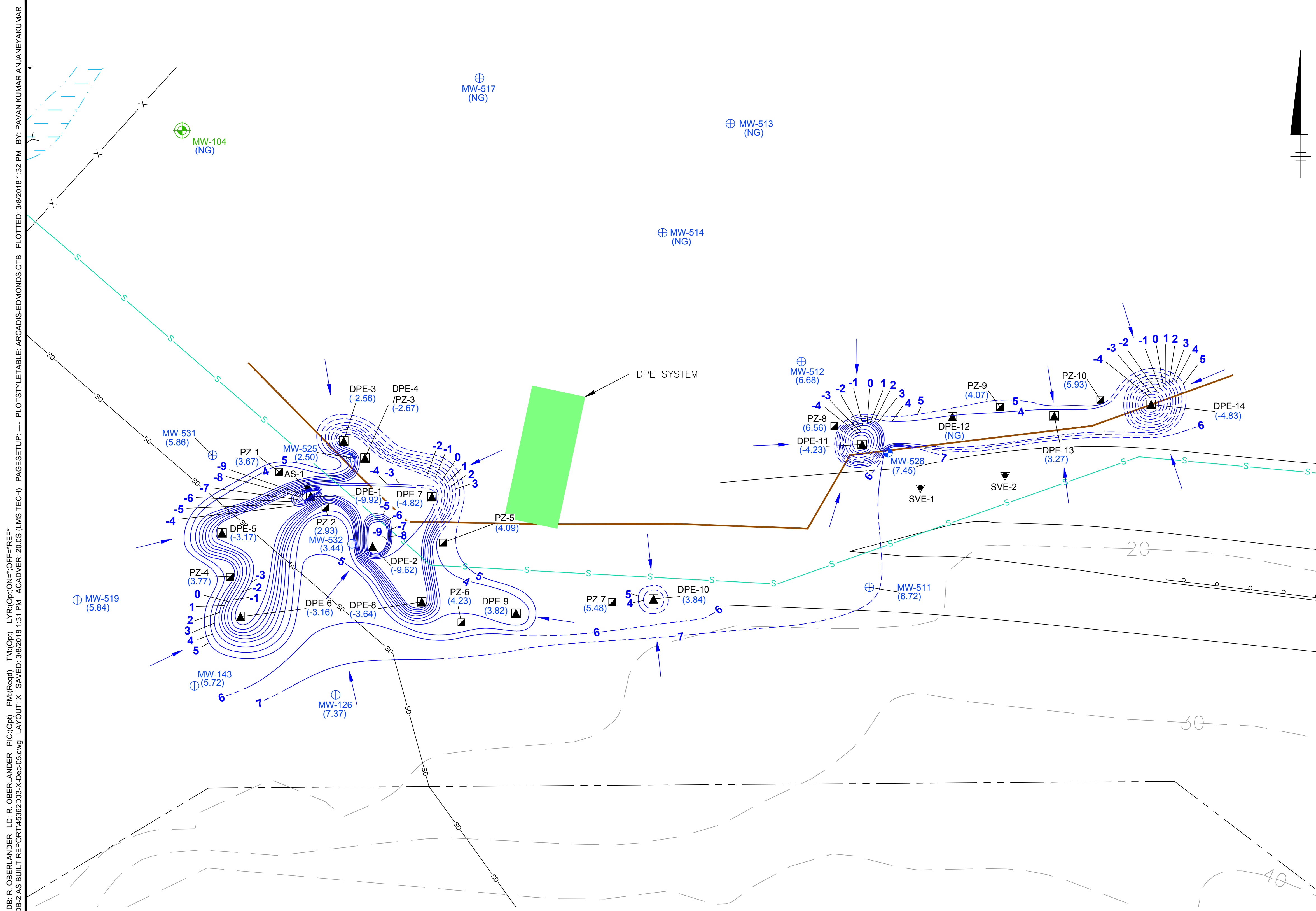
DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12	DPE-13	DPE-14
Status	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
EDMONDS, WASHINGTON

**POTENTIOMETRIC SURFACE MAP
NOVEMBER 28, 2017**

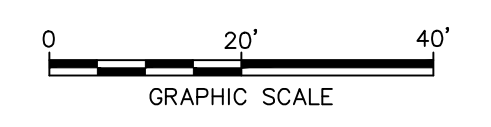
ARCADIS Design & Consultancy
for natural and built assets

FIGURE
1



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▣ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION (7.45) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 7 - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - INFERRED GROUNDWATER FLOW DIRECTION
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

- NOTES:**
- 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 - HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
VERTICAL DATUM: N.A.V.D. '88
UNITS: U.S. SURVEY FEET
HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 - SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12	DPE-13	DPE-14
Status	On	On	On	On	On	On	On	On	On	On	Off	On	On	On

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER, LD: R. OBERLANDER, PIC: (Opt), PM: (Read), TM: (Opt) LVR: (Opt) ON: "OFF" = "REF"
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 XREFS: 45382X03, 45382X02, RECORD-INT-ACT-X-RECORDTOPO
 IMAGES: PROJECTNAME:

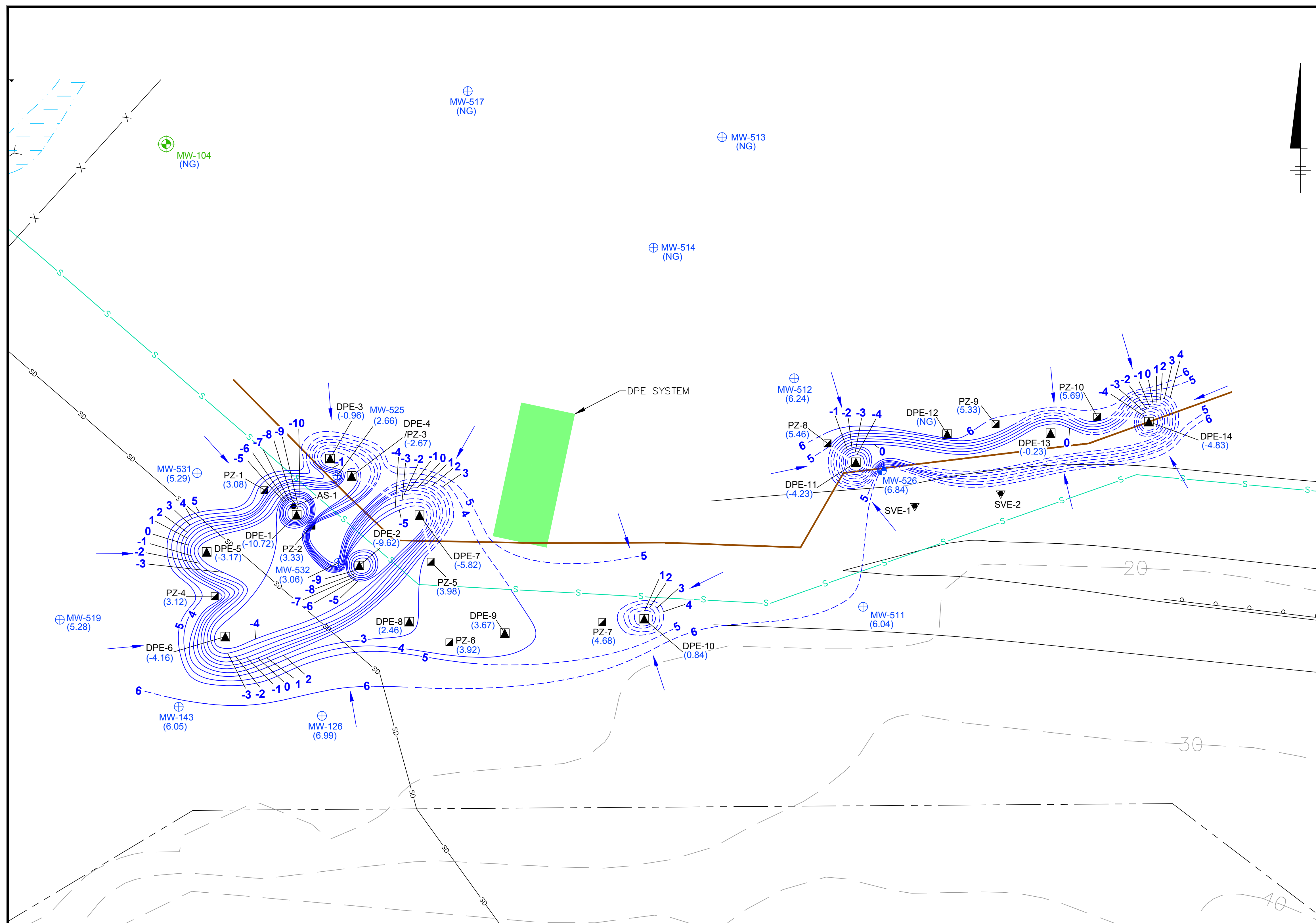
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
EDMONDS, WASHINGTON

**POTENTIOMETRIC SURFACE MAP
DECEMBER 5, 2017**

ARCADIS Design & Consultancy
for natural and built assets

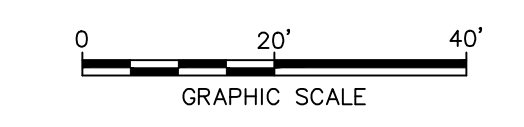
FIGURE
1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD, DB: R, OBERLANDER, LD, P, OBERLANDER, PIC:(Opt), FN:(Ref), TM:(Opt), LYR:(CON)*OFF=REF, D:\PROJECTS\33, Edmond Figures\Drawings\33-DECEMBER 13, 2017, X, LAYOUT: X, SAVER: 3/20/2018 1:51 PM, ACADVER: 20.05 (LMS TECH), PAGES: 1, PLOT: 3/20/2018 6:02 PM, BY: PAVANI KUMAR



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▣ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
 - (6.99) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 6 - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - INFERRED GROUNDWATER FLOW DIRECTION
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

- NOTES:**
1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
VERTICAL DATUM: N.A.V.D. '88
UNITS: U.S. SURVEY FEET
HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12	DPE-13	DPE-14
Status	On	On	On	On	On	On	On	On	On	On	On	Off	On	On

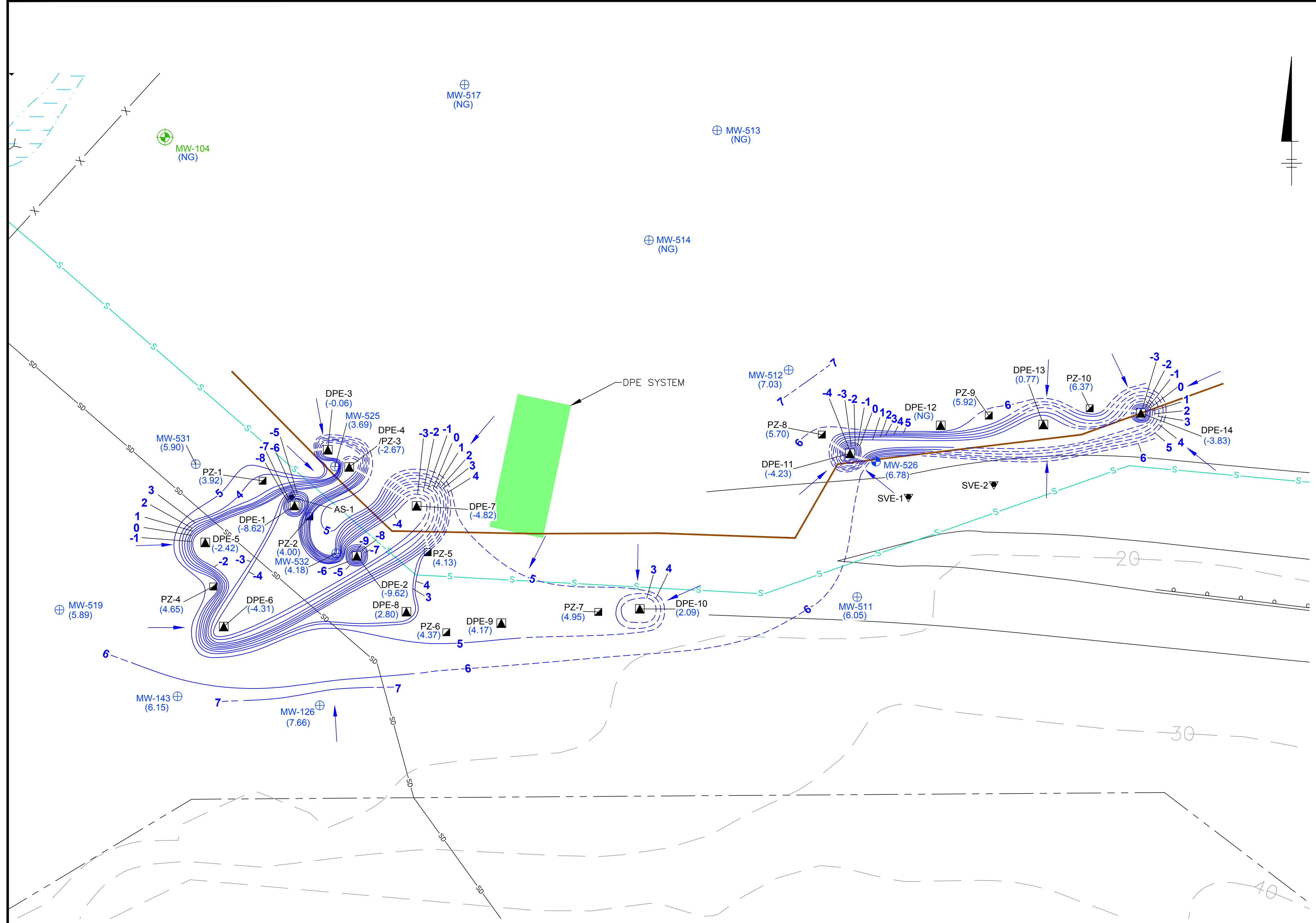
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
EDMONDS, WASHINGTON

**POTENTIOMETRIC SURFACE MAP
DECEMBER 13, 2017**

ARCADIS Design & Consultancy
for natural and built assets

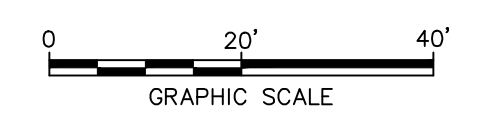
FIGURE
1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER, LD, P. OBERLANDER, PIC: (Opt) ENK (Reg'd) TM: (Opt) LYR: (Opt) OFF: (REF)
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 ANJANEYAKUMAR
 XREFS: IMAGES: PROJECTNAME: ---
 45362X03
 45362X02
 RECORD-INT-ACT-X-RECORDTOPO



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▣ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
(6.78) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 7--- POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - INFERRED GROUNDWATER FLOW DIRECTION
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

- NOTES:**
- 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 - HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
VERTICAL DATUM: N.A.V.D. '88
UNITS: U.S. SURVEY FEET
HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 - SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12	DPE-13	DPE-14
Status	On	On	On	On	On	On	On	On	On	On	Off	On	On	On

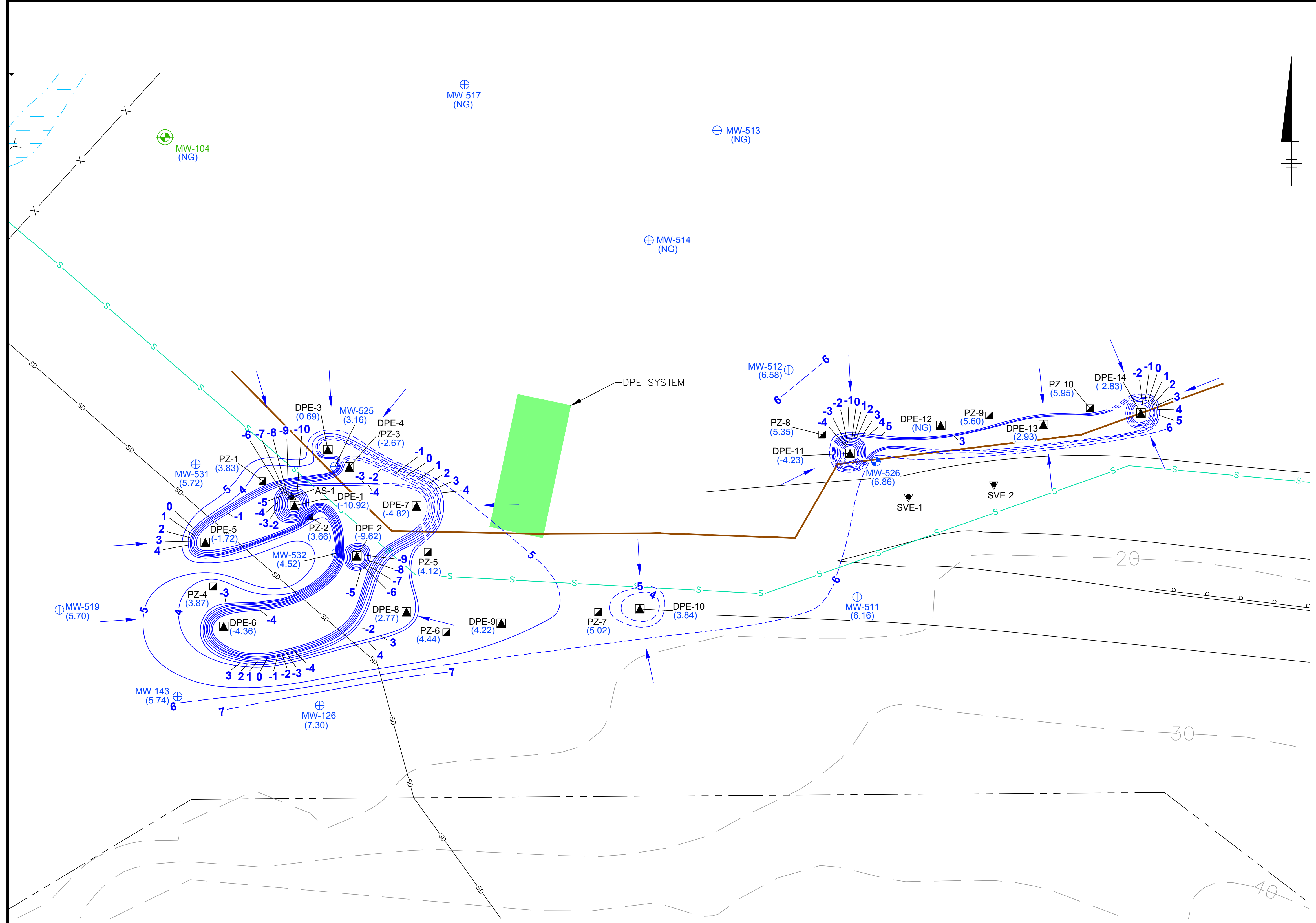
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

POTENTIOMETRIC SURFACE MAP
 DECEMBER 20, 2017

Design & Consultancy
 for natural and built assets

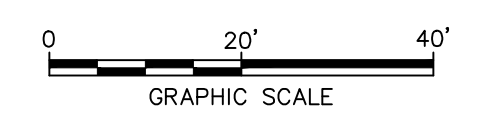
FIGURE 1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER, LD, P. OBERLANDER, PIC/OPD, TM/OPD, LYR/OPONS+OFF=REF-
 D:\PROJECTS\333 Edmond Figures\Drawings\DPEDB2 AS BUILT REPORT\45362D03-X-Jan-05.dwg LAYOUT: X SAVED: 3/12/2018 2:12 PM ACADVER: 21.05 (LMS TECH) PAGES: 1 OF 1 PLOT: 3/12/2018 6:16 PM BY: PAVAN KUMAR
 ANJANEYAKUMAR
 XREFS: IMAGES: PROJECTNAME: RECORD-INT-ACT-X-RECORDTOPO
 45362X03
 45362X02



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▣ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION (8.33) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 7 - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - INFERRED GROUNDWATER FLOW DIRECTION
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

- NOTES:**
1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
VERTICAL DATUM: N.A.V.D. '88
UNITS: U.S. SURVEY FEET
HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12	DPE-13	DPE-14
Status	On	On	On	On	On	On	On	On	On	On	Off	On	On	On

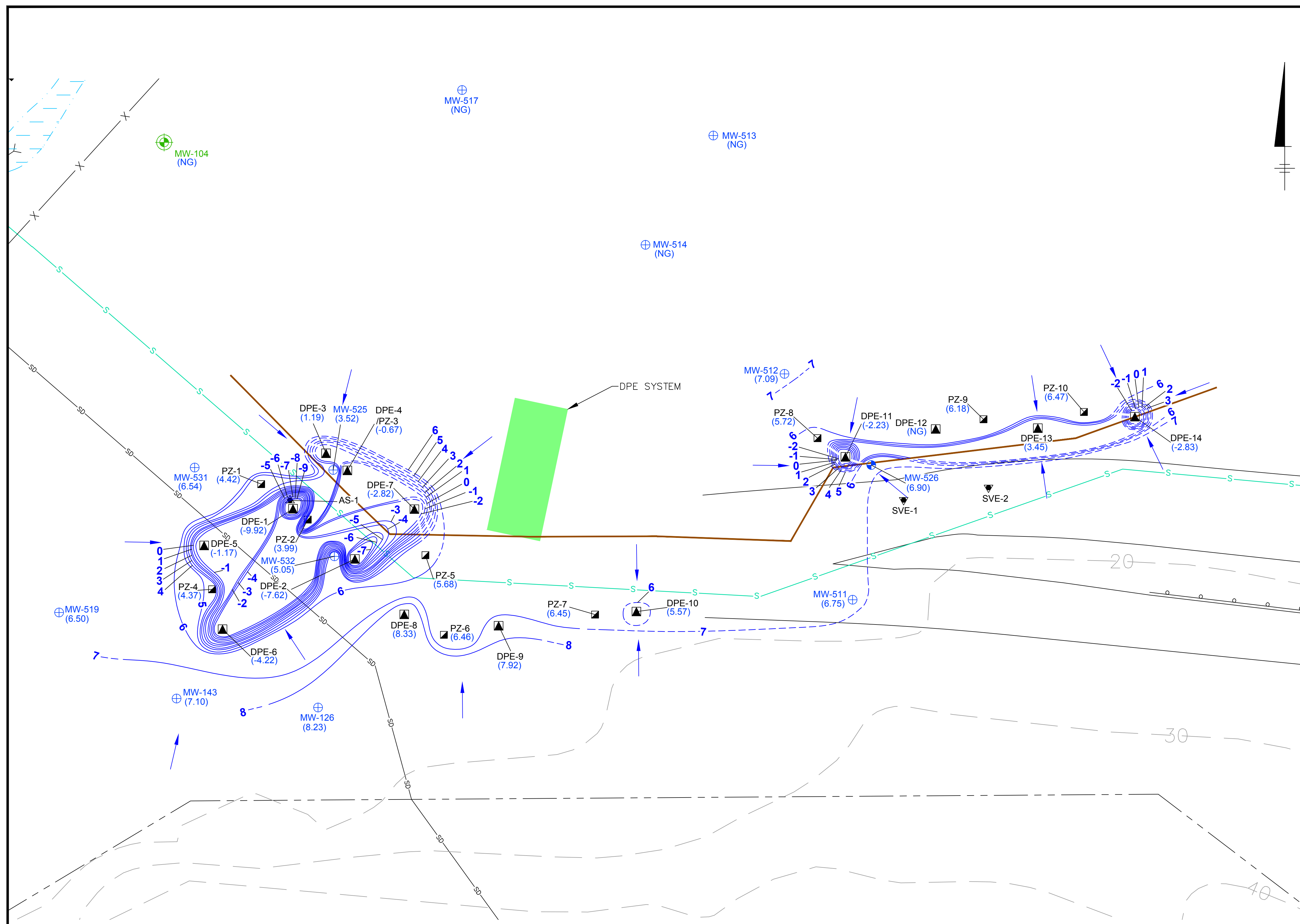
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

POTENTIOMETRIC SURFACE MAP
 JANUARY 5, 2018

Design & Consultancy
 for natural and built assets

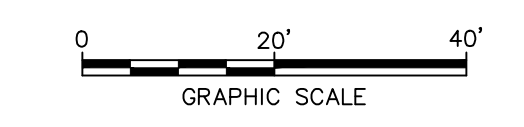
FIGURE
1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER, LD, P. OBERLANDER, PIC/OPD, TM/OPD, LYR/OPONS+OFF=REF*
 D:\PROJECTS\33 Edmond Figures\Drawings\PE\PE1DB2 AS BUILT REPORT\45362D03-X-Jan-18.dwg LAYOUT: X SAVED: 3/8/2018 2:13 PM ACADVER: 20.05 (LMS TECH) PAGES: 10 PLOT: 3/8/2018 5:58 PM BY: PAVAN KUMAR
 ANJANEYAKUMAR
 XREFS: IMAGES: PROJECTNAME: RECORD-INT-ACT-X-RECORDTOPO
 45362X03
 45362X02



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▣ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
 - (8.33) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 8 - - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - INFERRED GROUNDWATER FLOW DIRECTION
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

- NOTES:**
- 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 - HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
VERTICAL DATUM: N.A.V.D. '88
UNITS: U.S. SURVEY FEET
HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 - SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12	DPE-13	DPE-14
Status	On	On	On	On	On	On	On	Off	Off	On	On	Off	On	On

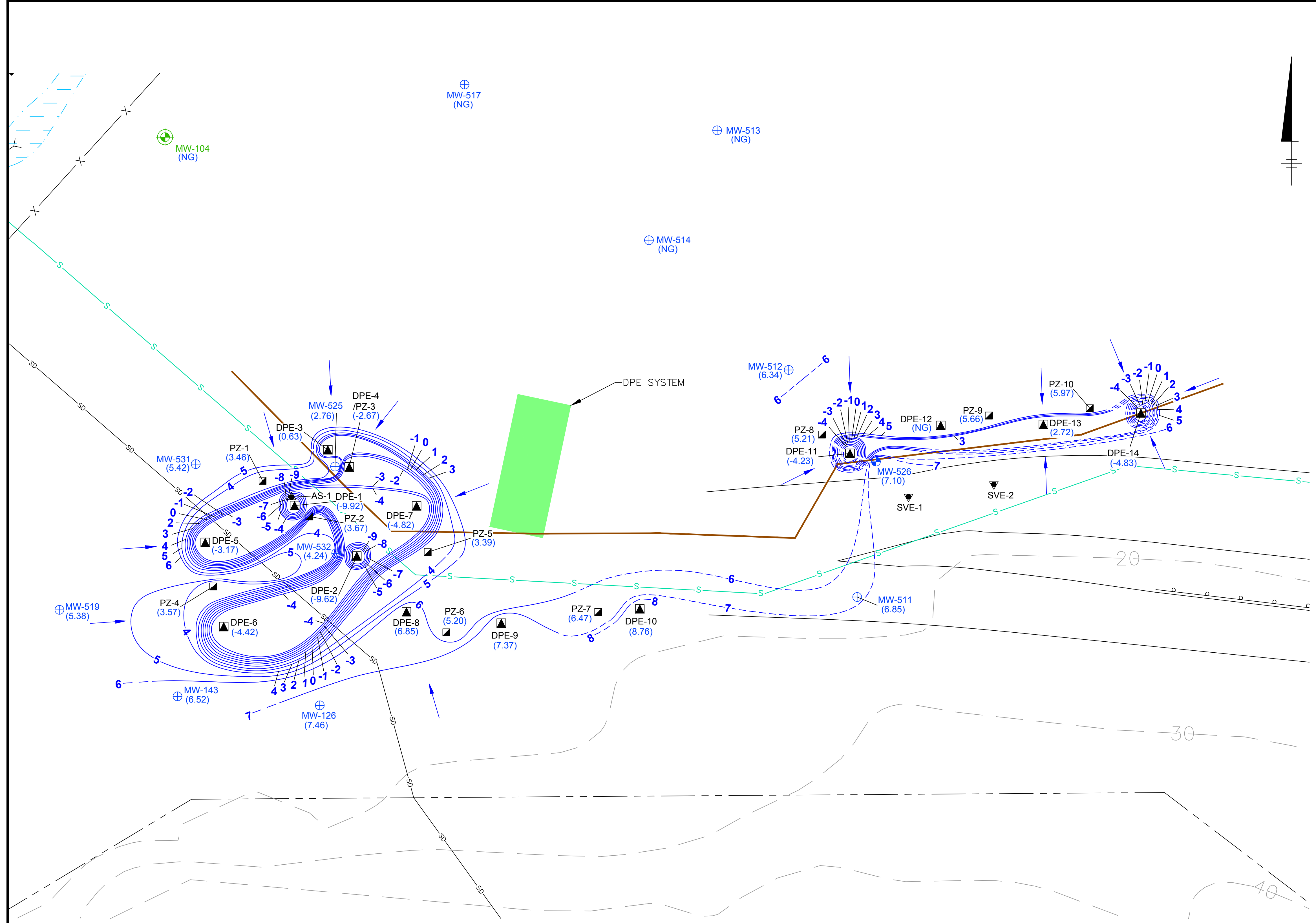
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

POTENTIOMETRIC SURFACE MAP
 JANUARY 18, 2018

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 built assets

FIGURE
1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: P. OBERLANDER LD: P. OBERLANDER PIC: (Opt) TM: (Opt) LY: (Opt) OFF: (REF)
 D:\PROJECTS\333 Edmond Figures\Drawings\PE\PE1DB2 AS BUILT REPORT\45362D03-X-Feb-20.dwg LAYOUT: X SAVED: 3/12/2018 6:18 PM ACADVER: 21.05 (LMS TECH) PAGES: 10 PLOTTED: 3/12/2018 6:29 PM BY: PAVAN KUMAR
 ANJANEYAKUMAR
 XREFS: IMAGES: PROJECTNAME: RECORD-INT-ACT-X-RECORDTOPO
 45362X03
 45362X02



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▣ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION (8.33) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 7 - - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - INFERRED GROUNDWATER FLOW DIRECTION
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

- NOTES:**
1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
VERTICAL DATUM: N.A.V.D. '88
UNITS: U.S. SURVEY FEET
HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.

DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12	DPE-13	DPE-14
Status	On	On	On	On	On	On	On	Off	Off	Off	On	Off	On	On

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

POTENTIOMETRIC SURFACE MAP
 FEBRUARY 20, 2018

Design & Consultancy
 for natural and built assets

FIGURE
1



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▣ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
 - (9.71) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 8 --- POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - ← INFERRED GROUNDWATER FLOW DIRECTION
 - (NG) NOT GAUGED
 - ▲ NOT CONSISTENT WITH HISTORICAL DATA
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
- NOTES:**
- 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 - HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
 VERTICAL DATUM: N.A.V.D. 88
 UNITS: U.S. SURVEY FEET
 HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 - SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.
 - SCREEN OF REMEDIATION WELLS DPE-11, DPE-12, DPE-13 AND DPE-14 IS INSTALLED BELOW THE 20-MIL POLYETHYLENE SHEETING.
- 0 20' 40'
 GRAPHIC SCALE

DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12	DPE-13	DPE-14
Status	On	On	On	On	On	On	Off	Off	Off	Off	Off	Off	Off	Off

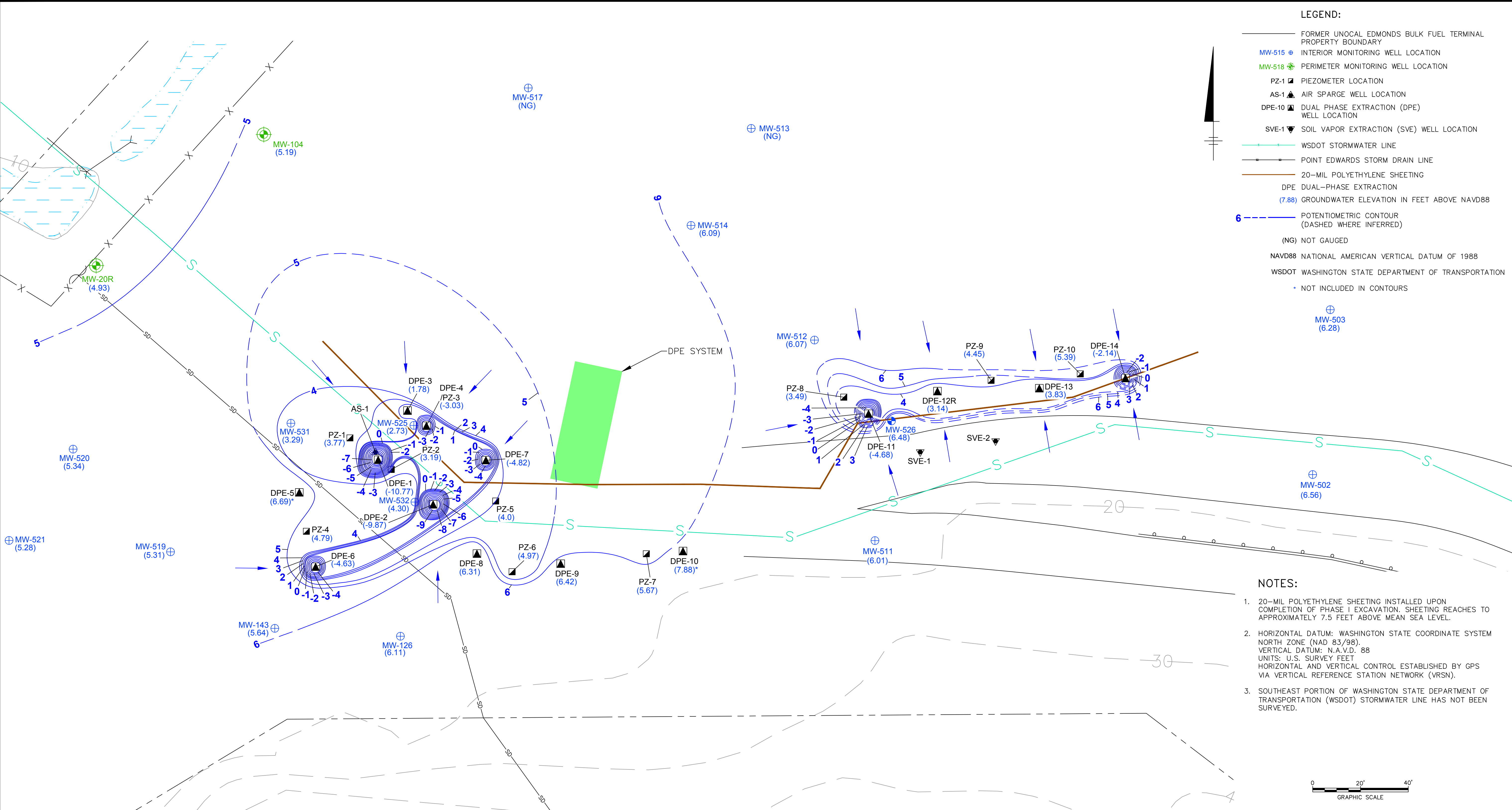
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

**POTENTIOMETRIC SURFACE MAP
 MARCH 8, 2018**

ARCADIS Design & Consultancy
 for natural and built assets

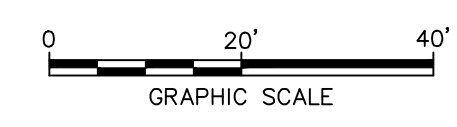
FIGURE
1

CITY: MINNEAPOLIS, MN DIV: GROUP: ENV/CAD DB: R. OBERLANDER LD: R. OBERLANDER TM: (Ref) Lyr: (On) ON= OFF= REF= C:\Users\PA01041\OneDrive - ARCADIS\BIM 360 Docs\CHEVRON CORPORATION\Edmonds-Public Review\Drawings\2018\B045362\001101-DWG\45362D03-X-May29.dwg LAYOUT: X SAVED: 6/13/2018 5:03 PM ACADVER: 21.05 (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ARCADIS-EDMONDS.CTB
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 XREFS: IMAGES: PROJECTNAME: ----
 45362X03
 45362X02
 RECORD-INT-ACT-X-RECORDTOPO



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▲ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
 - (7.88) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 6 - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
 - NOT INCLUDED IN CONTOURS

- NOTES:**
1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
 VERTICAL DATUM: N.A.V.D. 88
 UNITS: U.S. SURVEY FEET
 HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12R	DPE-13	DPE-14
Status	ON	ON	ON	ON	Off	ON	ON	Off	Off	Off	ON	ON	ON	ON

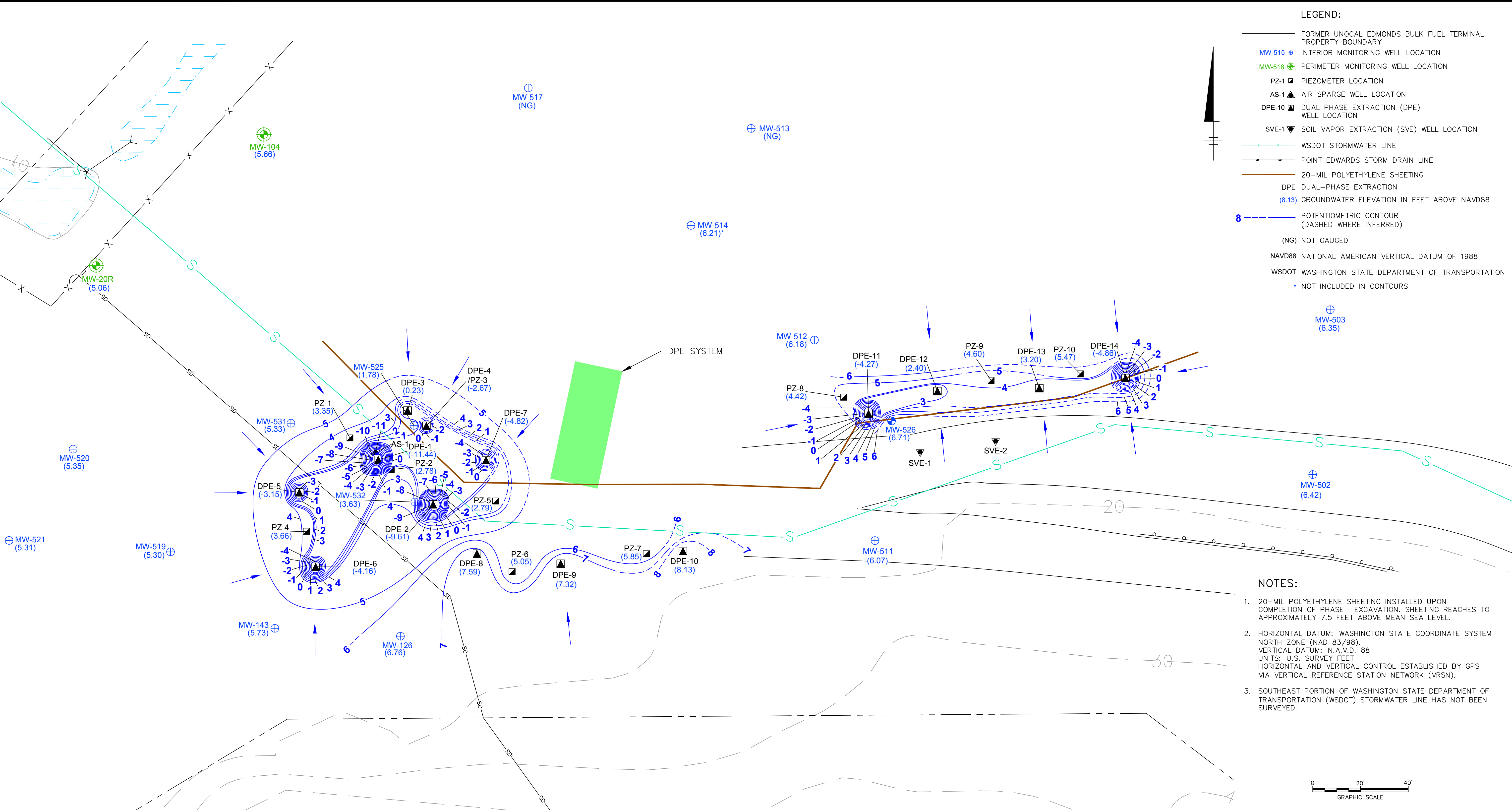
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

**POTENTIOMETRIC SURFACE MAP
 MAY 29, 2018**

ARCADIS Design & Consultancy
 for natural and built assets

FIGURE
1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER, LD: R. OBERLANDER, TM: (R) TM: (R) LYN: (C) ON: (N) OFF: (F) REF: C:\Users\PA01041\OneDrive - ARCADIS\BIM 360 Docs\CHEVRON\CORPORATION\Edmonds-Public Review\Drawn\20180604\562.001\101-DWG\45362003-X-1 June-18.dwg LAYOUT: X SAVER: 7/13/2018 4:39 PM ACADVER: 21.05 (LMS TECH) PAGES: 18 PLOTSTYLETABLE: ARCADIS\EDMONDS.CTB PLOTTED: 7/16/2018 12:30 PM BY: ANJANEYAKUMAR, PAVAN KUMAR XREFS: IMAGES: PROJECTNAME: RECORD-INT-ACT-X-RECORDTOPO 45362003 45362002



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▴ PIEZOMETER LOCATION
 - AS-1 ▴ AIR SPARGE WELL LOCATION
 - DPE-10 ▴ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▴ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
 - (8.13) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 8 --- POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
 - NOT INCLUDED IN CONTOURS

- NOTES:**
- 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 - HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98). VERTICAL DATUM: N.A.V.D. 88. UNITS: U.S. SURVEY FEET. HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 - SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.

DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12R	DPE-13	DPE-14
Status	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

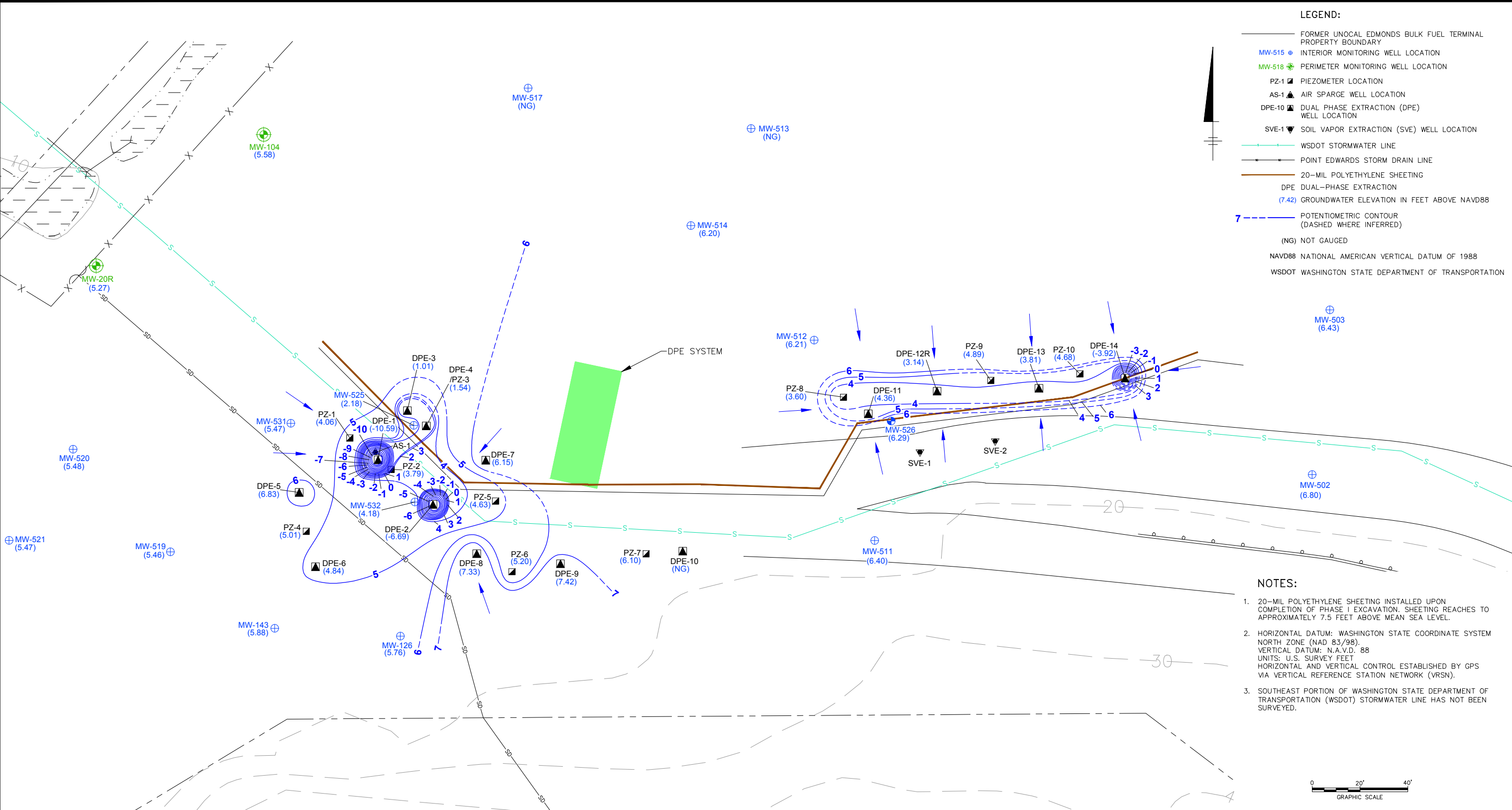
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

POTENTIOMETRIC SURFACE MAP
 JUNE 18, 2018

ARCADIS Design & Consultancy
 for natural and built assets

FIGURE
1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER, LD: R. OBERLANDER, PM: (Reed), Lyr: (Opt), Tm: (Reed), Pm: (Reed), Pic: (Opt), Pm: (Reed)
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CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

**POTENTIOMETRIC SURFACE MAP
 JULY 19, 2018**

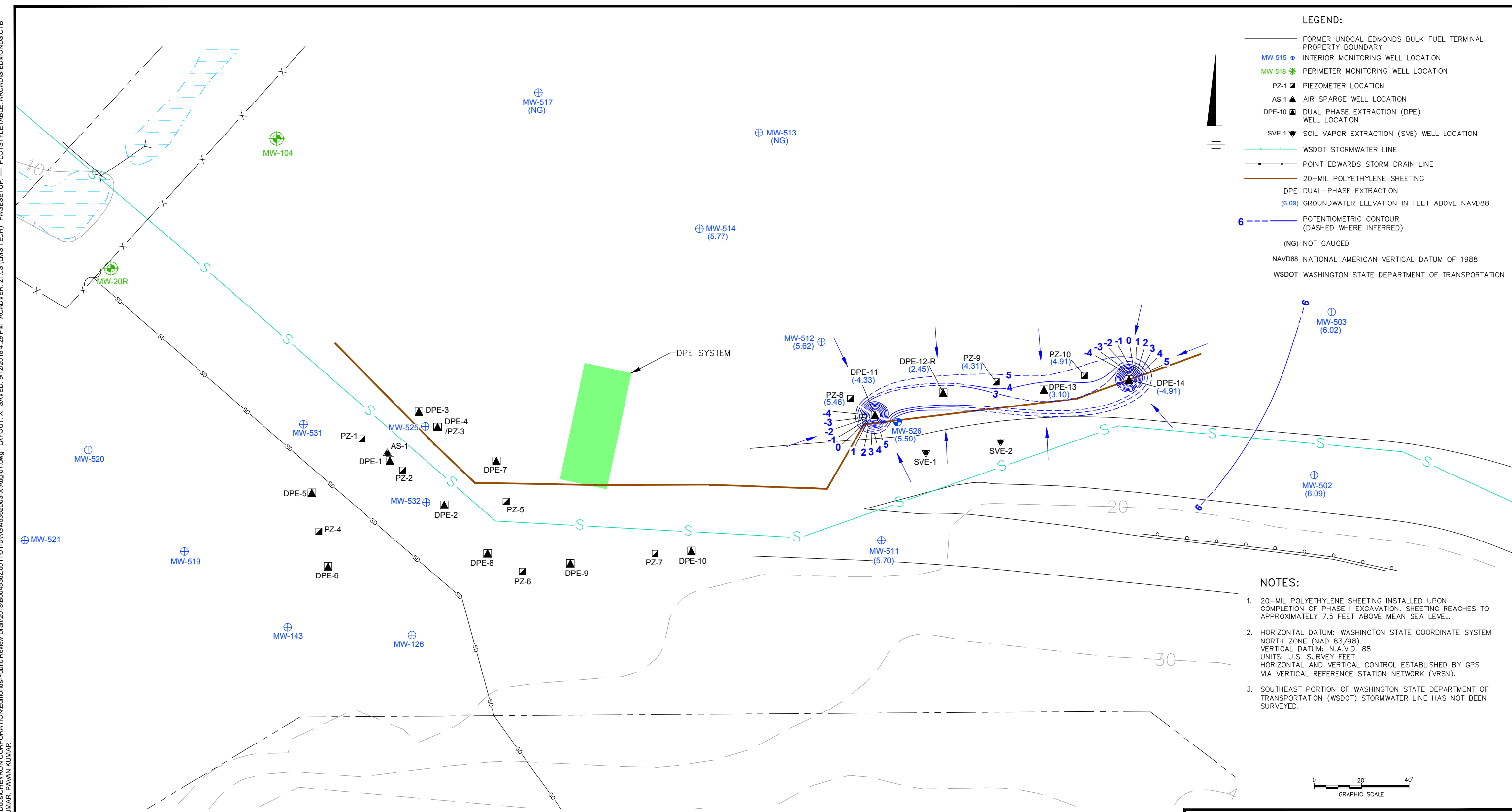
ARCADIS Design & Consultancy
 for natural and built assets

FIGURE
1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER LD: R. OBERLANDER LTR: (Opt) T.M. (Revt) P.M. (Revt) P.C. (Opt) P.M. (Revt) LTR: (Opt) ON="OFF" REF*
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 PLOTTED: 9/12/2018 4:30 PM BY: ANJANEYAKUMAR, PAVAN KUMAR
 XREFS: IMAGES: PROJECTNAME: RECORD-INT-ACT-X-RECORDTOPO

LEGEND:

- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
- MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
- MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
- PZ-1 ▴ PIEZOMETER LOCATION
- AS-1 ▴ AIR SPARGE WELL LOCATION
- DPE-10 ▴ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
- SVE-1 ▴ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
- WSDOT STORMWATER LINE
- POINT EDWARDS STORM DRAIN LINE
- 20-MIL POLYETHYLENE SHEETING
- DPE DUAL-PHASE EXTRACTION
- (6.09) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
- 6 --- POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
- (NG) NOT GAUGED
- NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
- WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION



- NOTES:**
1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
VERTICAL DATUM: N.A.V.D. 88
UNITS: U.S. SURVEY FEET
HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.

DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12R	DPE-13	DPE-14
Status	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	ON	ON	ON	ON

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
EDMONDS, WASHINGTON

POTENTIOMETRIC SURFACE MAP
AUGUST 7, 2018


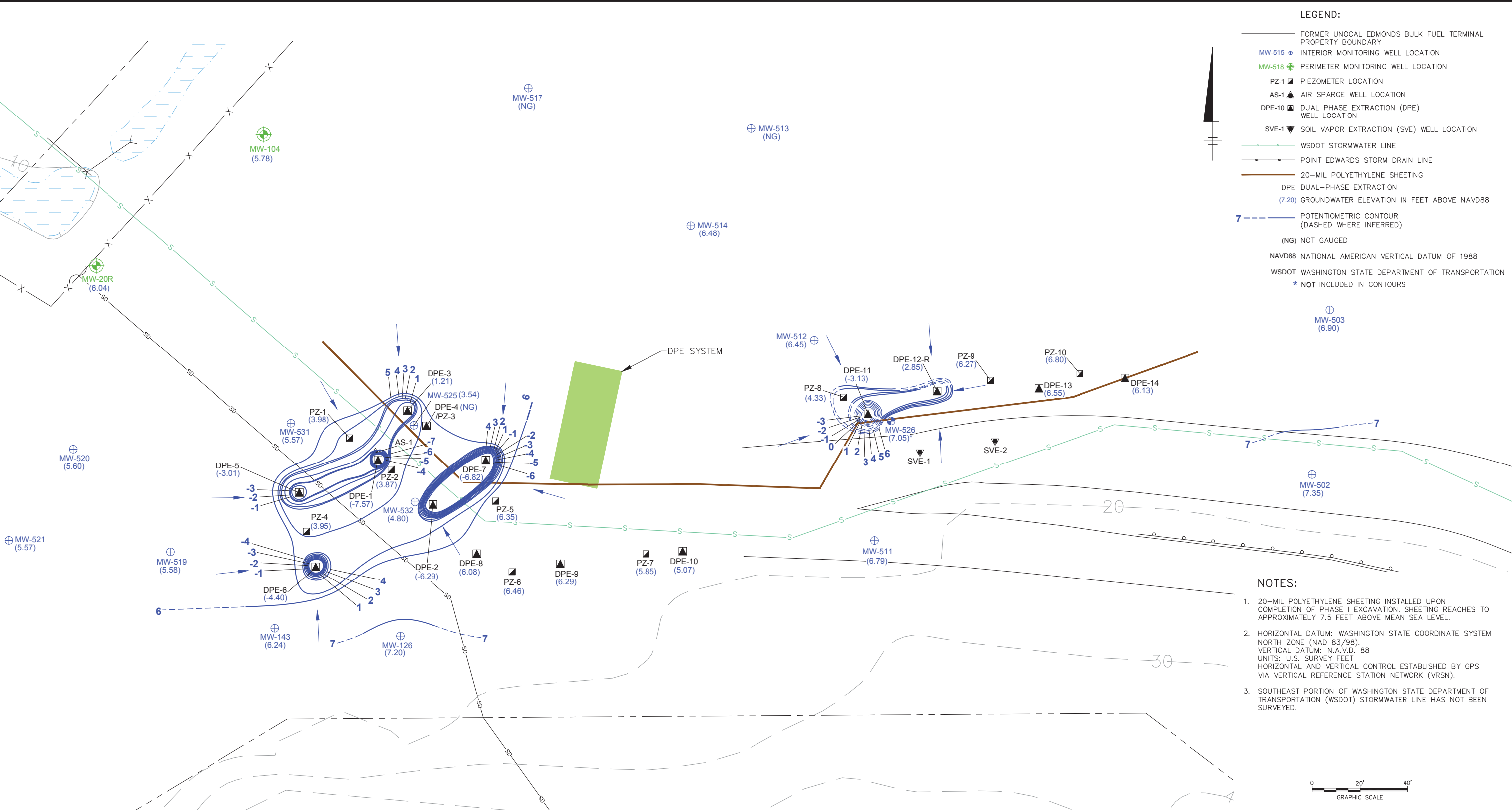

Design & Consultancy
for natural and built assets

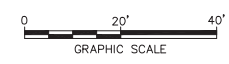
FIGURE **1**

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- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ⊕ INTERIOR MONITORING WELL LOCATION
 - MW-518 ⊕ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ▴ PIEZOMETER LOCATION
 - AS-1 ▴ AIR SPARGE WELL LOCATION
 - DPE-10 ▴ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▽ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
 - (7.20) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 7 - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
 - * NOT INCLUDED IN CONTOURS

- NOTES:**
1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
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 VERTICAL DATUM: N.A.V.D. 88
 UNITS: U.S. SURVEY FEET
 HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12R	DPE-13	DPE-14
Status	ON	ON	ON	OFF	ON	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF

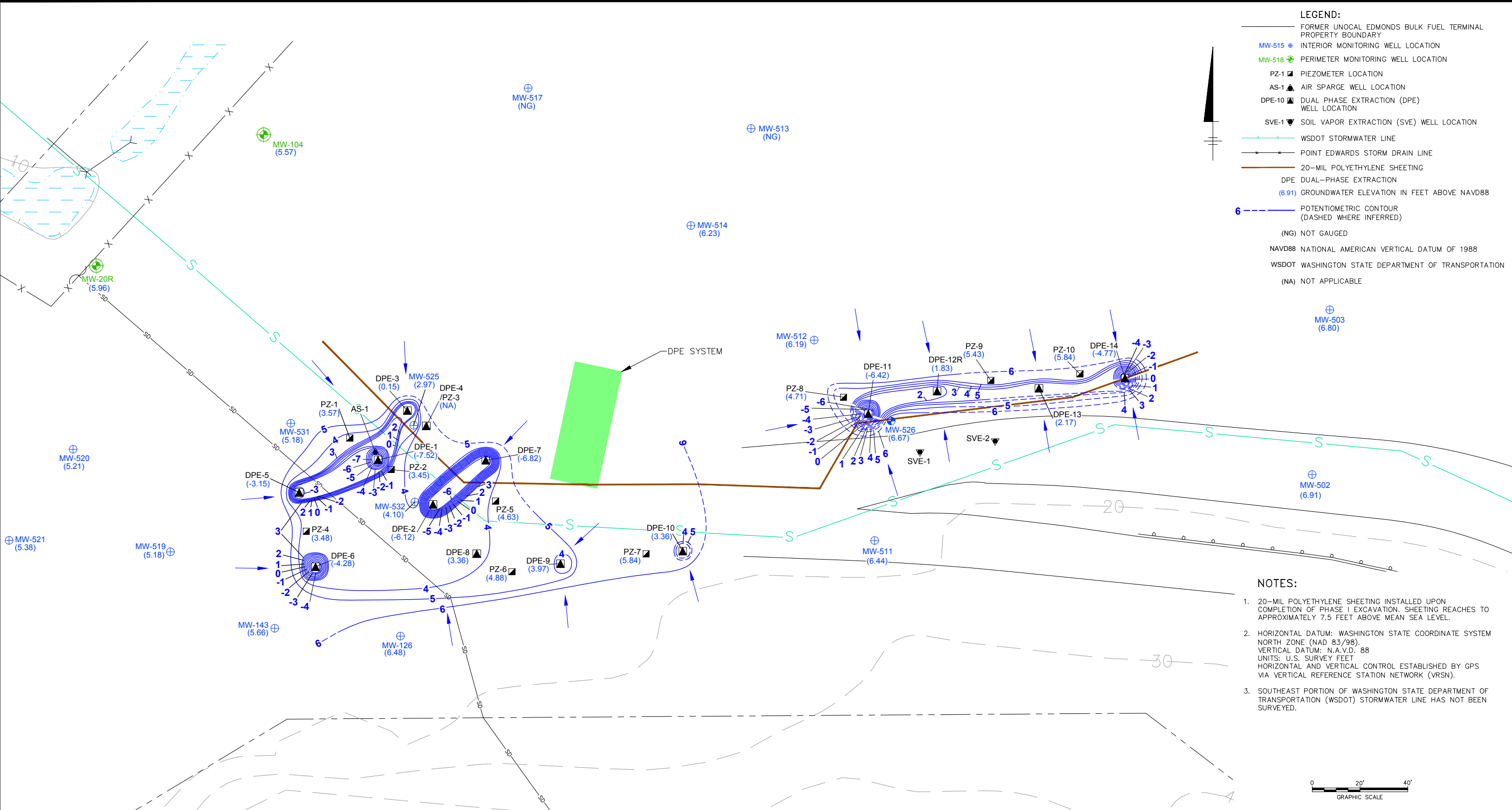
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

**POTENTIOMETRIC SURFACE MAP
 OCTOBER 26, 2018**

ARCADIS Design & Consultancy
 for natural and built assets

FIGURE
1

CITY: MINNEAPOLIS, MN DIV: GROUP: ENV/CAD DB: R. OBERLANDER, LD: R. OBERLANDER, PIC: (Opt) PM: (Revised) LYN: (Opt) LTR: (Opt) LTR: (Opt) OFF: (REF)
 C:\Users\PA01041\OneDrive - ARCADIS\BIM 360 Docs\CHEVRON CORPORATION\Edmonds-Public-Review\Drawings\101-DWG\ED03 GWM FIG-X-Nov-13.dwg LAYOUT: X. SAVED: 12/6/2018 11:29 AM ACADVER: 21.05 (LMS TECH) PAGES: 1. PLOTSTYLETABLE: ARCADIS-EDMONDS.CTB PLOTTED: 12/6/2018 2:12 PM BY: ANJANEYAKUMAR, PAVAN KUMAR



- LEGEND:**
- FORMER UNOCAL EDMONDS BULK FUEL TERMINAL PROPERTY BOUNDARY
 - MW-515 ◉ INTERIOR MONITORING WELL LOCATION
 - MW-518 ◉ PERIMETER MONITORING WELL LOCATION
 - PZ-1 ◼ PIEZOMETER LOCATION
 - AS-1 ▲ AIR SPARGE WELL LOCATION
 - DPE-10 ▲ DUAL PHASE EXTRACTION (DPE) WELL LOCATION
 - SVE-1 ▼ SOIL VAPOR EXTRACTION (SVE) WELL LOCATION
 - WSDOT STORMWATER LINE
 - POINT EDWARDS STORM DRAIN LINE
 - 20-MIL POLYETHYLENE SHEETING
 - DPE DUAL-PHASE EXTRACTION
 - (6.91) GROUNDWATER ELEVATION IN FEET ABOVE NAVD88
 - 6 - - - POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
 - (NG) NOT GAUGED
 - NAVD88 NATIONAL AMERICAN VERTICAL DATUM OF 1988
 - WSDOT WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
 - (NA) NOT APPLICABLE

- NOTES:**
1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
 2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
 VERTICAL DATUM: N.A.V.D. 88
 UNITS: U.S. SURVEY FEET
 HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
 3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.



DPE Well	DPE-1	DPE-2	DPE-3	DPE-4	DPE-5	DPE-6	DPE-7	DPE-8	DPE-9	DPE-10	DPE-11	DPE-12R	DPE-13	DPE-14
Status	ON	ON	ON	Off	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
 FORMER UNOCAL EDMONDS BULK FUEL TERMINAL
 EDMONDS, WASHINGTON

**POTENTIOMETRIC SURFACE MAP
 NOVEMBER 13, 2018**



APPENDIX H

DPE 12 Decommissioning Log and DPE 12-R Boring Log



RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT

Notice of Intent No. AE47095, RE15476

Construction/Decommission

Construction

Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

Resource Protection

Geotechnical Soil Boring

Consulting Firm Arcadis

Property Owner Chevron

Site Address 11720 Unoco Road

City Edmonds County Snohomish

Unique Ecology Well ID _____

Tag No. _____

Location 1/4 NW 1/4 NE Sec 26 TWN 27N R 3E or _____

Lat/Long (s,t,r still Required) Lat Deg n/a Lat Min/Sec n/a

Long Deg n/a Long Min/Sec n/a

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards

Materials used and the information reported above are true to my best knowledge and belief

Driller Trainee Name (Print) Kyle Ceruti

Driller/Trainee Signature _____

Driller/Trainee License No. 3200

Tax Parcel No. 27032600102400

Cased or Uncased Diameter 10'4" Static Level N/A

Work/Decommission Start Date 3-10-18

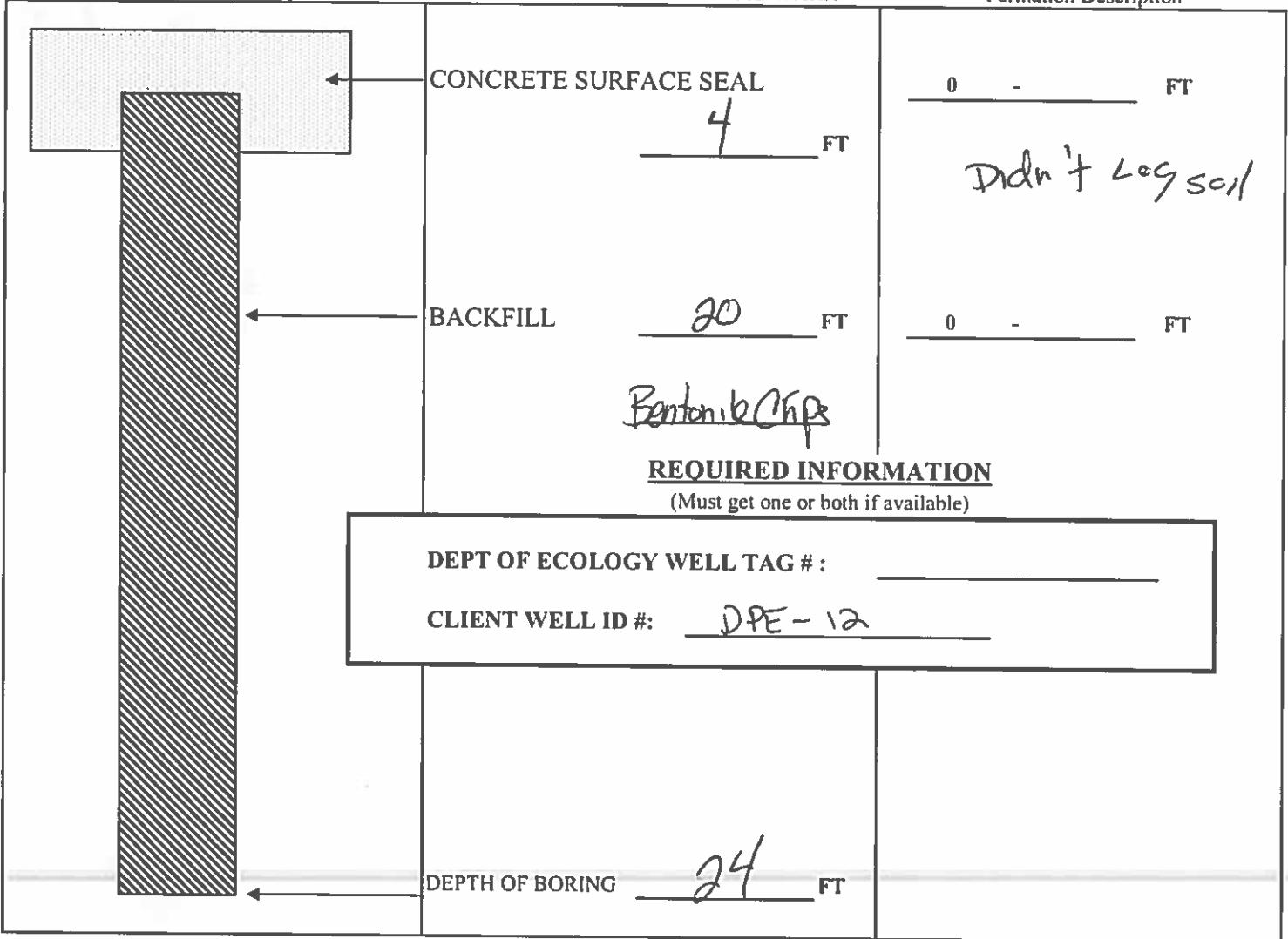
Work/Decommission Completed Date 3-27-18

If trainee, licensed drillers' Signature and License No. _____

Construction/Design

Well Data 103-WARR

Formation Description



REQUIRED INFORMATION

(Must get one or both if available)

DEPT OF ECOLOGY WELL TAG #: _____

CLIENT WELL ID #: DPE-12

Date Start-Finish: 3/22/18-3/22/18	Northing : NA	Well/Boring ID: DPE-12R
Drilling Company: Cascade Drilling	Easting: NA	Client: Chevron EMC
Driller's Name: Curtis Askew	Casing Elevation: NA	Location: 11720 Unoco Rd, Edmonds, WA. Former Unocal Edmonds Bulk Fuel Terminal.
Drilling Method: Hollow-stem Auger	Borehole Depth: 24.0 ft bgs.	Weather Conditions: 40° F Rain
Auger Size: 10 1/4"	Surface Elevation: NA	
Rig Type: NA	Descriptions By: Eric Krueger	
Sampling Method: Hand Auger		

DEPTH (ft.)	Sample Run Number	Sample/Int/Type	Recovery (%)	Blow Counts	N-Value	PID (ppm)	Analytical Sample	USGS Class	Geologic Column	Stratigraphic Description	Well/Boring Construction
0											<p>PCX Polymer Concrete Vault (24" x 37 7/8" x 26 1/4")</p> <p>10 1/4 inch diameter drilled hole</p> <p>Neat Cement</p> <p>4" Sch. 40 PVC Riser</p> <p>Hydrated Bentonite Pellets</p> <p>4" Sch. 40 PVC 0.020" Slotted Screen</p> <p>10x20 Colorado Silica Sand</p> <p>4" Sch. 40 PVC Sump</p>
1											
2											
3	HA	3-3.5	6	NA	NA	0.0	NA	SP	SP	SAND, poorly graded, fine grained; soft; moist; brown.	
4										At 4.5' bgs. Change to GRAVEL, small to medium sized; sub-rounded.	
5								GP	GP	At 5.0' bgs. Black liner encountered.	
6	HA	5.5-6	6	NA	NA	466.4	NA	SP	SP	SAND and GRAVEL, poorly graded, fine grained sand; small to medium sized, subrounded gravel; soft; moist; brown; HCLO.	
7											
8											
9										Boring cleared to 8.0 ft bgs via air knife and vacuum techniques.	
10										No samples taken from 8.0-24.0' bgs- Wood plug inserted into lead auger to combat heaving sands.	
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25										End of Boring at 24.0 ft bgs.	

<p>Design & Consultancy for natural and built assets</p>	REMARKS: 'ft=Feet "=Inch bgs=Below ground surface NA=Not Applicable/Available ppm=Parts per million = Groundwater level	°F=Degrees Fahrenheit HA=Hand Auger HCLO=Hydrocarbon like odor PVC=Polyvinyl Chloride PID=Photoionization detector
--	---	--

APPENDIX I

Outfall #002 Laboratory Analytical Results and Chain of Custody Documentation



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-73288-2

Client Project/Site: Edmonds Terminal
Revision: 3

For:

ARCADIS U.S. Inc
194 Seven Farms Drive
Suite F
Charleston, South Carolina 29492

Attn: Peter Campbell



Authorized for release by:
3/29/2018 3:06:16 PM

Kim Presley, Project Management Assistant I
(253)922-2310

kim.presley@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

Review your project
results through
Total Access

Have a Question?



Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11



Table of Contents

Cover Page	1
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Definitions	5
Client Sample Results	6
QC Sample Results	9
Chronicle	15
Certification Summary	16
Sample Summary	17
Chain of Custody	18
Receipt Checklists	19

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Job ID: 580-73288-2

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE Client: ARCADIS U.S. Inc Project: Edmonds Terminal Report Number: 580-73288-2

REVISION 3: March 29, 2018

revised to include MB/LCS/LCSD for all methods.

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Three samples were received on 12/1/2017 1:00 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.9° C and 4.7° C.

The chain of custody lists the time 1210 for the matrix spike/matrix spike duplicate entry for sample Outfall 002 but time 1200 for parent. Logging in with parent's time. Outfall 002 (580-73288-7[MSJ]) and Outfall 002 (580-73288-7[MSD]).

The chain of custody requests a 24 hour turn-around-time (TAT) for the following sample but as requested by the project manager, all samples are logged in on a 5 day TAT due to capacity in the laboratory. Outfall 002 (580-73288-7), Outfall 002 (580-73288-7[MSJ]) and Outfall 002 (580-73288-7[MSD]).

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample Outfall 002 (580-73288-7), DUP-1 (580-73288-8) and Trip Blank (580-73288-9) were analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 12/04/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)

Samples Outfall 002 (580-73288-7) and DUP-1 (580-73288-8) were analyzed for polycyclic aromatic hydrocarbons (PAHs) in accordance with EPA SW-846 Method 8270C SIM. The samples were prepared on 12/04/2017 and analyzed on 12/07/2017.

Benzo[a]anthracene was detected in method blank MB 580-262722/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples were not performed.

Benzo[a]anthracene and Benzo[a]pyrene failed the recovery criteria low for the MSD of sample Outfall 002MSD (580-73288-7) in batch

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Job ID: 580-73288-2 (Continued)

Laboratory: TestAmerica Seattle (Continued)

580-262954. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

The following samples were diluted due to dark extract color, typically indicative of matrix interference: Outfall 002 (580-73288-7), Outfall 002 (580-73288-7[MS]) and Outfall 002 (580-73288-7[MSD]). Elevated reporting limits (RL) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GASOLINE RANGE ORGANICS (GRO)

Sample Outfall 002 (580-73288-7), DUP-1 (580-73288-8) and Trip Blank (580-73288-9) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 12/05/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DIESEL AND MOTOR OIL RANGE ORGANICS

Sample Outfall 002 (580-73288-7) and DUP-1 (580-73288-8) were analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared on 12/04/2017 and analyzed on 12/05/2017.

Motor Oil (>C24-C36) exceeded the RPD limit for the MSD of sample Outfall 002MSD (580-73288-7) in batch 580-262795. The percent recoveries met acceptance limit and the LCS/LCSD was in control.

The following sample contained a hydrocarbon pattern in the diesel range; however, the elution pattern was earlier than the typical diesel fuel pattern used by the laboratory for quantitative purposes: GWSP-101 (580-73288-1).

Continuing calibration verification (CCV) standard associated with batch 580-262795 recovered outside %Drift acceptance criteria for o-Terphenyl surrogate. The %Recovery is within acceptance criteria for the surrogate in the CCV and associated samples; therefore, the data are qualified and reported. Outfall 002 (580-73288-7), Outfall 002 (580-73288-7[MS]), Outfall 002 (580-73288-7[MSD]), DUP-1 (580-73288-8), (CCV 580-262795/23), (CCVRT 580-262795/4), (LCS 580-262751/2-B), (LCSD 580-262751/3-B) and (MB 580-262751/1-B).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F1	MS and/or MSD Recovery is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F2	MS/MSD RPD exceeds control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Client Sample ID: Outfall 002

Lab Sample ID: 580-73288-7

Date Collected: 12/01/17 12:00

Matrix: Water

Date Received: 12/01/17 13:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/04/17 20:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					12/04/17 20:03	1
Toluene-d8 (Surr)	97		79 - 122					12/04/17 20:03	1
4-Bromofluorobenzene (Surr)	91		78 - 119					12/04/17 20:03	1
Dibromofluoromethane (Surr)	104		70 - 120					12/04/17 20:03	1
1,2-Dichloroethane-d4 (Surr)	114		70 - 120					12/04/17 20:03	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0067	J B F1	0.020	0.0020	ug/L		12/04/17 09:07	12/07/17 03:23	1
Chrysene	ND		0.020	0.0060	ug/L		12/04/17 09:07	12/07/17 03:23	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		12/04/17 09:07	12/07/17 03:23	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		12/04/17 09:07	12/07/17 03:23	1
Benzo[a]pyrene	ND	F1	0.020	0.0030	ug/L		12/04/17 09:07	12/07/17 03:23	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		12/04/17 09:07	12/07/17 03:23	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		12/04/17 09:07	12/07/17 03:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	70		53 - 112				12/04/17 09:07	12/07/17 03:23	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/05/17 19:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/05/17 19:52	1
Trifluorotoluene (Surr)	108		77 - 128					12/05/17 19:52	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.024	J	0.10	0.019	mg/L		12/04/17 14:02	12/05/17 18:44	1
Motor Oil (>C24-C36)	ND	F2	0.25	0.078	mg/L		12/04/17 14:02	12/05/17 18:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	63		50 - 150				12/04/17 14:02	12/05/17 18:44	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Client Sample ID: DUP-1
Date Collected: 12/01/17 00:01
Date Received: 12/01/17 13:00

Lab Sample ID: 580-73288-8
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/04/17 21:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123					12/04/17 21:17	1
Toluene-d8 (Surr)	98		79 - 122					12/04/17 21:17	1
4-Bromofluorobenzene (Surr)	83		78 - 119					12/04/17 21:17	1
Dibromofluoromethane (Surr)	104		70 - 120					12/04/17 21:17	1
1,2-Dichloroethane-d4 (Surr)	114		70 - 120					12/04/17 21:17	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0086	J B	0.020	0.0020	ug/L		12/04/17 09:07	12/07/17 04:29	1
Chrysene	ND		0.020	0.0061	ug/L		12/04/17 09:07	12/07/17 04:29	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		12/04/17 09:07	12/07/17 04:29	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		12/04/17 09:07	12/07/17 04:29	1
Benzo[a]pyrene	0.0058	J	0.020	0.0030	ug/L		12/04/17 09:07	12/07/17 04:29	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		12/04/17 09:07	12/07/17 04:29	1
Dibenz(a,h)anthracene	0.0055	J	0.020	0.0020	ug/L		12/04/17 09:07	12/07/17 04:29	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	61		53 - 112				12/04/17 09:07	12/07/17 04:29	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/05/17 22:31	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/05/17 22:31	1
Trifluorotoluene (Surr)	106		77 - 128					12/05/17 22:31	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.027	J	0.10	0.019	mg/L		12/04/17 14:02	12/05/17 20:12	1
Motor Oil (>C24-C36)	ND		0.25	0.078	mg/L		12/04/17 14:02	12/05/17 20:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	72		50 - 150				12/04/17 14:02	12/05/17 20:12	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Client Sample ID: Trip Blank

Lab Sample ID: 580-73288-9

Date Collected: 12/01/17 00:01

Matrix: Water

Date Received: 12/01/17 13:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/04/17 16:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	99		74 - 123					12/04/17 16:19	1
<i>Toluene-d8 (Surr)</i>	98		79 - 122					12/04/17 16:19	1
<i>4-Bromofluorobenzene (Surr)</i>	89		78 - 119					12/04/17 16:19	1
<i>Dibromofluoromethane (Surr)</i>	104		70 - 120					12/04/17 16:19	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	112		70 - 120					12/04/17 16:19	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/05/17 16:40	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	93		58 - 133					12/05/17 16:40	1
<i>Trifluorotoluene (Surr)</i>	107		77 - 128					12/05/17 16:40	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-262747/5

Matrix: Water

Analysis Batch: 262747

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/04/17 15:05	1

Surrogate	%Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	95		74 - 123		12/04/17 15:05	1
Toluene-d8 (Surr)	96		79 - 122		12/04/17 15:05	1
4-Bromofluorobenzene (Surr)	107		78 - 119		12/04/17 15:05	1
Dibromofluoromethane (Surr)	105		70 - 120		12/04/17 15:05	1
1,2-Dichloroethane-d4 (Surr)	109		70 - 120		12/04/17 15:05	1

Lab Sample ID: LCS 580-262747/6

Matrix: Water

Analysis Batch: 262747

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	11.8		ug/L		118	37 - 151

Surrogate	%Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	96		74 - 123
Toluene-d8 (Surr)	94		79 - 122
4-Bromofluorobenzene (Surr)	94		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	109		70 - 120

Lab Sample ID: 580-73288-7 MS

Matrix: Water

Analysis Batch: 262747

Client Sample ID: Outfall 002

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	ND		10.0	12.1		ug/L		121	37 - 151

Surrogate	%Recovery	MS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	97		79 - 122
4-Bromofluorobenzene (Surr)	93		78 - 119
Dibromofluoromethane (Surr)	104		70 - 120
1,2-Dichloroethane-d4 (Surr)	111		70 - 120

Lab Sample ID: 580-73288-7 MSD

Matrix: Water

Analysis Batch: 262747

Client Sample ID: Outfall 002

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	ND		10.0	12.1		ug/L		121	37 - 151	0	30

Surrogate	%Recovery	MSD Qualifier	Limits
Trifluorotoluene (Surr)	98		74 - 123
Toluene-d8 (Surr)	96		79 - 122

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-73288-7 MSD
Matrix: Water
Analysis Batch: 262747

Client Sample ID: Outfall 002
Prep Type: Total/NA

Surrogate	MSD %Recovery	MSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	92		78 - 119
Dibromofluoromethane (Surr)	104		70 - 120
1,2-Dichloroethane-d4 (Surr)	109		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-262722/1-A
Matrix: Water
Analysis Batch: 262767

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 262722

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00551	J	0.020	0.0020	ug/L		12/04/17 09:07	12/04/17 15:21	1
Chrysene	ND		0.020	0.0060	ug/L		12/04/17 09:07	12/04/17 15:21	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		12/04/17 09:07	12/04/17 15:21	1
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		12/04/17 09:07	12/04/17 15:21	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		12/04/17 09:07	12/04/17 15:21	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		12/04/17 09:07	12/04/17 15:21	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		12/04/17 09:07	12/04/17 15:21	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	71		53 - 112	12/04/17 09:07	12/04/17 15:21	1

Lab Sample ID: LCS 580-262722/2-A
Matrix: Water
Analysis Batch: 262767

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 262722

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	4.00	3.20		ug/L		80	71 - 120
Chrysene	4.00	3.37		ug/L		84	64 - 120
Benzo[b]fluoranthene	4.00	3.46		ug/L		87	66 - 120
Benzo[k]fluoranthene	4.00	3.45		ug/L		86	68 - 120
Benzo[a]pyrene	4.00	3.57		ug/L		89	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	3.43		ug/L		86	63 - 120
Dibenz(a,h)anthracene	4.00	3.55		ug/L		89	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	69		53 - 112

Lab Sample ID: LCSD 580-262722/3-A
Matrix: Water
Analysis Batch: 262767

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 262722

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.35		ug/L		84	71 - 120	4	16
Chrysene	4.00	3.57		ug/L		89	64 - 120	6	16
Benzo[b]fluoranthene	4.00	3.54		ug/L		89	66 - 120	2	20
Benzo[k]fluoranthene	4.00	3.70		ug/L		92	68 - 120	7	20

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: LCSD 580-262722/3-A

Matrix: Water

Analysis Batch: 262767

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 262722

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]pyrene	4.00	3.68		ug/L		92	76 - 120	3	17
Indeno[1,2,3-cd]pyrene	4.00	3.62		ug/L		91	63 - 120	5	15
Dibenz(a,h)anthracene	4.00	3.80		ug/L		95	60 - 125	7	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	70		53 - 112

Lab Sample ID: 580-73288-7 MS

Matrix: Water

Analysis Batch: 262954

Client Sample ID: Outfall 002

Prep Type: Total/NA

Prep Batch: 262722

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	0.0067	J B F1	4.04	2.96		ug/L		73	71 - 120		
Chrysene	ND		4.04	3.16		ug/L		78	64 - 120		
Benzo[b]fluoranthene	ND		4.04	2.99		ug/L		74	66 - 120		
Benzo[k]fluoranthene	ND		4.04	3.13		ug/L		77	68 - 120		
Benzo[a]pyrene	ND	F1	4.04	3.21		ug/L		80	76 - 120		
Indeno[1,2,3-cd]pyrene	ND		4.04	2.98		ug/L		74	63 - 120		
Dibenz(a,h)anthracene	ND		4.04	3.12		ug/L		77	60 - 125		

Surrogate	MS %Recovery	MS Qualifier	Limits
Terphenyl-d14	64		53 - 112

Lab Sample ID: 580-73288-7 MSD

Matrix: Water

Analysis Batch: 262954

Client Sample ID: Outfall 002

Prep Type: Total/NA

Prep Batch: 262722

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	0.0067	J B F1	4.02	2.75	F1	ug/L		68	71 - 120	7	16
Chrysene	ND		4.02	2.99		ug/L		74	64 - 120	6	16
Benzo[b]fluoranthene	ND		4.02	2.69		ug/L		67	66 - 120	11	20
Benzo[k]fluoranthene	ND		4.02	2.85		ug/L		71	68 - 120	9	20
Benzo[a]pyrene	ND	F1	4.02	2.88	F1	ug/L		72	76 - 120	11	17
Indeno[1,2,3-cd]pyrene	ND		4.02	2.71		ug/L		67	63 - 120	10	15
Dibenz(a,h)anthracene	ND		4.02	2.85		ug/L		71	60 - 125	9	15

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Terphenyl-d14	61		53 - 112

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-262841/5

Matrix: Water

Analysis Batch: 262841

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/05/17 15:05	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: MB 580-262841/5
Matrix: Water
Analysis Batch: 262841

Client Sample ID: Method Blank
Prep Type: Total/NA

Surrogate	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
4-Bromofluorobenzene (Surr)	91		58 - 133		12/05/17 15:05	1
Trifluorotoluene (Surr)	97		77 - 128		12/05/17 15:05	1

Lab Sample ID: LCS 580-262841/6
Matrix: Water
Analysis Batch: 262841

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.908		mg/L		91	79 - 110

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	100		58 - 133
Trifluorotoluene (Surr)	97		77 - 128

Lab Sample ID: LCSD 580-262841/7
Matrix: Water
Analysis Batch: 262841

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.968		mg/L		97	79 - 110	6	10

Surrogate	LCSD LCSD		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	99		58 - 133
Trifluorotoluene (Surr)	105		77 - 128

Lab Sample ID: 580-73288-7 MS
Matrix: Water
Analysis Batch: 262841

Client Sample ID: Outfall 002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	ND		1.00	0.885		mg/L		89	79 - 110

Surrogate	MS MS		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	98		58 - 133
Trifluorotoluene (Surr)	108		77 - 128

Lab Sample ID: 580-73288-7 MSD
Matrix: Water
Analysis Batch: 262841

Client Sample ID: Outfall 002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	ND		1.00	0.952		mg/L		95	79 - 110	7	10

Surrogate	MSD MSD		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	100		58 - 133
Trifluorotoluene (Surr)	107		77 - 128

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-262751/1-B
Matrix: Water
Analysis Batch: 262795

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 262751

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		12/04/17 14:02	12/05/17 15:27	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		12/04/17 14:02	12/05/17 15:27	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	83		50 - 150	12/04/17 14:02	12/05/17 15:27	1

Lab Sample ID: LCS 580-262751/2-B
Matrix: Water
Analysis Batch: 262795

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 262751

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
#2 Diesel (C10-C24)	2.00	1.78		mg/L		89	59 - 112
Motor Oil (>C24-C36)	2.00	2.14		mg/L		107	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	82		50 - 150

Lab Sample ID: LCSD 580-262751/3-B
Matrix: Water
Analysis Batch: 262795

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 262751

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.71		mg/L		86	59 - 112	4	16
Motor Oil (>C24-C36)	2.00	2.08		mg/L		104	64 - 120	3	17

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	82		50 - 150

Lab Sample ID: 580-73288-7 MS
Matrix: Water
Analysis Batch: 262795

Client Sample ID: Outfall 002
Prep Type: Total/NA
Prep Batch: 262751

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
#2 Diesel (C10-C24)	0.024	J	2.03	1.45		mg/L		70	59 - 112
Motor Oil (>C24-C36)	ND	F2	2.03	1.85		mg/L		91	64 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
<i>o</i> -Terphenyl	66		50 - 150

Lab Sample ID: 580-73288-7 MSD
Matrix: Water
Analysis Batch: 262795

Client Sample ID: Outfall 002
Prep Type: Total/NA
Prep Batch: 262751

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	0.024	J	2.02	1.24		mg/L		60	59 - 112	16	16
Motor Oil (>C24-C36)	ND	F2	2.02	1.50	F2	mg/L		74	64 - 120	21	17

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: 580-73288-7 MSD

Matrix: Water

Analysis Batch: 262795

Client Sample ID: Outfall 002

Prep Type: Total/NA

Prep Batch: 262751

<i>Surrogate</i>	<i>MSD</i> <i>%Recovery</i>	<i>MSD</i> <i>Qualifier</i>	<i>Limits</i>
<i>o-Terphenyl</i>	59		50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Client Sample ID: Outfall 002

Date Collected: 12/01/17 12:00

Date Received: 12/01/17 13:00

Lab Sample ID: 580-73288-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	262747	12/04/17 20:03	P1P	TAL SEA
Total/NA	Prep	3510C			262722	12/04/17 09:07	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		1	262954	12/07/17 03:23	ERB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	262841	12/05/17 19:52	JCV	TAL SEA
Total/NA	Prep	3510C			262751	12/04/17 14:02	NDB	TAL SEA
Total/NA	Cleanup	3630C			262781	12/04/17 18:07	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	262795	12/05/17 18:44	ADB	TAL SEA

Client Sample ID: DUP-1

Date Collected: 12/01/17 00:01

Date Received: 12/01/17 13:00

Lab Sample ID: 580-73288-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	262747	12/04/17 21:17	P1P	TAL SEA
Total/NA	Prep	3510C			262722	12/04/17 09:07	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		1	262954	12/07/17 04:29	ERB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	262841	12/05/17 22:31	JCV	TAL SEA
Total/NA	Prep	3510C			262751	12/04/17 14:02	NDB	TAL SEA
Total/NA	Cleanup	3630C			262781	12/04/17 18:07	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	262795	12/05/17 20:12	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 12/01/17 00:01

Date Received: 12/01/17 13:00

Lab Sample ID: 580-73288-9

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	262747	12/04/17 16:19	P1P	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	262841	12/05/17 16:40	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-73288-7	Outfall 002	Water	12/01/17 12:00	12/01/17 13:00
580-73288-8	DUP-1	Water	12/01/17 00:01	12/01/17 13:00
580-73288-9	Trip Blank	Water	12/01/17 00:01	12/01/17 13:00

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Rush

Short Hold

Chain of Custody Record

Client <u>Arcadis</u>		Client Contact <u>Peter Campbell</u>		Date <u>12/1/17</u>	Chain of Custody Number <u>31171</u>
Address <u>1100 Olive way, Suite 800</u>		Telephone Number (Area Code)/Fax Number <u>206.910.0217</u>		Lab Number <u>73288</u>	Page <u>1</u> of <u>1</u>

City <u>Seattle</u>	State <u>WA</u>	Zip Code <u>98101</u>	Sampler <u>Eric Krueger</u>	Lab Contact <u>Elaine Wanker</u>	Analysis (Attach list if more space is needed)
Project Name and Location (State) <u>Edmonds Terminal, 11720 Unoco Rd, Edmonds WA</u>			Billing Contact		

Sample I.D. and Location/Description <small>(Containers for each sample may be combined on one line)</small>	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		NWTPH-GIX	NWTPH-DX	6,24 Benzene
-1 GWSP-101	12/1/17	0830		X												Therm. ID <u>A2</u> Cor <u>1.9</u> Unc <u>2.6</u> Cooler Dsc <u>Ly Blue</u> @Lab <u>1620</u> Wet/Packs Packing <u>Bub</u> Lab Cov Custody Seal: Yes ___ No <u>X</u> 24 hr TAT Therm. ID <u>A2</u> Cor <u>4.7</u> Unc <u>5.4</u> Cooler Dsc <u>Ly Blue</u> @Lab <u>1620</u> Wet/Packs Packing <u>Bub</u> Custody Seal: Yes ___ No <u>X</u>
GWSP-102A		0900														
-3 GWSP-102B		0930														
GWSP-103A		1000														
-5 GWSP-103B		1025														
GWSP-104		1045														
-7 * Outfall 002		<u>1200</u>														
-7 Outfall 002 MS/MSD		1210														
DUP-1																
-9 Trip blank																

<input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____ Turn Around Time Required (business days) <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input checked="" type="checkbox"/> 5 Days <input type="checkbox"/> 10 Days <input type="checkbox"/> 15 Days <input type="checkbox"/> Other _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ <input type="checkbox"/> Return To Client
---	--	--

1. Relinquished By Sign/Print <u>Eric Krueger</u>	Date <u>12/1/17</u> Time <u>1300</u>	1. Received By Sign/Print <u>Blankenship</u>	Date <u>12/1/17</u> Time <u>1300</u>
2. Relinquished By Sign/Print	Date Time	2. Received By Sign/Print	Date Time
3. Relinquished By Sign/Print	Date Time	3. Received By Sign/Print	Date Time

Comments * Outfall 002: 24 hr TAT

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Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73288-2

Login Number: 73288

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	The COC lists time 1210 for the MS/D but 1200 for parent.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-73407-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
12/13/2017 5:48:04 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Job ID: 580-73407-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE **Client: ARCADIS U.S. Inc** **Project: Chevron Edmonds Terminal** **Report Number: 580-73407-1**

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Two samples were received on 12/6/2017 11:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.1° C.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Samples Outfall-120517 (580-73407-1) and Trip Blank (580-73407-2) were analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 12/09/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)

Sample Outfall-120517 (580-73407-1) was analyzed for polycyclic aromatic hydrocarbons (PAHs) in accordance with EPA SW-846 Method 8270C SIM. The samples were prepared on 12/11/2017 and analyzed on 12/13/2017.

Several analytes were detected in method blank MB 580-263163/1-A at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. The target analyte concentrations were less than half the reporting limit (1/2RL); therefore, re-extraction and/or re-analysis of samples was not performed.

Benzo[a]pyrene failed the recovery criteria high for LCSD 580-263163/3-A. The analyte was biased high in the LCSD and was not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GASOLINE RANGE ORGANICS (GRO)

Samples Outfall-120517 (580-73407-1) and Trip Blank (580-73407-2) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 12/09/2017 and 12/12/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Job ID: 580-73407-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

DIESEL AND MOTOR OIL RANGE ORGANICS

Sample Outfall-120517 (580-73407-1) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared on 12/07/2017 and analyzed on 12/09/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	LCS or LCSD is outside acceptance limits.

GC Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Client Sample ID: Outfall-120517

Lab Sample ID: 580-73407-1

Date Collected: 12/05/17 15:30

Matrix: Water

Date Received: 12/06/17 11:10

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/09/17 21:37	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					12/09/17 21:37	1
Toluene-d8 (Surr)	104		79 - 122					12/09/17 21:37	1
4-Bromofluorobenzene (Surr)	102		78 - 119					12/09/17 21:37	1
Dibromofluoromethane (Surr)	102		70 - 120					12/09/17 21:37	1
1,2-Dichloroethane-d4 (Surr)	98		70 - 120					12/09/17 21:37	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0090	J B	0.020	0.0020	ug/L		12/11/17 09:32	12/13/17 11:58	1
Chrysene	0.0079	J B	0.020	0.0061	ug/L		12/11/17 09:32	12/13/17 11:58	1
Benzo[b]fluoranthene	0.0098	J	0.020	0.0081	ug/L		12/11/17 09:32	12/13/17 11:58	1
Benzo[k]fluoranthene	ND		0.031	0.0092	ug/L		12/11/17 09:32	12/13/17 11:58	1
Benzo[a]pyrene	0.0089	J * B	0.020	0.0031	ug/L		12/11/17 09:32	12/13/17 11:58	1
Indeno[1,2,3-cd]pyrene	0.0078	J B	0.020	0.0071	ug/L		12/11/17 09:32	12/13/17 11:58	1
Dibenz(a,h)anthracene	0.0083	J B	0.020	0.0020	ug/L		12/11/17 09:32	12/13/17 11:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	60		53 - 112				12/11/17 09:32	12/13/17 11:58	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/09/17 03:04	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/09/17 03:04	1
Trifluorotoluene (Surr)	118		77 - 128					12/09/17 03:04	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.024	J	0.10	0.019	mg/L		12/07/17 09:33	12/09/17 03:11	1
Motor Oil (>C24-C36)	ND		0.25	0.078	mg/L		12/07/17 09:33	12/09/17 03:11	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	73		50 - 150				12/07/17 09:33	12/09/17 03:11	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-73407-2

Date Collected: 12/05/17 15:30

Matrix: Water

Date Received: 12/06/17 11:10

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/09/17 15:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					12/09/17 15:54	1
Toluene-d8 (Surr)	103		79 - 122					12/09/17 15:54	1
4-Bromofluorobenzene (Surr)	100		78 - 119					12/09/17 15:54	1
Dibromofluoromethane (Surr)	102		70 - 120					12/09/17 15:54	1
1,2-Dichloroethane-d4 (Surr)	98		70 - 120					12/09/17 15:54	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/12/17 13:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/12/17 13:48	1
Trifluorotoluene (Surr)	97		77 - 128					12/12/17 13:48	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-263136/5
Matrix: Water
Analysis Batch: 263136

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/09/17 13:27	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123		12/09/17 13:27	1
Toluene-d8 (Surr)	107		79 - 122		12/09/17 13:27	1
4-Bromofluorobenzene (Surr)	102		78 - 119		12/09/17 13:27	1
Dibromofluoromethane (Surr)	101		70 - 120		12/09/17 13:27	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 120		12/09/17 13:27	1

Lab Sample ID: LCS 580-263136/6
Matrix: Water
Analysis Batch: 263136

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	8.16		ug/L		82	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	108		79 - 122
4-Bromofluorobenzene (Surr)	106		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	97		70 - 120

Lab Sample ID: LCSD 580-263136/7
Matrix: Water
Analysis Batch: 263136

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	8.18		ug/L		82	37 - 151	0	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	103		74 - 123
Toluene-d8 (Surr)	103		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	97		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-263163/1-A
Matrix: Water
Analysis Batch: 263327

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 263163

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00660	J	0.020	0.0020	ug/L		12/11/17 09:32	12/13/17 10:45	1
Chrysene	0.00715	J	0.020	0.0060	ug/L		12/11/17 09:32	12/13/17 10:45	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		12/11/17 09:32	12/13/17 10:45	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-263163/1-A
Matrix: Water
Analysis Batch: 263327

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 263163

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	0.00920	J	0.030	0.0090	ug/L		12/11/17 09:32	12/13/17 10:45	1
Benzo[a]pyrene	0.00606	J	0.020	0.0030	ug/L		12/11/17 09:32	12/13/17 10:45	1
Indeno[1,2,3-cd]pyrene	0.00833	J	0.020	0.0070	ug/L		12/11/17 09:32	12/13/17 10:45	1
Dibenz(a,h)anthracene	0.00783	J	0.020	0.0020	ug/L		12/11/17 09:32	12/13/17 10:45	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	79		53 - 112	12/11/17 09:32	12/13/17 10:45	1

Lab Sample ID: LCS 580-263163/2-A
Matrix: Water
Analysis Batch: 263327

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 263163

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.65		ug/L		91	71 - 120
Chrysene	4.00	3.24		ug/L		81	64 - 120
Benzo[b]fluoranthene	4.00	4.35		ug/L		109	66 - 120
Benzo[k]fluoranthene	4.00	4.43		ug/L		111	68 - 120
Benzo[a]pyrene	4.00	4.65		ug/L		116	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	4.43		ug/L		111	63 - 120
Dibenz(a,h)anthracene	4.00	4.54		ug/L		114	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	68		53 - 112

Lab Sample ID: LCSD 580-263163/3-A
Matrix: Water
Analysis Batch: 263327

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 263163

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.97		ug/L		99	71 - 120	9	16
Chrysene	4.00	3.54		ug/L		89	64 - 120	9	16
Benzo[b]fluoranthene	4.00	4.64		ug/L		116	66 - 120	6	20
Benzo[k]fluoranthene	4.00	4.78		ug/L		120	68 - 120	8	20
Benzo[a]pyrene	4.00	4.92	*	ug/L		123	76 - 120	6	17
Indeno[1,2,3-cd]pyrene	4.00	4.77		ug/L		119	63 - 120	7	15
Dibenz(a,h)anthracene	4.00	5.00		ug/L		125	60 - 125	10	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	71		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-263121/6
Matrix: Water
Analysis Batch: 263121

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/08/17 22:30	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		58 - 133					12/08/17 22:30	1
Trifluorotoluene (Surr)	109		77 - 128					12/08/17 22:30	1

Lab Sample ID: LCS 580-263121/7
Matrix: Water
Analysis Batch: 263121

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline	1.00	0.864		mg/L		86	79 - 110		
Surrogate	%Recovery	LCS Qualifier	Limits						
4-Bromofluorobenzene (Surr)	92		58 - 133						
Trifluorotoluene (Surr)	103		77 - 128						

Lab Sample ID: LCSD 580-263121/8
Matrix: Water
Analysis Batch: 263121

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.900		mg/L		90	79 - 110	4	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	93		58 - 133						
Trifluorotoluene (Surr)	108		77 - 128						

Lab Sample ID: MB 580-263254/5
Matrix: Water
Analysis Batch: 263254

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/12/17 12:12	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/12/17 12:12	1
Trifluorotoluene (Surr)	98		77 - 128					12/12/17 12:12	1

Lab Sample ID: LCS 580-263254/6
Matrix: Water
Analysis Batch: 263254

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline	1.00	0.934		mg/L		93	79 - 110		

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-263254/6
Matrix: Water
Analysis Batch: 263254

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	99		58 - 133
Trifluorotoluene (Surr)	99		77 - 128

Lab Sample ID: LCSD 580-263254/7
Matrix: Water
Analysis Batch: 263254

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.919		mg/L		92	79 - 110	2	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	100		58 - 133
Trifluorotoluene (Surr)	96		77 - 128

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-262980/1-B
Matrix: Water
Analysis Batch: 263112

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 262980

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		12/07/17 09:33	12/09/17 02:07	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		12/07/17 09:33	12/09/17 02:07	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	82		50 - 150	12/07/17 09:33	12/09/17 02:07	1

Lab Sample ID: LCS 580-262980/2-B
Matrix: Water
Analysis Batch: 263112

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 262980

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.79		mg/L		90	59 - 112
Motor Oil (>C24-C36)	2.00	2.22		mg/L		111	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	91		50 - 150

Lab Sample ID: LCSD 580-262980/3-B
Matrix: Water
Analysis Batch: 263112

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 262980

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.80		mg/L		90	59 - 112	1	16
Motor Oil (>C24-C36)	2.00	2.19		mg/L		110	64 - 120	1	17

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCSD 580-262980/3-B

Matrix: Water

Analysis Batch: 263112

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 262980

<i>Surrogate</i>	<i>LCSD</i> <i>%Recovery</i>	<i>LCSD</i> <i>Qualifier</i>	<i>Limits</i>
<i>o-Terphenyl</i>	91		50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Client Sample ID: Outfall-120517

Date Collected: 12/05/17 15:30

Date Received: 12/06/17 11:10

Lab Sample ID: 580-73407-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	263136	12/09/17 21:37	W1T	TAL SEA
Total/NA	Prep	3510C			263163	12/11/17 09:32	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		1	263327	12/13/17 11:58	ERZ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	263121	12/09/17 03:04	RSB	TAL SEA
Total/NA	Prep	3510C			262980	12/07/17 09:33	NDB	TAL SEA
Total/NA	Cleanup	3630C			263027	12/07/17 15:02	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	263112	12/09/17 03:11	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 12/05/17 15:30

Date Received: 12/06/17 11:10

Lab Sample ID: 580-73407-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	263136	12/09/17 15:54	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	263254	12/12/17 13:48	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-73407-1	Outfall-120517	Water	12/05/17 15:30	12/06/17 11:10
580-73407-2	Trip Blank	Water	12/05/17 15:30	12/06/17 11:10

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Rush

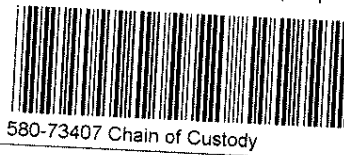
Short Hold

Chain of Custody Record

Address 1100 Olive Way Ste 800 Seattle WA 98101		Client Contact Peter Campbell		Date 12/5/2017	Chain of Custody Number 31176
City Seattle WA 98101		Telephone Number (Area Code)/Fax Number		Lab Number	
City	State	Zip Code	Sampler Scott Wenning	Lab Contact Elaine Walker	Page <u> </u> of <u> </u>

Project Name and Location (State) Chevron Edmonds Terminal			Billing Contact			Analysis (Attach list if more space is needed)			Special Instructions/ Conditions of Receipt
Contract/Purchase Order/Quote No. 8871						Loc: 580 73407			

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Benzene CER DRO/HO CPAHS	Analysis (Attach list if more space is needed)			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc2	NaOH					
Outfall - 120517	12/05/17	1530	X				X			X								
Trip Blank	12/05/17	-								X								



580-73407 Chain of Custody

Therm. ID A² Cor 5.1 Unc 5.8
Cooler Dsc Small Red@Lab
~~10~~Packs Packing Bubble
Cli do Custody Seal: Yes No X

Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: <u> </u>	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For <u> </u> Months	(A fee may be assessed if samples are retained longer than 1 month)
---	--	---	---

Turn Around Time Required (business days) <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input checked="" type="checkbox"/> 5 Days <input type="checkbox"/> 10 Days <input type="checkbox"/> 15 Days <input type="checkbox"/> Other <u> </u>	QC Requirements (Specify)
--	---------------------------

1. Relinquished By Sign/Print <u>Ryan W. Brauch</u> / Ryan W. Brauch	Date 12-6-17	Time 1110	1. Received By Sign/Print <u>B. Gell</u> / B. Gell SEA TV	Date 12.6.17	Time 1110
2. Relinquished By Sign/Print	Date	Time	2. Received By Sign/Print	Date	Time
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73407-1

Login Number: 73407

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-73617-2

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

1/22/2018 4:34:30 PM

Kim Presley, Project Management Assistant I

(253)922-2310

kim.presley@testamericainc.com

Designee for

Elaine Walker, Project Manager II

(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through

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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Job ID: 580-73617-2

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE
Client: ARCADIS U.S. Inc
Project: Chevron Edmonds Terminal
Report Number: 580-73617-1

Revision 1: January 22, 2018

Per Client email 1/22/2018, the Outfall #2 sample date has been reported separately.

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Two samples were received on 12/14/2017 3:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.2° C.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Samples Outfall #002 (580-73617-1) and Trip Blank - 2 (580-73617-2) were analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 12/15/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SEMIVOLATILE ORGANIC COMPOUNDS - SELECTED ION MODE (SIM)

Sample Outfall #002 (580-73617-1) was analyzed for semivolatile organic compounds - Selected Ion Mode (SIM) in accordance with EPA SW-846 Method 8270D SIM. The samples were prepared and analyzed on 12/18/2017.

Dibenz(a,h)anthracene and Indeno[1,2,3-cd]pyrene were detected in method blank MB 580-263608/1-A at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples were not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GASOLINE RANGE ORGANICS (GRO)

Samples Outfall #002 (580-73617-1) and Trip Blank - 2 (580-73617-2) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 12/15/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Job ID: 580-73617-2 (Continued)

Laboratory: TestAmerica Seattle (Continued)

DIESEL AND MOTOR OIL RANGE ORGANICS

Sample Outfall #002 (580-73617-1) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared and analyzed on 12/19/2017.

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Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

GC Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Client Sample ID: Outfall #002

Lab Sample ID: 580-73617-1

Date Collected: 12/14/17 09:00

Matrix: Water

Date Received: 12/14/17 15:40

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/15/17 19:37	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					12/15/17 19:37	1
Toluene-d8 (Surr)	97		79 - 122					12/15/17 19:37	1
4-Bromofluorobenzene (Surr)	103		78 - 119					12/15/17 19:37	1
Dibromofluoromethane (Surr)	103		70 - 120					12/15/17 19:37	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120					12/15/17 19:37	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0039	J	0.021	0.0021	ug/L		12/18/17 09:31	12/18/17 15:32	1
Benzo[a]pyrene	0.0062	J	0.021	0.0031	ug/L		12/18/17 09:31	12/18/17 15:32	1
Benzo[b]fluoranthene	ND		0.021	0.0083	ug/L		12/18/17 09:31	12/18/17 15:32	1
Benzo[k]fluoranthene	ND		0.031	0.0093	ug/L		12/18/17 09:31	12/18/17 15:32	1
Chrysene	ND		0.021	0.0062	ug/L		12/18/17 09:31	12/18/17 15:32	1
Dibenz(a,h)anthracene	0.0078	J B	0.021	0.0021	ug/L		12/18/17 09:31	12/18/17 15:32	1
Indeno[1,2,3-cd]pyrene	0.0080	J B	0.021	0.0072	ug/L		12/18/17 09:31	12/18/17 15:32	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	74		53 - 112				12/18/17 09:31	12/18/17 15:32	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/15/17 17:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		58 - 133					12/15/17 17:51	1
Trifluorotoluene (Surr)	107		77 - 128					12/15/17 17:51	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.028	J	0.10	0.020	mg/L		12/19/17 14:12	12/19/17 22:27	1
Motor Oil (>C24-C36)	ND		0.26	0.081	mg/L		12/19/17 14:12	12/19/17 22:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	75		50 - 150				12/19/17 14:12	12/19/17 22:27	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Client Sample ID: Trip Blank - 2

Lab Sample ID: 580-73617-2

Date Collected: 12/14/17 00:01

Matrix: Water

Date Received: 12/14/17 15:40

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/15/17 19:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	99		74 - 123					12/15/17 19:12	1
<i>Toluene-d8 (Surr)</i>	97		79 - 122					12/15/17 19:12	1
<i>4-Bromofluorobenzene (Surr)</i>	101		78 - 119					12/15/17 19:12	1
<i>Dibromofluoromethane (Surr)</i>	104		70 - 120					12/15/17 19:12	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	102		70 - 120					12/15/17 19:12	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/15/17 17:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	95		58 - 133					12/15/17 17:19	1
<i>Trifluorotoluene (Surr)</i>	100		77 - 128					12/15/17 17:19	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-263561/5
Matrix: Water
Analysis Batch: 263561

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/15/17 16:18	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	106		74 - 123		12/15/17 16:18	1
Toluene-d8 (Surr)	109		79 - 122		12/15/17 16:18	1
4-Bromofluorobenzene (Surr)	100		78 - 119		12/15/17 16:18	1
Dibromofluoromethane (Surr)	106		70 - 120		12/15/17 16:18	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120		12/15/17 16:18	1

Lab Sample ID: LCS 580-263561/6
Matrix: Water
Analysis Batch: 263561

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.5		ug/L		105	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	118		74 - 123
Toluene-d8 (Surr)	94		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	105		70 - 120
1,2-Dichloroethane-d4 (Surr)	107		70 - 120

Lab Sample ID: LCSD 580-263561/7
Matrix: Water
Analysis Batch: 263561

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	11.0		ug/L		110	37 - 151	4	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	96		79 - 122
4-Bromofluorobenzene (Surr)	104		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	99		70 - 120

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-263608/1-A
Matrix: Water
Analysis Batch: 263640

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 263608

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		12/18/17 09:31	12/18/17 14:20	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		12/18/17 09:31	12/18/17 14:20	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		12/18/17 09:31	12/18/17 14:20	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-263608/1-A
Matrix: Water
Analysis Batch: 263640

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 263608

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		12/18/17 09:31	12/18/17 14:20	1
Chrysene	ND		0.020	0.0060	ug/L		12/18/17 09:31	12/18/17 14:20	1
Dibenz(a,h)anthracene	0.00486	J	0.020	0.0020	ug/L		12/18/17 09:31	12/18/17 14:20	1
Indeno[1,2,3-cd]pyrene	0.00727	J	0.020	0.0070	ug/L		12/18/17 09:31	12/18/17 14:20	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	82		53 - 112	12/18/17 09:31	12/18/17 14:20	1

Lab Sample ID: LCS 580-263608/2-A
Matrix: Water
Analysis Batch: 263640

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 263608

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.62		ug/L		91	71 - 120
Benzo[a]pyrene	4.00	4.58		ug/L		115	76 - 120
Benzo[b]fluoranthene	4.00	4.43		ug/L		111	66 - 120
Benzo[k]fluoranthene	4.00	4.49		ug/L		112	68 - 120
Chrysene	4.00	3.12		ug/L		78	64 - 120
Dibenz(a,h)anthracene	4.00	4.45		ug/L		111	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	4.08		ug/L		102	63 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	77		53 - 112

Lab Sample ID: LCSD 580-263608/3-A
Matrix: Water
Analysis Batch: 263640

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 263608

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.62		ug/L		90	71 - 120	0	16
Benzo[a]pyrene	4.00	4.61		ug/L		115	76 - 120	1	17
Benzo[b]fluoranthene	4.00	4.43		ug/L		111	66 - 120	0	20
Benzo[k]fluoranthene	4.00	4.51		ug/L		113	68 - 120	0	20
Chrysene	4.00	3.15		ug/L		79	64 - 120	1	16
Dibenz(a,h)anthracene	4.00	4.50		ug/L		113	60 - 125	1	15
Indeno[1,2,3-cd]pyrene	4.00	4.38		ug/L		110	63 - 120	7	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	75		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-263564/5
Matrix: Water
Analysis Batch: 263564

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/15/17 15:44	1
Surrogate	%Recovery	MB Qualifier	Limits			D	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		58 - 133					12/15/17 15:44	1
Trifluorotoluene (Surr)	100		77 - 128					12/15/17 15:44	1

Lab Sample ID: LCS 580-263564/6
Matrix: Water
Analysis Batch: 263564

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.990		mg/L		99	79 - 110
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	103		58 - 133				
Trifluorotoluene (Surr)	103		77 - 128				

Lab Sample ID: LCSD 580-263564/7
Matrix: Water
Analysis Batch: 263564

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.960		mg/L		96	79 - 110	3	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	103		58 - 133						
Trifluorotoluene (Surr)	97		77 - 128						

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-263751/1-B
Matrix: Water
Analysis Batch: 263776

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 263751

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		12/19/17 14:12	12/19/17 21:21	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		12/19/17 14:12	12/19/17 21:21	1
Surrogate	MB %Recovery	MB Qualifier	Limits			D	Prepared	Analyzed	Dil Fac
o-Terphenyl	75		50 - 150				12/19/17 14:12	12/19/17 21:21	1

Lab Sample ID: LCS 580-263751/2-B
Matrix: Water
Analysis Batch: 263776

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 263751

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.83		mg/L		92	59 - 112

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-263751/2-B
Matrix: Water
Analysis Batch: 263776

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 263751

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	2.13		mg/L		106	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	84		50 - 150

Lab Sample ID: LCSD 580-263751/3-B
Matrix: Water
Analysis Batch: 263776

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 263751

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.83		mg/L		91	59 - 112	0	16
Motor Oil (>C24-C36)	2.00	2.17		mg/L		109	64 - 120	2	17

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	91		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Client Sample ID: Outfall #002

Date Collected: 12/14/17 09:00

Date Received: 12/14/17 15:40

Lab Sample ID: 580-73617-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	263561	12/15/17 19:37	P1P	TAL SEA
Total/NA	Prep	3510C			263608	12/18/17 09:31	NDB	TAL SEA
Total/NA	Analysis	8270D SIM		1	263640	12/18/17 15:32	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	263564	12/15/17 17:51	JCV	TAL SEA
Total/NA	Prep	3510C			263751	12/19/17 14:12	NDB	TAL SEA
Total/NA	Cleanup	3630C			263772	12/19/17 16:39	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	263776	12/19/17 22:27	ADB	TAL SEA

Client Sample ID: Trip Blank - 2

Date Collected: 12/14/17 00:01

Date Received: 12/14/17 15:40

Lab Sample ID: 580-73617-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	263561	12/15/17 19:12	P1P	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	263564	12/15/17 17:19	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-73617-1	Outfall #002	Water	12/14/17 09:00	12/14/17 15:40
580-73617-2	Trip Blank - 2	Water	12/14/17 00:01	12/14/17 15:40

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- 10
- 11

TestAmerica Seattle

5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Chain of Custody Record


TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: <i>Eric Krueger</i>	Lab PM: Walker, Elaine M	Carrier Tracking No(s):	COC No: 580-27035-8908.1
	Client Contact: Jason Little	Phone: <i>303-519-7192</i>		E-Mail: elaine.walker@testamericainc.com

Company: ARCADIS U.S. Inc	Due Date Requested:	Analysis Requested Field Filtered Sample (Yes or No) <input type="checkbox"/> Perform MS/MSA (Yes or No) <input type="checkbox"/> 8270C_SIM - cPAHs NNTPH_DX - Northwest - DRO/RO 624_5ml_NNTPH_GX <i>Benzene by EPA 624</i> <i>BTEX by TO-15</i> <i>TPH GRO by EPA TO-15</i> <i>Fixed Gas CH4, O2, CO2</i>	Job #: <i>73677</i>
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Address: 1100 Olive Way Suite 800	TAT Requested (days): <i>Five days</i>	Preservation Codes: A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2O3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - pH 4-5 L - EDA Z - other (specify)	Other:	
City: Seattle	PO #: B0045362.0010		Total Number of containers: 	Special Instructions/Note:
State, Zip: WA, 98101	WO #: 0015254061			
Phone: 206-726-4720(Tel)	Project #: 58011413			
Email: Jason.Little@arcadis.com	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/soil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSA (Yes or No)	8270C_SIM - cPAHs	NNTPH_DX - Northwest - DRO/RO	624_5ml_NNTPH_GX	Benzene by EPA 624	BTEX by TO-15	TPH GRO by EPA TO-15	Fixed Gas CH4, O2, CO2	Other	Special Instructions/Note:
<i>Outfall # 002</i>	<i>12/14/17</i>	<i>0900</i>	<i>G</i>	<i>Water</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<i>PH = 8.02</i>
<i>Trip blank</i>	<i>---</i>	<i>---</i>	<i>G</i>	<i>Water</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<i>VSP 801</i>	<i>12/14/17</i>	<i>0935</i>	<i>G</i>	<i>Air</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<i>PID = 301.5 ppm</i>
<i>VSP 802</i>	<i>12/14/17</i>	<i>0945</i>	<i>G</i>	<i>Air</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<i>PID = 0.1 ppm</i>
														580-73617 Chain of Custody	

Therm. ID *4R4* Cor *2.2* Unc *2.3*
 Cooler Desc *3 blue @ Lab*
 Wet/Packs Packing *Bvb*
 Labco Custody Seal: Yes No

Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For <input type="checkbox"/> Months
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by: <i>Peter Campbell</i>	Date/Time: <i>12/14/17 10:05</i>	Company: <i>ARCADIS</i>	Received by: <i>Tom Blunt</i>
Relinquished by: <i>[Signature]</i>	Date/Time: <i>12/14/17 1540</i>	Company: <i>ARCADIS</i>	Received by: <i>[Signature]</i>
Relinquished by:	Date/Time:	Company:	Received by:

Custody Seals Intact: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:
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Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73617-2

Login Number: 73617

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	The air samples may exceed hold time by the time they're analyzed.
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-73804-2

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

1/23/2018 10:37:37 AM

Kim Presley, Project Management Assistant I

(253)922-2310

kim.presley@testamericainc.com

Designee for

Elaine Walker, Project Manager II

(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Job ID: 580-73804-2

Laboratory: TestAmerica Seattle

Narrative

**Job Narrative
580-73804-1**

Revision 1: January 23, 2018

Per client email 1/22/18, the outfall #2 sample data has been reported separately.

Receipt

Two samples were received on 12/21/2017 1:55 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.2° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: The method blank for preparation batch 580-263972 and 580-263972 and analytical batch 580-264077 contained Benzo[a]anthracene, Benzo[a]pyrene, and Dibenz(a,h)anthracene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The method blank for preparation batch 580-264046 and 580-264100 and analytical batch 580-264112 contained #2 Diesel (C10-C24) above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

Method(s) NWTPH-Dx: The following sample contained a hydrocarbon pattern in the diesel range; however, the elution pattern was later than the typical diesel fuel pattern used by the laboratory for quantitative purposes: Outfall #002 (580-73804-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Client Sample ID: Outfall #002

Lab Sample ID: 580-73804-1

Date Collected: 12/20/17 16:00

Matrix: Water

Date Received: 12/21/17 13:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/27/17 23:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					12/27/17 23:44	1
Toluene-d8 (Surr)	101		79 - 122					12/27/17 23:44	1
4-Bromofluorobenzene (Surr)	96		78 - 119					12/27/17 23:44	1
Dibromofluoromethane (Surr)	100		70 - 120					12/27/17 23:44	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					12/27/17 23:44	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0038	J B	0.021	0.0021	ug/L		12/21/17 14:55	12/26/17 13:42	1
Chrysene	ND		0.021	0.0063	ug/L		12/21/17 14:55	12/26/17 13:42	1
Benzo[b]fluoranthene	ND		0.021	0.0084	ug/L		12/21/17 14:55	12/26/17 13:42	1
Benzo[k]fluoranthene	ND		0.032	0.0095	ug/L		12/21/17 14:55	12/26/17 13:42	1
Benzo[a]pyrene	ND		0.021	0.0032	ug/L		12/21/17 14:55	12/26/17 13:42	1
Indeno[1,2,3-cd]pyrene	ND		0.021	0.0074	ug/L		12/21/17 14:55	12/26/17 13:42	1
Dibenz(a,h)anthracene	ND		0.021	0.0021	ug/L		12/21/17 14:55	12/26/17 13:42	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	78		53 - 112				12/21/17 14:55	12/26/17 13:42	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/23/17 18:24	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/23/17 18:24	1
Trifluorotoluene (Surr)	109		77 - 128					12/23/17 18:24	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.081	J B	0.10	0.019	mg/L		12/22/17 13:07	12/26/17 21:54	1
Motor Oil (>C24-C36)	ND		0.26	0.079	mg/L		12/22/17 13:07	12/26/17 21:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	81		50 - 150				12/22/17 13:07	12/26/17 21:54	1
n-Decanoic Acid (Surr)							12/22/17 13:07	12/26/17 21:54	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Client Sample ID: Trip Blank

Lab Sample ID: 580-73804-2

Date Collected: 12/20/17 00:01

Matrix: Water

Date Received: 12/21/17 13:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/27/17 23:15	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123					12/27/17 23:15	1
Toluene-d8 (Surr)	101		79 - 122					12/27/17 23:15	1
4-Bromofluorobenzene (Surr)	100		78 - 119					12/27/17 23:15	1
Dibromofluoromethane (Surr)	99		70 - 120					12/27/17 23:15	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					12/27/17 23:15	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/23/17 16:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		58 - 133					12/23/17 16:49	1
Trifluorotoluene (Surr)	97		77 - 128					12/23/17 16:49	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-264164/13
Matrix: Water
Analysis Batch: 264164

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/27/17 17:04	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123		12/27/17 17:04	1
Toluene-d8 (Surr)	101		79 - 122		12/27/17 17:04	1
4-Bromofluorobenzene (Surr)	104		78 - 119		12/27/17 17:04	1
Dibromofluoromethane (Surr)	100		70 - 120		12/27/17 17:04	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120		12/27/17 17:04	1

Lab Sample ID: LCS 580-264164/14
Matrix: Water
Analysis Batch: 264164

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.51		ug/L		95	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	104		79 - 122
4-Bromofluorobenzene (Surr)	103		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Lab Sample ID: LCSD 580-264164/15
Matrix: Water
Analysis Batch: 264164

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.4		ug/L		104	37 - 151	9	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	106		79 - 122
4-Bromofluorobenzene (Surr)	105		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	102		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-263972/1-A
Matrix: Water
Analysis Batch: 264077

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 263972

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00697	J	0.020	0.0020	ug/L		12/21/17 14:17	12/22/17 20:52	1
Chrysene	ND		0.020	0.0060	ug/L		12/21/17 14:17	12/22/17 20:52	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		12/21/17 14:17	12/22/17 20:52	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-263972/1-A
Matrix: Water
Analysis Batch: 264077

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 263972

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		12/21/17 14:17	12/22/17 20:52	1
Benzo[a]pyrene	0.00499	J	0.020	0.0030	ug/L		12/21/17 14:17	12/22/17 20:52	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		12/21/17 14:17	12/22/17 20:52	1
Dibenz(a,h)anthracene	0.00462	J	0.020	0.0020	ug/L		12/21/17 14:17	12/22/17 20:52	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	81		53 - 112	12/21/17 14:17	12/22/17 20:52	1

Lab Sample ID: LCS 580-263972/2-A
Matrix: Water
Analysis Batch: 264077

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 263972

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.35		ug/L		84	71 - 120
Chrysene	4.00	3.32		ug/L		83	64 - 120
Benzo[b]fluoranthene	4.00	3.38		ug/L		84	66 - 120
Benzo[k]fluoranthene	4.00	3.39		ug/L		85	68 - 120
Benzo[a]pyrene	4.00	3.54		ug/L		88	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	3.30		ug/L		83	63 - 120
Dibenz(a,h)anthracene	4.00	3.28		ug/L		82	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	66		53 - 112

Lab Sample ID: LCSD 580-263972/3-A
Matrix: Water
Analysis Batch: 264077

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 263972

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.92		ug/L		98	71 - 120	16	16
Chrysene	4.00	3.90		ug/L		98	64 - 120	16	16
Benzo[b]fluoranthene	4.00	3.90		ug/L		97	66 - 120	14	20
Benzo[k]fluoranthene	4.00	3.97		ug/L		99	68 - 120	16	20
Benzo[a]pyrene	4.00	4.15		ug/L		104	76 - 120	16	17
Indeno[1,2,3-cd]pyrene	4.00	3.80		ug/L		95	63 - 120	14	15
Dibenz(a,h)anthracene	4.00	3.82		ug/L		96	60 - 125	15	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	77		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-264086/5
Matrix: Water
Analysis Batch: 264086

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/23/17 15:14	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133					12/23/17 15:14	1
Trifluorotoluene (Surr)	97		77 - 128					12/23/17 15:14	1

Lab Sample ID: LCS 580-264086/6
Matrix: Water
Analysis Batch: 264086

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	1.01		mg/L		101	79 - 110
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	99		58 - 133				
Trifluorotoluene (Surr)	105		77 - 128				

Lab Sample ID: LCSD 580-264086/7
Matrix: Water
Analysis Batch: 264086

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.929		mg/L		93	79 - 110	9	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	100		58 - 133						
Trifluorotoluene (Surr)	94		77 - 128						

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-264046/1-B
Matrix: Water
Analysis Batch: 264112

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264046

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0426	J	0.10	0.019	mg/L		12/22/17 13:07	12/26/17 20:55	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		12/22/17 13:07	12/26/17 20:55	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	84		50 - 150				12/22/17 13:07	12/26/17 20:55	1
n-Decanoic Acid (Surr)							12/22/17 13:07	12/26/17 20:55	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-264046/2-B
Matrix: Water
Analysis Batch: 264112

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264046

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
#2 Diesel (C10-C24)	2.00	1.82		mg/L		91	59 - 112
Motor Oil (>C24-C36)	2.00	2.09		mg/L		105	64 - 120
		LCS LCS					
Surrogate		%Recovery	Qualifier	Limits			
<i>o-Terphenyl</i>		89		50 - 150			

Lab Sample ID: LCSD 580-264046/3-B
Matrix: Water
Analysis Batch: 264112

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 264046

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.80		mg/L		90	59 - 112	1	16
Motor Oil (>C24-C36)	2.00	1.97		mg/L		98	64 - 120	6	17
		LCSD LCSD							
Surrogate		%Recovery	Qualifier	Limits					
<i>o-Terphenyl</i>		85		50 - 150					

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Client Sample ID: Outfall #002

Date Collected: 12/20/17 16:00

Date Received: 12/21/17 13:55

Lab Sample ID: 580-73804-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	264164	12/27/17 23:44	HDK	TAL SEA
Total/NA	Prep	3510C			263972	12/21/17 14:55	APR	TAL SEA
Total/NA	Analysis	8270C SIM		1	264105	12/26/17 13:42	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	264086	12/23/17 18:24	JCV	TAL SEA
Total/NA	Prep	3510C			264046	12/22/17 13:07	REY	TAL SEA
Total/NA	Cleanup	3630C			264100	12/26/17 09:03	REY	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	264112	12/26/17 21:54	T1W	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 12/20/17 00:01

Date Received: 12/21/17 13:55

Lab Sample ID: 580-73804-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	264164	12/27/17 23:15	HDK	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	264086	12/23/17 16:49	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-73804-1	Outfall #002	Water	12/20/17 16:00	12/21/17 13:55
580-73804-2	Trip Blank	Water	12/20/17 00:01	12/21/17 13:55

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TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Loc: 580
73804

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information				Sampler: <u>Eric Kouejer</u>		Lab PM: Walker, Elaine M		Carrier Tracking No(s):		COC No: 580-27035-8908.1			
Client Contact: Jason Little				Phone: <u>303-519-7192</u>		E-Mail: elaine.walker@testamericainc.com				Page: Page 1 of 1			
Company: ARCADIS U.S. Inc				Due Date Requested:		Analysis Requested							
Address: 1100 Olive Way Suite 800				TAT Requested (days): <u>5 days</u>									
City: Seattle				PO #: B0045362.0010		Field Filtered Sample (Yes or No) 8270C_SIM - cPAHs NWTPH_Dx - Northwest - DRO/RRO 824_5ml_NWTPH_Gx Benzene by EPA 624 BTEx (EPA-TD-15) TPH gasoline range (EPA-TD-15) Fixed Gas (Methane or O ₂)		Total Number of containers		Preservation Codes:			
State, Zip: WA, 98101				WO #: 0015254061						A - HCL		M - Hexane	
Phone: 206-726-4720(Tel)				Project #: 58011413						B - NaOH		N - None	
Email: Jason.Little@arcadis.com				SSOW#:				C - Zn Acetate		O - AsNaO2			
Project Name: Chevron Edmonds Terminal								D - Nitric Acid		P - Na2O4S			
Site: Washington								E - NaHSO4		Q - Na2SO3			
								F - MeOH		R - Na2S2O3			
								G - Amchlor		S - H2SO4			
								H - Ascorbic Acid		T - TSP Dodecahydrate			
								I - Ice		U - Acetone			
								J - DI Water		V - MCAA			
								K - EDTA		W - pH 4-5			
								L - EDA		Z - other (specify)			
								Other:					

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=As)	8270C_SIM - cPAHs	NWTPH_Dx - Northwest - DRO/RRO	824_5ml_NWTPH_Gx	BTEx (EPA-TD-15)	TPH gasoline range (EPA-TD-15)	Fixed Gas (Methane or O ₂)	Special Instructions/Note
Outfall #002	12/20/17	1600	G	Water	X	X	X	X			pH - 7.30
Trip blank	—	—	G	Water							
VSP-891	12/20/17	1630	G	air				X	X	X	PID - 0.0 172.4
VSP-892	12/20/17	1645	G	air				X	X	Y	PID - 0.0

580-73804 Chain of Custody

Therm. ID A2, Cor 5.2 Under Cooler Disc Smiley @ Lab 245
WetPacks Packing Wahl
Custody Seal: Yes No

Possible Hazard Identification
 Non-Hazard
 Flammable
 Skin Irritant
 Poison B
 Unknown
 Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return To Client
 Disposal By Lab
 Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: _____ Date: _____ Time: _____ Method of Shipment: _____

Relinquished by: <u>Eric Kouejer</u>	Date/Time: <u>12/20/17/1100</u>	Company:	Received by: <u>J. Su</u>	Date/Time: <u>12/21/17/1102</u>	Company: <u>JAC Su</u>
Relinquished by: _____	Date/Time: _____	Company:	Received by: _____	Date/Time: _____	Company: _____
Relinquished by: _____	Date/Time: _____	Company:	Received by: _____	Date/Time: _____	Company: _____

Custody Seals Intact: Yes No Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73804-2

Login Number: 73804

List Source: TestAmerica Seattle

List Number: 1

Creator: Gall, Brandon A

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-73946-2

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

1/23/2018 11:13:26 AM

Kim Presley, Project Management Assistant I

(253)922-2310

kim.presley@testamericainc.com

Designee for

Elaine Walker, Project Manager II

(253)248-4972

elaine.walker@testamericainc.com

LINKS

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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Job ID: 580-73946-2

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-73946-1

Revision 1: January 23, 2018

Per client email 1/22/18, the outfall #2 sample data has been reported separately.

Receipt

Two samples were received on 12/28/2017 2:55 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was -0.4° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: The method blank for preparation batch 580-264392 and analytical batch 580-264418 contained Benzo[a]anthracene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

Method(s) 8270C SIM: The following sample was diluted due to the nature of the sample matrix: Outfall #002 (580-73946-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The method blank for preparation batch 580-264464 and 580-264557 and analytical batch 580-264663 contained DRO (C10-C24) above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

Method(s) NWTPH-Dx: The following sample contained a hydrocarbon pattern in the diesel range; however, the elution pattern was later than the typical diesel fuel pattern used by the laboratory for quantitative purposes: Outfall #002 (580-73946-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep

Method(s) 3510C: The following sample formed emulsions during the extraction procedure: Outfall #002 (580-73946-1) extracting for 8270_SIM using 3510C_LVI. The emulsions required additional sodium sulfate in the funnel filter and additional DCM rinses.

Method(s) 3510C: The following sample formed emulsions during the extraction procedure: Outfall #002 (580-73946-1) extracting for NWTPH_Dx using 3510C_LVI. The emulsions required additional DCM rinses and additional sodium sulfate in the funnel filter during pour-offs.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Client Sample ID: Outfall #002

Lab Sample ID: 580-73946-1

Date Collected: 12/28/17 10:20

Matrix: Water

Date Received: 12/28/17 14:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/03/18 17:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	91		74 - 123					01/03/18 17:02	1
Toluene-d8 (Surr)	105		79 - 122					01/03/18 17:02	1
4-Bromofluorobenzene (Surr)	101		78 - 119					01/03/18 17:02	1
Dibromofluoromethane (Surr)	91		70 - 120					01/03/18 17:02	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 120					01/03/18 17:02	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.22	0.022	ug/L		01/02/18 09:08	01/02/18 17:55	10
Chrysene	ND		0.22	0.067	ug/L		01/02/18 09:08	01/02/18 17:55	10
Benzo[b]fluoranthene	ND		0.22	0.089	ug/L		01/02/18 09:08	01/02/18 17:55	10
Benzo[k]fluoranthene	ND		0.33	0.10	ug/L		01/02/18 09:08	01/02/18 17:55	10
Benzo[a]pyrene	ND		0.22	0.033	ug/L		01/02/18 09:08	01/02/18 17:55	10
Indeno[1,2,3-cd]pyrene	ND		0.22	0.078	ug/L		01/02/18 09:08	01/02/18 17:55	10
Dibenz(a,h)anthracene	ND		0.22	0.022	ug/L		01/02/18 09:08	01/02/18 17:55	10
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	82		53 - 112				01/02/18 09:08	01/02/18 17:55	10

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/02/18 16:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					01/02/18 16:21	1
Trifluorotoluene (Surr)	98		77 - 128					01/02/18 16:21	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.077	J B	0.11	0.021	mg/L		01/03/18 08:30	01/05/18 13:59	1
Motor Oil (>C24-C36)	0.19	J	0.27	0.085	mg/L		01/03/18 08:30	01/05/18 13:59	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	75		50 - 150				01/03/18 08:30	01/05/18 13:59	1
n-Decanoic Acid (Surr)							01/03/18 08:30	01/05/18 13:59	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Client Sample ID: Trip Blank

Lab Sample ID: 580-73946-2

Date Collected: 12/28/17 00:01

Matrix: Water

Date Received: 12/28/17 14:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/02/18 17:32	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	95		74 - 123					01/02/18 17:32	1
<i>Toluene-d8 (Surr)</i>	106		79 - 122					01/02/18 17:32	1
<i>4-Bromofluorobenzene (Surr)</i>	101		78 - 119					01/02/18 17:32	1
<i>Dibromofluoromethane (Surr)</i>	91		70 - 120					01/02/18 17:32	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	96		70 - 120					01/02/18 17:32	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/29/17 21:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	91		58 - 133					12/29/17 21:48	1
<i>Trifluorotoluene (Surr)</i>	109		77 - 128					12/29/17 21:48	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-264427/5

Matrix: Water

Analysis Batch: 264427

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/02/18 15:38	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123		01/02/18 15:38	1
Toluene-d8 (Surr)	105		79 - 122		01/02/18 15:38	1
4-Bromofluorobenzene (Surr)	102		78 - 119		01/02/18 15:38	1
Dibromofluoromethane (Surr)	89		70 - 120		01/02/18 15:38	1
1,2-Dichloroethane-d4 (Surr)	96		70 - 120		01/02/18 15:38	1

Lab Sample ID: LCS 580-264427/6

Matrix: Water

Analysis Batch: 264427

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	7.65		ug/L		77	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	94		74 - 123
Toluene-d8 (Surr)	105		79 - 122
4-Bromofluorobenzene (Surr)	107		78 - 119
Dibromofluoromethane (Surr)	91		70 - 120
1,2-Dichloroethane-d4 (Surr)	94		70 - 120

Lab Sample ID: LCSD 580-264427/7

Matrix: Water

Analysis Batch: 264427

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	8.10		ug/L		81	37 - 151	6	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	94		74 - 123
Toluene-d8 (Surr)	105		79 - 122
4-Bromofluorobenzene (Surr)	107		78 - 119
Dibromofluoromethane (Surr)	93		70 - 120
1,2-Dichloroethane-d4 (Surr)	96		70 - 120

Lab Sample ID: MB 580-264480/5

Matrix: Water

Analysis Batch: 264480

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/03/18 11:16	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	91		74 - 123		01/03/18 11:16	1
Toluene-d8 (Surr)	104		79 - 122		01/03/18 11:16	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-264480/5
Matrix: Water
Analysis Batch: 264480

Client Sample ID: Method Blank
Prep Type: Total/NA

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		78 - 119		01/03/18 11:16	1
Dibromofluoromethane (Surr)	91		70 - 120		01/03/18 11:16	1
1,2-Dichloroethane-d4 (Surr)	97		70 - 120		01/03/18 11:16	1

Lab Sample ID: LCS 580-264480/6
Matrix: Water
Analysis Batch: 264480

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	8.16		ug/L		82	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	94		74 - 123
Toluene-d8 (Surr)	104		79 - 122
4-Bromofluorobenzene (Surr)	106		78 - 119
Dibromofluoromethane (Surr)	94		70 - 120
1,2-Dichloroethane-d4 (Surr)	98		70 - 120

Lab Sample ID: LCSD 580-264480/7
Matrix: Water
Analysis Batch: 264480

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	8.24		ug/L		82	37 - 151	1	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	94		74 - 123
Toluene-d8 (Surr)	105		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	91		70 - 120
1,2-Dichloroethane-d4 (Surr)	94		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-264392/1-A
Matrix: Water
Analysis Batch: 264418

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264392

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00213	J	0.020	0.0020	ug/L		01/02/18 09:08	01/02/18 15:43	1
Chrysene	ND		0.020	0.0060	ug/L		01/02/18 09:08	01/02/18 15:43	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		01/02/18 09:08	01/02/18 15:43	1
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		01/02/18 09:08	01/02/18 15:43	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		01/02/18 09:08	01/02/18 15:43	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		01/02/18 09:08	01/02/18 15:43	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		01/02/18 09:08	01/02/18 15:43	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-264392/1-A
Matrix: Water
Analysis Batch: 264418

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264392

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	81		53 - 112	01/02/18 09:08	01/02/18 15:43	1

Lab Sample ID: LCS 580-264392/2-A
Matrix: Water
Analysis Batch: 264418

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264392

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.37		ug/L		84	71 - 120
Chrysene	4.00	3.54		ug/L		89	64 - 120
Benzo[b]fluoranthene	4.00	3.41		ug/L		85	66 - 120
Benzo[k]fluoranthene	4.00	3.67		ug/L		92	68 - 120
Benzo[a]pyrene	4.00	3.75		ug/L		94	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	3.57		ug/L		89	63 - 120
Dibenz(a,h)anthracene	4.00	3.66		ug/L		91	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	76		53 - 112

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-264371/5
Matrix: Water
Analysis Batch: 264371

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/29/17 19:09	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		58 - 133		12/29/17 19:09	1
Trifluorotoluene (Surr)	99		77 - 128		12/29/17 19:09	1

Lab Sample ID: LCS 580-264371/6
Matrix: Water
Analysis Batch: 264371

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.927		mg/L		93	79 - 110

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	100		58 - 133
Trifluorotoluene (Surr)	94		77 - 128

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCSD 580-264371/7

Matrix: Water

Analysis Batch: 264371

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.991		mg/L		99	79 - 110	7	10

Surrogate	LCSD %Recovery	LCSD Qualifier	LCSD Limits
4-Bromofluorobenzene (Surr)	98		58 - 133
Trifluorotoluene (Surr)	102		77 - 128

Lab Sample ID: MB 580-264451/5

Matrix: Water

Analysis Batch: 264451

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/02/18 14:46	1

Surrogate	MB %Recovery	MB Qualifier	MB Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		58 - 133		01/02/18 14:46	1
Trifluorotoluene (Surr)	99		77 - 128		01/02/18 14:46	1

Lab Sample ID: LCS 580-264451/6

Matrix: Water

Analysis Batch: 264451

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.973		mg/L		97	79 - 110

Surrogate	LCS %Recovery	LCS Qualifier	LCS Limits
4-Bromofluorobenzene (Surr)	101		58 - 133
Trifluorotoluene (Surr)	100		77 - 128

Lab Sample ID: LCSD 580-264451/7

Matrix: Water

Analysis Batch: 264451

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	1.00		mg/L		100	79 - 110	3	10

Surrogate	LCSD %Recovery	LCSD Qualifier	LCSD Limits
4-Bromofluorobenzene (Surr)	102		58 - 133
Trifluorotoluene (Surr)	103		77 - 128

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-264464/1-B

Matrix: Water

Analysis Batch: 264464

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264464

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0299	J	0.10	0.019	mg/L		01/03/18 08:30	01/05/18 12:58	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: MB 580-264464/1-B
Matrix: Water
Analysis Batch: 264663

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264464

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		01/03/18 08:30	01/05/18 12:58	1
Surrogate	%Recovery	MB Qualifier	MB	Limits			Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	84			50 - 150			01/03/18 08:30	01/05/18 12:58	1
<i>n</i> -Decanoic Acid (Surr)							01/03/18 08:30	01/05/18 12:58	1

Lab Sample ID: LCS 580-264464/2-B
Matrix: Water
Analysis Batch: 264663

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264464

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.85		mg/L		92	59 - 112
Motor Oil (>C24-C36)	2.00	2.06		mg/L		103	64 - 120
Surrogate	LCS %Recovery	LCS Qualifier	LCS	Limits			
<i>o</i> -Terphenyl	88			50 - 150			

Lab Sample ID: LCSD 580-264464/3-B
Matrix: Water
Analysis Batch: 264663

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 264464

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.77		mg/L		88	59 - 112	4	16
Motor Oil (>C24-C36)	2.00	2.05		mg/L		103	64 - 120	0	17
Surrogate	LCSD %Recovery	LCSD Qualifier	LCSD	Limits					
<i>o</i> -Terphenyl	87			50 - 150					

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Client Sample ID: Outfall #002

Lab Sample ID: 580-73946-1

Date Collected: 12/28/17 10:20

Matrix: Water

Date Received: 12/28/17 14:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	264480	01/03/18 17:02	P1P	TAL SEA
Total/NA	Prep	3510C			264392	01/02/18 09:08	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		10	264418	01/02/18 17:55	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	264451	01/02/18 16:21	JCV	TAL SEA
Total/NA	Prep	3510C			264464	01/03/18 08:30	NDB	TAL SEA
Total/NA	Cleanup	3630C			264557	01/04/18 09:26	MRG	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	264663	01/05/18 13:59	ADB	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-73946-2

Date Collected: 12/28/17 00:01

Matrix: Water

Date Received: 12/28/17 14:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	264427	01/02/18 17:32	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	264371	12/29/17 21:48	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-73946-1	Outfall #002	Water	12/28/17 10:20	12/28/17 14:55
580-73946-2	Trip Blank	Water	12/28/17 00:01	12/28/17 14:55

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- 11

Client: Arcadis Client Contact: Peter Campbell Date: 12/28/17 Chain of Custody Number: 36552
 Address: 1100 Olive Way Ste 80 Telephone Number (Area Code)/Fax Number: 206-910-0217 Lab Number: 73946 Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jan Little Lab Contact: Elaine
 Project Name and Location (State): Edmonds terminal Billing Contact: _____
 Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives										Special Instructions/ Conditions of Receipt						
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Tedlo	Biospec EPA 624	GRO(MTH-6x)	DAG/HO(N-MTH-6x VSGT)		CIAM	DTEX (EPA 1315)	Hydro 70-B	5.000 g/L (Arishore)		
OUT Fall #002	12/28/17	1020		✓			2			8						✓	✓	✓	✓				Any questions call Peter Campbell.
Trip Blank	-	-		✓			0			6						✓	✓	✓	✓				PID - 137.6
VSP-801	12/28/17	1120		✓										1				✓	✓	✓			PID - 0.3
VSP-802	12/28/17	1115		✓										1				✓	✓	✓			



580-73946 Chain of Custody

Therm. ID AZ Cor 0.4 Unc 0.5
 Cooler Disc See Red @ Lab _____
 Wet/Packs Packing Bubble
 Custody Seal: Yes _____ No X

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
 Sample Disposal: Return To Client Disposal By Lab Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By: <u>Jan Little</u> Date: <u>12/28/17</u> Time: <u>1125</u>	1. Received By: <u>Francisco Luna Jr</u> Date: <u>12/28/17</u> Time: <u>1125</u>
2. Relinquished By: <u>Francisco Luna Jr</u> Date: <u>12/28/17</u> Time: <u>1455</u>	2. Received By: <u>Tom Blunt</u> Date: <u>12/28/17</u> Time: <u>1455</u>
3. Relinquished By: _____ Date: _____ Time: _____	3. Received By: _____ Date: _____ Time: _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73946-2

Login Number: 73946

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-74109-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

1/12/2018 4:19:18 PM

Kristine Allen, Manager of Project Management
(253)248-4970

kristine.allen@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Job ID: 580-74109-1

Laboratory: TestAmerica Seattle

Narrative

**Job Narrative
580-74109-1**

Comments

No additional comments.

Receipt

The samples were received on 1/5/2018 1:15 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.8° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The method blank for preparation batch 580-264742 and analytical batch 580-264886 contained Benzo[a]anthracene, Benzo[a]pyrene and Dibenz(a,h)anthracene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74109-1

Date Collected: 01/05/18 11:15

Matrix: Water

Date Received: 01/05/18 13:15

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/10/18 08:51	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					01/10/18 08:51	1
Toluene-d8 (Surr)	100		79 - 122					01/10/18 08:51	1
4-Bromofluorobenzene (Surr)	98		78 - 119					01/10/18 08:51	1
Dibromofluoromethane (Surr)	98		70 - 120					01/10/18 08:51	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120					01/10/18 08:51	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.021	0.0021	ug/L		01/08/18 09:37	01/09/18 17:08	1
Chrysene	ND		0.021	0.0064	ug/L		01/08/18 09:37	01/09/18 17:08	1
Benzo[b]fluoranthene	ND		0.021	0.0085	ug/L		01/08/18 09:37	01/09/18 17:08	1
Benzo[k]fluoranthene	ND		0.032	0.0096	ug/L		01/08/18 09:37	01/09/18 17:08	1
Benzo[a]pyrene	ND		0.021	0.0032	ug/L		01/08/18 09:37	01/09/18 17:08	1
Indeno[1,2,3-cd]pyrene	ND		0.021	0.0075	ug/L		01/08/18 09:37	01/09/18 17:08	1
Dibenz(a,h)anthracene	ND		0.021	0.0021	ug/L		01/08/18 09:37	01/09/18 17:08	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	69		53 - 112				01/08/18 09:37	01/09/18 17:08	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/09/18 23:42	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133					01/09/18 23:42	1
Trifluorotoluene (Surr)	95		77 - 128					01/09/18 23:42	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.020	mg/L		01/09/18 09:38	01/09/18 19:02	1
Motor Oil (>C24-C36)	ND		0.26	0.081	mg/L		01/09/18 09:38	01/09/18 19:02	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	72		50 - 150				01/09/18 09:38	01/09/18 19:02	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-74109-2

Date Collected: 01/05/18 11:15

Matrix: Water

Date Received: 01/05/18 13:15

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/10/18 08:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					01/10/18 08:23	1
Toluene-d8 (Surr)	101		79 - 122					01/10/18 08:23	1
4-Bromofluorobenzene (Surr)	99		78 - 119					01/10/18 08:23	1
Dibromofluoromethane (Surr)	100		70 - 120					01/10/18 08:23	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					01/10/18 08:23	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/06/18 21:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					01/06/18 21:28	1
Trifluorotoluene (Surr)	107		77 - 128					01/06/18 21:28	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-264881/5

Matrix: Water

Analysis Batch: 264881

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/10/18 04:05	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123		01/10/18 04:05	1
Toluene-d8 (Surr)	99		79 - 122		01/10/18 04:05	1
4-Bromofluorobenzene (Surr)	101		78 - 119		01/10/18 04:05	1
Dibromofluoromethane (Surr)	99		70 - 120		01/10/18 04:05	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120		01/10/18 04:05	1

Lab Sample ID: LCS 580-264881/6

Matrix: Water

Analysis Batch: 264881

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.85		ug/L		99	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	101		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	105		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Lab Sample ID: LCSD 580-264881/7

Matrix: Water

Analysis Batch: 264881

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzene	10.0	10.2		ug/L		102	37 - 151	4	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	101		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-264742/1-A

Matrix: Water

Analysis Batch: 264886

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264742

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00352	J	0.020	0.0020	ug/L		01/08/18 09:37	01/09/18 15:55	1
Chrysene	ND		0.020	0.0060	ug/L		01/08/18 09:37	01/09/18 15:55	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		01/08/18 09:37	01/09/18 15:55	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-264742/1-A

Matrix: Water

Analysis Batch: 264886

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264742

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		01/08/18 09:37	01/09/18 15:55	1
Benzo[a]pyrene	0.00410	J	0.020	0.0030	ug/L		01/08/18 09:37	01/09/18 15:55	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		01/08/18 09:37	01/09/18 15:55	1
Dibenz(a,h)anthracene	0.00544	J	0.020	0.0020	ug/L		01/08/18 09:37	01/09/18 15:55	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	83		53 - 112	01/08/18 09:37	01/09/18 15:55	1

Lab Sample ID: LCS 580-264742/2-A

Matrix: Water

Analysis Batch: 264886

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264742

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.62		ug/L		91	71 - 120
Chrysene	4.00	3.24		ug/L		81	64 - 120
Benzo[b]fluoranthene	4.00	3.36		ug/L		84	66 - 120
Benzo[k]fluoranthene	4.00	3.75		ug/L		94	68 - 120
Benzo[a]pyrene	4.00	3.80		ug/L		95	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	3.47		ug/L		87	63 - 120
Dibenz(a,h)anthracene	4.00	3.85		ug/L		96	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	71		53 - 112

Lab Sample ID: LCSD 580-264742/3-A

Matrix: Water

Analysis Batch: 264886

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 264742

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.68		ug/L		92	71 - 120	2	16
Chrysene	4.00	3.23		ug/L		81	64 - 120	0	16
Benzo[b]fluoranthene	4.00	3.48		ug/L		87	66 - 120	4	20
Benzo[k]fluoranthene	4.00	3.74		ug/L		93	68 - 120	0	20
Benzo[a]pyrene	4.00	3.86		ug/L		97	76 - 120	2	17
Indeno[1,2,3-cd]pyrene	4.00	3.53		ug/L		88	63 - 120	2	15
Dibenz(a,h)anthracene	4.00	3.85		ug/L		96	60 - 125	0	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	70		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-264735/5

Matrix: Water

Analysis Batch: 264735

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/06/18 19:53	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		58 - 133					01/06/18 19:53	1
Trifluorotoluene (Surr)	89		77 - 128					01/06/18 19:53	1

Lab Sample ID: LCS 580-264735/6

Matrix: Water

Analysis Batch: 264735

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	1.00		mg/L		100	79 - 110
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	100		58 - 133				
Trifluorotoluene (Surr)	103		77 - 128				

Lab Sample ID: LCSD 580-264735/7

Matrix: Water

Analysis Batch: 264735

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.984		mg/L		98	79 - 110	2	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	100		58 - 133						
Trifluorotoluene (Surr)	101		77 - 128						

Lab Sample ID: MB 580-264910/5

Matrix: Water

Analysis Batch: 264910

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/09/18 22:07	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133					01/09/18 22:07	1
Trifluorotoluene (Surr)	97		77 - 128					01/09/18 22:07	1

Lab Sample ID: LCS 580-264910/6

Matrix: Water

Analysis Batch: 264910

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.916		mg/L		92	79 - 110

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-264910/6
Matrix: Water
Analysis Batch: 264910

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	97		58 - 133
Trifluorotoluene (Surr)	93		77 - 128

Lab Sample ID: LCSD 580-264910/7
Matrix: Water
Analysis Batch: 264910

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.944		mg/L		94	79 - 110	3	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	99		58 - 133
Trifluorotoluene (Surr)	95		77 - 128

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-264821/1-B
Matrix: Water
Analysis Batch: 264905

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 264821

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		01/09/18 09:38	01/09/18 17:56	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		01/09/18 09:38	01/09/18 17:56	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	76		50 - 150	01/09/18 09:38	01/09/18 17:56	1

Lab Sample ID: LCS 580-264821/2-B
Matrix: Water
Analysis Batch: 264905

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264821

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.74		mg/L		87	59 - 112
Motor Oil (>C24-C36)	2.00	1.99		mg/L		100	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	96		50 - 150

Lab Sample ID: LCSD 580-264821/3-B
Matrix: Water
Analysis Batch: 264905

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 264821

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.80		mg/L		90	59 - 112	3	16
Motor Oil (>C24-C36)	2.00	1.99		mg/L		100	64 - 120	0	17

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCSD 580-264821/3-B
Matrix: Water
Analysis Batch: 264905

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 264821

<i>Surrogate</i>	<i>LCSD</i> <i>%Recovery</i>	<i>LCSD</i> <i>Qualifier</i>	<i>Limits</i>
<i>o-Terphenyl</i>	96		50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74109-1

Date Collected: 01/05/18 11:15

Matrix: Water

Date Received: 01/05/18 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	264881	01/10/18 08:51	P1P	TAL SEA
Total/NA	Prep	3510C			264742	01/08/18 09:37	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		1	264886	01/09/18 17:08	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	264910	01/09/18 23:42	JCV	TAL SEA
Total/NA	Prep	3510C			264821	01/09/18 09:38	NDB	TAL SEA
Total/NA	Cleanup	3630C			264876	01/09/18 14:19	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	264905	01/09/18 19:02	ADB	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-74109-2

Date Collected: 01/05/18 11:15

Matrix: Water

Date Received: 01/05/18 13:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	264881	01/10/18 08:23	P1P	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	264735	01/06/18 21:28	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74109-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-74109-1	Outfall #002	Water	01/05/18 11:15	01/05/18 13:15
580-74109-2	Trip Blank	Water	01/05/18 11:15	01/05/18 13:15

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Client: Arcadis Client Contact: Jason Little Date: 1/5/18 Chain of Custody Number: 36542
 Address: 1100 olive way, suite Telephone Number (Area Code)/Fax Number: 206.726.4741 Lab Number: _____
 City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Walker Page 1 of 1

Project Name and Location (State): Edmonds Terminal Billing Contact: _____
 Contract/Purchase Order/Quote No.: _____ Analysis (Attach list if more space is needed): _____
 Special Instructions/Conditions of Receipt: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Loc: 580 74109	Special Instructions/Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Other				
Outfall #002	1/5/18	1115	X				2		8								
Trip Blank	—	—	X						6								



580-74109 Chain of Custody

Therm. ID 42 Cor 0.8 Unc 1.7
 Cooler Disc Medicine @ Lab
 Wet/Packs Packing Bubble
 Custody Seal: Yes No

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
 Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By Sign/Print: <u>[Signature] Eric Krueger</u> Date: <u>1/5/18</u> Time: <u>1125</u>	1. Received By Sign/Print: <u>[Signature] Francisco Lung, Jr</u> Date: <u>1/5/18</u> Time: <u>1125</u>
2. Relinquished By Sign/Print: <u>[Signature] Francisco Lung, Jr</u> Date: <u>1/5/18</u> Time: <u>1315</u>	2. Received By Sign/Print: <u>[Signature] Tasea</u> Date: <u>1-5-18</u> Time: <u>1315</u>
3. Relinquished By Sign/Print: _____ Date: _____ Time: _____	3. Received By Sign/Print: _____ Date: _____ Time: _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-74109-1

Login Number: 74109

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-74216-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

1/17/2018 2:57:52 PM

Kim Presley, Project Management Assistant I

(253)922-2310

kim.presley@testamericainc.com

Designee for

Elaine Walker, Project Manager II

(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Job ID: 580-74216-1

Laboratory: TestAmerica Seattle

Narrative

Receipt

The samples were received on 1/10/2018 2:20 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.9° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The method blank for preparation batch 580-265037 and analytical batch 580-265042 contained Benzo[a]anthracene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The method blank for preparation batch 580-265035 and 580-265082 and analytical batch 580-265094 contained #2 Diesel (C10-C24) and Motor Oil (>C24-C36) above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74216-1

Date Collected: 01/09/18 11:10

Matrix: Water

Date Received: 01/10/18 14:20

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/15/18 22:34	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	107		74 - 123					01/15/18 22:34	1
Toluene-d8 (Surr)	98		79 - 122					01/15/18 22:34	1
4-Bromofluorobenzene (Surr)	101		78 - 119					01/15/18 22:34	1
Dibromofluoromethane (Surr)	104		70 - 120					01/15/18 22:34	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					01/15/18 22:34	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		01/12/18 09:18	01/12/18 15:50	1
Chrysene	ND		0.020	0.0061	ug/L		01/12/18 09:18	01/12/18 15:50	1
Benzo[b]fluoranthene	ND		0.020	0.0082	ug/L		01/12/18 09:18	01/12/18 15:50	1
Benzo[k]fluoranthene	ND		0.031	0.0092	ug/L		01/12/18 09:18	01/12/18 15:50	1
Benzo[a]pyrene	ND		0.020	0.0031	ug/L		01/12/18 09:18	01/12/18 15:50	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		01/12/18 09:18	01/12/18 15:50	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		01/12/18 09:18	01/12/18 15:50	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	66		53 - 112				01/12/18 09:18	01/12/18 15:50	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/12/18 17:51	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					01/12/18 17:51	1
Trifluorotoluene (Surr)	107		77 - 128					01/12/18 17:51	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.046	J B	0.10	0.019	mg/L		01/12/18 09:15	01/12/18 22:14	1
Motor Oil (>C24-C36)	0.14	J B	0.25	0.078	mg/L		01/12/18 09:15	01/12/18 22:14	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	66		50 - 150				01/12/18 09:15	01/12/18 22:14	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-74216-2

Date Collected: 01/09/18 00:01

Matrix: Water

Date Received: 01/10/18 14:20

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/12/18 18:05	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					01/12/18 18:05	1
Trifluorotoluene (Surr)	108		74 - 123					01/15/18 17:46	1
Toluene-d8 (Surr)	98		79 - 122					01/12/18 18:05	1
Toluene-d8 (Surr)	96		79 - 122					01/15/18 17:46	1
4-Bromofluorobenzene (Surr)	102		78 - 119					01/12/18 18:05	1
4-Bromofluorobenzene (Surr)	102		78 - 119					01/15/18 17:46	1
Dibromofluoromethane (Surr)	103		70 - 120					01/12/18 18:05	1
Dibromofluoromethane (Surr)	104		70 - 120					01/15/18 17:46	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					01/12/18 18:05	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					01/15/18 17:46	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/12/18 14:08	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					01/12/18 14:08	1
Trifluorotoluene (Surr)	108		77 - 128					01/12/18 14:08	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-265091/5

Matrix: Water

Analysis Batch: 265091

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/12/18 14:44	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		74 - 123					01/12/18 14:44	1
Toluene-d8 (Surr)	99		79 - 122					01/12/18 14:44	1
4-Bromofluorobenzene (Surr)	106		78 - 119					01/12/18 14:44	1
Dibromofluoromethane (Surr)	104		70 - 120					01/12/18 14:44	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					01/12/18 14:44	1

Lab Sample ID: LCS 580-265091/6

Matrix: Water

Analysis Batch: 265091

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.5		ug/L		105	37 - 151
Surrogate	%Recovery	LCS Qualifier	Limits				
Trifluorotoluene (Surr)	105		74 - 123				
Toluene-d8 (Surr)	100		79 - 122				
4-Bromofluorobenzene (Surr)	105		78 - 119				
Dibromofluoromethane (Surr)	103		70 - 120				
1,2-Dichloroethane-d4 (Surr)	101		70 - 120				

Lab Sample ID: LCSD 580-265091/7

Matrix: Water

Analysis Batch: 265091

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	11.1		ug/L		111	37 - 151	6	30
Surrogate	%Recovery	LCSD Qualifier	Limits						
Trifluorotoluene (Surr)	106		74 - 123						
Toluene-d8 (Surr)	101		79 - 122						
4-Bromofluorobenzene (Surr)	105		78 - 119						
Dibromofluoromethane (Surr)	103		70 - 120						
1,2-Dichloroethane-d4 (Surr)	103		70 - 120						

Lab Sample ID: MB 580-265213/5

Matrix: Water

Analysis Batch: 265213

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/15/18 13:55	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	109		74 - 123					01/15/18 13:55	1
Toluene-d8 (Surr)	98		79 - 122					01/15/18 13:55	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-265213/5
Matrix: Water
Analysis Batch: 265213

Client Sample ID: Method Blank
Prep Type: Total/NA

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		78 - 119		01/15/18 13:55	1
Dibromofluoromethane (Surr)	99		70 - 120		01/15/18 13:55	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120		01/15/18 13:55	1

Lab Sample ID: LCS 580-265213/6
Matrix: Water
Analysis Batch: 265213

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.53		ug/L		95	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	109		74 - 123
Toluene-d8 (Surr)	98		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	103		70 - 120
1,2-Dichloroethane-d4 (Surr)	99		70 - 120

Lab Sample ID: LCSD 580-265213/7
Matrix: Water
Analysis Batch: 265213

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.3		ug/L		103	37 - 151	8	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	108		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	106		78 - 119
Dibromofluoromethane (Surr)	103		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-265037/1-A
Matrix: Water
Analysis Batch: 265042

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265037

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00519	J	0.020	0.0020	ug/L		01/12/18 09:18	01/12/18 12:32	1
Chrysene	ND		0.020	0.0060	ug/L		01/12/18 09:18	01/12/18 12:32	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		01/12/18 09:18	01/12/18 12:32	1
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		01/12/18 09:18	01/12/18 12:32	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		01/12/18 09:18	01/12/18 12:32	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		01/12/18 09:18	01/12/18 12:32	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		01/12/18 09:18	01/12/18 12:32	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-265037/1-A
Matrix: Water
Analysis Batch: 265042

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265037

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	85		53 - 112	01/12/18 09:18	01/12/18 12:32	1

Lab Sample ID: LCS 580-265037/2-A
Matrix: Water
Analysis Batch: 265042

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 265037

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	4.00	3.46		ug/L		87	71 - 120
Chrysene	4.00	3.61		ug/L		90	64 - 120
Benzo[b]fluoranthene	4.00	3.49		ug/L		87	66 - 120
Benzo[k]fluoranthene	4.00	3.74		ug/L		93	68 - 120
Benzo[a]pyrene	4.00	3.76		ug/L		94	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	3.26		ug/L		81	63 - 120
Dibenz(a,h)anthracene	4.00	3.52		ug/L		88	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	72		53 - 112

Lab Sample ID: LCSD 580-265037/3-A
Matrix: Water
Analysis Batch: 265042

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 265037

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.44		ug/L		86	71 - 120	1	16
Chrysene	4.00	3.56		ug/L		89	64 - 120	1	16
Benzo[b]fluoranthene	4.00	3.46		ug/L		86	66 - 120	1	20
Benzo[k]fluoranthene	4.00	3.69		ug/L		92	68 - 120	1	20
Benzo[a]pyrene	4.00	3.73		ug/L		93	76 - 120	1	17
Indeno[1,2,3-cd]pyrene	4.00	3.26		ug/L		81	63 - 120	0	15
Dibenz(a,h)anthracene	4.00	3.46		ug/L		87	60 - 125	2	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	72		53 - 112

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-265085/5
Matrix: Water
Analysis Batch: 265085

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/12/18 12:33	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		58 - 133		01/12/18 12:33	1
Trifluorotoluene (Surr)	99		77 - 128		01/12/18 12:33	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-265085/6

Matrix: Water

Analysis Batch: 265085

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.922		mg/L		92	79 - 110
Surrogate							
	%Recovery	LCS	LCS	Qualifier			Limits
4-Bromofluorobenzene (Surr)	100						58 - 133
Trifluorotoluene (Surr)	91						77 - 128

Lab Sample ID: LCSD 580-265085/7

Matrix: Water

Analysis Batch: 265085

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.966		mg/L		97	79 - 110	5	10
Surrogate									
	%Recovery	LCSD	LCSD	Qualifier			Limits		
4-Bromofluorobenzene (Surr)	100						58 - 133		
Trifluorotoluene (Surr)	95						77 - 128		

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-265035/1-B

Matrix: Water

Analysis Batch: 265094

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 265035

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0356	J	0.10	0.019	mg/L		01/12/18 09:15	01/12/18 21:09	1
Motor Oil (>C24-C36)	0.0841	J	0.25	0.077	mg/L		01/12/18 09:15	01/12/18 21:09	1
Surrogate									
	%Recovery	MB	MB	Qualifier			Prepared	Analyzed	Dil Fac
o-Terphenyl	81						01/12/18 09:15	01/12/18 21:09	1

Lab Sample ID: LCS 580-265035/2-B

Matrix: Water

Analysis Batch: 265094

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 265035

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.72		mg/L		86	59 - 112
Motor Oil (>C24-C36)	2.00	1.91		mg/L		96	64 - 120
Surrogate							
	%Recovery	LCS	LCS	Qualifier			Limits
o-Terphenyl	89						50 - 150

Lab Sample ID: LCSD 580-265035/3-B

Matrix: Water

Analysis Batch: 265094

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 265035

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.86		mg/L		93	59 - 112	7	16

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCSD 580-265035/3-B
Matrix: Water
Analysis Batch: 265094

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 265035

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Motor Oil (>C24-C36)	2.00	2.04		mg/L		102	64 - 120	6	17
Surrogate		LCSD %Recovery	LCSD Qualifier						Limits
<i>o</i> -Terphenyl		87							50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Client Sample ID: Outfall #002

Date Collected: 01/09/18 11:10

Date Received: 01/10/18 14:20

Lab Sample ID: 580-74216-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	265213	01/15/18 22:34	T1W	TAL SEA
Total/NA	Prep	3510C			265037	01/12/18 09:18	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		1	265042	01/12/18 15:50	ERZ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	265085	01/12/18 17:51	JCV	TAL SEA
Total/NA	Prep	3510C			265035	01/12/18 09:15	NDB	TAL SEA
Total/NA	Cleanup	3630C			265082	01/12/18 11:49	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	265094	01/12/18 22:14	W1T	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 01/09/18 00:01

Date Received: 01/10/18 14:20

Lab Sample ID: 580-74216-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	265091	01/12/18 18:05	T1W	TAL SEA
Total/NA	Analysis	624		1	265213	01/15/18 17:46	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	265085	01/12/18 14:08	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74216-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-74216-1	Outfall #002	Water	01/09/18 11:10	01/10/18 14:20
580-74216-2	Trip Blank	Water	01/09/18 00:01	01/10/18 14:20

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Client Arcadis Client Contact Peter Campbell Date 1/9/18 Chain of Custody Number 36555

Address 1100 Olive way, Suite 800 Telephone Number (Area Code)/Fax Number 206-910-0217 Lab Number 74216 Page 1 of 1

City Seattle State WA Zip Code 98101 Sampler Jason Little Lab Contact Elaine Walker Analysis (Attach list if more space is needed)

Project Name and Location (State) Edmonds Terminal Billing Contact _____

Contract/Purchase Order/Quote No. _____ Matrix _____ Containers & Preservatives _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt	
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HM03	HCl	NaOH	ZnAc/ NaOH		
<u>Outfall #002</u>	<u>1/9/18</u>	<u>1110</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>2</u>		<u>8</u>					<u>pH=</u>
<u>Trip Blank</u>	<u>1/9/18</u>	<u>1110</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<u>6</u>					



Therm. ID A2 Cor 2.9 Unc 3.5
Cooler Desc Mcd Blue @Lab _____
Wet/Packs Packing Bubble
Custody Seal: Yes ___ No ✓

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify) _____

1. Relinquished By <u>Jason Little</u> Date <u>1/10/18</u> Time <u>1310</u>	1. Received By <u>Francisco Lunny Jr</u> Date <u>1/10/18</u> Time <u>1310</u>
2. Relinquished By <u>Francisco Lunny Jr</u> Date <u>1/10/18</u> Time <u>1405</u>	2. Received By <u>Tom Blunt</u> Date <u>1/10/18</u> Time <u>1405</u>
3. Relinquished By _____ Date _____ Time _____	3. Received By _____ Date _____ Time _____

Comments _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-74216-1

Login Number: 74216

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-74473-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
1/25/2018 5:06:13 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Job ID: 580-74473-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-74473-1

Receipt

Two samples were received on 1/19/2018 1:30 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270D SIM: The method blank for preparation batch 580-265687 and analytical batch 580-265701 contained Benzo[a]anthracene, Benzo[a]pyrene, Chrysene, Dibenz(a,h)anthracene, and Indeno[1,2,3-cd]pyrene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The following sample contained a hydrocarbon pattern in the diesel range; however, the elution pattern was later than the typical diesel fuel pattern used by the laboratory for quantitative purposes: Outfall #002 (580-74473-1).

Method(s) NWTPH-Dx: The method blank for preparation batch preparation batch 580-265742 and analytical batch 580-265796 contained Motor Oil (>C24-C36) above the reporting limit (RL). None of the samples associated with this method blank contained the target compound at or above the RL; therefore, re-extraction and/or re-analysis of samples was not performed.

Method(s) NWTPH-Dx: The method blank for preparation batch 580-265742 and analytical batch 580-265796 contained #2 Diesel (C10-C24) above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and/or re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74473-1

Date Collected: 01/18/18 10:30

Matrix: Water

Date Received: 01/19/18 13:30

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/25/18 08:16	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	105		80 - 120					01/25/18 08:16	1
Toluene-d8 (Surr)	101		80 - 122					01/25/18 08:16	1
1,2-Dichloroethane-d4 (Surr)	101		80 - 126					01/25/18 08:16	1
4-Bromofluorobenzene (Surr)	103		75 - 125					01/25/18 08:16	1
Dibromofluoromethane (Surr)	104		77 - 120					01/25/18 08:16	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0078	J B	0.021	0.0021	ug/L		01/22/18 13:03	01/22/18 19:31	1
Benzo[a]pyrene	0.0063	J B	0.021	0.0031	ug/L		01/22/18 13:03	01/22/18 19:31	1
Benzo[b]fluoranthene	ND		0.021	0.0084	ug/L		01/22/18 13:03	01/22/18 19:31	1
Benzo[k]fluoranthene	ND		0.031	0.0094	ug/L		01/22/18 13:03	01/22/18 19:31	1
Chrysene	0.0065	J B	0.021	0.0063	ug/L		01/22/18 13:03	01/22/18 19:31	1
Dibenz(a,h)anthracene	0.0053	J B	0.021	0.0021	ug/L		01/22/18 13:03	01/22/18 19:31	1
Indeno[1,2,3-cd]pyrene	0.0075	J B	0.021	0.0073	ug/L		01/22/18 13:03	01/22/18 19:31	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	59		53 - 112				01/22/18 13:03	01/22/18 19:31	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/23/18 18:01	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133					01/23/18 18:01	1
Trifluorotoluene (Surr)	109		77 - 128					01/23/18 18:01	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.058	J B	0.10	0.020	mg/L		01/23/18 10:02	01/23/18 21:07	1
Motor Oil (>C24-C36)	0.13	J B	0.26	0.080	mg/L		01/23/18 10:02	01/23/18 21:07	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	74		50 - 150				01/23/18 10:02	01/23/18 21:07	1
n-Decanoic Acid (Surr)							01/23/18 10:02	01/23/18 21:07	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-74473-2

Date Collected: 01/18/18 00:01

Matrix: Water

Date Received: 01/19/18 13:30

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/25/18 04:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	105		80 - 120					01/25/18 04:00	1
Toluene-d8 (Surr)	99		80 - 122					01/25/18 04:00	1
1,2-Dichloroethane-d4 (Surr)	102		80 - 126					01/25/18 04:00	1
4-Bromofluorobenzene (Surr)	100		75 - 125					01/25/18 04:00	1
Dibromofluoromethane (Surr)	102		77 - 120					01/25/18 04:00	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/23/18 15:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		58 - 133					01/23/18 15:54	1
Trifluorotoluene (Surr)	99		77 - 128					01/23/18 15:54	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-265884/5

Matrix: Water

Analysis Batch: 265884

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/25/18 02:35	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	106		80 - 120		01/25/18 02:35	1
Toluene-d8 (Surr)	99		80 - 122		01/25/18 02:35	1
1,2-Dichloroethane-d4 (Surr)	99		80 - 126		01/25/18 02:35	1
4-Bromofluorobenzene (Surr)	101		75 - 125		01/25/18 02:35	1
Dibromofluoromethane (Surr)	103		77 - 120		01/25/18 02:35	1

Lab Sample ID: LCS 580-265884/6

Matrix: Water

Analysis Batch: 265884

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.83		ug/L		98	75 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	105		80 - 120
Toluene-d8 (Surr)	100		80 - 122
1,2-Dichloroethane-d4 (Surr)	99		80 - 126
4-Bromofluorobenzene (Surr)	104		75 - 125
Dibromofluoromethane (Surr)	103		77 - 120

Lab Sample ID: LCSD 580-265884/7

Matrix: Water

Analysis Batch: 265884

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.79		ug/L		98	75 - 120	0	14

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	105		80 - 120
Toluene-d8 (Surr)	101		80 - 122
1,2-Dichloroethane-d4 (Surr)	100		80 - 126
4-Bromofluorobenzene (Surr)	104		75 - 125
Dibromofluoromethane (Surr)	104		77 - 120

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-265687/1-A

Matrix: Water

Analysis Batch: 265701

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 265687

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00596	J	0.020	0.0020	ug/L		01/22/18 13:03	01/22/18 17:29	1
Benzo[a]pyrene	0.00450	J	0.020	0.0030	ug/L		01/22/18 13:03	01/22/18 17:29	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		01/22/18 13:03	01/22/18 17:29	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-265687/1-A
Matrix: Water
Analysis Batch: 265701

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265687

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		01/22/18 13:03	01/22/18 17:29	1
Chrysene	0.00728	J	0.020	0.0060	ug/L		01/22/18 13:03	01/22/18 17:29	1
Dibenz(a,h)anthracene	0.00627	J	0.020	0.0020	ug/L		01/22/18 13:03	01/22/18 17:29	1
Indeno[1,2,3-cd]pyrene	0.00790	J	0.020	0.0070	ug/L		01/22/18 13:03	01/22/18 17:29	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	74		53 - 112	01/22/18 13:03	01/22/18 17:29	1

Lab Sample ID: LCS 580-265687/2-A
Matrix: Water
Analysis Batch: 265701

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 265687

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.42		ug/L		86	71 - 120
Benzo[a]pyrene	4.00	3.51		ug/L		88	76 - 120
Benzo[b]fluoranthene	4.00	3.22		ug/L		81	66 - 120
Benzo[k]fluoranthene	4.00	3.44		ug/L		86	68 - 120
Chrysene	4.00	3.02		ug/L		75	64 - 120
Dibenz(a,h)anthracene	4.00	3.59		ug/L		90	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.34		ug/L		83	63 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	59		53 - 112

Lab Sample ID: LCSD 580-265687/3-A
Matrix: Water
Analysis Batch: 265701

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 265687

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.40		ug/L		85	71 - 120	1	16
Benzo[a]pyrene	4.00	3.44		ug/L		86	76 - 120	2	17
Benzo[b]fluoranthene	4.00	3.07		ug/L		77	66 - 120	5	20
Benzo[k]fluoranthene	4.00	3.33		ug/L		83	68 - 120	3	20
Chrysene	4.00	2.97		ug/L		74	64 - 120	1	16
Dibenz(a,h)anthracene	4.00	3.45		ug/L		86	60 - 125	4	15
Indeno[1,2,3-cd]pyrene	4.00	3.21		ug/L		80	63 - 120	4	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	61		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-265777/5
Matrix: Water
Analysis Batch: 265777

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/23/18 14:19	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		58 - 133					01/23/18 14:19	1
Trifluorotoluene (Surr)	111		77 - 128					01/23/18 14:19	1

Lab Sample ID: LCS 580-265777/6
Matrix: Water
Analysis Batch: 265777

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.982		mg/L		98	79 - 110
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	98		58 - 133				
Trifluorotoluene (Surr)	97		77 - 128				

Lab Sample ID: LCSD 580-265777/7
Matrix: Water
Analysis Batch: 265777

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	1.02		mg/L		102	79 - 110	3	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	99		58 - 133						
Trifluorotoluene (Surr)	101		77 - 128						

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-265742/1-B
Matrix: Water
Analysis Batch: 265796

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265742

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0349	J	0.10	0.019	mg/L		01/23/18 10:02	01/23/18 18:34	1
Motor Oil (>C24-C36)	0.365		0.25	0.077	mg/L		01/23/18 10:02	01/23/18 18:34	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	87		50 - 150				01/23/18 10:02	01/23/18 18:34	1
n-Decanoic Acid (Surr)							01/23/18 10:02	01/23/18 18:34	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: MB 580-265742/1-B
Matrix: Water
Analysis Batch: 265833

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265742

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		01/23/18 10:02	01/24/18 14:25	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		01/23/18 10:02	01/24/18 14:25	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	77		50 - 150				01/23/18 10:02	01/24/18 14:25	1

Lab Sample ID: LCS 580-265742/2-B
Matrix: Water
Analysis Batch: 265796

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 265742

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits		
#2 Diesel (C10-C24)	2.00	1.79		mg/L		90	59 - 112		
Motor Oil (>C24-C36)	2.00	2.13		mg/L		107	64 - 120		
Surrogate	LCS %Recovery	LCS Qualifier	Limits						
<i>o</i> -Terphenyl	95		50 - 150						

Lab Sample ID: LCSD 580-265742/3-B
Matrix: Water
Analysis Batch: 265796

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 265742

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.98		mg/L		99	59 - 112	10	16
Motor Oil (>C24-C36)	2.00	2.38		mg/L		119	64 - 120	11	17
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
<i>o</i> -Terphenyl	92		50 - 150						

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Client Sample ID: Outfall #002

Date Collected: 01/18/18 10:30

Date Received: 01/19/18 13:30

Lab Sample ID: 580-74473-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	265884	01/25/18 08:16	JSM	TAL SEA
Total/NA	Prep	3510C			265687	01/22/18 13:03	NDB	TAL SEA
Total/NA	Analysis	8270D SIM		1	265701	01/22/18 19:31	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	265777	01/23/18 18:01	JCV	TAL SEA
Total/NA	Prep	3510C			265742	01/23/18 10:02	REY	TAL SEA
Total/NA	Cleanup	3630C			265781	01/23/18 13:49	REY	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	265796	01/23/18 21:07	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 01/18/18 00:01

Date Received: 01/19/18 13:30

Lab Sample ID: 580-74473-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	265884	01/25/18 04:00	JSM	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	265777	01/23/18 15:54	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74473-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-74473-1	Outfall #002	Water	01/18/18 10:30	01/19/18 13:30
580-74473-2	Trip Blank	Water	01/18/18 00:01	01/19/18 13:30

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Client Arcadis		Client Contact Peter Campbell		Date 1/18/18	Chain of Custody Number 36553
Address 1100 olive way, suite 800		Telephone Number (Area Code)/Fax Number		Lab Number	Page 1 of 1

City Seattle	State WA	Zip Code 98101	Sampler Jason Little	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal			Billing Contact		

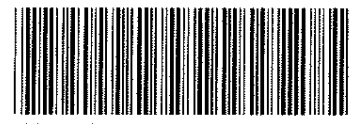
Contract/Purchase Order/Quote No. _____

Loc: 580
74473

Special Instructions/
Conditions of Receipt

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/Conditions of Receipt	
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		
Outfall #002	1/18/18	1030	<input checked="" type="checkbox"/>											PH=8.08
Trip Blank	---	---	<input checked="" type="checkbox"/>											

Benzene by EPA 824
MUTPH - Gx
NUMPH - Dx w/ SEC
CYANS by 8290.55M



580-74473 Chain of Custody

Therm. ID H2 Cor 1.2 Unc 2.1
Cooler Dsc Med Red @Lab ---
Wet/Packs Packing Bubble
Custody Seal: Yes ___ No X

Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Archive For _____ Months	<input type="checkbox"/> Disposal By Lab (A fee may be assessed if samples are retained longer than 1 month)
---	--	--	---

Turn Around Time Required (business days)
 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____

QC Requirements (Specify)

1. Relinquished By <u>Eric Kowger</u> Sign/Print Date <u>1/19/18</u> Time <u>1210</u>	1. Received By <u>Francisco Luna, Jr</u> Sign/Print Date <u>1/19/18</u> Time <u>1210</u>
2. Relinquished By <u>Francisco Luna, Jr</u> Sign/Print Date <u>1/19/18</u> Time <u>1330</u>	2. Received By <u>Henry Hobbs</u> Sign/Print Date <u>1/19/18</u> Time <u>1330</u>
3. Relinquished By _____ Sign/Print Date _____ Time _____	3. Received By _____ Sign/Print Date _____ Time _____

Comments

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-74473-1

Login Number: 74473

List Number: 1

Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-74658-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
2/6/2018 2:33:26 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Job ID: 580-74658-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-74658-1

Receipt

Two samples were received on 1/25/2018 2:10 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.0° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270D SIM: The method blank for preparation batch 580-266194 and analytical batch 580-266333 contained Benzo[a]anthracene, Chrysene, Benzo[k]fluoranthene, Benzo[a]pyrene, Indeno[1,2,3-cd]pyrene, and Dibenz(a,h)anthracene above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74658-1

Date Collected: 01/24/18 10:20

Matrix: Water

Date Received: 01/25/18 14:10

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/31/18 20:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		80 - 120					01/31/18 20:17	1
Toluene-d8 (Surr)	100		80 - 122					01/31/18 20:17	1
1,2-Dichloroethane-d4 (Surr)	98		80 - 126					01/31/18 20:17	1
4-Bromofluorobenzene (Surr)	103		75 - 125					01/31/18 20:17	1
Dibromofluoromethane (Surr)	99		77 - 120					01/31/18 20:17	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0079	J B	0.021	0.0021	ug/L		01/29/18 14:21	01/30/18 23:34	1
Benzo[a]pyrene	0.0070	J B	0.021	0.0031	ug/L		01/29/18 14:21	01/30/18 23:34	1
Benzo[b]fluoranthene	ND		0.021	0.0082	ug/L		01/29/18 14:21	01/30/18 23:34	1
Benzo[k]fluoranthene	ND		0.031	0.0092	ug/L		01/29/18 14:21	01/30/18 23:34	1
Chrysene	0.0073	J B	0.021	0.0062	ug/L		01/29/18 14:21	01/30/18 23:34	1
Dibenz(a,h)anthracene	0.0060	J B	0.021	0.0021	ug/L		01/29/18 14:21	01/30/18 23:34	1
Indeno[1,2,3-cd]pyrene	0.0075	J B	0.021	0.0072	ug/L		01/29/18 14:21	01/30/18 23:34	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	67		53 - 112				01/29/18 14:21	01/30/18 23:34	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/26/18 16:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		58 - 133					01/26/18 16:41	1
Trifluorotoluene (Surr)	106		77 - 128					01/26/18 16:41	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		01/30/18 14:37	01/31/18 17:52	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		01/30/18 14:37	01/31/18 17:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	59		50 - 150				01/30/18 14:37	01/31/18 17:52	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-74658-2

Date Collected: 01/24/18 10:20

Matrix: Water

Date Received: 01/25/18 14:10

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/30/18 21:33	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	100		80 - 120					01/30/18 21:33	1
<i>Toluene-d8 (Surr)</i>	100		80 - 122					01/30/18 21:33	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	100		80 - 126					01/30/18 21:33	1
<i>4-Bromofluorobenzene (Surr)</i>	103		75 - 125					01/30/18 21:33	1
<i>Dibromofluoromethane (Surr)</i>	101		77 - 120					01/30/18 21:33	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/26/18 15:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	94		58 - 133					01/26/18 15:38	1
<i>Trifluorotoluene (Surr)</i>	107		77 - 128					01/26/18 15:38	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-266303/13
Matrix: Water
Analysis Batch: 266303

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/30/18 20:07	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		80 - 120					01/30/18 20:07	1
Toluene-d8 (Surr)	99		80 - 122					01/30/18 20:07	1
1,2-Dichloroethane-d4 (Surr)	102		80 - 126					01/30/18 20:07	1
4-Bromofluorobenzene (Surr)	105		75 - 125					01/30/18 20:07	1
Dibromofluoromethane (Surr)	102		77 - 120					01/30/18 20:07	1

Lab Sample ID: LCS 580-266303/14
Matrix: Water
Analysis Batch: 266303

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.44		ug/L		94	75 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
Trifluorotoluene (Surr)	96		80 - 120				
Toluene-d8 (Surr)	101		80 - 122				
1,2-Dichloroethane-d4 (Surr)	100		80 - 126				
4-Bromofluorobenzene (Surr)	103		75 - 125				
Dibromofluoromethane (Surr)	99		77 - 120				

Lab Sample ID: LCSD 580-266303/15
Matrix: Water
Analysis Batch: 266303

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.1		ug/L		101	75 - 120	6	14
Surrogate	%Recovery	LCSD Qualifier	Limits						
Trifluorotoluene (Surr)	101		80 - 120						
Toluene-d8 (Surr)	100		80 - 122						
1,2-Dichloroethane-d4 (Surr)	100		80 - 126						
4-Bromofluorobenzene (Surr)	104		75 - 125						
Dibromofluoromethane (Surr)	101		77 - 120						

Lab Sample ID: MB 580-266429/5
Matrix: Water
Analysis Batch: 266429

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/31/18 16:57	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		80 - 120					01/31/18 16:57	1
Toluene-d8 (Surr)	100		80 - 122					01/31/18 16:57	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 580-266429/5
Matrix: Water
Analysis Batch: 266429

Client Sample ID: Method Blank
Prep Type: Total/NA

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	94		80 - 126		01/31/18 16:57	1
4-Bromofluorobenzene (Surr)	103		75 - 125		01/31/18 16:57	1
Dibromofluoromethane (Surr)	96		77 - 120		01/31/18 16:57	1

Lab Sample ID: LCS 580-266429/6
Matrix: Water
Analysis Batch: 266429

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.92		ug/L		99	75 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	100		80 - 120
Toluene-d8 (Surr)	100		80 - 122
1,2-Dichloroethane-d4 (Surr)	97		80 - 126
4-Bromofluorobenzene (Surr)	103		75 - 125
Dibromofluoromethane (Surr)	99		77 - 120

Lab Sample ID: LCSD 580-266429/7
Matrix: Water
Analysis Batch: 266429

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzene	10.0	10.6		ug/L		106	75 - 120	7	14

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	100		80 - 120
Toluene-d8 (Surr)	100		80 - 122
1,2-Dichloroethane-d4 (Surr)	96		80 - 126
4-Bromofluorobenzene (Surr)	104		75 - 125
Dibromofluoromethane (Surr)	100		77 - 120

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-266194/1-A
Matrix: Water
Analysis Batch: 266333

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266194

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00608	J	0.020	0.0020	ug/L		01/29/18 14:21	01/30/18 19:06	1
Benzo[a]pyrene	0.00544	J	0.020	0.0030	ug/L		01/29/18 14:21	01/30/18 19:06	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		01/29/18 14:21	01/30/18 19:06	1
Benzo[k]fluoranthene	0.0105	J	0.030	0.0090	ug/L		01/29/18 14:21	01/30/18 19:06	1
Chrysene	0.0101	J	0.020	0.0060	ug/L		01/29/18 14:21	01/30/18 19:06	1
Dibenz(a,h)anthracene	0.00702	J	0.020	0.0020	ug/L		01/29/18 14:21	01/30/18 19:06	1
Indeno[1,2,3-cd]pyrene	0.00936	J	0.020	0.0070	ug/L		01/29/18 14:21	01/30/18 19:06	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-266194/1-A
Matrix: Water
Analysis Batch: 266333

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266194

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	62		53 - 112	01/29/18 14:21	01/30/18 19:06	1

Lab Sample ID: LCS 580-266194/4-A
Matrix: Water
Analysis Batch: 266333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266194

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	8.00	6.23		ug/L		78	71 - 120
Benzo[a]pyrene	8.00	6.40		ug/L		80	76 - 120
Benzo[b]fluoranthene	8.00	6.02		ug/L		75	66 - 120
Benzo[k]fluoranthene	8.00	6.14		ug/L		77	68 - 120
Chrysene	8.00	5.56		ug/L		69	64 - 120
Dibenz(a,h)anthracene	8.00	6.40		ug/L		80	60 - 125
Indeno[1,2,3-cd]pyrene	8.00	6.03		ug/L		75	63 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	62		53 - 112

Lab Sample ID: LCSD 580-266194/5-A
Matrix: Water
Analysis Batch: 266333

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 266194

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzo[a]anthracene	8.00	6.29		ug/L		79	71 - 120	1	16
Benzo[a]pyrene	8.00	6.59		ug/L		82	76 - 120	3	17
Benzo[b]fluoranthene	8.00	6.20		ug/L		78	66 - 120	3	20
Benzo[k]fluoranthene	8.00	6.32		ug/L		79	68 - 120	3	20
Chrysene	8.00	5.68		ug/L		71	64 - 120	2	16
Dibenz(a,h)anthracene	8.00	6.72		ug/L		84	60 - 125	5	15
Indeno[1,2,3-cd]pyrene	8.00	6.24		ug/L		78	63 - 120	3	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	63		53 - 112

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-266076/5
Matrix: Water
Analysis Batch: 266076

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/26/18 12:59	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		58 - 133		01/26/18 12:59	1
Trifluorotoluene (Surr)	109		77 - 128		01/26/18 12:59	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-266076/6
Matrix: Water
Analysis Batch: 266076

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.938		mg/L		94	79 - 110
Surrogate							
		LCS %Recovery	LCS Qualifier				Limits
4-Bromofluorobenzene (Surr)		100					58 - 133
Trifluorotoluene (Surr)		95					77 - 128

Lab Sample ID: LCSD 580-266076/7
Matrix: Water
Analysis Batch: 266076

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.897		mg/L		90	79 - 110	5	10
Surrogate									
		LCSD %Recovery	LCSD Qualifier				Limits		
4-Bromofluorobenzene (Surr)		99					58 - 133		
Trifluorotoluene (Surr)		90					77 - 128		

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-266313/1-B
Matrix: Water
Analysis Batch: 266353

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266313

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		01/30/18 14:37	01/31/18 16:45	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		01/30/18 14:37	01/31/18 16:45	1
Surrogate									
	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	70		50 - 150				01/30/18 14:37	01/31/18 16:45	1

Lab Sample ID: LCS 580-266313/2-B
Matrix: Water
Analysis Batch: 266353

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266313

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.88		mg/L		94	59 - 112
Motor Oil (>C24-C36)	2.00	2.12		mg/L		106	64 - 120
Surrogate							
		LCS %Recovery	LCS Qualifier				Limits
o-Terphenyl		98					50 - 150

Lab Sample ID: LCSD 580-266313/3-B
Matrix: Water
Analysis Batch: 266353

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 266313

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.67		mg/L		83	59 - 112	12	16

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCSD 580-266313/3-B
 Matrix: Water
 Analysis Batch: 266353

Client Sample ID: Lab Control Sample Dup
 Prep Type: Total/NA
 Prep Batch: 266313

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Motor Oil (>C24-C36)	2.00	1.94		mg/L		97	64 - 120	9	17
Surrogate		LCSD %Recovery	LCSD Qualifier						Limits
<i>o</i> -Terphenyl		90							50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Client Sample ID: Outfall #002

Date Collected: 01/24/18 10:20

Date Received: 01/25/18 14:10

Lab Sample ID: 580-74658-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	266429	01/31/18 20:17	JSM	TAL SEA
Total/NA	Prep	3510C			266194	01/29/18 14:21	APR	TAL SEA
Total/NA	Analysis	8270D SIM		1	266333	01/30/18 23:34	ERZ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	266076	01/26/18 16:41	JCV	TAL SEA
Total/NA	Prep	3510C			266313	01/30/18 14:37	NDB	TAL SEA
Total/NA	Cleanup	3630C			266349	01/31/18 10:43	REY	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	266353	01/31/18 17:52	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 01/24/18 10:20

Date Received: 01/25/18 14:10

Lab Sample ID: 580-74658-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	266303	01/30/18 21:33	JSM	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	266076	01/26/18 15:38	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-74658-1	Outfall #002	Water	01/24/18 10:20	01/25/18 14:10
580-74658-2	Trip Blank	Water	01/24/18 10:20	01/25/18 14:10

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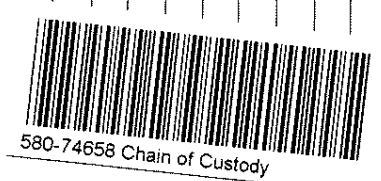
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Client **Arcadis** Client Contact **Peter Campbell** Date **1/24/18** Chain of Custody Number **36554**
 Address **1100 Olive Way, Suite 800** Telephone Number (Area Code)/Fax Number _____ Lab Number _____
 Page **1** of **1**

City **Seattle** State **WA** Zip Code **98101** Sampler **Jason Little** Lab Contact **Elaine Wailer**
 Project Name and Location (State) **Edmonds Terminal** Billing Contact _____ Analysis (Attach list if more space is needed)
 Contract/Purchase Order/Quote No. _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Loc: 580 74658	Special Instructions/ Conditions of Receipt	
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH			
Outfall #002	1/24/18	1020	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			2			8					pH = 7.58
Trip Blank	—	—	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					6						



erm. ID **124** Cor **40** Unc **4.1**
 oler Dsc **Med Blue** @Lab _____
 #/Packs **Packing** **Bubble**
 Custody Seal: Yes ___ No

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Disposal By Lab Disposal By Lab Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify)

1. Relinquished By Jason Little Sign/Print _____ Date 1/25/17 Time 1145	1. Received By Francisco Luna, Jr Sign/Print _____ Date 1/25/18 Time 1145
2. Relinquished By Francisco Luna, Jr Sign/Print _____ Date 1/25/18 Time 1410	2. Received By Henry Hobbs Sign/Print _____ Date 1-25-18 Time 1410
3. Relinquished By _____ Sign/Print _____ Date _____ Time _____	3. Received By _____ Sign/Print _____ Date _____ Time _____

Comments _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-74658-1

Login Number: 74658

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-74854-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
2/9/2018 9:56:45 AM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Job ID: 580-74854-1

Laboratory: TestAmerica Seattle

Narrative

**Job Narrative
580-74854-1**

Receipt

Three samples were received on 2/2/2018 12:33 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.0° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74854-1

Date Collected: 02/01/18 15:00

Matrix: Water

Date Received: 02/02/18 12:33

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			02/08/18 15:14	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	108		74 - 123					02/08/18 15:14	1
Toluene-d8 (Surr)	90		79 - 122					02/08/18 15:14	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 120					02/08/18 15:14	1
4-Bromofluorobenzene (Surr)	101		78 - 119					02/08/18 15:14	1
Dibromofluoromethane (Surr)	103		70 - 120					02/08/18 15:14	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		02/05/18 09:03	02/05/18 20:27	1
Benzo[a]pyrene	ND		0.020	0.0031	ug/L		02/05/18 09:03	02/05/18 20:27	1
Benzo[b]fluoranthene	ND		0.020	0.0082	ug/L		02/05/18 09:03	02/05/18 20:27	1
Benzo[k]fluoranthene	ND		0.031	0.0092	ug/L		02/05/18 09:03	02/05/18 20:27	1
Chrysene	ND		0.020	0.0061	ug/L		02/05/18 09:03	02/05/18 20:27	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		02/05/18 09:03	02/05/18 20:27	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0072	ug/L		02/05/18 09:03	02/05/18 20:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	83		53 - 112				02/05/18 09:03	02/05/18 20:27	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/06/18 14:31	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		58 - 133					02/06/18 14:31	1
Trifluorotoluene (Surr)	96		77 - 128					02/06/18 14:31	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		02/06/18 09:21	02/06/18 19:11	1
Motor Oil (>C24-C36)	ND		0.36	0.098	mg/L		02/06/18 09:21	02/06/18 19:11	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	71		50 - 150				02/06/18 09:21	02/06/18 19:11	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Client Sample ID: Dup-1
Date Collected: 02/01/18 00:01
Date Received: 02/02/18 12:33

Lab Sample ID: 580-74854-2
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			02/08/18 16:40	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	108		74 - 123					02/08/18 16:40	1
Toluene-d8 (Surr)	91		79 - 122					02/08/18 16:40	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					02/08/18 16:40	1
4-Bromofluorobenzene (Surr)	100		78 - 119					02/08/18 16:40	1
Dibromofluoromethane (Surr)	101		70 - 120					02/08/18 16:40	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		02/05/18 09:03	02/05/18 20:51	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		02/05/18 09:03	02/05/18 20:51	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		02/05/18 09:03	02/05/18 20:51	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		02/05/18 09:03	02/05/18 20:51	1
Chrysene	ND		0.020	0.0061	ug/L		02/05/18 09:03	02/05/18 20:51	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		02/05/18 09:03	02/05/18 20:51	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		02/05/18 09:03	02/05/18 20:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	80		53 - 112				02/05/18 09:03	02/05/18 20:51	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/06/18 16:06	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		58 - 133					02/06/18 16:06	1
Trifluorotoluene (Surr)	106		77 - 128					02/06/18 16:06	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		02/06/18 09:21	02/06/18 20:18	1
Motor Oil (>C24-C36)	ND		0.35	0.097	mg/L		02/06/18 09:21	02/06/18 20:18	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	71		50 - 150				02/06/18 09:21	02/06/18 20:18	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-74854-3

Date Collected: 02/01/18 00:01

Matrix: Water

Date Received: 02/02/18 12:33

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			02/08/18 14:45	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	105		74 - 123					02/08/18 14:45	1
Toluene-d8 (Surr)	91		79 - 122					02/08/18 14:45	1
1,2-Dichloroethane-d4 (Surr)	109		70 - 120					02/08/18 14:45	1
4-Bromofluorobenzene (Surr)	101		78 - 119					02/08/18 14:45	1
Dibromofluoromethane (Surr)	104		70 - 120					02/08/18 14:45	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/06/18 14:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		58 - 133					02/06/18 14:00	1
Trifluorotoluene (Surr)	109		77 - 128					02/06/18 14:00	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-266916/5

Matrix: Water

Analysis Batch: 266916

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			02/08/18 12:50	1

Surrogate	%Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	107		74 - 123		02/08/18 12:50	1
Toluene-d8 (Surr)	93		79 - 122		02/08/18 12:50	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120		02/08/18 12:50	1
4-Bromofluorobenzene (Surr)	101		78 - 119		02/08/18 12:50	1
Dibromofluoromethane (Surr)	101		70 - 120		02/08/18 12:50	1

Lab Sample ID: LCS 580-266916/6

Matrix: Water

Analysis Batch: 266916

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.27		ug/L		93	37 - 151

Surrogate	%Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	106		74 - 123
Toluene-d8 (Surr)	93		79 - 122
1,2-Dichloroethane-d4 (Surr)	106		70 - 120
4-Bromofluorobenzene (Surr)	103		78 - 119
Dibromofluoromethane (Surr)	104		70 - 120

Lab Sample ID: LCSD 580-266916/7

Matrix: Water

Analysis Batch: 266916

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.78		ug/L		98	37 - 151	5	30

Surrogate	%Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	106		74 - 123
Toluene-d8 (Surr)	91		79 - 122
1,2-Dichloroethane-d4 (Surr)	104		70 - 120
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120

Lab Sample ID: 580-74854-1 MS

Matrix: Water

Analysis Batch: 266916

Client Sample ID: Outfall #002

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	ND		11.6	12.5		ug/L		108	37 - 151

Surrogate	%Recovery	MS Qualifier	Limits
Trifluorotoluene (Surr)	107		74 - 123
Toluene-d8 (Surr)	92		79 - 122

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-74854-1 MS
Matrix: Water
Analysis Batch: 266916

Client Sample ID: Outfall #002
Prep Type: Total/NA

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	105		70 - 120
4-Bromofluorobenzene (Surr)	103		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120

Lab Sample ID: 580-74854-1 MSD
Matrix: Water
Analysis Batch: 266916

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	ND		11.6	12.8		ug/L		110	37 - 151	2	30

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Trifluorotoluene (Surr)	106		74 - 123
Toluene-d8 (Surr)	93		79 - 122
1,2-Dichloroethane-d4 (Surr)	106		70 - 120
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-266640/1-A
Matrix: Water
Analysis Batch: 266691

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266640

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		02/05/18 09:03	02/05/18 17:12	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		02/05/18 09:03	02/05/18 17:12	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		02/05/18 09:03	02/05/18 17:12	1
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		02/05/18 09:03	02/05/18 17:12	1
Chrysene	ND		0.020	0.0060	ug/L		02/05/18 09:03	02/05/18 17:12	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		02/05/18 09:03	02/05/18 17:12	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		02/05/18 09:03	02/05/18 17:12	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	92		53 - 112	02/05/18 09:03	02/05/18 17:12	1

Lab Sample ID: LCS 580-266640/2-A
Matrix: Water
Analysis Batch: 266691

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266640

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.76		ug/L		94	71 - 120
Benzo[a]pyrene	4.00	3.97		ug/L		99	76 - 120
Benzo[b]fluoranthene	4.00	3.71		ug/L		93	66 - 120
Benzo[k]fluoranthene	4.00	3.68		ug/L		92	68 - 120
Chrysene	4.00	3.48		ug/L		87	64 - 120
Dibenz(a,h)anthracene	4.00	4.16		ug/L		104	60 - 125

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: LCS 580-266640/2-A
Matrix: Water
Analysis Batch: 266691

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266640

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Indeno[1,2,3-cd]pyrene	4.00	3.95		ug/L		99	63 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	82		53 - 112

Lab Sample ID: LCSD 580-266640/3-A
Matrix: Water
Analysis Batch: 266691

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 266640

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzo[a]anthracene	4.00	3.83		ug/L		96	71 - 120	2	16
Benzo[a]pyrene	4.00	4.00		ug/L		100	76 - 120	1	17
Benzo[b]fluoranthene	4.00	3.88		ug/L		97	66 - 120	4	20
Benzo[k]fluoranthene	4.00	3.65		ug/L		91	68 - 120	1	20
Chrysene	4.00	3.52		ug/L		88	64 - 120	1	16
Dibenz(a,h)anthracene	4.00	3.92		ug/L		98	60 - 125	6	15
Indeno[1,2,3-cd]pyrene	4.00	4.06		ug/L		101	63 - 120	3	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	82		53 - 112

Lab Sample ID: 580-74854-1 MS
Matrix: Water
Analysis Batch: 266691

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 266640

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	ND		4.17	3.58		ug/L		86	71 - 120
Benzo[a]pyrene	ND		4.17	3.74		ug/L		90	76 - 120
Benzo[b]fluoranthene	ND		4.17	3.63		ug/L		87	66 - 120
Benzo[k]fluoranthene	ND		4.17	3.29		ug/L		79	68 - 120
Chrysene	ND		4.17	3.25		ug/L		78	64 - 120
Dibenz(a,h)anthracene	ND		4.17	3.88		ug/L		93	60 - 125
Indeno[1,2,3-cd]pyrene	ND		4.17	3.80		ug/L		91	63 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
Terphenyl-d14	74		53 - 112

Lab Sample ID: 580-74854-1 MSD
Matrix: Water
Analysis Batch: 266691

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 266640

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzo[a]anthracene	ND		4.06	3.48		ug/L		86	71 - 120	3	16
Benzo[a]pyrene	ND		4.06	3.54		ug/L		87	76 - 120	6	17
Benzo[b]fluoranthene	ND		4.06	3.36		ug/L		83	66 - 120	8	20
Benzo[k]fluoranthene	ND		4.06	3.10		ug/L		76	68 - 120	6	20
Chrysene	ND		4.06	3.14		ug/L		77	64 - 120	4	16

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: 580-74854-1 MSD
Matrix: Water
Analysis Batch: 266691

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 266640

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Dibenz(a,h)anthracene	ND		4.06	3.61		ug/L		89	60 - 125	7	15
Indeno[1,2,3-cd]pyrene	ND		4.06	3.52		ug/L		87	63 - 120	8	15
Surrogate	%Recovery	MSD Qualifier	Limits								
Terphenyl-d14	74		53 - 112								

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-266742/5
Matrix: Water
Analysis Batch: 266742

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/06/18 12:25	1
Surrogate	%Recovery	MB Qualifier	Limits						
4-Bromofluorobenzene (Surr)	95		58 - 133						
Trifluorotoluene (Surr)	96		77 - 128						

Lab Sample ID: LCS 580-266742/6
Matrix: Water
Analysis Batch: 266742

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.952		mg/L		95	79 - 110
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	102		58 - 133				
Trifluorotoluene (Surr)	98		77 - 128				

Lab Sample ID: LCSD 580-266742/7
Matrix: Water
Analysis Batch: 266742

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.971		mg/L		97	79 - 110	2	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	103		58 - 133						
Trifluorotoluene (Surr)	99		77 - 128						

Lab Sample ID: 580-74854-1 MS
Matrix: Water
Analysis Batch: 266742

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	ND		1.00	0.898		mg/L		90	79 - 110

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Surrogate	MS %Recovery	MS Qualifier	Limits
4-Bromofluorobenzene (Surr)	99		58 - 133
Trifluorotoluene (Surr)	111		77 - 128

Lab Sample ID: 580-74854-1 MSD
Matrix: Water
Analysis Batch: 266742

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	ND		1.00	0.941		mg/L		94	79 - 110	5	10

Surrogate	MSD %Recovery	MSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	99		58 - 133
Trifluorotoluene (Surr)	106		77 - 128

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-266712/1-B
Matrix: Water
Analysis Batch: 266768

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266712

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		02/06/18 09:21	02/06/18 17:22	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		02/06/18 09:21	02/06/18 17:22	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	76		50 - 150	02/06/18 09:21	02/06/18 17:22	1

Lab Sample ID: LCS 580-266712/2-B
Matrix: Water
Analysis Batch: 266768

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266712

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.65		mg/L		83	59 - 112
Motor Oil (>C24-C36)	2.00	1.84		mg/L		92	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	90		50 - 150

Lab Sample ID: LCSD 580-266712/3-B
Matrix: Water
Analysis Batch: 266768

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 266712

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.72		mg/L		86	59 - 112	4	16
Motor Oil (>C24-C36)	2.00	1.92		mg/L		96	64 - 120	4	17

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
o-Terphenyl	93		50 - 150

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: 580-74854-1 MS
Matrix: Water
Analysis Batch: 266768

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 266712
%Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits	
#2 Diesel (C10-C24)	ND		2.03	1.51		mg/L		75	59 - 112	
Motor Oil (>C24-C36)	ND		2.03	1.87		mg/L		93	64 - 120	
		MS	MS							
Surrogate	%Recovery	Qualifier	Limits							
<i>o-Terphenyl</i>	87		50 - 150							

Lab Sample ID: 580-74854-1 MSD
Matrix: Water
Analysis Batch: 266768

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 266712
%Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	ND		2.02	1.54		mg/L		76	59 - 112	2	16
Motor Oil (>C24-C36)	ND		2.02	1.88		mg/L		93	64 - 120	0	17
		MSD	MSD								
Surrogate	%Recovery	Qualifier	Limits								
<i>o-Terphenyl</i>	86		50 - 150								

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Client Sample ID: Outfall #002

Date Collected: 02/01/18 15:00

Date Received: 02/02/18 12:33

Lab Sample ID: 580-74854-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	266916	02/08/18 15:14	P1P	TAL SEA
Total/NA	Prep	3510C			266640	02/05/18 09:03	NDB	TAL SEA
Total/NA	Analysis	8270D SIM		1	266691	02/05/18 20:27	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	266742	02/06/18 14:31	JCV	TAL SEA
Total/NA	Prep	3510C			266712	02/06/18 09:21	NDB	TAL SEA
Total/NA	Cleanup	3630C			266750	02/06/18 12:34	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	266768	02/06/18 19:11	ADB	TAL SEA

Client Sample ID: Dup-1

Date Collected: 02/01/18 00:01

Date Received: 02/02/18 12:33

Lab Sample ID: 580-74854-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	266916	02/08/18 16:40	P1P	TAL SEA
Total/NA	Prep	3510C			266640	02/05/18 09:03	NDB	TAL SEA
Total/NA	Analysis	8270D SIM		1	266691	02/05/18 20:51	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	266742	02/06/18 16:06	JCV	TAL SEA
Total/NA	Prep	3510C			266712	02/06/18 09:21	NDB	TAL SEA
Total/NA	Cleanup	3630C			266750	02/06/18 12:34	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	266768	02/06/18 20:18	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 02/01/18 00:01

Date Received: 02/02/18 12:33

Lab Sample ID: 580-74854-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	266916	02/08/18 14:45	P1P	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	266742	02/06/18 14:00	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74854-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-74854-1	Outfall #002	Water	02/01/18 15:00	02/02/18 12:33
580-74854-2	Dup-1	Water	02/01/18 00:01	02/02/18 12:33
580-74854-3	Trip Blank	Water	02/01/18 00:01	02/02/18 12:33

- 1
- 2
- 3
- 4
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- 6
- 7
- 8
- 9
- 10
- 11

Client Arcadis Client Contact Peter Campbell Date 2/1/18 Chain of Custody Number 36596
 Address 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number _____ Lab Number _____
 City Seattle State WA Zip Code 98101 Sampler Jason Little Lab Contact Elaine Walker Page 1 of 1

Project Name and Location (State) Edmonds Terminal Billing Contact _____ Analysis (Attach list if more space is needed)
 Contract/Purchase Order/Quote No. _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt	
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		
Outfall #002	2/1/18	1500		X			2					8		Benzene EPA 624 MANTPH - GIX MANTPH - Dk W/SGC CPAN 8270C SINA PH ^{EPZ} = 7.58
outfall #002 MS/MSD	2/1/18	1510		X			2					8		
DUP-1	2/1/18	—		X			2					8		
Trip Blank	—	—		X								6		



580-74854 Chain of Custody

Therm. ID A7 Cor 0.0 Unc 0.9
 Cooler Desc by Binc @ Lab MS
 Wet/Packs Packing Bubbler
 Custody Seal: Yes No

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown
 Sample Disposal Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify) _____

1. Relinquished By <u>Eriz Kowcs</u> Sign/Print _____ Date <u>2/2/18</u> Time <u>1233</u>	1. Received By <u>Francisco Lung Jr</u> Sign/Print _____ Date <u>2/2/18</u> Time <u>1233</u>
2. Relinquished By _____ Sign/Print _____ Date _____ Time _____	2. Received By _____ Sign/Print _____ Date _____ Time _____
3. Relinquished By _____ Sign/Print _____ Date _____ Time _____	3. Received By _____ Sign/Print _____ Date _____ Time _____

Comments _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-74854-1

Login Number: 74854

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-74956-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
2/12/2018 4:04:31 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
TotalAccess

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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Job ID: 580-74956-1

Laboratory: TestAmerica Seattle

Narrative

**Job Narrative
580-74956-1**

Receipt

Two samples were received on 2/7/2018 12:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.1° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74956-1

Date Collected: 02/06/18 10:30

Matrix: Water

Date Received: 02/07/18 12:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			02/08/18 17:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	108		74 - 123					02/08/18 17:09	1
Toluene-d8 (Surr)	92		79 - 122					02/08/18 17:09	1
4-Bromofluorobenzene (Surr)	100		78 - 119					02/08/18 17:09	1
Dibromofluoromethane (Surr)	101		70 - 120					02/08/18 17:09	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					02/08/18 17:09	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0053	J	0.020	0.0020	ug/L		02/08/18 13:22	02/09/18 20:48	1
Benzo[a]pyrene	0.0048	J	0.020	0.0030	ug/L		02/08/18 13:22	02/09/18 20:48	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		02/08/18 13:22	02/09/18 20:48	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		02/08/18 13:22	02/09/18 20:48	1
Chrysene	ND		0.020	0.0061	ug/L		02/08/18 13:22	02/09/18 20:48	1
Dibenz(a,h)anthracene	0.0026	J	0.020	0.0020	ug/L		02/08/18 13:22	02/09/18 20:48	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		02/08/18 13:22	02/09/18 20:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	73		53 - 112				02/08/18 13:22	02/09/18 20:48	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/08/18 19:35	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		58 - 133					02/08/18 19:35	1
Trifluorotoluene (Surr)	106		77 - 128					02/08/18 19:35	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		02/08/18 09:29	02/08/18 18:11	1
Motor Oil (>C24-C36)	ND		0.35	0.097	mg/L		02/08/18 09:29	02/08/18 18:11	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	78		50 - 150				02/08/18 09:29	02/08/18 18:11	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-74956-2

Date Collected: 02/06/18 00:01

Matrix: Water

Date Received: 02/07/18 12:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			02/08/18 14:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	106		74 - 123					02/08/18 14:17	1
<i>Toluene-d8 (Surr)</i>	92		79 - 122					02/08/18 14:17	1
<i>4-Bromofluorobenzene (Surr)</i>	101		78 - 119					02/08/18 14:17	1
<i>Dibromofluoromethane (Surr)</i>	102		70 - 120					02/08/18 14:17	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	106		70 - 120					02/08/18 14:17	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/08/18 19:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	94		58 - 133					02/08/18 19:03	1
<i>Trifluorotoluene (Surr)</i>	87		77 - 128					02/08/18 19:03	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-266916/5
Matrix: Water
Analysis Batch: 266916

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			02/08/18 12:50	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	107		74 - 123					02/08/18 12:50	1
Toluene-d8 (Surr)	93		79 - 122					02/08/18 12:50	1
4-Bromofluorobenzene (Surr)	101		78 - 119					02/08/18 12:50	1
Dibromofluoromethane (Surr)	101		70 - 120					02/08/18 12:50	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120					02/08/18 12:50	1

Lab Sample ID: LCS 580-266916/6
Matrix: Water
Analysis Batch: 266916

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.27		ug/L		93	37 - 151
Surrogate	%Recovery	LCS Qualifier	Limits				
Trifluorotoluene (Surr)	106		74 - 123				
Toluene-d8 (Surr)	93		79 - 122				
4-Bromofluorobenzene (Surr)	103		78 - 119				
Dibromofluoromethane (Surr)	104		70 - 120				
1,2-Dichloroethane-d4 (Surr)	106		70 - 120				

Lab Sample ID: LCSD 580-266916/7
Matrix: Water
Analysis Batch: 266916

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.78		ug/L		98	37 - 151	5	30
Surrogate	%Recovery	LCSD Qualifier	Limits						
Trifluorotoluene (Surr)	106		74 - 123						
Toluene-d8 (Surr)	91		79 - 122						
4-Bromofluorobenzene (Surr)	102		78 - 119						
Dibromofluoromethane (Surr)	101		70 - 120						
1,2-Dichloroethane-d4 (Surr)	104		70 - 120						

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-266949/1-A
Matrix: Water
Analysis Batch: 267043

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266949

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		02/08/18 13:22	02/09/18 19:35	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		02/08/18 13:22	02/09/18 19:35	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		02/08/18 13:22	02/09/18 19:35	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-266949/1-A
Matrix: Water
Analysis Batch: 267043

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266949

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		02/08/18 13:22	02/09/18 19:35	1
Chrysene	ND		0.020	0.0060	ug/L		02/08/18 13:22	02/09/18 19:35	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		02/08/18 13:22	02/09/18 19:35	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		02/08/18 13:22	02/09/18 19:35	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	99		53 - 112	02/08/18 13:22	02/09/18 19:35	1

Lab Sample ID: LCS 580-266949/2-A
Matrix: Water
Analysis Batch: 267043

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266949

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.58		ug/L		90	71 - 120
Benzo[a]pyrene	4.00	3.92		ug/L		98	76 - 120
Benzo[b]fluoranthene	4.00	3.80		ug/L		95	66 - 120
Benzo[k]fluoranthene	4.00	3.94		ug/L		99	68 - 120
Chrysene	4.00	3.58		ug/L		89	64 - 120
Dibenz(a,h)anthracene	4.00	3.91		ug/L		98	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.56		ug/L		89	63 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	78		53 - 112

Lab Sample ID: LCSD 580-266949/3-A
Matrix: Water
Analysis Batch: 267043

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 266949

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.50		ug/L		87	71 - 120	2	16
Benzo[a]pyrene	4.00	3.88		ug/L		97	76 - 120	1	17
Benzo[b]fluoranthene	4.00	3.76		ug/L		94	66 - 120	1	20
Benzo[k]fluoranthene	4.00	3.84		ug/L		96	68 - 120	3	20
Chrysene	4.00	3.49		ug/L		87	64 - 120	3	16
Dibenz(a,h)anthracene	4.00	3.90		ug/L		97	60 - 125	0	15
Indeno[1,2,3-cd]pyrene	4.00	3.51		ug/L		88	63 - 120	1	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	75		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-266996/5
Matrix: Water
Analysis Batch: 266996

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/08/18 17:28	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		58 - 133					02/08/18 17:28	1
Trifluorotoluene (Surr)	96		77 - 128					02/08/18 17:28	1

Lab Sample ID: LCS 580-266996/6
Matrix: Water
Analysis Batch: 266996

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.924		mg/L		92	79 - 110
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	105		58 - 133				
Trifluorotoluene (Surr)	90		77 - 128				

Lab Sample ID: LCSD 580-266996/7
Matrix: Water
Analysis Batch: 266996

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.944		mg/L		94	79 - 110	2	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	101		58 - 133						
Trifluorotoluene (Surr)	92		77 - 128						

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-266907/1-B
Matrix: Water
Analysis Batch: 266963

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266907

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		02/08/18 09:29	02/08/18 17:05	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		02/08/18 09:29	02/08/18 17:05	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	77		50 - 150				02/08/18 09:29	02/08/18 17:05	1

Lab Sample ID: LCS 580-266907/2-B
Matrix: Water
Analysis Batch: 266963

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266907

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.69		mg/L		85	59 - 112

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-266907/2-B
Matrix: Water
Analysis Batch: 266963

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266907
%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.85		mg/L		93	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	90		50 - 150

Lab Sample ID: LCSD 580-266907/3-B
Matrix: Water
Analysis Batch: 266963

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 266907
%Rec.

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.70		mg/L		85	59 - 112	1	16
Motor Oil (>C24-C36)	2.00	1.88		mg/L		94	64 - 120	2	17

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	95		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74956-1

Date Collected: 02/06/18 10:30

Matrix: Water

Date Received: 02/07/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	266916	02/08/18 17:09	P1P	TAL SEA
Total/NA	Prep	3510C			266949	02/08/18 13:22	NDB	TAL SEA
Total/NA	Analysis	8270D SIM		1	267043	02/09/18 20:48	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	266996	02/08/18 19:35	JCV	TAL SEA
Total/NA	Prep	3510C			266907	02/08/18 09:29	NDB	TAL SEA
Total/NA	Cleanup	3630C			266953	02/08/18 13:22	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	266963	02/08/18 18:11	ADB	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-74956-2

Date Collected: 02/06/18 00:01

Matrix: Water

Date Received: 02/07/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	266916	02/08/18 14:17	P1P	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	266996	02/08/18 19:03	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74956-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-74956-1	Outfall #002	Water	02/06/18 10:30	02/07/18 12:00
580-74956-2	Trip Blank	Water	02/06/18 00:01	02/07/18 12:00

1

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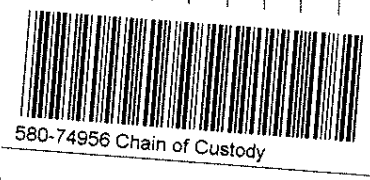
10

11

Client: Arcadis Client Contact: Peter Campbell Date: 2/6/18 Chain of Custody Number: 36540
Address: 1100 Olive way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____
City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Walker Page 1 of 1

Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed): _____
Contract/Purchase Order/Quote No.: _____ Loc: 580 74956 Special Instructions/Conditions of Receipt: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives								Special Instructions/Conditions of Receipt					
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Other							
<u>Outfall #002</u> <u>Trip Blank</u>	<u>2/6/18</u>	<u>1030</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>2</u>				<u>8</u>									<u>PH = 7.70</u>



Therm. ID 17 Cor 0.1 Unc 1.0
Cooler Desc Sm Blnd @Lab 1300
Wet/Packs Packing Bubble
Custody Seal: Yes No

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By Sign/Print: <u>Jason Little</u>	Date: <u>2/7/18</u> Time: <u>1200</u>	1. Received By Sign/Print: <u>FRANCISCO LUNA, JR</u>	Date: <u>2/7/18</u> Time: <u>1200</u>
2. Relinquished By Sign/Print: _____	Date: _____ Time: _____	2. Received By Sign/Print: _____	Date: _____ Time: _____
3. Relinquished By Sign/Print: _____	Date: _____ Time: _____	3. Received By Sign/Print: _____	Date: _____ Time: _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-74956-1

Login Number: 74956

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-75109-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
2/20/2018 2:02:58 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Job ID: 580-75109-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-75109-1

Receipt

Two samples were received on 2/14/2018 12:20 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.8° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270D SIM: The method blank for preparation batch 580-267557 and analytical batch 580-267585 contained Benzo[a]anthracene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-75109-1

Date Collected: 02/13/18 11:30

Matrix: Water

Date Received: 02/14/18 12:20

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			02/15/18 23:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	105		74 - 123					02/15/18 23:03	1
Toluene-d8 (Surr)	99		79 - 122					02/15/18 23:03	1
4-Bromofluorobenzene (Surr)	106		78 - 119					02/15/18 23:03	1
Dibromofluoromethane (Surr)	110		70 - 120					02/15/18 23:03	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 120					02/15/18 23:03	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0043	J B	0.020	0.0020	ug/L		02/19/18 08:56	02/19/18 15:18	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		02/19/18 08:56	02/19/18 15:18	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		02/19/18 08:56	02/19/18 15:18	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		02/19/18 08:56	02/19/18 15:18	1
Chrysene	ND		0.020	0.0061	ug/L		02/19/18 08:56	02/19/18 15:18	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		02/19/18 08:56	02/19/18 15:18	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		02/19/18 08:56	02/19/18 15:18	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	83		53 - 112				02/19/18 08:56	02/19/18 15:18	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/15/18 15:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		58 - 133					02/15/18 15:49	1
Trifluorotoluene (Surr)	117		77 - 128					02/15/18 15:49	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		02/15/18 13:17	02/16/18 01:30	1
Motor Oil (>C24-C36)	ND		0.36	0.097	mg/L		02/15/18 13:17	02/16/18 01:30	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	62		50 - 150				02/15/18 13:17	02/16/18 01:30	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-75109-2

Date Collected: 02/13/18 00:01

Matrix: Water

Date Received: 02/14/18 12:20

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			02/15/18 15:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	105		74 - 123					02/15/18 15:28	1
<i>Toluene-d8 (Surr)</i>	96		79 - 122					02/15/18 15:28	1
<i>4-Bromofluorobenzene (Surr)</i>	102		78 - 119					02/15/18 15:28	1
<i>Dibromofluoromethane (Surr)</i>	104		70 - 120					02/15/18 15:28	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	107		70 - 120					02/15/18 15:28	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/15/18 14:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	89		58 - 133					02/15/18 14:48	1
<i>Trifluorotoluene (Surr)</i>	109		77 - 128					02/15/18 14:48	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-267378/5

Matrix: Water

Analysis Batch: 267378

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			02/15/18 13:41	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	104		74 - 123		02/15/18 13:41	1
Toluene-d8 (Surr)	95		79 - 122		02/15/18 13:41	1
4-Bromofluorobenzene (Surr)	101		78 - 119		02/15/18 13:41	1
Dibromofluoromethane (Surr)	105		70 - 120		02/15/18 13:41	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120		02/15/18 13:41	1

Lab Sample ID: LCS 580-267378/6

Matrix: Water

Analysis Batch: 267378

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.3		ug/L		103	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	104		74 - 123
Toluene-d8 (Surr)	93		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	103		70 - 120
1,2-Dichloroethane-d4 (Surr)	103		70 - 120

Lab Sample ID: LCSD 580-267378/7

Matrix: Water

Analysis Batch: 267378

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.9		ug/L		109	37 - 151	5	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	104		74 - 123
Toluene-d8 (Surr)	97		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	103		70 - 120
1,2-Dichloroethane-d4 (Surr)	102		70 - 120

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-267557/1-A

Matrix: Water

Analysis Batch: 267585

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 267557

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00255	J	0.020	0.0020	ug/L		02/19/18 08:56	02/19/18 14:06	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		02/19/18 08:56	02/19/18 14:06	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		02/19/18 08:56	02/19/18 14:06	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-267557/1-A
Matrix: Water
Analysis Batch: 267585

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 267557

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		02/19/18 08:56	02/19/18 14:06	1
Chrysene	ND		0.020	0.0060	ug/L		02/19/18 08:56	02/19/18 14:06	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		02/19/18 08:56	02/19/18 14:06	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		02/19/18 08:56	02/19/18 14:06	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	96		53 - 112	02/19/18 08:56	02/19/18 14:06	1

Lab Sample ID: LCS 580-267557/2-A
Matrix: Water
Analysis Batch: 267585

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 267557

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.64		ug/L		91	71 - 120
Benzo[a]pyrene	4.00	3.93		ug/L		98	76 - 120
Benzo[b]fluoranthene	4.00	3.69		ug/L		92	66 - 120
Benzo[k]fluoranthene	4.00	3.81		ug/L		95	68 - 120
Chrysene	4.00	3.54		ug/L		88	64 - 120
Dibenz(a,h)anthracene	4.00	3.99		ug/L		100	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.66		ug/L		92	63 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	88		53 - 112

Lab Sample ID: LCSD 580-267557/3-A
Matrix: Water
Analysis Batch: 267585

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 267557

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.79		ug/L		95	71 - 120	4	16
Benzo[a]pyrene	4.00	4.11		ug/L		103	76 - 120	5	17
Benzo[b]fluoranthene	4.00	3.91		ug/L		98	66 - 120	6	20
Benzo[k]fluoranthene	4.00	3.87		ug/L		97	68 - 120	2	20
Chrysene	4.00	3.61		ug/L		90	64 - 120	2	16
Dibenz(a,h)anthracene	4.00	4.04		ug/L		101	60 - 125	1	15
Indeno[1,2,3-cd]pyrene	4.00	3.82		ug/L		96	63 - 120	4	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	88		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-267389/6

Matrix: Water

Analysis Batch: 267389

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/15/18 13:17	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		58 - 133					02/15/18 13:17	1
Trifluorotoluene (Surr)	111		77 - 128					02/15/18 13:17	1

Lab Sample ID: LCS 580-267389/7

Matrix: Water

Analysis Batch: 267389

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.886		mg/L		89	79 - 110
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	92		58 - 133				
Trifluorotoluene (Surr)	98		77 - 128				

Lab Sample ID: LCSD 580-267389/8

Matrix: Water

Analysis Batch: 267389

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.966		mg/L		97	79 - 110	9	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	92		58 - 133						
Trifluorotoluene (Surr)	106		77 - 128						

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-267402/1-B

Matrix: Water

Analysis Batch: 267426

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 267402

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		02/15/18 13:17	02/16/18 11:18	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		02/15/18 13:17	02/16/18 11:18	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	69		50 - 150				02/15/18 13:17	02/16/18 11:18	1

Lab Sample ID: LCS 580-267402/2-B

Matrix: Water

Analysis Batch: 267426

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 267402

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.64		mg/L		82	59 - 112

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-267402/2-B
Matrix: Water
Analysis Batch: 267426

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 267402
%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.72		mg/L		86	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	81		50 - 150

Lab Sample ID: LCSD 580-267402/3-B
Matrix: Water
Analysis Batch: 267426

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 267402
%Rec.
RPD

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.58		mg/L		79	59 - 112	4	16
Motor Oil (>C24-C36)	2.00	1.68		mg/L		84	64 - 120	3	17

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	78		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Client Sample ID: Outfall #002

Date Collected: 02/13/18 11:30

Date Received: 02/14/18 12:20

Lab Sample ID: 580-75109-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	267378	02/15/18 23:03	P1P	TAL SEA
Total/NA	Prep	3510C			267557	02/19/18 08:56	NDB	TAL SEA
Total/NA	Analysis	8270D SIM		1	267585	02/19/18 15:18	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	267389	02/15/18 15:49	JCV	TAL SEA
Total/NA	Prep	3510C			267402	02/15/18 13:17	NDB	TAL SEA
Total/NA	Cleanup	3630C			267448	02/15/18 16:24	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	267426	02/16/18 01:30	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 02/13/18 00:01

Date Received: 02/14/18 12:20

Lab Sample ID: 580-75109-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	267378	02/15/18 15:28	P1P	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	267389	02/15/18 14:48	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-75109-1	Outfall #002	Water	02/13/18 11:30	02/14/18 12:20
580-75109-2	Trip Blank	Water	02/13/18 00:01	02/14/18 12:20

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Client: **Arcadis** Client Contact: **Peter Campbell** Date: **2/13/18** Chain of Custody Number: **36687**
Address: **1100 Olive way, Suite 800** Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____
City: **Seattle** State: **WA** Zip Code: **98101** Sampler: **Jason Little** Lab Contact: **Elaine Walker** Page **1** of **1**

Project Name and Location (State): **Edmonds Terminal** Billing Contact: _____
Contract/Purchase Order/Quote No.: _____ Analysis (Attach list if more space is needed)

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Benzene EPA 624	NWI PH - 6x	NWI PH - D.L.W. / SBC	CPAHS 8270C SA	Special Instructions/ Conditions of Receipt	
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH						
Outfall #002	2/13/17	1130	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	PH=
Trip Blank	—	—	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



580-75109 Chain of Custody

Therm. ID AZ Cor 0.80 Unc 1.70
Cooler Dsc: Ins Red
Wet/Packs Packing: Bubble
Custody Seal: Yes No

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify)

Relinquished By Sign/Print	Date	Time	Received By Sign/Print	Date	Time
<i>[Signature]</i> Jason Little	2/14/18	1220	<i>[Signature]</i> Francisco Luna, Jr	2/14/18	1220
2. Relinquished By Sign/Print	Date	Time	2. Received By Sign/Print	Date	Time
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-75109-1

Login Number: 75109

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	N/A	Not Present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	False	Headspace larger than 1/4".
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-75387-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
3/8/2018 4:14:45 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Job ID: 580-75387-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-75387-1

Receipt

Two samples were received on 2/28/2018 12:10 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.5° C.

GC/MS VOA

Method(s) NWTPH-Gx: Surrogate recovery for the following sample was outside the upper control limit: Trip Blank (580-75387-2). This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Qualifiers

GC VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-75387-1

Date Collected: 02/27/18 10:00

Matrix: Water

Date Received: 02/28/18 12:10

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			03/06/18 05:08	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	106		74 - 123					03/06/18 05:08	1
<i>Toluene-d8 (Surr)</i>	94		79 - 122					03/06/18 05:08	1
<i>4-Bromofluorobenzene (Surr)</i>	109		78 - 119					03/06/18 05:08	1
<i>Dibromofluoromethane (Surr)</i>	107		70 - 120					03/06/18 05:08	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	106		70 - 120					03/06/18 05:08	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.021	0.0021	ug/L		03/01/18 13:32	03/05/18 18:27	1
Chrysene	ND		0.021	0.0062	ug/L		03/01/18 13:32	03/05/18 18:27	1
Benzo[b]fluoranthene	ND		0.021	0.0083	ug/L		03/01/18 13:32	03/05/18 18:27	1
Benzo[k]fluoranthene	ND		0.031	0.0093	ug/L		03/01/18 13:32	03/05/18 18:27	1
Benzo[a]pyrene	ND		0.021	0.0031	ug/L		03/01/18 13:32	03/05/18 18:27	1
Indeno[1,2,3-cd]pyrene	ND		0.021	0.0072	ug/L		03/01/18 13:32	03/05/18 18:27	1
Dibenz(a,h)anthracene	ND		0.021	0.0021	ug/L		03/01/18 13:32	03/05/18 18:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Terphenyl-d14</i>	83		53 - 112				03/01/18 13:32	03/05/18 18:27	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/07/18 15:35	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	89		58 - 133					03/07/18 15:35	1
<i>Trifluorotoluene (Surr)</i>	103		77 - 128					03/07/18 15:35	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		03/02/18 08:07	03/07/18 16:47	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		03/02/18 08:07	03/07/18 16:47	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o-Terphenyl</i>	80		50 - 150				03/02/18 08:07	03/07/18 16:47	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-75387-2

Date Collected: 02/27/18 10:00

Matrix: Water

Date Received: 02/28/18 12:10

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			03/06/18 04:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	113		74 - 123					03/06/18 04:41	1
<i>Toluene-d8 (Surr)</i>	94		79 - 122					03/06/18 04:41	1
<i>4-Bromofluorobenzene (Surr)</i>	102		78 - 119					03/06/18 04:41	1
<i>Dibromofluoromethane (Surr)</i>	110		70 - 120					03/06/18 04:41	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	110		70 - 120					03/06/18 04:41	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/07/18 15:04	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	89		58 - 133					03/07/18 15:04	1
<i>Trifluorotoluene (Surr)</i>	135	X	77 - 128					03/07/18 15:04	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-268340/5

Matrix: Water

Analysis Batch: 268340

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			03/06/18 02:54	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	117		74 - 123		03/06/18 02:54	1
Toluene-d8 (Surr)	92		79 - 122		03/06/18 02:54	1
4-Bromofluorobenzene (Surr)	104		78 - 119		03/06/18 02:54	1
Dibromofluoromethane (Surr)	109		70 - 120		03/06/18 02:54	1
1,2-Dichloroethane-d4 (Surr)	112		70 - 120		03/06/18 02:54	1

Lab Sample ID: LCS 580-268340/6

Matrix: Water

Analysis Batch: 268340

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.2		ug/L		102	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	115		74 - 123
Toluene-d8 (Surr)	93		79 - 122
4-Bromofluorobenzene (Surr)	106		78 - 119
Dibromofluoromethane (Surr)	106		70 - 120
1,2-Dichloroethane-d4 (Surr)	106		70 - 120

Lab Sample ID: LCSD 580-268340/7

Matrix: Water

Analysis Batch: 268340

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	11.0		ug/L		110	37 - 151	7	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	109		74 - 123
Toluene-d8 (Surr)	92		79 - 122
4-Bromofluorobenzene (Surr)	104		78 - 119
Dibromofluoromethane (Surr)	108		70 - 120
1,2-Dichloroethane-d4 (Surr)	108		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-268174/1-A

Matrix: Water

Analysis Batch: 268287

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 268174

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		03/01/18 13:32	03/02/18 15:05	1
Chrysene	ND		0.020	0.0060	ug/L		03/01/18 13:32	03/02/18 15:05	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		03/01/18 13:32	03/02/18 15:05	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-268174/1-A
Matrix: Water
Analysis Batch: 268287

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268174

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		03/01/18 13:32	03/02/18 15:05	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		03/01/18 13:32	03/02/18 15:05	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		03/01/18 13:32	03/02/18 15:05	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		03/01/18 13:32	03/02/18 15:05	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	90		53 - 112	03/01/18 13:32	03/02/18 15:05	1

Lab Sample ID: LCS 580-268174/2-A
Matrix: Water
Analysis Batch: 268287

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 268174

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.59		ug/L		90	71 - 120
Chrysene	4.00	3.37		ug/L		84	64 - 120
Benzo[b]fluoranthene	4.00	3.54		ug/L		89	66 - 120
Benzo[k]fluoranthene	4.00	3.63		ug/L		91	68 - 120
Benzo[a]pyrene	4.00	3.80		ug/L		95	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	3.65		ug/L		91	63 - 120
Dibenz(a,h)anthracene	4.00	3.88		ug/L		97	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	83		53 - 112

Lab Sample ID: LCSD 580-268174/3-A
Matrix: Water
Analysis Batch: 268287

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 268174

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.58		ug/L		90	71 - 120	0	16
Chrysene	4.00	3.37		ug/L		84	64 - 120	0	16
Benzo[b]fluoranthene	4.00	3.57		ug/L		89	66 - 120	1	20
Benzo[k]fluoranthene	4.00	3.62		ug/L		90	68 - 120	0	20
Benzo[a]pyrene	4.00	3.80		ug/L		95	76 - 120	0	17
Indeno[1,2,3-cd]pyrene	4.00	3.77		ug/L		94	63 - 120	3	15
Dibenz(a,h)anthracene	4.00	3.94		ug/L		98	60 - 125	2	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	83		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-268425/6
Matrix: Water
Analysis Batch: 268425

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/06/18 13:53	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		58 - 133					03/06/18 13:53	1
Trifluorotoluene (Surr)	113		77 - 128					03/06/18 13:53	1

Lab Sample ID: LCS 580-268425/7
Matrix: Water
Analysis Batch: 268425

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.945		mg/L		95	79 - 110
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	91		58 - 133				
Trifluorotoluene (Surr)	105		77 - 128				

Lab Sample ID: LCSD 580-268425/8
Matrix: Water
Analysis Batch: 268425

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.930		mg/L		93	79 - 110	2	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	91		58 - 133						
Trifluorotoluene (Surr)	102		77 - 128						

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-268220/1-B
Matrix: Water
Analysis Batch: 268469

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268220

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		03/02/18 08:07	03/07/18 04:28	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		03/02/18 08:07	03/07/18 04:28	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	77		50 - 150				03/02/18 08:07	03/07/18 04:28	1

Lab Sample ID: MB 580-268220/1-B
Matrix: Water
Analysis Batch: 268521

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268220

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		03/02/18 08:07	03/07/18 15:46	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: MB 580-268220/1-B
Matrix: Water
Analysis Batch: 268521

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268220

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		03/02/18 08:07	03/07/18 15:46	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	89		50 - 150				03/02/18 08:07	03/07/18 15:46	1

Lab Sample ID: LCS 580-268220/2-B
Matrix: Water
Analysis Batch: 268521

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 268220

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
#2 Diesel (C10-C24)	2.00	1.81		mg/L		91	59 - 112
Motor Oil (>C24-C36)	2.00	2.09		mg/L		105	64 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				%Rec.
<i>o</i> -Terphenyl	88		50 - 150				

Lab Sample ID: LCSD 580-268220/3-B
Matrix: Water
Analysis Batch: 268521

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 268220

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.94		mg/L		97	59 - 112	7	16
Motor Oil (>C24-C36)	2.00	2.15		mg/L		107	64 - 120	2	17
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
<i>o</i> -Terphenyl	95		50 - 150						

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Client Sample ID: Outfall #002

Date Collected: 02/27/18 10:00

Date Received: 02/28/18 12:10

Lab Sample ID: 580-75387-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	268340	03/06/18 05:08	RSB	TAL SEA
Total/NA	Prep	3510C			268174	03/01/18 13:32	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		1	268316	03/05/18 18:27	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	268425	03/07/18 15:35	JCV	TAL SEA
Total/NA	Prep	3510C			268220	03/02/18 08:07	NDB	TAL SEA
Total/NA	Cleanup	3630C			268273	03/02/18 15:36	TTN	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	268521	03/07/18 16:47	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 02/27/18 10:00

Date Received: 02/28/18 12:10

Lab Sample ID: 580-75387-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	268340	03/06/18 04:41	RSB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	268425	03/07/18 15:04	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75387-1

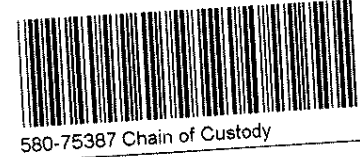
Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-75387-1	Outfall #002	Water	02/27/18 10:00	02/28/18 12:10
580-75387-2	Trip Blank	Water	02/27/18 10:00	02/28/18 12:10

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Client: Arcadis Client Contact: Peter Campbell Date: 2/27/18 Chain of Custody Number: 36776
 Address: 1100 Olive way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Eric Krueger Lab Contact: Elaine Walker Analysis (Attach list if more space is needed):
 Project Name and Location (State): Edmonds Terminal Billing Contact: _____
 Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives								Benzene EPA 624	NMTPH-GX	NMTPH-DX w/ SAC	PAHs 8210 C SWA	Loc: 580 75387	Special Instructions/ Conditions of Receipt
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH								
<u>Outfall #002</u>	<u>2-27-18</u>	<u>1000</u>	X				2			8				X	X	X	X		<u>pH = 7.85</u>	
<u>Trip Blank</u>	<u>---</u>	<u>---</u>	X							6				X	X	X	X			



Therm. ID A2 Cor 1.5° Unc 2.4°
 Cooler Disc: Med Blue
 Wet/Packs Packing: Bubble
 Custody Seal: Yes No

Cooler: Yes No Cooler Temp: _____
 Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
 Sample Disposal: Return To Client Disposal By Lab Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____
 QC Requirements (Specify): _____

1. Relinquished By Sign/Print	Date	Time	1. Received By Sign/Print	Date	Time
<u>[Signature]</u>	<u>2.28.18</u>	<u>1210</u>	<u>[Signature] Francisco Lung, Jr</u>	<u>2/28/18</u>	<u>1210</u>
2. Relinquished By Sign/Print	Date	Time	2. Received By Sign/Print	Date	Time
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-75387-1

Login Number: 75387

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-75584-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
3/19/2018 4:36:38 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Job ID: 580-75584-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-75584-1

Receipt

Two samples were received on 3/6/2018 12:50 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2° C.

Receipt Exceptions

One of the voa vials of the following sample lacks sample ID, sampling date and time. Outfall #002 (580-75584-1).

GC/MS VOA

Method(s) 624: The RPD of the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for batch analytical batch 580-268906 recovered outside control limits for the following analyte: Benzene. The LCS and LCSD recoveries met acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: Surrogate recovery for the following samples were outside control limits: (580-75594-E-19-B MS) and (580-75594-F-19-A MSD). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Method(s) 8270C SIM: The method blank for preparation batch 580-268855 and analytical batch 580-268901 contained Dibenz(a,h)anthracene, Indeno[1,2,3-cd]pyrene, Benzo[k]fluoranthene, Benzo[a]pyrene, Benzo[b]fluoranthene, Chrysene and Benzo[a]anthracene above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.

Method(s) 8270C SIM, 8270D SIM: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 580-268855 and analytical batch 580-268901 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The following sample contained a hydrocarbon pattern in the diesel range; however, the elution pattern was earlier than the typical diesel fuel pattern used by the laboratory for quantitative purposes: (580-75594-C-19-B).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*	RPD of the LCS and LCSD exceeds the control limits

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-75584-1

Date Collected: 03/05/18 10:30

Matrix: Water

Date Received: 03/06/18 12:50

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	*	1.0	0.53	ug/L			03/13/18 21:10	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		74 - 123					03/13/18 21:10	1
Toluene-d8 (Surr)	98		79 - 122					03/13/18 21:10	1
4-Bromofluorobenzene (Surr)	105		78 - 119					03/13/18 21:10	1
Dibromofluoromethane (Surr)	103		70 - 120					03/13/18 21:10	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 120					03/13/18 21:10	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0044	J B	0.021	0.0021	ug/L		03/12/18 13:31	03/13/18 19:26	1
Chrysene	ND		0.021	0.0064	ug/L		03/12/18 13:31	03/13/18 19:26	1
Benzo[b]fluoranthene	ND		0.021	0.0085	ug/L		03/12/18 13:31	03/13/18 19:26	1
Benzo[k]fluoranthene	ND		0.032	0.0096	ug/L		03/12/18 13:31	03/13/18 19:26	1
Benzo[a]pyrene	ND		0.021	0.0032	ug/L		03/12/18 13:31	03/13/18 19:26	1
Indeno[1,2,3-cd]pyrene	ND		0.021	0.0074	ug/L		03/12/18 13:31	03/13/18 19:26	1
Dibenz(a,h)anthracene	0.0021	J B	0.021	0.0021	ug/L		03/12/18 13:31	03/13/18 19:26	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	72		53 - 112				03/12/18 13:31	03/13/18 19:26	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/10/18 22:06	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133					03/10/18 22:06	1
Trifluorotoluene (Surr)	109		77 - 128					03/10/18 22:06	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		03/15/18 13:34	03/17/18 00:25	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		03/15/18 13:34	03/17/18 00:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	53		50 - 150				03/15/18 13:34	03/17/18 00:25	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-75584-2

Date Collected: 03/05/18 00:01

Matrix: Water

Date Received: 03/06/18 12:50

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	*	1.0	0.53	ug/L	-		03/13/18 14:30	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	104		74 - 123					03/13/18 14:30	1
<i>Toluene-d8 (Surr)</i>	101		79 - 122					03/13/18 14:30	1
<i>4-Bromofluorobenzene (Surr)</i>	106		78 - 119					03/13/18 14:30	1
<i>Dibromofluoromethane (Surr)</i>	106		70 - 120					03/13/18 14:30	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	105		70 - 120					03/13/18 14:30	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L	-		03/10/18 14:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	90		58 - 133					03/10/18 14:09	1
<i>Trifluorotoluene (Surr)</i>	109		77 - 128					03/10/18 14:09	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-268906/5
Matrix: Water
Analysis Batch: 268906

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			03/13/18 13:11	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	105		74 - 123		03/13/18 13:11	1
Toluene-d8 (Surr)	101		79 - 122		03/13/18 13:11	1
4-Bromofluorobenzene (Surr)	106		78 - 119		03/13/18 13:11	1
Dibromofluoromethane (Surr)	106		70 - 120		03/13/18 13:11	1
1,2-Dichloroethane-d4 (Surr)	110		70 - 120		03/13/18 13:11	1

Lab Sample ID: LCS 580-268906/6
Matrix: Water
Analysis Batch: 268906

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	8.37		ug/L		84	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	104		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	106		70 - 120

Lab Sample ID: LCSD 580-268906/7
Matrix: Water
Analysis Batch: 268906

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	12.1	*	ug/L		121	37 - 151	36	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	102		74 - 123
Toluene-d8 (Surr)	99		79 - 122
4-Bromofluorobenzene (Surr)	106		78 - 119
Dibromofluoromethane (Surr)	105		70 - 120
1,2-Dichloroethane-d4 (Surr)	105		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-268855/1-A
Matrix: Water
Analysis Batch: 268901

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268855

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0111	J	0.020	0.0020	ug/L		03/12/18 13:31	03/13/18 09:39	1
Chrysene	0.0152	J	0.020	0.0060	ug/L		03/12/18 13:31	03/13/18 09:39	1
Benzo[b]fluoranthene	0.0107	J	0.020	0.0080	ug/L		03/12/18 13:31	03/13/18 09:39	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-268855/1-A
Matrix: Water
Analysis Batch: 268901

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268855

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	0.0141	J	0.030	0.0090	ug/L		03/12/18 13:31	03/13/18 09:39	1
Benzo[a]pyrene	0.00750	J	0.020	0.0030	ug/L		03/12/18 13:31	03/13/18 09:39	1
Indeno[1,2,3-cd]pyrene	0.0110	J	0.020	0.0070	ug/L		03/12/18 13:31	03/13/18 09:39	1
Dibenz(a,h)anthracene	0.0108	J	0.020	0.0020	ug/L		03/12/18 13:31	03/13/18 09:39	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	88		53 - 112	03/12/18 13:31	03/13/18 09:39	1

Lab Sample ID: LCS 580-268855/2-A
Matrix: Water
Analysis Batch: 268901

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 268855

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.48		ug/L		87	71 - 120
Chrysene	4.00	3.37		ug/L		84	64 - 120
Benzo[b]fluoranthene	4.00	3.30		ug/L		83	66 - 120
Benzo[k]fluoranthene	4.00	3.48		ug/L		87	68 - 120
Benzo[a]pyrene	4.00	3.51		ug/L		88	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	3.17		ug/L		79	63 - 120
Dibenz(a,h)anthracene	4.00	3.50		ug/L		88	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	72		53 - 112

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-268785/5
Matrix: Water
Analysis Batch: 268785

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/10/18 12:02	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		58 - 133		03/10/18 12:02	1
Trifluorotoluene (Surr)	104		77 - 128		03/10/18 12:02	1

Lab Sample ID: LCS 580-268785/6
Matrix: Water
Analysis Batch: 268785

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.973		mg/L		97	79 - 110

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	93		58 - 133
Trifluorotoluene (Surr)	97		77 - 128

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Lab Sample ID: LCSD 580-268785/7
Matrix: Water
Analysis Batch: 268785

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.923		mg/L		92	79 - 110	5	10
Surrogate		%Recovery	Qualifier						Limits
4-Bromofluorobenzene (Surr)		93							58 - 133
Trifluorotoluene (Surr)		93							77 - 128

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-269156/1-B
Matrix: Water
Analysis Batch: 269276

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 269156

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		03/15/18 13:34	03/16/18 16:23	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		03/15/18 13:34	03/16/18 16:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	62		50 - 150				03/15/18 13:34	03/16/18 16:23	1

Lab Sample ID: LCS 580-269156/2-B
Matrix: Water
Analysis Batch: 269276

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 269156

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.31		mg/L		66	59 - 112
Motor Oil (>C24-C36)	2.00	1.45		mg/L		73	64 - 120
Surrogate	%Recovery	Qualifier	Limits				
o-Terphenyl	63		50 - 150				

Lab Sample ID: LCSD 580-269156/3-B
Matrix: Water
Analysis Batch: 269276

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 269156

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.36		mg/L		68	59 - 112	3	16
Motor Oil (>C24-C36)	2.00	1.58		mg/L		79	64 - 120	8	17
Surrogate	%Recovery	Qualifier	Limits						
o-Terphenyl	66		50 - 150						

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Client Sample ID: Outfall #002

Date Collected: 03/05/18 10:30

Date Received: 03/06/18 12:50

Lab Sample ID: 580-75584-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	268906	03/13/18 21:10	T1W	TAL SEA
Total/NA	Prep	3510C			268855	03/12/18 13:31	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		1	268901	03/13/18 19:26	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	268785	03/10/18 22:06	W1T	TAL SEA
Total/NA	Prep	3510C			269156	03/15/18 13:34	NDB	TAL SEA
Total/NA	Cleanup	3630C			269243	03/16/18 12:02	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	269276	03/17/18 00:25	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 03/05/18 00:01

Date Received: 03/06/18 12:50

Lab Sample ID: 580-75584-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	268906	03/13/18 14:30	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	268785	03/10/18 14:09	W1T	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-75584-1	Outfall #002	Water	03/05/18 10:30	03/06/18 12:50
580-75584-2	Trip Blank	Water	03/05/18 00:01	03/06/18 12:50

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Client Accadis		Client Contact Peter Campbell		Date 3/5/18	Chain of Custody Number 36777
Address 1100 Olive way suite 800		Telephone Number (Area Code)/Fax Number 206-992-7735		Lab Number 75584	Page of

City Seattle	State WA	Zip Code 98109	Sampler Jain Little	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds (WA) Terminal			Billing Contact		

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH			
O-Tfall #002	3/5/18	1030		<input checked="" type="checkbox"/>			2			8					pH - 7.75
Trip blank				<input checked="" type="checkbox"/>						6					



580-75584 Chain of Custody

Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months	(A fee may be assessed if samples are retained longer than 1 month)
---	--	---	---

Turn Around Time Required (business days) <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input type="checkbox"/> 5 Days <input type="checkbox"/> 10 Days <input type="checkbox"/> 15 Days <input type="checkbox"/> Other _____	QC Requirements (Specify)
---	---------------------------

1. Relinquished By Sign/Print [Signature]	Date 3-6-18	Time 1200	1. Received By Sign/Print [Signature]	Date 3/6/18	Time 1200
2. Relinquished By Sign/Print [Signature]	Date 3/6/18	Time 1250	2. Received By Sign/Print [Signature]	Date 3/6/18	Time 1250
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments: **Therm. ID A2 Cor. 2.0 Unc. Cooler Dsc: [Signature] Wet/Packs Packing: [Signature] Custody Seal: Yes No**

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-75584-1

Login Number: 75584

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	Refer to Job Narrative for details.
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-75831-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
3/21/2018 5:04:46 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Job ID: 580-75831-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-75831-1

Receipt

Two samples were received on 3/14/2018 1:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.0° C.

GC/MS VOA

Method(s) 624: The surrogate (1,2-Dichloroethane-d4) recovery for the method blank (MB) and the laboratory control sample duplicate (LCSD) associated with analytical batch 580-269460 was outside the upper control limits. (LCSD 580-269460/7) and (MB 580-269460/5).

Method(s) 624: Surrogate recovery for the following sample was outside the upper control limit: Trip Blank (580-75831-2). This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Method(s) 624: The RPD of the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for batch analytical batch 580-269460 recovered outside control limits for Benzene. The LCS and LCSD recoveries met acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The method blank for preparation batch 580-269355 and analytical batch 580-269366 contained Benzo[a]anthracene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits
*	RPD of the LCS and LCSD exceeds the control limits

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-75831-1

Date Collected: 03/14/18 10:00

Matrix: Water

Date Received: 03/14/18 13:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			03/20/18 22:20	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					03/20/18 22:20	1
Toluene-d8 (Surr)	102		79 - 122					03/20/18 22:20	1
4-Bromofluorobenzene (Surr)	101		78 - 119					03/20/18 22:20	1
Dibromofluoromethane (Surr)	99		70 - 120					03/20/18 22:20	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					03/20/18 22:20	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		03/19/18 10:06	03/19/18 19:26	1
Chrysene	ND		0.020	0.0061	ug/L		03/19/18 10:06	03/19/18 19:26	1
Benzo[b]fluoranthene	ND		0.020	0.0082	ug/L		03/19/18 10:06	03/19/18 19:26	1
Benzo[k]fluoranthene	ND		0.031	0.0092	ug/L		03/19/18 10:06	03/19/18 19:26	1
Benzo[a]pyrene	ND		0.020	0.0031	ug/L		03/19/18 10:06	03/19/18 19:26	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0072	ug/L		03/19/18 10:06	03/19/18 19:26	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		03/19/18 10:06	03/19/18 19:26	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	71		53 - 112				03/19/18 10:06	03/19/18 19:26	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/17/18 23:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		58 - 133					03/17/18 23:19	1
Trifluorotoluene (Surr)	111		77 - 128					03/17/18 23:19	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		03/19/18 14:21	03/21/18 12:45	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		03/19/18 14:21	03/21/18 12:45	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	63		50 - 150				03/19/18 14:21	03/21/18 12:45	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-75831-2

Date Collected: 03/14/18 00:01

Matrix: Water

Date Received: 03/14/18 13:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	*	1.0	0.53	ug/L			03/20/18 17:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	117		74 - 123					03/20/18 17:02	1
<i>Toluene-d8 (Surr)</i>	95		79 - 122					03/20/18 17:02	1
<i>4-Bromofluorobenzene (Surr)</i>	112		78 - 119					03/20/18 17:02	1
<i>Dibromofluoromethane (Surr)</i>	120		70 - 120					03/20/18 17:02	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	125	X	70 - 120					03/20/18 17:02	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/17/18 21:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	89		58 - 133					03/17/18 21:44	1
<i>Trifluorotoluene (Surr)</i>	102		77 - 128					03/17/18 21:44	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-269460/5
Matrix: Water
Analysis Batch: 269460

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			03/20/18 13:29	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	120		74 - 123					03/20/18 13:29	1
Toluene-d8 (Surr)	92		79 - 122					03/20/18 13:29	1
4-Bromofluorobenzene (Surr)	115		78 - 119					03/20/18 13:29	1
Dibromofluoromethane (Surr)	117		70 - 120					03/20/18 13:29	1
1,2-Dichloroethane-d4 (Surr)	124	X	70 - 120					03/20/18 13:29	1

Lab Sample ID: LCS 580-269460/6
Matrix: Water
Analysis Batch: 269460

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	8.51		ug/L		85	37 - 151
Surrogate	%Recovery	LCS Qualifier	Limits				
Trifluorotoluene (Surr)	115		74 - 123				
Toluene-d8 (Surr)	93		79 - 122				
4-Bromofluorobenzene (Surr)	115		78 - 119				
Dibromofluoromethane (Surr)	111		70 - 120				
1,2-Dichloroethane-d4 (Surr)	115		70 - 120				

Lab Sample ID: LCSD 580-269460/7
Matrix: Water
Analysis Batch: 269460

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	11.8	*	ug/L		118	37 - 151	33	30
Surrogate	%Recovery	LCSD Qualifier	Limits						
Trifluorotoluene (Surr)	116		74 - 123						
Toluene-d8 (Surr)	90		79 - 122						
4-Bromofluorobenzene (Surr)	107		78 - 119						
Dibromofluoromethane (Surr)	120		70 - 120						
1,2-Dichloroethane-d4 (Surr)	123	X	70 - 120						

Lab Sample ID: MB 580-269475/5
Matrix: Water
Analysis Batch: 269475

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			03/20/18 14:23	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					03/20/18 14:23	1
Toluene-d8 (Surr)	102		79 - 122					03/20/18 14:23	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-269475/5
Matrix: Water
Analysis Batch: 269475

Client Sample ID: Method Blank
Prep Type: Total/NA

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		78 - 119		03/20/18 14:23	1
Dibromofluoromethane (Surr)	100		70 - 120		03/20/18 14:23	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 120		03/20/18 14:23	1

Lab Sample ID: LCS 580-269475/6
Matrix: Water
Analysis Batch: 269475

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.9		ug/L		109	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	104		74 - 123
Toluene-d8 (Surr)	95		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	99		70 - 120

Lab Sample ID: LCSD 580-269475/7
Matrix: Water
Analysis Batch: 269475

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.8		ug/L		108	37 - 151	0	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	103		74 - 123
Toluene-d8 (Surr)	97		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	99		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-269355/1-A
Matrix: Water
Analysis Batch: 269366

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 269355

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00256	J	0.020	0.0020	ug/L		03/19/18 10:06	03/19/18 13:18	1
Chrysene	ND		0.020	0.0060	ug/L		03/19/18 10:06	03/19/18 13:18	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		03/19/18 10:06	03/19/18 13:18	1
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		03/19/18 10:06	03/19/18 13:18	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		03/19/18 10:06	03/19/18 13:18	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		03/19/18 10:06	03/19/18 13:18	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		03/19/18 10:06	03/19/18 13:18	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-269355/1-A
Matrix: Water
Analysis Batch: 269366

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 269355

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	75		53 - 112	03/19/18 10:06	03/19/18 13:18	1

Lab Sample ID: LCS 580-269355/2-A
Matrix: Water
Analysis Batch: 269366

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 269355

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	4.00	4.25		ug/L		106	71 - 120
Chrysene	4.00	3.80		ug/L		95	64 - 120
Benzo[b]fluoranthene	4.00	3.85		ug/L		96	66 - 120
Benzo[k]fluoranthene	4.00	3.82		ug/L		96	68 - 120
Benzo[a]pyrene	4.00	4.04		ug/L		101	76 - 120
Indeno[1,2,3-cd]pyrene	4.00	4.02		ug/L		100	63 - 120
Dibenz(a,h)anthracene	4.00	4.00		ug/L		100	60 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	71		53 - 112

Lab Sample ID: LCSD 580-269355/3-A
Matrix: Water
Analysis Batch: 269366

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 269355

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzo[a]anthracene	4.00	4.51		ug/L		113	71 - 120	6	16
Chrysene	4.00	4.03		ug/L		101	64 - 120	6	16
Benzo[b]fluoranthene	4.00	4.02		ug/L		100	66 - 120	4	20
Benzo[k]fluoranthene	4.00	3.99		ug/L		100	68 - 120	4	20
Benzo[a]pyrene	4.00	4.27		ug/L		107	76 - 120	6	17
Indeno[1,2,3-cd]pyrene	4.00	4.21		ug/L		105	63 - 120	5	15
Dibenz(a,h)anthracene	4.00	4.21		ug/L		105	60 - 125	5	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	71		53 - 112

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-269327/5
Matrix: Water
Analysis Batch: 269327

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/17/18 20:09	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		58 - 133		03/17/18 20:09	1
Trifluorotoluene (Surr)	105		77 - 128		03/17/18 20:09	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-269327/6

Matrix: Water

Analysis Batch: 269327

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	1.03		mg/L		103	79 - 110
Surrogate							
	%Recovery	LCS	LCS	Qualifier			Limits
4-Bromofluorobenzene (Surr)	97						58 - 133
Trifluorotoluene (Surr)	104						77 - 128

Lab Sample ID: LCSD 580-269327/7

Matrix: Water

Analysis Batch: 269327

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.986		mg/L		99	79 - 110	4	10
Surrogate									
	%Recovery	LCSD	LCSD	Qualifier			Limits		
4-Bromofluorobenzene (Surr)	96						58 - 133		
Trifluorotoluene (Surr)	98						77 - 128		

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-269403/1-B

Matrix: Water

Analysis Batch: 269505

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 269403

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		03/19/18 14:21	03/20/18 16:52	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		03/19/18 14:21	03/20/18 16:52	1
Surrogate									
	%Recovery	MB	MB	Qualifier			Prepared	Analyzed	Dil Fac
o-Terphenyl	67						03/19/18 14:21	03/20/18 16:52	1

Lab Sample ID: MB 580-269403/1-B

Matrix: Water

Analysis Batch: 269540

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 269403

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		03/19/18 14:21	03/21/18 12:23	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		03/19/18 14:21	03/21/18 12:23	1
Surrogate									
	%Recovery	MB	MB	Qualifier			Prepared	Analyzed	Dil Fac
o-Terphenyl	94						03/19/18 14:21	03/21/18 12:23	1

Lab Sample ID: LCS 580-269403/2-B

Matrix: Water

Analysis Batch: 269505

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 269403

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.50		mg/L		75	59 - 112

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-269403/2-B
Matrix: Water
Analysis Batch: 269505

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 269403

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.61		mg/L		80	64 - 120
LCS LCS							
Surrogate	%Recovery	Qualifier	Limits				
<i>o-Terphenyl</i>	73		50 - 150				

Lab Sample ID: LCSD 580-269403/3-B
Matrix: Water
Analysis Batch: 269505

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 269403

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.43		mg/L		72	59 - 112	4	16
Motor Oil (>C24-C36)	2.00	1.56		mg/L		78	64 - 120	3	17
LCSD LCSD									
Surrogate	%Recovery	Qualifier	Limits						
<i>o-Terphenyl</i>	72		50 - 150						

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Client Sample ID: Outfall #002

Date Collected: 03/14/18 10:00

Date Received: 03/14/18 13:45

Lab Sample ID: 580-75831-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	269475	03/20/18 22:20	TL1	TAL SEA
Total/NA	Prep	3510C			269355	03/19/18 10:06	NDB	TAL SEA
Total/NA	Analysis	8270C SIM		1	269405	03/19/18 19:26	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	269327	03/17/18 23:19	W1T	TAL SEA
Total/NA	Prep	3510C			269403	03/19/18 14:21	NDB	TAL SEA
Total/NA	Cleanup	3630C			269477	03/20/18 12:30	NDB	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	269540	03/21/18 12:45	ADB	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 03/14/18 00:01

Date Received: 03/14/18 13:45

Lab Sample ID: 580-75831-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	269460	03/20/18 17:02	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	269327	03/17/18 21:44	W1T	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-75831-1	Outfall #002	Water	03/14/18 10:00	03/14/18 13:45
580-75831-2	Trip Blank	Water	03/14/18 00:01	03/14/18 13:45

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- 11

Rush
 Short Hold

Chain of Custody Record

Client: Arcadis Client Contact: Peter Campbell Date: 3/14/18 Chain of Custody Number: 36686
 Address: 1100 olive way, suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: 75831 Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Walker
 Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed)

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Special Instructions/ Conditions of Receipt					
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH							
<u>Outfall #002</u>	<u>3/14/18</u>	<u>1000</u>		X															
<u>Trip blank</u>	<u>—</u>	<u>—</u>		X															

Benzene EPA 624
NWTPH-GIX
NWTPH-Dx w/SGC
CPAHs 8270C SIM

PH=7.70
 * use standard
 SGC

Therm. ID A7 Cor 5.00 Unc 5.20
 Cooler Dsc: Mark Blue
 Wet/Packs Packing: Bubble
 Custody Seal: Yes No



Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify)

1. Relinquished By Sign/Print: <u>Eric Loueiser</u> Date: <u>3/14/18</u> Time: <u>1345</u>	1. Received By Sign/Print: <u>Francisco Luna, Jr</u> Date: <u>3/14/18</u> Time: <u>1345</u>
2. Relinquished By Sign/Print: _____ Date: _____ Time: _____	2. Received By Sign/Print: _____ Date: _____ Time: _____
3. Relinquished By Sign/Print: _____ Date: _____ Time: _____	3. Received By Sign/Print: _____ Date: _____ Time: _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-75831-1

Login Number: 75831

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-77215-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
5/17/2018 1:36:41 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Job ID: 580-77215-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-77215-1

Receipt

Two samples were received on 5/9/2018 11:43 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.5° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The method blank for preparation batch 580-273742 and analytical batch 580-274008 contained Benzo[a]anthracene, Chrysene, Dibenz(a,h)anthracene and Indeno[1,2,3-cd]pyrene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The RPD of the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for batch preparation batch 580-273587 and 580-273640 and analytical batch 580-273843 recovered outside control limits for the following analytes: #2 Diesel (C10-C24).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
*	RPD of the LCS and LCSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77215-1

Date Collected: 05/08/18 09:00

Matrix: Water

Date Received: 05/09/18 11:43

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/13/18 01:13	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	115		74 - 123					05/13/18 01:13	1
Toluene-d8 (Surr)	92		79 - 122					05/13/18 01:13	1
4-Bromofluorobenzene (Surr)	106		78 - 119					05/13/18 01:13	1
Dibromofluoromethane (Surr)	111		70 - 120					05/13/18 01:13	1
1,2-Dichloroethane-d4 (Surr)	109		70 - 120					05/13/18 01:13	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		05/14/18 10:35	05/16/18 17:48	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		05/14/18 10:35	05/16/18 17:48	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		05/14/18 10:35	05/16/18 17:48	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		05/14/18 10:35	05/16/18 17:48	1
Chrysene	ND		0.020	0.0061	ug/L		05/14/18 10:35	05/16/18 17:48	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		05/14/18 10:35	05/16/18 17:48	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		05/14/18 10:35	05/16/18 17:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	69		53 - 112				05/14/18 10:35	05/16/18 17:48	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/12/18 16:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	85		58 - 133					05/12/18 16:55	1
Trifluorotoluene (Surr)	103		77 - 128					05/12/18 16:55	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND	*	0.11	0.068	mg/L		05/11/18 09:32	05/15/18 15:52	1
Motor Oil (>C24-C36)	ND		0.36	0.10	mg/L		05/11/18 09:32	05/15/18 15:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	77		50 - 150				05/11/18 09:32	05/15/18 15:52	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77215-2

Date Collected: 05/08/18 00:01

Matrix: Water

Date Received: 05/09/18 11:43

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/12/18 17:16	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	114		74 - 123					05/12/18 17:16	1
Toluene-d8 (Surr)	92		79 - 122					05/12/18 17:16	1
4-Bromofluorobenzene (Surr)	104		78 - 119					05/12/18 17:16	1
Dibromofluoromethane (Surr)	105		70 - 120					05/12/18 17:16	1
1,2-Dichloroethane-d4 (Surr)	109		70 - 120					05/12/18 17:16	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/12/18 15:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		58 - 133					05/12/18 15:52	1
Trifluorotoluene (Surr)	95		77 - 128					05/12/18 15:52	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-273676/5

Matrix: Water

Analysis Batch: 273676

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/12/18 16:01	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	112		74 - 123		05/12/18 16:01	1
Toluene-d8 (Surr)	92		79 - 122		05/12/18 16:01	1
4-Bromofluorobenzene (Surr)	104		78 - 119		05/12/18 16:01	1
Dibromofluoromethane (Surr)	109		70 - 120		05/12/18 16:01	1
1,2-Dichloroethane-d4 (Surr)	108		70 - 120		05/12/18 16:01	1

Lab Sample ID: LCS 580-273676/6

Matrix: Water

Analysis Batch: 273676

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	13.2		ug/L		132	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	113		74 - 123
Toluene-d8 (Surr)	88		79 - 122
4-Bromofluorobenzene (Surr)	103		78 - 119
Dibromofluoromethane (Surr)	106		70 - 120
1,2-Dichloroethane-d4 (Surr)	104		70 - 120

Lab Sample ID: LCSD 580-273676/7

Matrix: Water

Analysis Batch: 273676

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	13.7		ug/L		137	37 - 151	4	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	113		74 - 123
Toluene-d8 (Surr)	87		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	109		70 - 120
1,2-Dichloroethane-d4 (Surr)	108		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-273742/1-A

Matrix: Water

Analysis Batch: 274008

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 273742

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00596	J	0.020	0.0020	ug/L		05/14/18 10:35	05/16/18 16:41	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		05/14/18 10:35	05/16/18 16:41	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		05/14/18 10:35	05/16/18 16:41	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-273742/1-A
Matrix: Water
Analysis Batch: 274008

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 273742

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		05/14/18 10:35	05/16/18 16:41	1
Chrysene	0.00662	J	0.020	0.0060	ug/L		05/14/18 10:35	05/16/18 16:41	1
Dibenz(a,h)anthracene	0.00889	J	0.020	0.0020	ug/L		05/14/18 10:35	05/16/18 16:41	1
Indeno[1,2,3-cd]pyrene	0.00782	J	0.020	0.0070	ug/L		05/14/18 10:35	05/16/18 16:41	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	77		53 - 112	05/14/18 10:35	05/16/18 16:41	1

Lab Sample ID: LCS 580-273742/2-A
Matrix: Water
Analysis Batch: 274008

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 273742

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.09		ug/L		77	71 - 120
Benzo[a]pyrene	4.00	3.41		ug/L		85	76 - 120
Benzo[b]fluoranthene	4.00	3.61		ug/L		90	66 - 120
Benzo[k]fluoranthene	4.00	3.30		ug/L		83	68 - 120
Chrysene	4.00	3.44		ug/L		86	64 - 120
Dibenz(a,h)anthracene	4.00	3.65		ug/L		91	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.72		ug/L		93	63 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	74		53 - 112

Lab Sample ID: LCSD 580-273742/3-A
Matrix: Water
Analysis Batch: 274008

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 273742

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.29		ug/L		82	71 - 120	6	16
Benzo[a]pyrene	4.00	3.61		ug/L		90	76 - 120	6	17
Benzo[b]fluoranthene	4.00	3.76		ug/L		94	66 - 120	4	20
Benzo[k]fluoranthene	4.00	3.51		ug/L		88	68 - 120	6	20
Chrysene	4.00	3.49		ug/L		87	64 - 120	1	16
Dibenz(a,h)anthracene	4.00	3.84		ug/L		96	60 - 125	5	15
Indeno[1,2,3-cd]pyrene	4.00	3.89		ug/L		97	63 - 120	5	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	74		53 - 112

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-273690/5
Matrix: Water
Analysis Batch: 273690

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/12/18 14:16	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133					05/12/18 14:16	1
Trifluorotoluene (Surr)	101		77 - 128					05/12/18 14:16	1

Lab Sample ID: LCS 580-273690/6
Matrix: Water
Analysis Batch: 273690

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.942		mg/L		94	79 - 110
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	94		58 - 133				
Trifluorotoluene (Surr)	98		77 - 128				

Lab Sample ID: LCSD 580-273690/7
Matrix: Water
Analysis Batch: 273690

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.987		mg/L		99	79 - 110	5	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	92		58 - 133						
Trifluorotoluene (Surr)	103		77 - 128						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-273587/1-B
Matrix: Water
Analysis Batch: 273843

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 273587

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		05/11/18 09:32	05/15/18 14:32	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		05/11/18 09:32	05/15/18 14:32	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	78		50 - 150				05/11/18 09:32	05/15/18 14:32	1

Lab Sample ID: LCS 580-273587/2-B
Matrix: Water
Analysis Batch: 273843

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 273587

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.28		mg/L		64	59 - 112

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-273587/2-B
Matrix: Water
Analysis Batch: 273843

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 273587

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.78		mg/L		89	64 - 120
		LCS LCS					
Surrogate	%Recovery	Qualifier	Limits				
<i>o-Terphenyl</i>	84		50 - 150				

Lab Sample ID: LCSD 580-273587/3-B
Matrix: Water
Analysis Batch: 273843

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 273587

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.55	*	mg/L		78	59 - 112	19	16
Motor Oil (>C24-C36)	2.00	1.96		mg/L		98	64 - 120	9	17
		LCSD LCSD							
Surrogate	%Recovery	Qualifier	Limits						
<i>o-Terphenyl</i>	91		50 - 150						

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Client Sample ID: Outfall #002

Date Collected: 05/08/18 09:00

Date Received: 05/09/18 11:43

Lab Sample ID: 580-77215-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	273676	05/13/18 01:13	TL1	TAL SEA
Total/NA	Prep	3510C			273742	05/14/18 10:35	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	274008	05/16/18 17:48	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	273690	05/12/18 16:55	JSM	TAL SEA
Total/NA	Prep	3510C			273587	05/11/18 09:32	JCM	TAL SEA
Total/NA	Cleanup	3630C			273640	05/11/18 14:42	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	273843	05/15/18 15:52	TL1	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 05/08/18 00:01

Date Received: 05/09/18 11:43

Lab Sample ID: 580-77215-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	273676	05/12/18 17:16	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	273690	05/12/18 15:52	JSM	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77215-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-77215-1	Outfall #002	Water	05/08/18 09:00	05/09/18 11:43
580-77215-2	Trip Blank	Water	05/08/18 00:01	05/09/18 11:43

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Client Aradis		Client Contact Peter Campbell		Date 5/9/18	Chain of Custody Number 38033
Address 1100 Olive Way Suite 800		Telephone Number (Area Code)/Fax Number		Lab Number 772155	Page 1 of 1
City Seattle	State WA	Zip Code 98101	Sampler Jason Little	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal (WA)			Billing Contact		

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix			Containers & Preservatives						Special Instructions/ Conditions of Receipt	
			Air	Aqueous	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		
Outfall #002	5/8/18	0900	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	pH = 7.13
TRIP BLANK			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	
													Benzene & PAHs must have quantitative less than 1 ug/L
													Run standard SGC



580-77215 Chain of Custody

Therm. ID: **JRS** Cor: **3.5** Unc: **3.4**
Cooler Desc: **Sm Red**
Packing: **Bubble** FedEx: _____
Cust. Seal: Yes _____ No UPS: _____
Lab Cour: **X**
 Packs/Dry Ice/None Other: _____

Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Archive For _____ Months	<input type="checkbox"/> Disposal By Lab (A fee may be assessed if samples are retained longer than 1 month)
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Turn Around Time Required (business days)
 24 Hours 48 Hours 5 Days 10 Days 15 Days Other **STAT**

QC Requirements (Specify)

1. Relinquished By Sign/Print [Signature] Jason Little	Date 5/9/18	Time 1143	1. Received By Sign/Print [Signature] Francisco Luna, Jr	Date 5/9/18	Time 1143
2. Relinquished By Sign/Print	Date	Time	2. Received By Sign/Print	Date	Time
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-77215-1

Login Number: 77215

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-77414-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
5/25/2018 1:25:00 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Job ID: 580-77414-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-77414-1

Receipt

Two samples were received on 5/18/2018 2:34 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2° C.

GC/MS VOA

Method(s) NWTPH-Gx: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for analytical batch 580-274372 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77414-1

Date Collected: 05/17/18 14:30

Matrix: Water

Date Received: 05/18/18 14:34

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/23/18 16:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					05/23/18 16:02	1
Toluene-d8 (Surr)	106		79 - 122					05/23/18 16:02	1
4-Bromofluorobenzene (Surr)	97		78 - 119					05/23/18 16:02	1
Dibromofluoromethane (Surr)	101		70 - 120					05/23/18 16:02	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120					05/23/18 16:02	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0045	J B	0.020	0.0020	ug/L		05/22/18 09:41	05/23/18 14:54	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		05/22/18 09:41	05/23/18 14:54	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		05/22/18 09:41	05/23/18 14:54	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		05/22/18 09:41	05/23/18 14:54	1
Chrysene	ND		0.020	0.0061	ug/L		05/22/18 09:41	05/23/18 14:54	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		05/22/18 09:41	05/23/18 14:54	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		05/22/18 09:41	05/23/18 14:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	71		53 - 120				05/22/18 09:41	05/23/18 14:54	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/22/18 15:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		50 - 150					05/22/18 15:49	1
Trifluorotoluene (Surr)	110		50 - 150					05/22/18 15:49	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		05/23/18 09:49	05/24/18 14:47	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		05/23/18 09:49	05/24/18 14:47	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	67		50 - 150				05/23/18 09:49	05/24/18 14:47	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77414-2

Date Collected: 05/17/18 00:00

Matrix: Water

Date Received: 05/18/18 14:34

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/23/18 15:12	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123		05/23/18 15:12	1
Toluene-d8 (Surr)	107		79 - 122		05/23/18 15:12	1
4-Bromofluorobenzene (Surr)	96		78 - 119		05/23/18 15:12	1
Dibromofluoromethane (Surr)	102		70 - 120		05/23/18 15:12	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120		05/23/18 15:12	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/20/18 00:22	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		50 - 150		05/20/18 00:22	1
Trifluorotoluene (Surr)	99		50 - 150		05/20/18 00:22	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-274475/5
Matrix: Water
Analysis Batch: 274475

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/23/18 13:30	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123		05/23/18 13:30	1
Toluene-d8 (Surr)	106		79 - 122		05/23/18 13:30	1
4-Bromofluorobenzene (Surr)	97		78 - 119		05/23/18 13:30	1
Dibromofluoromethane (Surr)	101		70 - 120		05/23/18 13:30	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120		05/23/18 13:30	1

Lab Sample ID: LCS 580-274475/6
Matrix: Water
Analysis Batch: 274475

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.5		ug/L		105	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	96		79 - 122
4-Bromofluorobenzene (Surr)	97		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	100		70 - 120

Lab Sample ID: LCSD 580-274475/7
Matrix: Water
Analysis Batch: 274475

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.2		ug/L		102	37 - 151	3	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	97		79 - 122
4-Bromofluorobenzene (Surr)	95		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	100		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-274341/1-A
Matrix: Water
Analysis Batch: 274480

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 274341

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0160	J	0.020	0.0020	ug/L		05/22/18 09:41	05/23/18 11:58	1
Benzo[a]pyrene	0.00884	J	0.020	0.0030	ug/L		05/22/18 09:41	05/23/18 11:58	1
Benzo[b]fluoranthene	0.0126	J	0.020	0.0080	ug/L		05/22/18 09:41	05/23/18 11:58	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-274341/1-A
Matrix: Water
Analysis Batch: 274480

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 274341

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	0.0151	J	0.030	0.0090	ug/L		05/22/18 09:41	05/23/18 11:58	1
Chrysene	0.0169	J	0.020	0.0060	ug/L		05/22/18 09:41	05/23/18 11:58	1
Dibenz(a,h)anthracene	0.0113	J	0.020	0.0020	ug/L		05/22/18 09:41	05/23/18 11:58	1
Indeno[1,2,3-cd]pyrene	0.0141	J	0.020	0.0070	ug/L		05/22/18 09:41	05/23/18 11:58	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	94		53 - 120	05/22/18 09:41	05/23/18 11:58	1

Lab Sample ID: LCS 580-274341/2-A
Matrix: Water
Analysis Batch: 274480

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 274341

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.52		ug/L		88	61 - 120
Benzo[a]pyrene	4.00	3.95		ug/L		99	65 - 120
Benzo[b]fluoranthene	4.00	3.98		ug/L		99	58 - 120
Benzo[k]fluoranthene	4.00	3.98		ug/L		100	58 - 120
Chrysene	4.00	3.87		ug/L		97	58 - 120
Dibenz(a,h)anthracene	4.00	3.55		ug/L		89	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.45		ug/L		86	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	85		53 - 120

Lab Sample ID: LCSD 580-274341/3-A
Matrix: Water
Analysis Batch: 274480

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 274341

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.53		ug/L		88	61 - 120	0	16
Benzo[a]pyrene	4.00	3.96		ug/L		99	65 - 120	0	17
Benzo[b]fluoranthene	4.00	3.82		ug/L		96	58 - 120	4	20
Benzo[k]fluoranthene	4.00	4.06		ug/L		102	58 - 120	2	20
Chrysene	4.00	3.95		ug/L		99	58 - 120	2	16
Dibenz(a,h)anthracene	4.00	3.53		ug/L		88	60 - 125	1	15
Indeno[1,2,3-cd]pyrene	4.00	3.43		ug/L		86	56 - 120	1	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	82		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-274244/5
Matrix: Water
Analysis Batch: 274244

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/19/18 22:52	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		50 - 150					05/19/18 22:52	1
Trifluorotoluene (Surr)	106		50 - 150					05/19/18 22:52	1

Lab Sample ID: LCS 580-274244/6
Matrix: Water
Analysis Batch: 274244

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline	1.00	0.960		mg/L		96	79 - 120		
Surrogate	%Recovery	LCS Qualifier	Limits						
4-Bromofluorobenzene (Surr)	101		50 - 150						
Trifluorotoluene (Surr)	103		50 - 150						

Lab Sample ID: LCSD 580-274244/7
Matrix: Water
Analysis Batch: 274244

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.977		mg/L		98	79 - 120	2	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	98		50 - 150						
Trifluorotoluene (Surr)	103		50 - 150						

Lab Sample ID: MB 580-274372/5
Matrix: Water
Analysis Batch: 274372

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/22/18 13:18	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		50 - 150					05/22/18 13:18	1
Trifluorotoluene (Surr)	107		50 - 150					05/22/18 13:18	1

Lab Sample ID: LCS 580-274372/6
Matrix: Water
Analysis Batch: 274372

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline	1.00	0.937		mg/L		94	79 - 120		

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-274372/6
Matrix: Water
Analysis Batch: 274372

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	97		50 - 150
Trifluorotoluene (Surr)	98		50 - 150

Lab Sample ID: LCSD 580-274372/7
Matrix: Water
Analysis Batch: 274372

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.960		mg/L		96	79 - 120	2	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	96		50 - 150
Trifluorotoluene (Surr)	100		50 - 150

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-274454/1-B
Matrix: Water
Analysis Batch: 274578

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 274454

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		05/23/18 09:49	05/24/18 12:36	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		05/23/18 09:49	05/24/18 12:36	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	80		50 - 150	05/23/18 09:49	05/24/18 12:36	1

Lab Sample ID: LCS 580-274454/2-B
Matrix: Water
Analysis Batch: 274578

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 274454

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.59		mg/L		80	50 - 120
Motor Oil (>C24-C36)	2.00	2.12		mg/L		106	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	95		50 - 150

Lab Sample ID: LCSD 580-274454/3-B
Matrix: Water
Analysis Batch: 274578

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 274454

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.59		mg/L		80	50 - 120	0	26
Motor Oil (>C24-C36)	2.00	2.12		mg/L		106	64 - 120	0	24

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCSD 580-274454/3-B
Matrix: Water
Analysis Batch: 274578

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 274454

<i>Surrogate</i>	<i>LCSD</i> <i>%Recovery</i>	<i>LCSD</i> <i>Qualifier</i>	<i>Limits</i>
<i>o-Terphenyl</i>	92		50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Client Sample ID: Outfall #002

Date Collected: 05/17/18 14:30

Date Received: 05/18/18 14:34

Lab Sample ID: 580-77414-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	274475	05/23/18 16:02	T1W	TAL SEA
Total/NA	Prep	3510C			274341	05/22/18 09:41	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	274480	05/23/18 14:54	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	274372	05/22/18 15:49	JCV	TAL SEA
Total/NA	Prep	3510C			274454	05/23/18 09:49	JCM	TAL SEA
Total/NA	Cleanup	3630C			274531	05/23/18 16:05	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	274578	05/24/18 14:47	NMI	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 05/17/18 00:00

Date Received: 05/18/18 14:34

Lab Sample ID: 580-77414-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	274475	05/23/18 15:12	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	274244	05/20/18 00:22	CJ	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

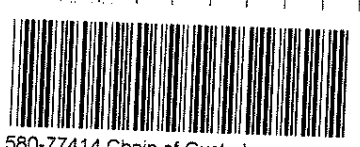
TestAmerica Job ID: 580-77414-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-77414-1	Outfall #002	Water	05/17/18 14:30	05/18/18 14:34
580-77414-2	Trip Blank	Water	05/17/18 00:00	05/18/18 14:34

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Client: **Arcadis** Client Contact: **Peter Campbell** Date: **5/17/18** Chain of Custody Number: **36775**
Address: **1100 Olive Way, Suite 800** Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page **1** of **1**

City: **Seattle** State: **WA** Zip Code: **98101** Sampler: **Jason Little** Lab Contact: **Elaine Walker**
Project Name and Location (State): **Edmonds Terminal** Billing Contact: _____ Analysis (Attach list if more space is needed): _____
Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Special Instructions/ Conditions of Receipt			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	Other				
Outfall #002	5/17/18	1430	X	X												Loc: 580 77414	pH = 8.04
Trip Blank	---	---	X	X													
 580-77414 Chain of Custody																	
													Therm. ID: W2 Cor: 1.2 Unc: 1.4 Cooler Desc: Red Cool Packing: Bub FedEx: _____ Cust. Seal: Yes _____ No X UPS: _____ Wet Packs/Dry Ice/None _____ Lab Cour: X Other: _____				

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By Sign/Print: Jason Little	Date: 5/18/18	Time: 1125	1. Received By Sign/Print: B. Gail	Date: 5-18-18	Time: 1125
2. Relinquished By Sign/Print: B. Gail	Date: 5/18/18	Time: 1434	2. Received By Sign/Print: Kevin Hill	Date: 5-18-18	Time: 1434
3. Relinquished By Sign/Print: _____	Date: _____	Time: _____	3. Received By Sign/Print: _____	Date: _____	Time: _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-77414-1

Login Number: 77414

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	False	Headspace larger than 1/4".
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310


TestAmerica Job ID: 580-77584-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

6/1/2018 5:42:13 PM

Kristine Allen, Manager of Project Management

(253)248-4970

kristine.allen@testamericainc.com

Designee for

Elaine Walker, Project Manager II

(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Job ID: 580-77584-1

Laboratory: TestAmerica Seattle

Narrative

**Job Narrative
580-77584-1**

Comments

No additional comments.

Receipt

The samples were received on 5/26/2018 11:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.3° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: The method blank for preparation batch 580-274804 and analytical batch 580-274853 contained Benzo[a]anthracene and Dibenz(a,h)anthracene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The %D of surrogate (o-Terphenyl) for CCV associated with batch 580-275088 was outside the lower control limits. All associated sample surrogate fell within acceptance criteria; therefore, the data have been reported. (CCVRT 580-275088/3)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77584-1

Date Collected: 05/23/18 09:00

Matrix: Water

Date Received: 05/26/18 11:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/29/18 20:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					05/29/18 20:27	1
Toluene-d8 (Surr)	105		79 - 122					05/29/18 20:27	1
4-Bromofluorobenzene (Surr)	99		78 - 119					05/29/18 20:27	1
Dibromofluoromethane (Surr)	100		70 - 120					05/29/18 20:27	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					05/29/18 20:27	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.022	0.0022	ug/L		05/26/18 12:15	05/29/18 14:38	1
Benzo[a]pyrene	ND		0.022	0.0032	ug/L		05/26/18 12:15	05/29/18 14:38	1
Benzo[b]fluoranthene	ND		0.022	0.0087	ug/L		05/26/18 12:15	05/29/18 14:38	1
Benzo[k]fluoranthene	ND		0.032	0.0097	ug/L		05/26/18 12:15	05/29/18 14:38	1
Chrysene	ND		0.022	0.0065	ug/L		05/26/18 12:15	05/29/18 14:38	1
Dibenz[a,h]anthracene	ND		0.022	0.0022	ug/L		05/26/18 12:15	05/29/18 14:38	1
Indeno[1,2,3-cd]pyrene	ND		0.022	0.0076	ug/L		05/26/18 12:15	05/29/18 14:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	63		53 - 120				05/26/18 12:15	05/29/18 14:38	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/26/18 16:40	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		50 - 150					05/26/18 16:40	1
Trifluorotoluene (Surr)	95		50 - 150					05/26/18 16:40	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		05/30/18 09:16	05/31/18 15:25	1
Motor Oil (>C24-C36)	ND		0.36	0.098	mg/L		05/30/18 09:16	05/31/18 15:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	78		50 - 150				05/30/18 09:16	05/31/18 15:25	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77584-2

Date Collected: 05/23/18 00:01

Matrix: Water

Date Received: 05/26/18 11:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/29/18 15:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					05/29/18 15:00	1
Toluene-d8 (Surr)	106		79 - 122					05/29/18 15:00	1
4-Bromofluorobenzene (Surr)	99		78 - 119					05/29/18 15:00	1
Dibromofluoromethane (Surr)	99		70 - 120					05/29/18 15:00	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120					05/29/18 15:00	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/26/18 16:08	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		50 - 150					05/26/18 16:08	1
Trifluorotoluene (Surr)	104		50 - 150					05/26/18 16:08	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-274858/9
Matrix: Water
Analysis Batch: 274858

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/29/18 13:19	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		74 - 123		05/29/18 13:19	1
Toluene-d8 (Surr)	104		79 - 122		05/29/18 13:19	1
4-Bromofluorobenzene (Surr)	98		78 - 119		05/29/18 13:19	1
Dibromofluoromethane (Surr)	100		70 - 120		05/29/18 13:19	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120		05/29/18 13:19	1

Lab Sample ID: LCS 580-274858/10
Matrix: Water
Analysis Batch: 274858

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.49		ug/L		95	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	98		74 - 123
Toluene-d8 (Surr)	99		79 - 122
4-Bromofluorobenzene (Surr)	98		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	103		70 - 120

Lab Sample ID: LCSD 580-274858/11
Matrix: Water
Analysis Batch: 274858

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzene	10.0	10.4		ug/L		104	37 - 151	9	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	96		79 - 122
4-Bromofluorobenzene (Surr)	97		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	103		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-274804/1-A
Matrix: Water
Analysis Batch: 274853

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 274804

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00284	J	0.020	0.0020	ug/L		05/26/18 12:15	05/29/18 11:48	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		05/26/18 12:15	05/29/18 11:48	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		05/26/18 12:15	05/29/18 11:48	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-274804/1-A

Matrix: Water

Analysis Batch: 274853

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 274804

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		05/26/18 12:15	05/29/18 11:48	1
Chrysene	ND		0.020	0.0060	ug/L		05/26/18 12:15	05/29/18 11:48	1
Dibenz(a,h)anthracene	0.00787	J	0.020	0.0020	ug/L		05/26/18 12:15	05/29/18 11:48	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		05/26/18 12:15	05/29/18 11:48	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	81		53 - 120	05/26/18 12:15	05/29/18 11:48	1

Lab Sample ID: LCS 580-274804/2-A

Matrix: Water

Analysis Batch: 274853

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 274804

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.82		ug/L		96	61 - 120
Benzo[a]pyrene	4.00	3.45		ug/L		86	65 - 120
Benzo[b]fluoranthene	4.00	3.67		ug/L		92	58 - 120
Benzo[k]fluoranthene	4.00	3.23		ug/L		81	58 - 120
Chrysene	4.00	3.47		ug/L		87	58 - 120
Dibenz(a,h)anthracene	4.00	3.14		ug/L		79	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.47		ug/L		87	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	78		53 - 120

Lab Sample ID: LCSD 580-274804/3-A

Matrix: Water

Analysis Batch: 274853

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 274804

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.92		ug/L		98	61 - 120	2	16
Benzo[a]pyrene	4.00	3.56		ug/L		89	65 - 120	3	17
Benzo[b]fluoranthene	4.00	3.78		ug/L		94	58 - 120	3	20
Benzo[k]fluoranthene	4.00	3.38		ug/L		84	58 - 120	4	20
Chrysene	4.00	3.60		ug/L		90	58 - 120	4	16
Dibenz(a,h)anthracene	4.00	3.24		ug/L		81	60 - 125	3	15
Indeno[1,2,3-cd]pyrene	4.00	3.57		ug/L		89	56 - 120	3	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	77		53 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-274813/5

Matrix: Water

Analysis Batch: 274813

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/26/18 14:33	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	78		50 - 150					05/26/18 14:33	1
Trifluorotoluene (Surr)	103		50 - 150					05/26/18 14:33	1

Lab Sample ID: LCS 580-274813/6

Matrix: Water

Analysis Batch: 274813

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	1.03		mg/L		103	79 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	97		50 - 150				
Trifluorotoluene (Surr)	105		50 - 150				

Lab Sample ID: LCSD 580-274813/7

Matrix: Water

Analysis Batch: 274813

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	1.04		mg/L		104	79 - 120	1	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	81		50 - 150						
Trifluorotoluene (Surr)	108		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-274947/1-B

Matrix: Water

Analysis Batch: 275088

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 274947

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		05/30/18 09:16	05/31/18 13:13	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		05/30/18 09:16	05/31/18 13:13	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	74		50 - 150				05/30/18 09:16	05/31/18 13:13	1

Lab Sample ID: LCS 580-274947/2-B

Matrix: Water

Analysis Batch: 275088

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 274947

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.46		mg/L		73	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

(Continued)

Lab Sample ID: LCS 580-274947/2-B

Matrix: Water

Analysis Batch: 275088

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 274947

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Motor Oil (>C24-C36)	2.00	1.87		mg/L		93	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	85		50 - 150

Lab Sample ID: LCSD 580-274947/3-B

Matrix: Water

Analysis Batch: 275088

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 274947

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.52		mg/L		76	50 - 120	4	26
Motor Oil (>C24-C36)	2.00	1.95		mg/L		97	64 - 120	4	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	88		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77584-1

Date Collected: 05/23/18 09:00

Matrix: Water

Date Received: 05/26/18 11:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	274858	05/29/18 20:27	CJ	TAL SEA
Total/NA	Prep	3510C			274804	05/26/18 12:15	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	274853	05/29/18 14:38	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	274813	05/26/18 16:40	JCV	TAL SEA
Total/NA	Prep	3510C			274947	05/30/18 09:16	JCM	TAL SEA
Total/NA	Cleanup	3630C			275039	05/30/18 18:28	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	275088	05/31/18 15:25	CJ	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-77584-2

Date Collected: 05/23/18 00:01

Matrix: Water

Date Received: 05/26/18 11:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	274858	05/29/18 15:00	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	274813	05/26/18 16:08	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-77584-1	Outfall #002	Water	05/23/18 09:00	05/26/18 11:00
580-77584-2	Trip Blank	Water	05/23/18 00:01	05/26/18 11:00

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Rush
 Short Hold

Chain of Custody Record

Client <u>Arriades</u>	Client Contact <u>Peter Campbell</u>	Date <u>5/23/18</u>	Chain of Custody Number <u>36778</u>
Address <u>1100 Olive Way Suite 800</u>	Telephone Number (Area Code)/Fax Number <u>206-726-4741</u>	Lab Number	
City <u>Seattle</u>	State <u>WA</u>	Zip Code <u>98101</u>	Page <u> </u> of <u> </u>

Sampler: Jasm Little Lab Contact: Elaine Walker

Project Name and Location (State): Edmonds Terminal

Billing Contact: _____

Analysis (Attach list if more space is needed)

Contract/Purchase Order/Quote No. _____

Matrix: _____

Containers & Preservatives: _____

Special Instructions/ Conditions of Receipt

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH			
OUTFALL #002	5/23/18	0900		10				2		8					pH = 7.98
Trip Blank	—	—		6					6						
															USE Standard Sol for NWTHI-DX Buzac + CPAH should have a limit of 1ug/L



Therm. ID: A2 Cor: 0.3 ° Unc: 0.5 °

Cooler Dsc: Insulated

Packing: Bubble FedEx: _____

Cust. Seal: Yes _____ No X UPS: _____

Wet/Packs/Dry Ice/None Lab Cour: X

Other: _____

Cooler: Yes No Cooler Temp: _____

Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown

Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months

(A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days)

24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____

1. Relinquished By				QC Requirements (Specify)				1. Received By				
Sign/Print	Date	Time						Sign/Print	Date	Time		
<u>[Signature]</u>	<u>5/23/18</u>	<u>1100</u>						<u>[Signature]</u> Francisco Luna Jr	<u>5/23/18</u>	<u>1100</u>		
2. Relinquished By	Date	Time						2. Received By	Date	Time		
3. Relinquished By	Date	Time						3. Received By	Date	Time		

Comments _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-77584-1

Login Number: 77584

List Source: TestAmerica Seattle

List Number: 1

Creator: Gall, Brandon A

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	False	Headspace larger than 1/4" in one or more vials, 4 vial with acct. headspace
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-77727-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
6/7/2018 2:41:48 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Job ID: 580-77727-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-77727-1

Receipt

Three samples were received on 5/31/2018 2:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 6.1° C.

Receipt Exceptions

The VOA vials for the following samples were not provided by TestAmerica. Outfall #002 (580-77727-1), Outfall #002 (580-77727-1[MS]), Outfall #002 (580-77727-1[MSD]) and DUP-1 (580-77727-2).

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The method blank for preparation batch 580-275384 and analytical batch 580-275611 contained Benzo[a]anthracene above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and/or re-analysis of samples was not performed.

Method(s) 8270C SIM: The matrix spike (MS) recoveries for preparation batch 580-275384 and analytical batch 580-275611 were 2% outside lower control limits for Benzo[a]anthracene. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F1	MS and/or MSD Recovery is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77727-1

Date Collected: 05/29/18 16:00

Matrix: Water

Date Received: 05/31/18 14:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/06/18 17:21	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					06/06/18 17:21	1
Toluene-d8 (Surr)	103		79 - 122					06/06/18 17:21	1
4-Bromofluorobenzene (Surr)	99		78 - 119					06/06/18 17:21	1
Dibromofluoromethane (Surr)	96		70 - 120					06/06/18 17:21	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					06/06/18 17:21	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0049	J B F1	0.022	0.0022	ug/L		06/05/18 09:44	06/07/18 10:53	1
Benzo[a]pyrene	ND		0.022	0.0032	ug/L		06/05/18 09:44	06/07/18 10:53	1
Benzo[b]fluoranthene	ND		0.022	0.0087	ug/L		06/05/18 09:44	06/07/18 10:53	1
Benzo[k]fluoranthene	ND		0.032	0.0097	ug/L		06/05/18 09:44	06/07/18 10:53	1
Chrysene	ND		0.022	0.0065	ug/L		06/05/18 09:44	06/07/18 10:53	1
Dibenz(a,h)anthracene	0.0061	J	0.022	0.0022	ug/L		06/05/18 09:44	06/07/18 10:53	1
Indeno[1,2,3-cd]pyrene	ND		0.022	0.0076	ug/L		06/05/18 09:44	06/07/18 10:53	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	74		53 - 120				06/05/18 09:44	06/07/18 10:53	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/02/18 19:56	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		50 - 150					06/02/18 19:56	1
Trifluorotoluene (Surr)	101		50 - 150					06/02/18 19:56	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.072	mg/L		06/04/18 10:56	06/06/18 15:47	1
Motor Oil (>C24-C36)	ND		0.39	0.11	mg/L		06/04/18 10:56	06/06/18 15:47	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	68		50 - 150				06/04/18 10:56	06/06/18 15:47	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Client Sample ID: DUP-1
Date Collected: 05/29/18 16:10
Date Received: 05/31/18 14:00

Lab Sample ID: 580-77727-2
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/06/18 18:35	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					06/06/18 18:35	1
Toluene-d8 (Surr)	105		79 - 122					06/06/18 18:35	1
4-Bromofluorobenzene (Surr)	102		78 - 119					06/06/18 18:35	1
Dibromofluoromethane (Surr)	101		70 - 120					06/06/18 18:35	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					06/06/18 18:35	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0050	J B	0.022	0.0022	ug/L		06/05/18 09:44	06/07/18 11:59	1
Benzo[a]pyrene	ND		0.022	0.0032	ug/L		06/05/18 09:44	06/07/18 11:59	1
Benzo[b]fluoranthene	ND		0.022	0.0086	ug/L		06/05/18 09:44	06/07/18 11:59	1
Benzo[k]fluoranthene	ND		0.032	0.0097	ug/L		06/05/18 09:44	06/07/18 11:59	1
Chrysene	ND		0.022	0.0065	ug/L		06/05/18 09:44	06/07/18 11:59	1
Dibenz(a,h)anthracene	0.0060	J	0.022	0.0022	ug/L		06/05/18 09:44	06/07/18 11:59	1
Indeno[1,2,3-cd]pyrene	ND		0.022	0.0075	ug/L		06/05/18 09:44	06/07/18 11:59	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	65		53 - 120				06/05/18 09:44	06/07/18 11:59	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/02/18 17:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		50 - 150					06/02/18 17:21	1
Trifluorotoluene (Surr)	101		50 - 150					06/02/18 17:21	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		06/04/18 10:56	06/06/18 16:53	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		06/04/18 10:56	06/06/18 16:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	72		50 - 150				06/04/18 10:56	06/06/18 16:53	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77727-3

Date Collected: 05/29/18 00:01

Matrix: Water

Date Received: 05/31/18 14:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/06/18 16:08	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					06/06/18 16:08	1
Toluene-d8 (Surr)	104		79 - 122					06/06/18 16:08	1
4-Bromofluorobenzene (Surr)	102		78 - 119					06/06/18 16:08	1
Dibromofluoromethane (Surr)	98		70 - 120					06/06/18 16:08	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 120					06/06/18 16:08	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/02/18 14:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		50 - 150					06/02/18 14:46	1
Trifluorotoluene (Surr)	100		50 - 150					06/02/18 14:46	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-275526/5
Matrix: Water
Analysis Batch: 275526

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/06/18 14:54	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		74 - 123		06/06/18 14:54	1
Toluene-d8 (Surr)	107		79 - 122		06/06/18 14:54	1
4-Bromofluorobenzene (Surr)	101		78 - 119		06/06/18 14:54	1
Dibromofluoromethane (Surr)	101		70 - 120		06/06/18 14:54	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120		06/06/18 14:54	1

Lab Sample ID: LCS 580-275526/6
Matrix: Water
Analysis Batch: 275526

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.3		ug/L		103	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	102		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	99		70 - 120

Lab Sample ID: LCSD 580-275526/7
Matrix: Water
Analysis Batch: 275526

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.88		ug/L		99	37 - 151	4	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	98		70 - 120
1,2-Dichloroethane-d4 (Surr)	100		70 - 120

Lab Sample ID: 580-77727-1 MS
Matrix: Water
Analysis Batch: 275526

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	ND		11.6	11.3		ug/L		98	37 - 151

Surrogate	MS %Recovery	MS Qualifier	Limits
Trifluorotoluene (Surr)	105		74 - 123
Toluene-d8 (Surr)	102		79 - 122

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-77727-1 MS
Matrix: Water
Analysis Batch: 275526

Client Sample ID: Outfall #002
Prep Type: Total/NA

Surrogate	MS %Recovery	MS Qualifier	Limits
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	104		70 - 120
1,2-Dichloroethane-d4 (Surr)	104		70 - 120

Lab Sample ID: 580-77727-1 MSD
Matrix: Water
Analysis Batch: 275526

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	ND		11.6	11.1		ug/L		95	37 - 151	2	30

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Trifluorotoluene (Surr)	101		74 - 123
Toluene-d8 (Surr)	99		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	98		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-275384/1-A
Matrix: Water
Analysis Batch: 275611

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 275384

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.00274	J	0.020	0.0020	ug/L		06/05/18 09:44	06/07/18 09:25	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		06/05/18 09:44	06/07/18 09:25	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		06/05/18 09:44	06/07/18 09:25	1
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		06/05/18 09:44	06/07/18 09:25	1
Chrysene	ND		0.020	0.0060	ug/L		06/05/18 09:44	06/07/18 09:25	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		06/05/18 09:44	06/07/18 09:25	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		06/05/18 09:44	06/07/18 09:25	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	83		53 - 120	06/05/18 09:44	06/07/18 09:25	1

Lab Sample ID: LCS 580-275384/2-A
Matrix: Water
Analysis Batch: 275611

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 275384

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	2.67		ug/L		67	61 - 120
Benzo[a]pyrene	4.00	2.94		ug/L		74	65 - 120
Benzo[b]fluoranthene	4.00	2.99		ug/L		75	58 - 120
Benzo[k]fluoranthene	4.00	2.80		ug/L		70	58 - 120
Chrysene	4.00	2.79		ug/L		70	58 - 120
Dibenz(a,h)anthracene	4.00	3.23		ug/L		81	60 - 125

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: LCS 580-275384/2-A
Matrix: Water
Analysis Batch: 275611

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 275384

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Indeno[1,2,3-cd]pyrene	4.00	3.30		ug/L		83	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	71		53 - 120

Lab Sample ID: 580-77727-1 MS
Matrix: Water
Analysis Batch: 275611

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 275384

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	0.0049	J B F1	4.26	2.52	F1	ug/L		59	61 - 120
Benzo[a]pyrene	ND		4.26	2.79		ug/L		66	65 - 120
Benzo[b]fluoranthene	ND		4.26	2.66		ug/L		62	58 - 120
Benzo[k]fluoranthene	ND		4.26	2.82		ug/L		66	58 - 120
Chrysene	ND		4.26	2.74		ug/L		64	58 - 120
Dibenz(a,h)anthracene	0.0061	J	4.26	3.08		ug/L		72	60 - 125
Indeno[1,2,3-cd]pyrene	ND		4.26	3.08		ug/L		72	56 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
Terphenyl-d14	66		53 - 120

Lab Sample ID: 580-77727-1 MSD
Matrix: Water
Analysis Batch: 275611

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 275384

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzo[a]anthracene	0.0049	J B F1	4.21	2.87		ug/L		68	61 - 120	13	16
Benzo[a]pyrene	ND		4.21	3.08		ug/L		73	65 - 120	10	17
Benzo[b]fluoranthene	ND		4.21	2.94		ug/L		70	58 - 120	10	20
Benzo[k]fluoranthene	ND		4.21	3.15		ug/L		75	58 - 120	11	20
Chrysene	ND		4.21	3.11		ug/L		74	58 - 120	13	16
Dibenz(a,h)anthracene	0.0061	J	4.21	3.39		ug/L		80	60 - 125	10	15
Indeno[1,2,3-cd]pyrene	ND		4.21	3.38		ug/L		80	56 - 120	9	15

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Terphenyl-d14	70		53 - 120

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-275249/6
Matrix: Water
Analysis Batch: 275249

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/02/18 12:37	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: MB 580-275249/6
Matrix: Water
Analysis Batch: 275249

Client Sample ID: Method Blank
Prep Type: Total/NA

Surrogate	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
4-Bromofluorobenzene (Surr)	85		50 - 150		06/02/18 12:37	1
Trifluorotoluene (Surr)	97		50 - 150		06/02/18 12:37	1

Lab Sample ID: LCS 580-275249/7
Matrix: Water
Analysis Batch: 275249

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.953		mg/L		95	79 - 120

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	102		50 - 150
Trifluorotoluene (Surr)	108		50 - 150

Lab Sample ID: LCSD 580-275249/8
Matrix: Water
Analysis Batch: 275249

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.959		mg/L		96	79 - 120	1	10

Surrogate	LCSD LCSD		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	103		50 - 150
Trifluorotoluene (Surr)	104		50 - 150

Lab Sample ID: 580-77727-1 MS
Matrix: Water
Analysis Batch: 275249

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	ND		1.00	0.904		mg/L		90	79 - 120

Surrogate	MS MS		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	102		50 - 150
Trifluorotoluene (Surr)	101		50 - 150

Lab Sample ID: 580-77727-1 MSD
Matrix: Water
Analysis Batch: 275249

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	ND		1.00	0.965		mg/L		97	79 - 120	7	10

Surrogate	MSD MSD		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	104		50 - 150
Trifluorotoluene (Surr)	99		50 - 150

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-275309/1-B
Matrix: Water
Analysis Batch: 275495

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 275309

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		06/04/18 10:56	06/06/18 14:41	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		06/04/18 10:56	06/06/18 14:41	1
Surrogate									
	MB MB		Limits			D	Prepared	Analyzed	Dil Fac
Surrogate	%Recovery	Qualifier							
<i>o</i> -Terphenyl	70		50 - 150				06/04/18 10:56	06/06/18 14:41	1

Lab Sample ID: LCS 580-275309/2-B
Matrix: Water
Analysis Batch: 275495

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 275309

Analyte	Spike Added	LCS LCS		Unit	D	%Rec	Limits
		Result	Qualifier				
#2 Diesel (C10-C24)	2.00	1.61		mg/L		81	50 - 120
Motor Oil (>C24-C36)	2.00	1.98		mg/L		99	64 - 120
Surrogate							
	LCS LCS		Limits			D	%Rec
Surrogate	%Recovery	Qualifier					
<i>o</i> -Terphenyl	98		50 - 150				

Lab Sample ID: LCSD 580-275309/3-B
Matrix: Water
Analysis Batch: 275495

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 275309

Analyte	Spike Added	LCSD LCSD		Unit	D	%Rec	%Rec.		RPD	Limit
		Result	Qualifier				Limits	RPD		
#2 Diesel (C10-C24)	2.00	1.56		mg/L		78	50 - 120	3	26	
Motor Oil (>C24-C36)	2.00	1.88		mg/L		94	64 - 120	5	24	
Surrogate										
	LCSD LCSD		Limits			D	%Rec	Limits	RPD	Limit
Surrogate	%Recovery	Qualifier								
<i>o</i> -Terphenyl	86		50 - 150							

Lab Sample ID: 580-77727-1 MS
Matrix: Water
Analysis Batch: 275495

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 275309

Analyte	Sample Result	Sample Qualifier	Spike Added	MS MS		Unit	D	%Rec	%Rec.	
				Result	Qualifier				Limits	RPD
#2 Diesel (C10-C24)	ND		2.12	1.47		mg/L		70	50 - 120	
Motor Oil (>C24-C36)	ND		2.12	1.92		mg/L		90	64 - 120	
Surrogate										
	MS MS		Limits			D	%Rec	Limits	RPD	Limit
Surrogate	%Recovery	Qualifier								
<i>o</i> -Terphenyl	88		50 - 150							

Lab Sample ID: 580-77727-1 MSD
Matrix: Water
Analysis Batch: 275495

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 275309

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD MSD		Unit	D	%Rec	%Rec.	
				Result	Qualifier				Limits	RPD
#2 Diesel (C10-C24)	ND		2.13	1.37		mg/L		64	50 - 120	8
Motor Oil (>C24-C36)	ND		2.13	1.77		mg/L		83	64 - 120	8

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: 580-77727-1 MSD
Matrix: Water
Analysis Batch: 275495

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 275309

<i>Surrogate</i>	<i>MSD</i> <i>%Recovery</i>	<i>MSD</i> <i>Qualifier</i>	<i>Limits</i>
<i>o-Terphenyl</i>	76		50 - 150

- 1
- 2
- 3
- 4
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- 9
- 10
- 11

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Client Sample ID: Outfall #002

Date Collected: 05/29/18 16:00

Date Received: 05/31/18 14:00

Lab Sample ID: 580-77727-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	275526	06/06/18 17:21	CJ	TAL SEA
Total/NA	Prep	3510C			275384	06/05/18 09:44	KMS	TAL SEA
Total/NA	Analysis	8270C SIM		1	275611	06/07/18 10:53	ERZ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	275249	06/02/18 19:56	T1W	TAL SEA
Total/NA	Prep	3510C			275309	06/04/18 10:56	JCM	TAL SEA
Total/NA	Cleanup	3630C			275480	06/05/18 18:03	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	275495	06/06/18 15:47	W1T	TAL SEA

Client Sample ID: DUP-1

Date Collected: 05/29/18 16:10

Date Received: 05/31/18 14:00

Lab Sample ID: 580-77727-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	275526	06/06/18 18:35	CJ	TAL SEA
Total/NA	Prep	3510C			275384	06/05/18 09:44	KMS	TAL SEA
Total/NA	Analysis	8270C SIM		1	275611	06/07/18 11:59	ERZ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	275249	06/02/18 17:21	T1W	TAL SEA
Total/NA	Prep	3510C			275309	06/04/18 10:56	JCM	TAL SEA
Total/NA	Cleanup	3630C			275480	06/05/18 18:03	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	275495	06/06/18 16:53	W1T	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 05/29/18 00:01

Date Received: 05/31/18 14:00

Lab Sample ID: 580-77727-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	275526	06/06/18 16:08	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	275249	06/02/18 14:46	T1W	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

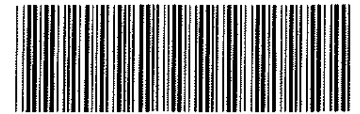
Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-77727-1	Outfall #002	Water	05/29/18 16:00	05/31/18 14:00
580-77727-2	DUP-1	Water	05/29/18 16:10	05/31/18 14:00
580-77727-3	Trip Blank	Water	05/29/18 00:01	05/31/18 14:00

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Client: Arcadis Client Contact: Peter Campbell Date: 5/29/18 Chain of Custody Number: 38034
 Address: 1100 Olive Way Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: 7727 Page _____ of _____
 City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Walker
 Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed): _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH				
Outfall #002	5/29/18	1600	X						8			X	X	X	X	PH-7.81 Benzon + CPAHS MUST have a quantitative MUL value less than 1ug/L Run Nwrph-DX w/standard SGC
Outfall #002 MS/MSD	5/29/18	1610	X						8			X	X	X	X	
DUP-1	5/29/18	-	X						8			X	X	X	X	
Trip Blank	-	-	X						6			X	X			

Therm. ID: JES Cor: 6.1 Inc: 6.0
 Cooler Desc: med Red
 Packing: Bubble FedEx: _____
 Cust. Seal: Yes _____ No
 Lab Cour: X
 Wet/Packs/Dry Ice/None _____ Other: _____



580-77727 Chain of Custody

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal: Disposal By Lab Return To Client Archive For _____

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____

QC Requirements (Specify)

1. Relinquished By Sign/Print: <u>[Signature]</u> / <u>Fritz Krueser</u>	Date: <u>5/31/18</u> Time: <u>1400</u>	1. Received By Sign/Print: <u>[Signature]</u> / <u>Francisco Luna, Jr.</u>	Date: <u>5/31/18</u> Time: <u>1400</u>
2. Relinquished By Sign/Print: _____	Date: _____ Time: _____	2. Received By Sign/Print: _____	Date: _____ Time: _____
3. Relinquished By Sign/Print: _____	Date: _____ Time: _____	3. Received By Sign/Print: _____	Date: _____ Time: _____

Comments

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-77727-1

Login Number: 77727

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	False	Refer to Job Narrative for details.
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-77886-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
6/14/2018 5:46:13 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
TotalAccess

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Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Job ID: 580-77886-1

Laboratory: TestAmerica Seattle

Narrative

**Job Narrative
580-77886-1**

Receipt

Two samples were received on 6/7/2018 11:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 17.3° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77886-1

Date Collected: 06/07/18 08:45

Matrix: Water

Date Received: 06/07/18 11:50

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	2.9		1.0	0.53	ug/L			06/11/18 14:34	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					06/11/18 14:34	1
Toluene-d8 (Surr)	107		79 - 122					06/11/18 14:34	1
4-Bromofluorobenzene (Surr)	103		78 - 119					06/11/18 14:34	1
Dibromofluoromethane (Surr)	98		70 - 120					06/11/18 14:34	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 120					06/11/18 14:34	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.023	0.0023	ug/L		06/08/18 09:38	06/12/18 18:14	1
Benzo[a]pyrene	ND		0.023	0.0034	ug/L		06/08/18 09:38	06/12/18 18:14	1
Benzo[b]fluoranthene	ND		0.023	0.0090	ug/L		06/08/18 09:38	06/12/18 18:14	1
Benzo[k]fluoranthene	ND		0.034	0.010	ug/L		06/08/18 09:38	06/12/18 18:14	1
Chrysene	ND		0.023	0.0068	ug/L		06/08/18 09:38	06/12/18 18:14	1
Dibenz(a,h)anthracene	ND		0.023	0.0023	ug/L		06/08/18 09:38	06/12/18 18:14	1
Indeno[1,2,3-cd]pyrene	ND		0.023	0.0079	ug/L		06/08/18 09:38	06/12/18 18:14	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	72		53 - 120				06/08/18 09:38	06/12/18 18:14	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/12/18 18:45	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		50 - 150					06/12/18 18:45	1
Trifluorotoluene (Surr)	102		50 - 150					06/12/18 18:45	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.073	mg/L		06/11/18 13:05	06/12/18 14:24	1
Motor Oil (>C24-C36)	ND		0.40	0.11	mg/L		06/11/18 13:05	06/12/18 14:24	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	106		50 - 150				06/11/18 13:05	06/12/18 14:24	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77886-2

Date Collected: 06/07/18 00:00

Matrix: Water

Date Received: 06/07/18 11:50

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/11/18 12:56	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	101		74 - 123					06/11/18 12:56	1
<i>Toluene-d8 (Surr)</i>	106		79 - 122					06/11/18 12:56	1
<i>4-Bromofluorobenzene (Surr)</i>	100		78 - 119					06/11/18 12:56	1
<i>Dibromofluoromethane (Surr)</i>	99		70 - 120					06/11/18 12:56	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	102		70 - 120					06/11/18 12:56	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/08/18 17:16	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	89		50 - 150					06/08/18 17:16	1
<i>Trifluorotoluene (Surr)</i>	105		50 - 150					06/08/18 17:16	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-275911/5
Matrix: Water
Analysis Batch: 275911

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/11/18 11:42	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		74 - 123		06/11/18 11:42	1
Toluene-d8 (Surr)	105		79 - 122		06/11/18 11:42	1
4-Bromofluorobenzene (Surr)	101		78 - 119		06/11/18 11:42	1
Dibromofluoromethane (Surr)	99		70 - 120		06/11/18 11:42	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120		06/11/18 11:42	1

Lab Sample ID: LCS 580-275911/6
Matrix: Water
Analysis Batch: 275911

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.1		ug/L		101	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	102		70 - 120

Lab Sample ID: LCSD 580-275911/7
Matrix: Water
Analysis Batch: 275911

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	8.87		ug/L		89	37 - 151	13	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	98		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	100		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-275767/1-A
Matrix: Water
Analysis Batch: 276070

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 275767

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		06/08/18 09:38	06/12/18 14:55	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		06/08/18 09:38	06/12/18 14:55	1
Benzo[b]fluoranthene	ND		0.020	0.0080	ug/L		06/08/18 09:38	06/12/18 14:55	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-275767/1-A
Matrix: Water
Analysis Batch: 276070

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 275767

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.030	0.0090	ug/L		06/08/18 09:38	06/12/18 14:55	1
Chrysene	ND		0.020	0.0060	ug/L		06/08/18 09:38	06/12/18 14:55	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		06/08/18 09:38	06/12/18 14:55	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0070	ug/L		06/08/18 09:38	06/12/18 14:55	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	112		53 - 120	06/08/18 09:38	06/12/18 14:55	1

Lab Sample ID: LCS 580-275767/2-A
Matrix: Water
Analysis Batch: 276070

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 275767

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.71		ug/L		93	61 - 120
Benzo[a]pyrene	4.00	4.24		ug/L		106	65 - 120
Benzo[b]fluoranthene	4.00	4.22		ug/L		105	58 - 120
Benzo[k]fluoranthene	4.00	4.21		ug/L		105	58 - 120
Chrysene	4.00	4.03		ug/L		101	58 - 120
Dibenz(a,h)anthracene	4.00	4.55		ug/L		114	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	4.54		ug/L		113	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	86		53 - 120

Lab Sample ID: LCSD 580-275767/3-A
Matrix: Water
Analysis Batch: 276070

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 275767

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.77		ug/L		94	61 - 120	2	16
Benzo[a]pyrene	4.00	4.27		ug/L		107	65 - 120	1	17
Benzo[b]fluoranthene	4.00	4.16		ug/L		104	58 - 120	1	20
Benzo[k]fluoranthene	4.00	4.37		ug/L		109	58 - 120	4	20
Chrysene	4.00	4.16		ug/L		104	58 - 120	3	16
Dibenz(a,h)anthracene	4.00	4.60		ug/L		115	60 - 125	1	15
Indeno[1,2,3-cd]pyrene	4.00	4.57		ug/L		114	56 - 120	1	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	89		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-275792/5
Matrix: Water
Analysis Batch: 275792

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/08/18 13:28	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		50 - 150					06/08/18 13:28	1
Trifluorotoluene (Surr)	99		50 - 150					06/08/18 13:28	1

Lab Sample ID: LCS 580-275792/6
Matrix: Water
Analysis Batch: 275792

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.864		mg/L		86	79 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	92		50 - 150				
Trifluorotoluene (Surr)	93		50 - 150				

Lab Sample ID: LCSD 580-275792/7
Matrix: Water
Analysis Batch: 275792

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.814		mg/L		81	79 - 120	6	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	76		50 - 150						
Trifluorotoluene (Surr)	89		50 - 150						

Lab Sample ID: MB 580-276069/6
Matrix: Water
Analysis Batch: 276069

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/12/18 16:10	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		50 - 150					06/12/18 16:10	1
Trifluorotoluene (Surr)	98		50 - 150					06/12/18 16:10	1

Lab Sample ID: LCS 580-276069/7
Matrix: Water
Analysis Batch: 276069

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.883		mg/L		88	79 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-276069/7
Matrix: Water
Analysis Batch: 276069

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	107		50 - 150
Trifluorotoluene (Surr)	99		50 - 150

Lab Sample ID: LCSD 580-276069/8
Matrix: Water
Analysis Batch: 276069

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.917		mg/L		92	79 - 120	4	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	103		50 - 150
Trifluorotoluene (Surr)	101		50 - 150

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-275937/1-B
Matrix: Water
Analysis Batch: 275993

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 275937

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		06/11/18 13:05	06/12/18 13:04	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		06/11/18 13:05	06/12/18 13:04	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	108		50 - 150	06/11/18 13:05	06/12/18 13:04	1

Lab Sample ID: LCS 580-275937/2-B
Matrix: Water
Analysis Batch: 275993

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 275937

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.78		mg/L		89	50 - 120
Motor Oil (>C24-C36)	2.00	2.03		mg/L		102	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	101		50 - 150

Lab Sample ID: LCSD 580-275937/3-B
Matrix: Water
Analysis Batch: 275993

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 275937

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.74		mg/L		87	50 - 120	2	26
Motor Oil (>C24-C36)	2.00	2.12		mg/L		106	64 - 120	4	24

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCSD 580-275937/3-B
Matrix: Water
Analysis Batch: 275993

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 275937

<i>Surrogate</i>	<i>LCSD</i> <i>%Recovery</i>	<i>LCSD</i> <i>Qualifier</i>	<i>Limits</i>
<i>o-Terphenyl</i>	102		50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77886-1

Date Collected: 06/07/18 08:45

Matrix: Water

Date Received: 06/07/18 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	275911	06/11/18 14:34	CJ	TAL SEA
Total/NA	Prep	3510C			275767	06/08/18 09:38	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	276070	06/12/18 18:14	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	276069	06/12/18 18:45	JCV	TAL SEA
Total/NA	Prep	3510C			275937	06/11/18 13:05	JCM	TAL SEA
Total/NA	Cleanup	3630C			275978	06/11/18 17:40	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	275993	06/12/18 14:24	CJ	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-77886-2

Date Collected: 06/07/18 00:00

Matrix: Water

Date Received: 06/07/18 11:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	275911	06/11/18 12:56	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	275792	06/08/18 17:16	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-77886-1	Outfall #002	Water	06/07/18 08:45	06/07/18 11:50
580-77886-2	Trip Blank	Water	06/07/18 00:00	06/07/18 11:50

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Client Arcadis			Client Contact Peter Campbell			Date 6/7/18		Chain of Custody Number 36688		
Address 170 Olive Way Suite 800			Telephone Number (Area Code)/Fax Number			Lab Number		Page _____ of _____		

City Seattle		State WA	Zip Code 98101		Sampler Jain Little		Lab Contact Elaine Walker		Analysis (Attach list if more space is needed)		
Project Name and Location (State) Edmonds Terminal				Billing Contact		NWTRH-6x NWTRH-DX w/SGC BenZene EPA 624 CPTAS 870C		Loc: 580 77886		Special Instructions/ Conditions of Receipt	

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives					pH = 8.15	NWTRH-DX w/SGC - use standard SGC	* BenZene + CPTAS w/quantitative level less than bag/L				
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH				ZnAc/ NaOH			
OUT Fall #002	6/7/18	0845		X			2						X	X	X	X		
Trip Blank				Y									X	X				



Therm: 1 Cor: 1.5 Unc: 17.1
Cooler Desc: Sm Blue
Packing: Bob FedEx:
Cust. Seal: Yes No UPS:
2 / Packs/Dry Ice/None Lab Cour: X
Other:

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Disposal By Lab Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify)

1. Relinquished By <u>Jain Little</u> Date <u>6/7/18</u> Time <u>1150</u>	1. Received By <u>Francisco Luyra Jr</u> Date <u>6/7/18</u> Time <u>1150</u>
2. Relinquished By _____ Date _____ Time _____	2. Received By _____ Date _____ Time _____
3. Relinquished By _____ Date _____ Time _____	3. Received By _____ Date _____ Time _____

Comments

DISTRIBUTION: WHITE - Stays with the Samples; CANARY - Returned to Client with Report; PINK - Field Copy

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-77886-1

Login Number: 77886

List Number: 1

Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-78119-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
6/27/2018 5:54:47 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Job ID: 580-78119-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-78119-1

Receipt

Two samples were received on 6/15/2018 12:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.7° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for preparation batch 580-276570 and analytical batch 580-276870 recovered outside control limits for the following analytes: Benzo[a]anthracene, Benzo[a]pyrene, and Benzo[b]fluoranthene. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The following samples and QC were reanalyzed due to CCV failure in the initial analysis: (LCS 580-277249/2-B), (LCSD 580-277249/3-B) and (MB 580-277249/1-B).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78119-1

Date Collected: 06/15/18 09:55

Matrix: Water

Date Received: 06/15/18 12:25

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/20/18 23:14	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123					06/20/18 23:14	1
Toluene-d8 (Surr)	106		79 - 122					06/20/18 23:14	1
4-Bromofluorobenzene (Surr)	102		78 - 119					06/20/18 23:14	1
Dibromofluoromethane (Surr)	96		70 - 120					06/20/18 23:14	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120					06/20/18 23:14	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND	*	0.052	0.015	ug/L		06/18/18 12:32	06/21/18 00:09	1
Benzo[a]pyrene	ND	*	0.10	0.012	ug/L		06/18/18 12:32	06/21/18 00:09	1
Benzo[b]fluoranthene	ND	*	0.052	0.012	ug/L		06/18/18 12:32	06/21/18 00:09	1
Benzo[k]fluoranthene	ND		0.052	0.013	ug/L		06/18/18 12:32	06/21/18 00:09	1
Chrysene	ND		0.10	0.017	ug/L		06/18/18 12:32	06/21/18 00:09	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		06/18/18 12:32	06/21/18 00:09	1
Indeno[1,2,3-cd]pyrene	ND		0.052	0.015	ug/L		06/18/18 12:32	06/21/18 00:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	67		53 - 120				06/18/18 12:32	06/21/18 00:09	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/23/18 22:56	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		50 - 150					06/23/18 22:56	1
Trifluorotoluene (Surr)	82		50 - 150					06/23/18 22:56	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.069	mg/L		06/25/18 08:54	06/26/18 21:38	1
Motor Oil (>C24-C36)	ND		0.37	0.10	mg/L		06/25/18 08:54	06/26/18 21:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	61		50 - 150				06/25/18 08:54	06/26/18 21:38	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-78119-2

Date Collected: 06/15/18 00:00

Matrix: Water

Date Received: 06/15/18 12:25

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/20/18 16:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	100		74 - 123					06/20/18 16:38	1
<i>Toluene-d8 (Surr)</i>	106		79 - 122					06/20/18 16:38	1
<i>4-Bromofluorobenzene (Surr)</i>	101		78 - 119					06/20/18 16:38	1
<i>Dibromofluoromethane (Surr)</i>	97		70 - 120					06/20/18 16:38	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	101		70 - 120					06/20/18 16:38	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/23/18 18:11	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	86		50 - 150					06/23/18 18:11	1
<i>Trifluorotoluene (Surr)</i>	83		50 - 150					06/23/18 18:11	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-276819/5

Matrix: Water

Analysis Batch: 276819

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/20/18 15:25	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123		06/20/18 15:25	1
Toluene-d8 (Surr)	106		79 - 122		06/20/18 15:25	1
4-Bromofluorobenzene (Surr)	101		78 - 119		06/20/18 15:25	1
Dibromofluoromethane (Surr)	97		70 - 120		06/20/18 15:25	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120		06/20/18 15:25	1

Lab Sample ID: LCS 580-276819/6

Matrix: Water

Analysis Batch: 276819

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.75		ug/L		97	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Lab Sample ID: LCSD 580-276819/7

Matrix: Water

Analysis Batch: 276819

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.97		ug/L		100	37 - 151	2	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	98		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-276570/1-A

Matrix: Water

Analysis Batch: 276870

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 276570

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		06/18/18 12:32	06/20/18 17:11	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		06/18/18 12:32	06/20/18 17:11	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		06/18/18 12:32	06/20/18 17:11	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-276570/1-A
Matrix: Water
Analysis Batch: 276870

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 276570

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		06/18/18 12:32	06/20/18 17:11	1
Chrysene	ND		0.10	0.016	ug/L		06/18/18 12:32	06/20/18 17:11	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		06/18/18 12:32	06/20/18 17:11	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		06/18/18 12:32	06/20/18 17:11	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	97		53 - 120				06/18/18 12:32	06/20/18 17:11	1

Lab Sample ID: LCS 580-276570/2-A
Matrix: Water
Analysis Batch: 276870

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 276570

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]pyrene	4.00	4.83	*	ug/L		121	65 - 120
Benzo[b]fluoranthene	4.00	5.10	*	ug/L		127	58 - 120
Benzo[k]fluoranthene	4.00	4.56		ug/L		114	58 - 120
Chrysene	4.00	4.54		ug/L		114	58 - 120
Dibenz(a,h)anthracene	4.00	4.43		ug/L		111	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	4.50		ug/L		112	56 - 120
Surrogate	%Recovery	Qualifier	Limits				
Terphenyl-d14	107		53 - 120				

Lab Sample ID: LCSD 580-276570/3-A
Matrix: Water
Analysis Batch: 276870

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 276570

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	
								RPD	Limit
Benzo[a]anthracene	4.00	5.05	*	ug/L		126	61 - 120	4	16
Benzo[a]pyrene	4.00	4.96	*	ug/L		124	65 - 120	3	17
Benzo[b]fluoranthene	4.00	5.37	*	ug/L		134	58 - 120	5	20
Benzo[k]fluoranthene	4.00	4.54		ug/L		113	58 - 120	0	20
Chrysene	4.00	4.72		ug/L		118	58 - 120	4	16
Dibenz(a,h)anthracene	4.00	4.50		ug/L		113	60 - 125	2	15
Indeno[1,2,3-cd]pyrene	4.00	4.43		ug/L		111	56 - 120	2	15
Surrogate	%Recovery	Qualifier	Limits						
Terphenyl-d14	110		53 - 120						

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-277212/5
Matrix: Water
Analysis Batch: 277212

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/23/18 14:09	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		50 - 150					06/23/18 14:09	1
Trifluorotoluene (Surr)	80		50 - 150					06/23/18 14:09	1

Lab Sample ID: LCS 580-277212/6
Matrix: Water
Analysis Batch: 277212

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.829		mg/L		83	79 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	96		50 - 150				
Trifluorotoluene (Surr)	95		50 - 150				

Lab Sample ID: LCSD 580-277212/7
Matrix: Water
Analysis Batch: 277212

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.809		mg/L		81	79 - 120	2	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	88		50 - 150						
Trifluorotoluene (Surr)	98		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-277249/1-B
Matrix: Water
Analysis Batch: 277389

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 277249

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		06/25/18 08:54	06/26/18 13:21	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	76		50 - 150				06/25/18 08:54	06/26/18 13:21	1

Lab Sample ID: LCS 580-277249/2-B
Matrix: Water
Analysis Batch: 277389

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 277249

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.36		mg/L		68	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-277249/2-B
Matrix: Water
Analysis Batch: 277389

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 277249

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
<i>o</i> -Terphenyl	85		50 - 150

Lab Sample ID: LCSD 580-277249/3-B
Matrix: Water
Analysis Batch: 277389

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 277249

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
#2 Diesel (C10-C24)	2.00	1.57		mg/L		79	50 - 120	14	26	

Surrogate	LCSD LCSD		Limits
	%Recovery	Qualifier	
<i>o</i> -Terphenyl	83		50 - 150

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup - RA

Lab Sample ID: MB 580-277249/1-B
Matrix: Water
Analysis Batch: 277513

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 277249

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Motor Oil (>C24-C36) - RA	ND		0.35	0.096	mg/L		06/25/18 08:54	06/27/18 11:59	1

Lab Sample ID: LCS 580-277249/2-B
Matrix: Water
Analysis Batch: 277513

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 277249

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.	
							Limits	RPD
Motor Oil (>C24-C36) - RA	2.00	1.78		mg/L		89	64 - 120	

Lab Sample ID: LCSD 580-277249/3-B
Matrix: Water
Analysis Batch: 277513

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 277249

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
Motor Oil (>C24-C36) - RA	2.00	1.87		mg/L		94	64 - 120	5	24	

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Client Sample ID: Outfall #002

Date Collected: 06/15/18 09:55

Date Received: 06/15/18 12:25

Lab Sample ID: 580-78119-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	276819	06/20/18 23:14	W1T	TAL SEA
Total/NA	Prep	3510C			276570	06/18/18 12:32	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	276870	06/21/18 00:09	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	277212	06/23/18 22:56	JSM	TAL SEA
Total/NA	Prep	3510C			277249	06/25/18 08:54	JCM	TAL SEA
Total/NA	Cleanup	3630C			277358	06/26/18 08:51	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	277389	06/26/18 21:38	T1W	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 06/15/18 00:00

Date Received: 06/15/18 12:25

Lab Sample ID: 580-78119-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	276819	06/20/18 16:38	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	277212	06/23/18 18:11	JSM	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78119-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-78119-1	Outfall #002	Water	06/15/18 09:55	06/15/18 12:25
580-78119-2	Trip Blank	Water	06/15/18 00:00	06/15/18 12:25

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Chevron Northwest Region Analysis Request/Chain of Custody

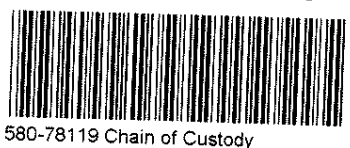
Loc: 580
78119



Lancaster Laboratories
Environmental

Acct. # _____ Group # _____ Sample # _____
For Eurofins Lancaster Laboratories Environmental use only
Instructions on reverse side correspond with circled numbers.

1 Client Information				4 Matrix				5 Analyses Requested												6 Remarks																						
Facility # Edmonds Terminal		WBS		Sediment <input type="checkbox"/>		Ground <input type="checkbox"/>		Surface <input type="checkbox"/>		<input type="checkbox"/> Results in Dry Weight <input type="checkbox"/> J value reporting needed <input type="checkbox"/> Must meet lowest detection limits possible for 8260 compounds <input type="checkbox"/> 8021 MTBE Confirmation <input type="checkbox"/> Confirm MTBE + Naphthalene <input type="checkbox"/> Confirm highest hit by 8260 <input type="checkbox"/> Confirm all hits by 8260 <input type="checkbox"/> Run _____ oxy's on highest hit <input type="checkbox"/> Run _____ oxy's on all hits												SCR #: _____																				
Site Address 11720 Vasco Rd Edmonds, WA		Chevron PM		Potable <input type="checkbox"/>		NPDES <input type="checkbox"/>		Air <input type="checkbox"/>																																		
Consultant/Office Arcadis		Lead Consultant		Oil <input type="checkbox"/>		Total Number of Containers		BTEX + MTBE 8021 <input type="checkbox"/>		8260 full scan <input type="checkbox"/>		Naphth <input type="checkbox"/>		Oxygenates		NWTPH-Gx		NWTPH-Dx with Silica Gel Cleanup <input type="checkbox"/>		NWTPH-Dx without Silica Gel Cleanup <input type="checkbox"/>		WA VPH <input type="checkbox"/>		WA EPH <input type="checkbox"/>		Lead <input type="checkbox"/>		Total <input type="checkbox"/>		Diss. <input type="checkbox"/>		Method		Benzene EPA 8264 CPATIS 8264 NWTPH-Gx NWTPH-Dx w/sgc								
Consultant Project Mgr. Scott Zorn		Consultant Phone #		Soil <input type="checkbox"/>		Water <input type="checkbox"/>		Total Number of Containers		8260 full scan		Oxygenates		NWTPH-Gx		NWTPH-Dx with Silica Gel Cleanup		NWTPH-Dx without Silica Gel Cleanup		WA VPH		WA EPH		Lead		Total		Diss.		Method												
Sampler Jason Little		3		Grab		Composite		Total Number of Containers		8260 full scan		Oxygenates		NWTPH-Gx		NWTPH-Dx with Silica Gel Cleanup		NWTPH-Dx without Silica Gel Cleanup		WA VPH		WA EPH		Lead		Total		Diss.		Method												
2 Sample Identification		Collected		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20				
Date		Time		Grab		Composite		Soil		Water		Oil		Total Number of Containers		BTEX + MTBE 8021		8260 full scan		Naphth		Oxygenates		NWTPH-Gx		NWTPH-Dx with Silica Gel Cleanup		NWTPH-Dx without Silica Gel Cleanup		WA VPH		WA EPH		Lead		Total		Diss.		Method		Remarks
outfall #002		6/15/18		0955						✓				10																										PH - 8.19		
trip blank										✓				6																								NWTPH-dx w/sgc				
																																						w/ standard sgc				
																																						* Benzene and CPAT MUST have a quantitative limit of				
																																						ETC				
7 Turnaround Time Requested (TAT) (please circle)				Relinquished by				Date				Time				Received by				Date				Time																		
Standard 5 day 4 day				Jason Little				6/15/18				1225				[Signature]				6/15/18				1225																		
72 hour 48 hour 24 hour																																										
8 Data Package (circle if required)				EDD (circle if required)				Relinquished by Commercial Carrier:				Received by				Date				Time																						
Type I - Full				CVX-RTBU-FL_05 (default)				UPS _____ FedEx _____ Other _____																																		
Type VI (Raw Data)				Other: _____				Temperature Upon Receipt _____ °C				Custody Seals Intact?				Yes No																										



580-78119 Chain of Custody

Therm. ID: A2 Cor: 1.7 Unc: 1.6
Cooler Desc: Med Blue
Packing: bub FedEx:
Cust. Seal: Yes No * UPS:
Wet/Packs/Dry Ice/None Lab Cour: *
Other: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-78119-1

Login Number: 78119

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	False	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-78160-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
6/27/2018 6:01:27 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Job ID: 580-78160-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-78160-1

Receipt

Two samples were received on 6/18/2018 12:03 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 580-277304 and analytical batch 580-277376 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The following samples and QC were reanalyzed due to CCV failure in the initial analysis: (LCS 580-277249/2-B), (LCSD 580-277249/3-B) and (MB 580-277249/1-B).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78160-1

Date Collected: 06/18/18 09:00

Matrix: Water

Date Received: 06/18/18 12:03

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/20/18 23:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					06/20/18 23:38	1
Toluene-d8 (Surr)	107		79 - 122					06/20/18 23:38	1
4-Bromofluorobenzene (Surr)	101		78 - 119					06/20/18 23:38	1
Dibromofluoromethane (Surr)	99		70 - 120					06/20/18 23:38	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 120					06/20/18 23:38	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.051	0.014	ug/L		06/25/18 14:24	06/26/18 13:49	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		06/25/18 14:24	06/26/18 13:49	1
Benzo[b]fluoranthene	ND		0.051	0.011	ug/L		06/25/18 14:24	06/26/18 13:49	1
Benzo[k]fluoranthene	ND		0.051	0.012	ug/L		06/25/18 14:24	06/26/18 13:49	1
Chrysene	ND		0.10	0.016	ug/L		06/25/18 14:24	06/26/18 13:49	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		06/25/18 14:24	06/26/18 13:49	1
Indeno[1,2,3-cd]pyrene	ND		0.051	0.014	ug/L		06/25/18 14:24	06/26/18 13:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	72		53 - 120				06/25/18 14:24	06/26/18 13:49	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/26/18 20:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		50 - 150					06/26/18 20:49	1
Trifluorotoluene (Surr)	83		50 - 150					06/26/18 20:49	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		06/25/18 08:54	06/26/18 22:06	1
Motor Oil (>C24-C36)	ND		0.35	0.097	mg/L		06/25/18 08:54	06/26/18 22:06	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	69		50 - 150				06/25/18 08:54	06/26/18 22:06	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-78160-2

Date Collected: 06/18/18 00:01

Matrix: Water

Date Received: 06/18/18 12:03

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/20/18 17:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	100		74 - 123					06/20/18 17:03	1
<i>Toluene-d8 (Surr)</i>	105		79 - 122					06/20/18 17:03	1
<i>4-Bromofluorobenzene (Surr)</i>	102		78 - 119					06/20/18 17:03	1
<i>Dibromofluoromethane (Surr)</i>	97		70 - 120					06/20/18 17:03	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	101		70 - 120					06/20/18 17:03	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/26/18 19:47	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	88		50 - 150					06/26/18 19:47	1
<i>Trifluorotoluene (Surr)</i>	82		50 - 150					06/26/18 19:47	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-276819/5
Matrix: Water
Analysis Batch: 276819

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/20/18 15:25	1

Surrogate	%Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123		06/20/18 15:25	1
Toluene-d8 (Surr)	106		79 - 122		06/20/18 15:25	1
4-Bromofluorobenzene (Surr)	101		78 - 119		06/20/18 15:25	1
Dibromofluoromethane (Surr)	97		70 - 120		06/20/18 15:25	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120		06/20/18 15:25	1

Lab Sample ID: LCS 580-276819/6
Matrix: Water
Analysis Batch: 276819

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.75		ug/L		97	37 - 151

Surrogate	%Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Lab Sample ID: LCSD 580-276819/7
Matrix: Water
Analysis Batch: 276819

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.97		ug/L		100	37 - 151	2	30

Surrogate	%Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	98		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-277304/1-A
Matrix: Water
Analysis Batch: 277376

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 277304

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		06/25/18 14:24	06/26/18 11:23	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		06/25/18 14:24	06/26/18 11:23	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		06/25/18 14:24	06/26/18 11:23	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-277304/1-A
Matrix: Water
Analysis Batch: 277376

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 277304

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		06/25/18 14:24	06/26/18 11:23	1
Chrysene	ND		0.10	0.016	ug/L		06/25/18 14:24	06/26/18 11:23	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		06/25/18 14:24	06/26/18 11:23	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		06/25/18 14:24	06/26/18 11:23	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	93		53 - 120	06/25/18 14:24	06/26/18 11:23	1

Lab Sample ID: LCS 580-277304/2-A
Matrix: Water
Analysis Batch: 277376

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 277304

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.87		ug/L		97	61 - 120
Benzo[a]pyrene	4.00	3.80		ug/L		95	65 - 120
Benzo[b]fluoranthene	4.00	3.82		ug/L		96	58 - 120
Benzo[k]fluoranthene	4.00	3.72		ug/L		93	58 - 120
Chrysene	4.00	3.57		ug/L		89	58 - 120
Dibenz(a,h)anthracene	4.00	3.65		ug/L		91	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.68		ug/L		92	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	92		53 - 120

Lab Sample ID: LCSD 580-277304/3-A
Matrix: Water
Analysis Batch: 277376

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 277304

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	4.03		ug/L		101	61 - 120	4	16
Benzo[a]pyrene	4.00	4.04		ug/L		101	65 - 120	6	17
Benzo[b]fluoranthene	4.00	4.15		ug/L		104	58 - 120	8	20
Benzo[k]fluoranthene	4.00	3.93		ug/L		98	58 - 120	6	20
Chrysene	4.00	3.79		ug/L		95	58 - 120	6	16
Dibenz(a,h)anthracene	4.00	3.86		ug/L		96	60 - 125	6	15
Indeno[1,2,3-cd]pyrene	4.00	3.85		ug/L		96	56 - 120	5	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	89		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-277452/6
Matrix: Water
Analysis Batch: 277452

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/26/18 18:14	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		50 - 150					06/26/18 18:14	1
Trifluorotoluene (Surr)	80		50 - 150					06/26/18 18:14	1

Lab Sample ID: LCS 580-277452/7
Matrix: Water
Analysis Batch: 277452

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.872		mg/L		87	79 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	104		50 - 150				
Trifluorotoluene (Surr)	95		50 - 150				

Lab Sample ID: LCSD 580-277452/8
Matrix: Water
Analysis Batch: 277452

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.920		mg/L		92	79 - 120	5	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	102		50 - 150						
Trifluorotoluene (Surr)	98		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-277249/1-B
Matrix: Water
Analysis Batch: 277389

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 277249

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		06/25/18 08:54	06/26/18 13:21	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	76		50 - 150				06/25/18 08:54	06/26/18 13:21	1

Lab Sample ID: LCS 580-277249/2-B
Matrix: Water
Analysis Batch: 277389

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 277249

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.36		mg/L		68	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-277249/2-B
Matrix: Water
Analysis Batch: 277389

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 277249

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
<i>o</i> -Terphenyl	85		50 - 150

Lab Sample ID: LCSD 580-277249/3-B
Matrix: Water
Analysis Batch: 277389

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 277249

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
#2 Diesel (C10-C24)	2.00	1.57		mg/L		79	50 - 120	14	26	

Surrogate	LCSD LCSD		Limits
	%Recovery	Qualifier	
<i>o</i> -Terphenyl	83		50 - 150

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup - RA

Lab Sample ID: MB 580-277249/1-B
Matrix: Water
Analysis Batch: 277513

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 277249

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Motor Oil (>C24-C36) - RA	ND		0.35	0.096	mg/L		06/25/18 08:54	06/27/18 11:59	1

Lab Sample ID: LCS 580-277249/2-B
Matrix: Water
Analysis Batch: 277513

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 277249

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.	
							Limits	RPD
Motor Oil (>C24-C36) - RA	2.00	1.78		mg/L		89	64 - 120	

Lab Sample ID: LCSD 580-277249/3-B
Matrix: Water
Analysis Batch: 277513

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 277249

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
Motor Oil (>C24-C36) - RA	2.00	1.87		mg/L		94	64 - 120	5	24	

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Client Sample ID: Outfall #002

Date Collected: 06/18/18 09:00

Date Received: 06/18/18 12:03

Lab Sample ID: 580-78160-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	276819	06/20/18 23:38	W1T	TAL SEA
Total/NA	Prep	3510C			277304	06/25/18 14:24	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	277376	06/26/18 13:49	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	277452	06/26/18 20:49	JCV	TAL SEA
Total/NA	Prep	3510C			277249	06/25/18 08:54	JCM	TAL SEA
Total/NA	Cleanup	3630C			277358	06/26/18 08:51	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	277389	06/26/18 22:06	T1W	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 06/18/18 00:01

Date Received: 06/18/18 12:03

Lab Sample ID: 580-78160-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	276819	06/20/18 17:03	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	277452	06/26/18 19:47	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78160-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-78160-1	Outfall #002	Water	06/18/18 09:00	06/18/18 12:03
580-78160-2	Trip Blank	Water	06/18/18 00:01	06/18/18 12:03

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Client: Arcadis Client Contact: Peter Campbell Date: 6/18/18 Chain of Custody Number: 37651
Address: 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____
City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Walker Page 1 of 1

Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed): _____
Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives								Special Instructions/ Conditions of Receipt				
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	Other						
<u>Outfall #002</u>	<u>6/18/18</u>	<u>0900</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>2</u>												<u>pH = 8.23</u>
<u>Trip Blank</u>	<u>---</u>	<u>---</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>															<u>NWTPH-DX: use Standard Silica Gel</u>
																			<u>* Benzene & cPAHs w/ quantitative limit less than 1 ug/L</u>

Therm. ID: AZ Cor: 3.2 Unc: 3.1
Cooler Desc: Med Red FedEx: _____
Packing: Bubble UPS: _____
Cust. Seal: Yes _____ No Lab Cour: X
Wet/Packs/Dry Ice/None _____ Other: _____



Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other STAT
QC Requirements (Specify): _____

Relinquished By Sign/Print	Date	Time	Received By Sign/Print	Date	Time
			<u>Francisco Lopez Jr</u>	<u>6/18/18</u>	<u>1203</u>
			<u>Jason Little</u>		

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-78160-1

Login Number: 78160

List Source: TestAmerica Seattle

List Number: 1

Creator: Gall, Brandon A

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-78490-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:
7/10/2018 3:00:48 PM

Kristine Allen, Manager of Project Management
(253)248-4970
kristine.allen@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Job ID: 580-78490-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-78490-1

Comments

No additional comments.

Receipt

The samples were received on 6/30/2018 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.0° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: The RPD of the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for batch preparation batch 580-277943 and analytical batch 580-278195 recovered outside control limits for the following analytes: Indeno[1,2,3-cd]pyrene. The individual recoveries of both the LCS and LCSD met the acceptance criteria.

Method(s) 8270C SIM, 8270D SIM: The surrogate (Terphenyl-d14) of CCVIS associated with batch 278195 have %D -27.4 (%D Limit +/- 20); that result was outside the control limits. Since the %Recovery is within the acceptance criteria for the surrogate in associated samples (unless matrix interferes) and all the other surrogates and target analytes were within %D criteria; therefore, the data have been reported. (CCVIS 580-278195/3)

Method(s) 8270C SIM, 8270D SIM: The opening DFTPP tune has a Benzidine Tailing Factor at 3.2 (8270D limit is 2.0 and 8207C limit is 3.0). However for SIM analysis, Benzidine is not representative of any of the target analytes, and all other instrument QC (other DFTPP parameters and CCVIS) met acceptance criteria, therefore in the data is reported. (DFTPP 580-278195/2)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
*	RPD of the LCS and LCSD exceeds the control limits

GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78490-1

Date Collected: 06/29/18 10:45

Matrix: Water

Date Received: 06/30/18 10:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/04/18 02:29	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		74 - 123					07/04/18 02:29	1
Toluene-d8 (Surr)	106		79 - 122					07/04/18 02:29	1
4-Bromofluorobenzene (Surr)	100		78 - 119					07/04/18 02:29	1
Dibromofluoromethane (Surr)	100		70 - 120					07/04/18 02:29	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120					07/04/18 02:29	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.055	0.015	ug/L		07/02/18 14:04	07/05/18 18:42	1
Benzo[a]pyrene	ND		0.11	0.012	ug/L		07/02/18 14:04	07/05/18 18:42	1
Benzo[b]fluoranthene	ND		0.055	0.012	ug/L		07/02/18 14:04	07/05/18 18:42	1
Benzo[k]fluoranthene	ND		0.055	0.013	ug/L		07/02/18 14:04	07/05/18 18:42	1
Chrysene	ND		0.11	0.017	ug/L		07/02/18 14:04	07/05/18 18:42	1
Dibenz[a,h]anthracene	ND		0.11	0.011	ug/L		07/02/18 14:04	07/05/18 18:42	1
Indeno[1,2,3-cd]pyrene	ND	*	0.055	0.015	ug/L		07/02/18 14:04	07/05/18 18:42	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	77		53 - 120				07/02/18 14:04	07/05/18 18:42	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	0.10	J	0.25	0.10	mg/L			06/30/18 23:43	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		50 - 150					06/30/18 23:43	1
Trifluorotoluene (Surr)	84		50 - 150					06/30/18 23:43	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.14	0.083	mg/L		07/05/18 10:41	07/06/18 12:43	1
Motor Oil (>C24-C36)	ND		0.45	0.12	mg/L		07/05/18 10:41	07/06/18 12:43	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	78		50 - 150				07/05/18 10:41	07/06/18 12:43	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-78490-2

Date Collected: 06/29/18 00:00

Matrix: Water

Date Received: 06/30/18 10:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/03/18 23:14	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					07/03/18 23:14	1
Toluene-d8 (Surr)	105		79 - 122					07/03/18 23:14	1
4-Bromofluorobenzene (Surr)	102		78 - 119					07/03/18 23:14	1
Dibromofluoromethane (Surr)	100		70 - 120					07/03/18 23:14	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120					07/03/18 23:14	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/30/18 18:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		50 - 150					06/30/18 18:03	1
Trifluorotoluene (Surr)	85		50 - 150					06/30/18 18:03	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-278037/5

Matrix: Water

Analysis Batch: 278037

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/03/18 18:22	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123		07/03/18 18:22	1
Toluene-d8 (Surr)	106		79 - 122		07/03/18 18:22	1
4-Bromofluorobenzene (Surr)	100		78 - 119		07/03/18 18:22	1
Dibromofluoromethane (Surr)	100		70 - 120		07/03/18 18:22	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120		07/03/18 18:22	1

Lab Sample ID: LCS 580-278037/6

Matrix: Water

Analysis Batch: 278037

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.8		ug/L		108	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	102		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	103		70 - 120

Lab Sample ID: LCSD 580-278037/7

Matrix: Water

Analysis Batch: 278037

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.8		ug/L		108	37 - 151	1	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	103		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-277943/1-A

Matrix: Water

Analysis Batch: 278195

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 277943

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		07/02/18 14:04	07/05/18 17:34	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		07/02/18 14:04	07/05/18 17:34	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		07/02/18 14:04	07/05/18 17:34	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-277943/1-A

Matrix: Water

Analysis Batch: 278195

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 277943

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		07/02/18 14:04	07/05/18 17:34	1
Chrysene	ND		0.10	0.016	ug/L		07/02/18 14:04	07/05/18 17:34	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		07/02/18 14:04	07/05/18 17:34	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		07/02/18 14:04	07/05/18 17:34	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	97		53 - 120	07/02/18 14:04	07/05/18 17:34	1

Lab Sample ID: LCS 580-277943/2-A

Matrix: Water

Analysis Batch: 278195

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 277943

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.76		ug/L		94	61 - 120
Benzo[a]pyrene	4.00	4.30		ug/L		108	65 - 120
Benzo[b]fluoranthene	4.00	4.35		ug/L		109	58 - 120
Benzo[k]fluoranthene	4.00	4.19		ug/L		105	58 - 120
Chrysene	4.00	4.28		ug/L		107	58 - 120
Dibenz(a,h)anthracene	4.00	4.63		ug/L		116	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	4.62		ug/L		115	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	85		53 - 120

Lab Sample ID: LCSD 580-277943/3-A

Matrix: Water

Analysis Batch: 278195

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 277943

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.96		ug/L		99	61 - 120	5	16
Benzo[a]pyrene	4.00	4.47		ug/L		112	65 - 120	4	17
Benzo[b]fluoranthene	4.00	4.61		ug/L		115	58 - 120	6	20
Benzo[k]fluoranthene	4.00	4.41		ug/L		110	58 - 120	5	20
Chrysene	4.00	4.52		ug/L		113	58 - 120	5	16
Dibenz(a,h)anthracene	4.00	3.98		ug/L		99	60 - 125	15	15
Indeno[1,2,3-cd]pyrene	4.00	3.79	*	ug/L		95	56 - 120	20	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	88		53 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-277895/6

Matrix: Water

Analysis Batch: 277895

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/30/18 16:00	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		50 - 150					06/30/18 16:00	1
Trifluorotoluene (Surr)	81		50 - 150					06/30/18 16:00	1

Lab Sample ID: LCS 580-277895/7

Matrix: Water

Analysis Batch: 277895

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	1.03		mg/L		103	79 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	106		50 - 150				
Trifluorotoluene (Surr)	101		50 - 150				

Lab Sample ID: LCSD 580-277895/8

Matrix: Water

Analysis Batch: 277895

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	1.11		mg/L		111	79 - 120	8	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	105		50 - 150						
Trifluorotoluene (Surr)	105		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-278147/1-B

Matrix: Water

Analysis Batch: 278229

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 278147

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		07/05/18 10:41	07/06/18 11:22	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		07/05/18 10:41	07/06/18 11:22	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	86		50 - 150				07/05/18 10:41	07/06/18 11:22	1

Lab Sample ID: LCS 580-278147/2-B

Matrix: Water

Analysis Batch: 278229

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 278147

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.77		mg/L		88	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

(Continued)

Lab Sample ID: LCS 580-278147/2-B

Matrix: Water

Analysis Batch: 278229

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 278147

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Motor Oil (>C24-C36)	2.00	2.12		mg/L		106	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	96		50 - 150

Lab Sample ID: LCSD 580-278147/3-B

Matrix: Water

Analysis Batch: 278229

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 278147

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.83		mg/L		91	50 - 120	3	26
Motor Oil (>C24-C36)	2.00	2.12		mg/L		106	64 - 120	0	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	97		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78490-1

Date Collected: 06/29/18 10:45

Matrix: Water

Date Received: 06/30/18 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	278037	07/04/18 02:29	W1T	TAL SEA
Total/NA	Prep	3510C			277943	07/02/18 14:04	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	278195	07/05/18 18:42	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	277895	06/30/18 23:43	JCV	TAL SEA
Total/NA	Prep	3510C			278147	07/05/18 10:41	JCM	TAL SEA
Total/NA	Cleanup	3630C			278213	07/05/18 17:44	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	278229	07/06/18 12:43	T1W	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-78490-2

Date Collected: 06/29/18 00:00

Matrix: Water

Date Received: 06/30/18 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	278037	07/03/18 23:14	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	277895	06/30/18 18:03	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-78490-1	Outfall #002	Water	06/29/18 10:45	06/30/18 10:00
580-78490-2	Trip Blank	Water	06/29/18 00:00	06/30/18 10:00

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Client: Arcois Client Contact: Peter Campbell Date: 6/29/18 Chain of Custody Number: 37557
Address: 1720 Vnoco Rd Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page 1 of 1

City: Edmonds State: WA Zip Code: 98109 Sampler: Jason Little Lab Contact: Elaine Walker
Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed):
Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH				
<u>Outfall #002</u>	<u>6/29/18</u>	<u>1045</u>		<u>10</u>			<u>2</u>			<u>8</u>						<p>Loc: 580 78490</p> <p>PH = 6.78</p> <p>* vsc standard silica gel cleanup</p> <p>* Birene and cl A15 should have a quantitative detection limit of 1ug/L</p>
<u>Trip Blank</u>	<u>-</u>	<u>-</u>		<u>6</u>						<u>6</u>						



Therm. ID: A2 Cor: +42.0 Unc: 0.1
Cooler Desc: Sm Blue FedEx: PO
Packing: Box UPS: _____
Cust. Seal: Yes X No _____ Lab Cour: _____
 Wet/Packs/Dry Ice/None Other: _____

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other: Standard (TA)

1. Relinquished By Sign/Print: <u>Jason Little</u>	Date: <u>6/29/18</u> Time: <u>1130</u>	Received By Sign/Print: <u>Ken Hobbs</u>	Date: <u>6-30-18</u> Time: <u>1000</u>
2. Relinquished By Sign/Print: _____	Date: _____ Time: _____	2. Received By Sign/Print: _____	Date: _____ Time: _____
3. Relinquished By Sign/Print: _____	Date: _____ Time: _____	3. Received By Sign/Print: _____	Date: _____ Time: _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-78490-1

Login Number: 78490

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-78657-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
7/20/2018 3:28:40 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
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Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Job ID: 580-78657-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-78657-1

Receipt

Two samples were received on 7/6/2018 11:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.3° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for preparation batch 580-278525 and analytical batch 580-278919 recovered outside control limits for the following analytes: Dibenz(a,h)anthracene (LCS and LCSD) and Indeno[1,2,3-cd]pyrene (LCSD only). These analytes were biased high in the LCS/LCSD and not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78657-1

Date Collected: 07/05/18 14:45

Matrix: Water

Date Received: 07/06/18 11:30

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/09/18 18:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					07/09/18 18:46	1
Toluene-d8 (Surr)	104		79 - 122					07/09/18 18:46	1
4-Bromofluorobenzene (Surr)	101		78 - 119					07/09/18 18:46	1
Dibromofluoromethane (Surr)	100		70 - 120					07/09/18 18:46	1
1,2-Dichloroethane-d4 (Surr)	110		70 - 120					07/09/18 18:46	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		07/10/18 09:51	07/19/18 15:17	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		07/10/18 09:51	07/19/18 15:17	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		07/10/18 09:51	07/19/18 15:17	1
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		07/10/18 09:51	07/19/18 15:17	1
Chrysene	ND		0.10	0.016	ug/L		07/10/18 09:51	07/19/18 15:17	1
Dibenz(a,h)anthracene	ND *		0.10	0.010	ug/L		07/10/18 09:51	07/19/18 15:17	1
Indeno[1,2,3-cd]pyrene	ND *		0.050	0.014	ug/L		07/10/18 09:51	07/19/18 15:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	81		53 - 120				07/10/18 09:51	07/19/18 15:17	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/12/18 07:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		50 - 150					07/12/18 07:41	1
Trifluorotoluene (Surr)	99		50 - 150					07/12/18 07:41	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		07/10/18 09:44	07/12/18 13:19	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		07/10/18 09:44	07/12/18 13:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	87		50 - 150				07/10/18 09:44	07/12/18 13:19	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-78657-2

Date Collected: 07/05/18 00:00

Matrix: Water

Date Received: 07/06/18 11:30

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/09/18 17:33	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	101		74 - 123					07/09/18 17:33	1
<i>Toluene-d8 (Surr)</i>	102		79 - 122					07/09/18 17:33	1
<i>4-Bromofluorobenzene (Surr)</i>	100		78 - 119					07/09/18 17:33	1
<i>Dibromofluoromethane (Surr)</i>	101		70 - 120					07/09/18 17:33	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	109		70 - 120					07/09/18 17:33	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/11/18 20:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	94		50 - 150					07/11/18 20:48	1
<i>Trifluorotoluene (Surr)</i>	100		50 - 150					07/11/18 20:48	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-278424/5
Matrix: Water
Analysis Batch: 278424

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/09/18 14:18	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		74 - 123		07/09/18 14:18	1
Toluene-d8 (Surr)	105		79 - 122		07/09/18 14:18	1
4-Bromofluorobenzene (Surr)	102		78 - 119		07/09/18 14:18	1
Dibromofluoromethane (Surr)	101		70 - 120		07/09/18 14:18	1
1,2-Dichloroethane-d4 (Surr)	108		70 - 120		07/09/18 14:18	1

Lab Sample ID: LCS 580-278424/6
Matrix: Water
Analysis Batch: 278424

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.8		ug/L		108	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	101		74 - 123
Toluene-d8 (Surr)	99		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	107		70 - 120

Lab Sample ID: LCSD 580-278424/7
Matrix: Water
Analysis Batch: 278424

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.7		ug/L		107	37 - 151	0	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	104		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-278525/1-A
Matrix: Water
Analysis Batch: 278919

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 278525

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		07/10/18 09:51	07/12/18 22:39	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		07/10/18 09:51	07/12/18 22:39	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		07/10/18 09:51	07/12/18 22:39	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-278525/1-A
Matrix: Water
Analysis Batch: 278919

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 278525

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		07/10/18 09:51	07/12/18 22:39	1
Chrysene	ND		0.10	0.016	ug/L		07/10/18 09:51	07/12/18 22:39	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		07/10/18 09:51	07/12/18 22:39	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		07/10/18 09:51	07/12/18 22:39	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	115		53 - 120	07/10/18 09:51	07/12/18 22:39	1

Lab Sample ID: LCS 580-278525/2-A
Matrix: Water
Analysis Batch: 278919

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 278525

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	4.67		ug/L		117	61 - 120
Benzo[a]pyrene	4.00	4.33		ug/L		108	65 - 120
Benzo[b]fluoranthene	4.00	4.43		ug/L		111	58 - 120
Benzo[k]fluoranthene	4.00	4.60		ug/L		115	58 - 120
Chrysene	4.00	4.17		ug/L		104	58 - 120
Dibenz(a,h)anthracene	4.00	5.07	*	ug/L		127	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	4.75		ug/L		119	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	117		53 - 120

Lab Sample ID: LCSD 580-278525/3-A
Matrix: Water
Analysis Batch: 278919

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 278525

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	4.82		ug/L		120	61 - 120	3	16
Benzo[a]pyrene	4.00	4.50		ug/L		112	65 - 120	4	17
Benzo[b]fluoranthene	4.00	4.63		ug/L		116	58 - 120	4	20
Benzo[k]fluoranthene	4.00	4.79		ug/L		120	58 - 120	4	20
Chrysene	4.00	4.25		ug/L		106	58 - 120	2	16
Dibenz(a,h)anthracene	4.00	5.21	*	ug/L		130	60 - 125	3	15
Indeno[1,2,3-cd]pyrene	4.00	4.84	*	ug/L		121	56 - 120	2	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	119		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-278725/6
Matrix: Water
Analysis Batch: 278725

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/11/18 18:13	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		50 - 150					07/11/18 18:13	1
Trifluorotoluene (Surr)	97		50 - 150					07/11/18 18:13	1

Lab Sample ID: LCS 580-278725/7
Matrix: Water
Analysis Batch: 278725

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.912		mg/L		91	79 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	102		50 - 150				
Trifluorotoluene (Surr)	105		50 - 150				

Lab Sample ID: LCSD 580-278725/8
Matrix: Water
Analysis Batch: 278725

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.925		mg/L		93	79 - 120	1	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	100		50 - 150						
Trifluorotoluene (Surr)	105		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-278523/1-B
Matrix: Water
Analysis Batch: 278793

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 278523

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		07/10/18 09:44	07/12/18 10:07	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		07/10/18 09:44	07/12/18 10:07	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	90		50 - 150				07/10/18 09:44	07/12/18 10:07	1

Lab Sample ID: LCS 580-278523/2-B
Matrix: Water
Analysis Batch: 278793

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 278523

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.75		mg/L		88	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-278523/2-B
Matrix: Water
Analysis Batch: 278793

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 278523

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.97		mg/L		98	64 - 120
		LCS LCS					
Surrogate	%Recovery	Qualifier	Limits				
<i>o-Terphenyl</i>	104		50 - 150				

Lab Sample ID: LCSD 580-278523/3-B
Matrix: Water
Analysis Batch: 278793

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 278523

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.80		mg/L		90	50 - 120	3	26
Motor Oil (>C24-C36)	2.00	2.02		mg/L		101	64 - 120	3	24
		LCSD LCSD							
Surrogate	%Recovery	Qualifier	Limits						
<i>o-Terphenyl</i>	105		50 - 150						

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78657-1

Date Collected: 07/05/18 14:45

Matrix: Water

Date Received: 07/06/18 11:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	278424	07/09/18 18:46	TL1	TAL SEA
Total/NA	Prep	3510C			278525	07/10/18 09:51	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	279507	07/19/18 15:17	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	278725	07/12/18 07:41	T1W	TAL SEA
Total/NA	Prep	3510C			278523	07/10/18 09:44	JCM	TAL SEA
Total/NA	Cleanup	3630C			278734	07/11/18 16:57	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	278793	07/12/18 13:19	T1W	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-78657-2

Date Collected: 07/05/18 00:00

Matrix: Water

Date Received: 07/06/18 11:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	278424	07/09/18 17:33	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	278725	07/11/18 20:48	T1W	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

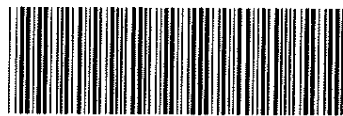
TestAmerica Job ID: 580-78657-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-78657-1	Outfall #002	Water	07/05/18 14:45	07/06/18 11:30
580-78657-2	Trip Blank	Water	07/05/18 00:00	07/06/18 11:30

- 1
- 2
- 3
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- 5
- 6
- 7
- 8
- 9
- 10
- 11

Client **Arcadis** Client Contact **Peter Campbell** Date **7/5/18** Chain of Custody Number **37650**
 Address **1100 Olive Way, Suite 800,** Telephone Number (Area Code)/Fax Number Lab Number
 City **Seattle** State **WA** Zip Code **98101** Sampler **Eric Krueger** Lab Contact **Elaine Walker** Page **1** of **1**
 Project Name and Location (State) **Edmonds Terminal** Billing Contact Analysis (Attach list if more space is needed)

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH			
Outfall #002	7/5/18	1445	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			2			8					Loc: 580 78657 * use Standard SGC * Benzene & CPAH w/ quantitative level less than 1 ug/L
Trip Blank	—	—	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						6					



580-78657 Chain of Custody

Therm. ID: **H2** Cor: **5.3** ° Unc: **5.2** °
 Cooler Dsc: **Med Blue**
 Packing: **Bubble** FedEx: _____
 Cust. Seal: Yes _____ No UPS: _____
 Wet/Packs/Dry Ice/None Lab Cour: **X** Other: _____

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify)

1. Relinquished By Eric Krueger Date 7/6/18 Time 1130	1. Received By Francisco Luna, Jr Date 7/6/18 Time 1130
2. Relinquished By _____ Date _____ Time _____	2. Received By _____ Date _____ Time _____
3. Relinquished By _____ Date _____ Time _____	3. Received By _____ Date _____ Time _____

Comments

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-78657-1

Login Number: 78657

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

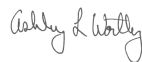
TestAmerica Job ID: 580-78765-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:
7/26/2018 12:24:00 PM

Ashley Worthy, Project Manager I
ashley.worthy@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Job ID: 580-78765-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-78765-1

Comments

No additional comments.

Receipt

The samples were received on 7/11/2018 11:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.4° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The following sample was diluted due to the nature of the sample matrix: Outfall #002 (580-78765-1). Elevated reporting limits (RLs) are provided.

Method(s) 8270C SIM: The following analyte recovered outside control limits for the LCS/LCSD associated with preparation batch 580-279060 and analytical batch 580-279306: Indeno[1,2,3-cd]pyrene. This is not indicative of a systematic control problem because these were random marginal exceedances. Qualified results have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
X	Surrogate is outside control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78765-1

Date Collected: 07/11/18 08:15

Matrix: Water

Date Received: 07/11/18 11:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/16/18 19:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					07/16/18 19:48	1
Toluene-d8 (Surr)	103		79 - 122					07/16/18 19:48	1
4-Bromofluorobenzene (Surr)	101		78 - 119					07/16/18 19:48	1
Dibromofluoromethane (Surr)	102		70 - 120					07/16/18 19:48	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120					07/16/18 19:48	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.28	0.078	ug/L		07/15/18 11:18	07/18/18 02:18	5
Benzo[a]pyrene	ND		0.56	0.062	ug/L		07/15/18 11:18	07/18/18 02:18	5
Benzo[b]fluoranthene	ND		0.28	0.062	ug/L		07/15/18 11:18	07/18/18 02:18	5
Benzo[k]fluoranthene	ND		0.28	0.067	ug/L		07/15/18 11:18	07/18/18 02:18	5
Chrysene	ND		0.56	0.090	ug/L		07/15/18 11:18	07/18/18 02:18	5
Dibenz[a,h]anthracene	ND		0.56	0.056	ug/L		07/15/18 11:18	07/18/18 02:18	5
Indeno[1,2,3-cd]pyrene	ND	*	0.28	0.078	ug/L		07/15/18 11:18	07/18/18 02:18	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	89		53 - 120				07/15/18 11:18	07/18/18 02:18	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/25/18 20:56	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	111		50 - 150					07/25/18 20:56	1
Trifluorotoluene (Surr)	101		50 - 150					07/25/18 20:56	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.070	mg/L		07/15/18 11:10	07/16/18 23:10	1
Motor Oil (>C24-C36)	ND		0.38	0.10	mg/L		07/15/18 11:10	07/16/18 23:10	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	79		50 - 150				07/15/18 11:10	07/16/18 23:10	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-78765-2

Date Collected: 07/11/18 00:00

Matrix: Water

Date Received: 07/11/18 11:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/16/18 16:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					07/16/18 16:58	1
Toluene-d8 (Surr)	105		79 - 122					07/16/18 16:58	1
4-Bromofluorobenzene (Surr)	100		78 - 119					07/16/18 16:58	1
Dibromofluoromethane (Surr)	101		70 - 120					07/16/18 16:58	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 120					07/16/18 16:58	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/25/18 20:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		50 - 150					07/25/18 20:25	1
Trifluorotoluene (Surr)	105		50 - 150					07/25/18 20:25	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-279121/5

Matrix: Water

Analysis Batch: 279121

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/16/18 14:56	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123		07/16/18 14:56	1
Toluene-d8 (Surr)	103		79 - 122		07/16/18 14:56	1
4-Bromofluorobenzene (Surr)	104		78 - 119		07/16/18 14:56	1
Dibromofluoromethane (Surr)	101		70 - 120		07/16/18 14:56	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120		07/16/18 14:56	1

Lab Sample ID: LCS 580-279121/6

Matrix: Water

Analysis Batch: 279121

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.2		ug/L		102	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	100		70 - 120

Lab Sample ID: LCSD 580-279121/7

Matrix: Water

Analysis Batch: 279121

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.2		ug/L		102	37 - 151	0	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	101		74 - 123
Toluene-d8 (Surr)	99		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	103		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-279060/1-A

Matrix: Water

Analysis Batch: 279306

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 279060

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		07/15/18 11:18	07/17/18 21:28	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		07/15/18 11:18	07/17/18 21:28	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		07/15/18 11:18	07/17/18 21:28	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-279060/1-A

Matrix: Water

Analysis Batch: 279306

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 279060

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		07/15/18 11:18	07/17/18 21:28	1
Chrysene	ND		0.10	0.016	ug/L		07/15/18 11:18	07/17/18 21:28	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		07/15/18 11:18	07/17/18 21:28	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		07/15/18 11:18	07/17/18 21:28	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	104		53 - 120	07/15/18 11:18	07/17/18 21:28	1

Lab Sample ID: LCS 580-279060/2-A

Matrix: Water

Analysis Batch: 279306

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 279060

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	4.00		ug/L		100	61 - 120
Benzo[a]pyrene	4.00	4.23		ug/L		106	65 - 120
Benzo[b]fluoranthene	4.00	4.15		ug/L		104	58 - 120
Benzo[k]fluoranthene	4.00	4.04		ug/L		101	58 - 120
Chrysene	4.00	4.21		ug/L		105	58 - 120
Dibenz(a,h)anthracene	4.00	4.77		ug/L		119	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	4.94	*	ug/L		124	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	133	X	53 - 120

Lab Sample ID: LCSD 580-279060/3-A

Matrix: Water

Analysis Batch: 279306

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 279060

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.85		ug/L		96	61 - 120	4	16
Benzo[a]pyrene	4.00	4.19		ug/L		105	65 - 120	1	17
Benzo[b]fluoranthene	4.00	4.25		ug/L		106	58 - 120	3	20
Benzo[k]fluoranthene	4.00	3.89		ug/L		97	58 - 120	4	20
Chrysene	4.00	4.20		ug/L		105	58 - 120	0	16
Dibenz(a,h)anthracene	4.00	4.71		ug/L		118	60 - 125	1	15
Indeno[1,2,3-cd]pyrene	4.00	4.90	*	ug/L		123	56 - 120	1	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	84		53 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-280047/5

Matrix: Water

Analysis Batch: 280047

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/25/18 18:52	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	108		50 - 150					07/25/18 18:52	1
Trifluorotoluene (Surr)	103		50 - 150					07/25/18 18:52	1

Lab Sample ID: LCS 580-280047/6

Matrix: Water

Analysis Batch: 280047

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.937		mg/L		94	79 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	114		50 - 150				
Trifluorotoluene (Surr)	113		50 - 150				

Lab Sample ID: LCSD 580-280047/7

Matrix: Water

Analysis Batch: 280047

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.945		mg/L		95	79 - 120	1	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	111		50 - 150						
Trifluorotoluene (Surr)	113		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-279058/1-B

Matrix: Water

Analysis Batch: 279178

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 279058

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		07/15/18 11:10	07/16/18 22:02	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		07/15/18 11:10	07/16/18 22:02	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	83		50 - 150				07/15/18 11:10	07/16/18 22:02	1

Lab Sample ID: LCS 580-279058/2-B

Matrix: Water

Analysis Batch: 279178

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 279058

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.65		mg/L		83	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

(Continued)

Lab Sample ID: LCS 580-279058/2-B

Matrix: Water

Analysis Batch: 279178

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 279058

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Motor Oil (>C24-C36)	2.00	1.72		mg/L		86	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	89		50 - 150

Lab Sample ID: LCSD 580-279058/3-B

Matrix: Water

Analysis Batch: 279178

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 279058

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.69		mg/L		84	50 - 120	2	26
Motor Oil (>C24-C36)	2.00	1.72		mg/L		86	64 - 120	0	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	96		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78765-1

Date Collected: 07/11/18 08:15

Matrix: Water

Date Received: 07/11/18 11:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	279121	07/16/18 19:48	CJ	TAL SEA
Total/NA	Prep	3510C			279060	07/15/18 11:18	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		5	279306	07/18/18 02:18	ERB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	280047	07/25/18 20:56	RSB	TAL SEA
Total/NA	Prep	3510C			279058	07/15/18 11:10	JCM	TAL SEA
Total/NA	Cleanup	3630C			279091	07/16/18 09:42	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	279178	07/16/18 23:10	AEK	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-78765-2

Date Collected: 07/11/18 00:00

Matrix: Water

Date Received: 07/11/18 11:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	279121	07/16/18 16:58	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	280047	07/25/18 20:25	RSB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-78765-1	Outfall #002	Water	07/11/18 08:15	07/11/18 11:55
580-78765-2	Trip Blank	Water	07/11/18 00:00	07/11/18 11:55

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Client Arcadis		Client Contact Peter Campbell		Date 7/11/18	Chain of Custody Number 37556
Address 1100 Olive Way Suite 800		Telephone Number (Area Code)/Fax Number		Lab Number	Page 1 of 1
City Seattle	State WA	Zip Code 98101	Sampler Jason Little	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal		Billing Contact			
Contract/Purchase Order/Quote No.					

Loc: 580
78765
S
G

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Binzel EPAG 2	NwPH-6X	NwPH-1-DX w/10% C	CPAHS 8270G	PH = 7.46	
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH							
Outfall #002	7/11/18	0815		X				2											
Trip Blank	-	-		X															



Therm. ID: **A2** Cor: **0.4** Unc: **0.3**
Cooler Desc: **Ice Blue**
Packing: **Bubble** FedEx: _____
Cust. Seal: Yes _____ No **X** UPS: _____
 Wet/Packs/Dry Ice/None Lab Cour: **X**
Other: _____

Binzel and CPAHS must have qualitative electron limits of log/L.
Use standard silica gel cleanup

Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Return To Client <input type="checkbox"/> Archive For _____ Months	(A fee may be assessed if samples are retained longer than 1 month)
---	--	---	---

Turn Around Time Required (business days) <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input checked="" type="checkbox"/> 5 Days <input type="checkbox"/> 10 Days <input type="checkbox"/> 15 Days <input type="checkbox"/> Other _____	QC Requirements (Specify)
1. Relinquished By Sign/Print Jason Little Date 7/11/18 Time _____	1. Received By Sign/Print Francisco Luna Jr Date 7/11/18 Time 1155
2. Relinquished By Sign/Print _____ Date _____ Time _____	2. Received By Sign/Print _____ Date _____ Time _____
3. Relinquished By Sign/Print _____ Date _____ Time _____	3. Received By Sign/Print _____ Date _____ Time _____

Comments _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-78765-1

Login Number: 78765

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-79184-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
8/8/2018 2:49:57 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Job ID: 580-79184-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-79184-1

Receipt

Three samples were received on 7/27/2018 1:15 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 6.4° C.

GC/MS VOA

Method(s) 624: The matrix spike / matrix spike duplicate (MS/MSD) precision for analytical batch 580-280467 was outside control limits for Benzene. Sample matrix interference and/or non-homogeneity are suspected because the MS/MSD and associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) precision was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for preparation batch 580-280563 and analytical batch 580-280719 recovered outside control limits for the following analytes: Benzo(b)fluoranthene, Dibenz(a,h)anthracene and Indeno(1,2,3-cd)pyrene. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method(s) 8270C SIM: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 580-280563 and analytical batch 580-280719 were outside control limits for Dibenz(a,h)anthracene and Indeno(1,2,3-cd)pyrene. Spike recoveries were high, parent sample ND for affected targets, data is reported without concern for bias.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
F2	MS/MSD RPD exceeds control limits

GC/MS Semi VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
F1	MS and/or MSD Recovery is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79184-1

Date Collected: 07/26/18 12:05

Matrix: Water

Date Received: 07/27/18 13:15

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	F2	1.0	0.53	ug/L			07/31/18 19:42	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	107		74 - 123					07/31/18 19:42	1
Toluene-d8 (Surr)	101		79 - 122					07/31/18 19:42	1
4-Bromofluorobenzene (Surr)	102		78 - 119					07/31/18 19:42	1
Dibromofluoromethane (Surr)	97		70 - 120					07/31/18 19:42	1
1,2-Dichloroethane-d4 (Surr)	79		70 - 120					07/31/18 19:42	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.26	0.074	ug/L		08/01/18 09:57	08/02/18 17:36	5
Benzo[a]pyrene	ND		0.53	0.058	ug/L		08/01/18 09:57	08/02/18 17:36	5
Benzo[b]fluoranthene	ND	*	0.26	0.058	ug/L		08/01/18 09:57	08/02/18 17:36	5
Benzo[k]fluoranthene	ND		0.26	0.063	ug/L		08/01/18 09:57	08/02/18 17:36	5
Chrysene	ND		0.53	0.084	ug/L		08/01/18 09:57	08/02/18 17:36	5
Dibenz(a,h)anthracene	ND	F1 *	0.53	0.053	ug/L		08/01/18 09:57	08/02/18 17:36	5
Indeno[1,2,3-cd]pyrene	ND	F1 *	0.26	0.074	ug/L		08/01/18 09:57	08/02/18 17:36	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	88		53 - 120				08/01/18 09:57	08/02/18 17:36	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/04/18 21:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	84		50 - 150					08/04/18 21:54	1
Trifluorotoluene (Surr)	116		50 - 150					08/04/18 21:54	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.071	mg/L		07/31/18 10:17	08/01/18 13:04	1
Motor Oil (>C24-C36)	ND		0.38	0.10	mg/L		07/31/18 10:17	08/01/18 13:04	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	76		50 - 150				07/31/18 10:17	08/01/18 13:04	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-79184-2

Date Collected: 07/26/18 00:00

Matrix: Water

Date Received: 07/27/18 13:15

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/31/18 15:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	107		74 - 123					07/31/18 15:46	1
Toluene-d8 (Surr)	99		79 - 122					07/31/18 15:46	1
4-Bromofluorobenzene (Surr)	100		78 - 119					07/31/18 15:46	1
Dibromofluoromethane (Surr)	99		70 - 120					07/31/18 15:46	1
1,2-Dichloroethane-d4 (Surr)	82		70 - 120					07/31/18 15:46	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/04/18 23:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	84		50 - 150					08/04/18 23:27	1
Trifluorotoluene (Surr)	117		50 - 150					08/04/18 23:27	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Client Sample ID: Dup-1
Date Collected: 07/26/18 00:00
Date Received: 07/27/18 13:15

Lab Sample ID: 580-79184-3
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/31/18 21:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	108		74 - 123					07/31/18 21:00	1
<i>Toluene-d8 (Surr)</i>	100		79 - 122					07/31/18 21:00	1
<i>4-Bromofluorobenzene (Surr)</i>	101		78 - 119					07/31/18 21:00	1
<i>Dibromofluoromethane (Surr)</i>	98		70 - 120					07/31/18 21:00	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	78		70 - 120					07/31/18 21:00	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.27	0.075	ug/L		08/01/18 09:57	08/02/18 18:42	5
Benzo[a]pyrene	ND		0.54	0.059	ug/L		08/01/18 09:57	08/02/18 18:42	5
Benzo[b]fluoranthene	ND *		0.27	0.059	ug/L		08/01/18 09:57	08/02/18 18:42	5
Benzo[k]fluoranthene	ND		0.27	0.064	ug/L		08/01/18 09:57	08/02/18 18:42	5
Chrysene	ND		0.54	0.086	ug/L		08/01/18 09:57	08/02/18 18:42	5
Dibenz(a,h)anthracene	ND *		0.54	0.054	ug/L		08/01/18 09:57	08/02/18 18:42	5
Indeno[1,2,3-cd]pyrene	ND *		0.27	0.075	ug/L		08/01/18 09:57	08/02/18 18:42	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Terphenyl-d14</i>	83		53 - 120				08/01/18 09:57	08/02/18 18:42	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/04/18 23:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	86		50 - 150					08/04/18 23:58	1
<i>Trifluorotoluene (Surr)</i>	119		50 - 150					08/04/18 23:58	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.071	mg/L		07/31/18 10:17	08/01/18 14:09	1
Motor Oil (>C24-C36)	ND		0.38	0.10	mg/L		07/31/18 10:17	08/01/18 14:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o-Terphenyl</i>	79		50 - 150				07/31/18 10:17	08/01/18 14:09	1

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-280467/5
Matrix: Water
Analysis Batch: 280467

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/31/18 14:01	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	105		74 - 123		07/31/18 14:01	1
Toluene-d8 (Surr)	100		79 - 122		07/31/18 14:01	1
4-Bromofluorobenzene (Surr)	99		78 - 119		07/31/18 14:01	1
Dibromofluoromethane (Surr)	97		70 - 120		07/31/18 14:01	1
1,2-Dichloroethane-d4 (Surr)	80		70 - 120		07/31/18 14:01	1

Lab Sample ID: LCS 580-280467/6
Matrix: Water
Analysis Batch: 280467

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.4		ug/L		104	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	107		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	98		78 - 119
Dibromofluoromethane (Surr)	97		70 - 120
1,2-Dichloroethane-d4 (Surr)	79		70 - 120

Lab Sample ID: LCSD 580-280467/7
Matrix: Water
Analysis Batch: 280467

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.7		ug/L		107	37 - 151	3	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	106		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	97		70 - 120
1,2-Dichloroethane-d4 (Surr)	80		70 - 120

Lab Sample ID: 580-79184-1 MS
Matrix: Water
Analysis Batch: 280467

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	ND	F2	11.6	9.58		ug/L		82	37 - 151

Surrogate	MS %Recovery	MS Qualifier	Limits
Trifluorotoluene (Surr)	108		74 - 123
Toluene-d8 (Surr)	100		79 - 122

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-79184-1 MS
Matrix: Water
Analysis Batch: 280467

Client Sample ID: Outfall #002
Prep Type: Total/NA

Surrogate	MS %Recovery	MS Qualifier	Limits
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	98		70 - 120
1,2-Dichloroethane-d4 (Surr)	78		70 - 120

Lab Sample ID: 580-79184-1 MSD
Matrix: Water
Analysis Batch: 280467

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	ND	F2	11.6	13.7	F2	ug/L		118	37 - 151	35	30

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Trifluorotoluene (Surr)	107		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	97		70 - 120
1,2-Dichloroethane-d4 (Surr)	77		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-280563/1-A
Matrix: Water
Analysis Batch: 280719

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 280563

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		08/01/18 09:57	08/02/18 16:29	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		08/01/18 09:57	08/02/18 16:29	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		08/01/18 09:57	08/02/18 16:29	1
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		08/01/18 09:57	08/02/18 16:29	1
Chrysene	ND		0.10	0.016	ug/L		08/01/18 09:57	08/02/18 16:29	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		08/01/18 09:57	08/02/18 16:29	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		08/01/18 09:57	08/02/18 16:29	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	92		53 - 120	08/01/18 09:57	08/02/18 16:29	1

Lab Sample ID: LCS 580-280563/2-A
Matrix: Water
Analysis Batch: 280719

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 280563

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	4.13		ug/L		103	61 - 120
Benzo[a]pyrene	4.00	4.61		ug/L		115	65 - 120
Benzo[b]fluoranthene	4.00	4.79		ug/L		120	58 - 120
Benzo[k]fluoranthene	4.00	4.33		ug/L		108	58 - 120
Chrysene	4.00	4.43		ug/L		111	58 - 120
Dibenz(a,h)anthracene	4.00	5.10	*	ug/L		128	60 - 125

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: LCS 580-280563/2-A
Matrix: Water
Analysis Batch: 280719

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 280563

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Indeno[1,2,3-cd]pyrene	4.00	5.20	*	ug/L		130	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	84		53 - 120

Lab Sample ID: LCSD 580-280563/3-A
Matrix: Water
Analysis Batch: 280719

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 280563

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzo[a]anthracene	4.00	4.30		ug/L		107	61 - 120	4	16
Benzo[a]pyrene	4.00	4.75		ug/L		119	65 - 120	3	17
Benzo[b]fluoranthene	4.00	4.86	*	ug/L		121	58 - 120	1	20
Benzo[k]fluoranthene	4.00	4.38		ug/L		109	58 - 120	1	20
Chrysene	4.00	4.57		ug/L		114	58 - 120	3	16
Dibenz(a,h)anthracene	4.00	5.23	*	ug/L		131	60 - 125	3	15
Indeno[1,2,3-cd]pyrene	4.00	5.37	*	ug/L		134	56 - 120	3	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	83		53 - 120

Lab Sample ID: 580-79184-1 MS
Matrix: Water
Analysis Batch: 280719

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 280563

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	ND		4.28	4.20		ug/L		98	61 - 120
Benzo[a]pyrene	ND		4.28	4.57		ug/L		107	65 - 120
Benzo[b]fluoranthene	ND	*	4.28	4.32		ug/L		101	58 - 120
Benzo[k]fluoranthene	ND		4.28	4.79		ug/L		112	58 - 120
Chrysene	ND		4.28	4.58		ug/L		107	58 - 120
Dibenz(a,h)anthracene	ND	F1 *	4.28	5.51	F1	ug/L		129	60 - 125
Indeno[1,2,3-cd]pyrene	ND	F1 *	4.28	5.71	F1	ug/L		133	56 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
Terphenyl-d14	80		53 - 120

Lab Sample ID: 580-79184-1 MSD
Matrix: Water
Analysis Batch: 280719

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 280563

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzo[a]anthracene	ND		4.22	3.94		ug/L		93	61 - 120	6	16
Benzo[a]pyrene	ND		4.22	4.40		ug/L		104	65 - 120	4	17
Benzo[b]fluoranthene	ND	*	4.22	4.28		ug/L		101	58 - 120	1	20
Benzo[k]fluoranthene	ND		4.22	4.60		ug/L		109	58 - 120	4	20
Chrysene	ND		4.22	4.68		ug/L		111	58 - 120	2	16

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: 580-79184-1 MSD
Matrix: Water
Analysis Batch: 280719

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 280563

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Dibenz(a,h)anthracene	ND	F1 *	4.22	5.37	F1	ug/L		127	60 - 125	3	15
Indeno[1,2,3-cd]pyrene	ND	F1 *	4.22	5.55	F1	ug/L		132	56 - 120	3	15
Surrogate	%Recovery	MSD Qualifier	Limits								
Terphenyl-d14	78		53 - 120								

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-280854/6
Matrix: Water
Analysis Batch: 280854

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Gasoline	ND		0.25	0.10	mg/L			08/04/18 20:21	1
Surrogate	%Recovery	MB Qualifier	Limits						
4-Bromofluorobenzene (Surr)	87		50 - 150						
Trifluorotoluene (Surr)	92		50 - 150						

Lab Sample ID: LCS 580-280854/7
Matrix: Water
Analysis Batch: 280854

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec.	Limits
		Result	Qualifier					
Gasoline	1.00	1.19		mg/L		119	79 - 120	
Surrogate	%Recovery	LCS Qualifier	Limits					
4-Bromofluorobenzene (Surr)	100		50 - 150					
Trifluorotoluene (Surr)	140		50 - 150					

Lab Sample ID: LCSD 580-280854/8
Matrix: Water
Analysis Batch: 280854

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike	LCSD	LCSD	Unit	D	%Rec	%Rec.	Limits	RPD	Limit
		Result	Qualifier							
Gasoline	1.00	1.10		mg/L		110	79 - 120	8	10	
Surrogate	%Recovery	LCSD Qualifier	Limits							
4-Bromofluorobenzene (Surr)	100		50 - 150							
Trifluorotoluene (Surr)	138		50 - 150							

Lab Sample ID: 580-79184-1 MS
Matrix: Water
Analysis Batch: 280854

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec.	Limits
	Result	Qualifier		Result	Qualifier					
Gasoline	ND		1.00	1.13		mg/L		113	79 - 120	

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Surrogate	MS %Recovery	MS Qualifier	Limits
4-Bromofluorobenzene (Surr)	100		50 - 150
Trifluorotoluene (Surr)	120		50 - 150

Lab Sample ID: 580-79184-1 MSD
Matrix: Water
Analysis Batch: 280854

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	ND		1.00	1.13		mg/L		113	79 - 120	0	10

Surrogate	MSD %Recovery	MSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	98		50 - 150
Trifluorotoluene (Surr)	120		50 - 150

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-280454/1-B
Matrix: Water
Analysis Batch: 280546

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 280454

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		07/31/18 10:17	08/01/18 11:59	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		07/31/18 10:17	08/01/18 11:59	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	104		50 - 150	07/31/18 10:17	08/01/18 11:59	1

Lab Sample ID: LCS 580-280454/2-B
Matrix: Water
Analysis Batch: 280546

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 280454

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.88		mg/L		94	50 - 120
Motor Oil (>C24-C36)	2.00	2.01		mg/L		101	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	119		50 - 150

Lab Sample ID: LCSD 580-280454/3-B
Matrix: Water
Analysis Batch: 280546

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 280454

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.79		mg/L		90	50 - 120	5	26
Motor Oil (>C24-C36)	2.00	1.98		mg/L		99	64 - 120	1	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
o-Terphenyl	115		50 - 150

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: 580-79184-1 MS

Matrix: Water

Analysis Batch: 280546

Client Sample ID: Outfall #002

Prep Type: Total/NA

Prep Batch: 280454

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec.	Limits
	Result	Qualifier		Result	Qualifier					
#2 Diesel (C10-C24)	ND		2.09	1.62		mg/L		77		50 - 120
Motor Oil (>C24-C36)	ND		2.09	2.02		mg/L		97		64 - 120
MS MS										
Surrogate	%Recovery	Qualifier	Limits							
<i>o</i> -Terphenyl	102		50 - 150							

Lab Sample ID: 580-79184-1 MSD

Matrix: Water

Analysis Batch: 280546

Client Sample ID: Outfall #002

Prep Type: Total/NA

Prep Batch: 280454

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	Limits	RPD	
	Result	Qualifier		Result	Qualifier						RPD	Limit
#2 Diesel (C10-C24)	ND		2.17	1.69		mg/L		78		50 - 120	4	26
Motor Oil (>C24-C36)	ND		2.17	2.07		mg/L		95		64 - 120	2	24
MSD MSD												
Surrogate	%Recovery	Qualifier	Limits									
<i>o</i> -Terphenyl	96		50 - 150									

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Client Sample ID: Outfall #002

Date Collected: 07/26/18 12:05

Date Received: 07/27/18 13:15

Lab Sample ID: 580-79184-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	280467	07/31/18 19:42	T1W	TAL SEA
Total/NA	Prep	3510C			280563	08/01/18 09:57	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		5	280719	08/02/18 17:36	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	280854	08/04/18 21:54	W1T	TAL SEA
Total/NA	Prep	3510C			280454	07/31/18 10:17	JCM	TAL SEA
Total/NA	Cleanup	3630C			280550	08/01/18 08:45	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	280546	08/01/18 13:04	T1W	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 07/26/18 00:00

Date Received: 07/27/18 13:15

Lab Sample ID: 580-79184-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	280467	07/31/18 15:46	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	280854	08/04/18 23:27	W1T	TAL SEA

Client Sample ID: Dup-1

Date Collected: 07/26/18 00:00

Date Received: 07/27/18 13:15

Lab Sample ID: 580-79184-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	280467	07/31/18 21:00	T1W	TAL SEA
Total/NA	Prep	3510C			280563	08/01/18 09:57	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		5	280719	08/02/18 18:42	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	280854	08/04/18 23:58	W1T	TAL SEA
Total/NA	Prep	3510C			280454	07/31/18 10:17	JCM	TAL SEA
Total/NA	Cleanup	3630C			280550	08/01/18 08:45	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	280546	08/01/18 14:09	T1W	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-79184-1	Outfall #002	Water	07/26/18 12:05	07/27/18 13:15
580-79184-2	Trip Blank	Water	07/26/18 00:00	07/27/18 13:15
580-79184-3	Dup-1	Water	07/26/18 00:00	07/27/18 13:15

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Chevron Northwest Region Analysis Request/Chain of Custody



Lancaster Laboratories

For Lancaster Laboratories use only
 Acct. # _____ Group # _____ Sample # _____
Instructions on reverse side correspond with circled numbers.

1 Client Information

Facility # Edmonds terminal WBS

Site Address 11720 Anoco Rd

Chevron PM _____ Lead Consultant Arcoadis

Consultant/Office Arcoadis/Seattle

Consultant Project Mgr. Peter Campbell

Consultant Phone # _____

Sampler Justin Little

4 Matrix

Sediment

Ground

Surface

Potable

NPDES

Air

5 Analyses Requested

Total Number of Containers _____

BTEX + MTBE 8021 8260 Naphth

8260 full scan

Oxygenates

NWTPH GX

NWTPH DX Silica Gel Cleanup

Lead Total Diss. Method

WAVPH WAEPH

Benzene EPA 624

CPAHs 827051M

SCR #: _____

Loc: 580
79184

Res

J ve

Mus

limit

corr

8021 w/ BDE Confirmation

Confirm MTBE + Naphthalene

Confirm highest hit by 8260

Confirm all hits by 8260

Run _____ oxy's on highest hit

Run _____ oxy's on all hits

2 Sample Identification

Sample Identification	Collected		Grab	Composite	Soil	Water	Oil	Total Number of Containers	BTEX + MTBE	8021	8260	Naphth	8260 full scan	Oxygenates	NWTPH GX	NWTPH DX	Silica Gel Cleanup	Lead	Total	Diss.	Method	WAVPH	WAEPH	
	Date	Time																						
Outfall # 002	7/26/18	1205	X			X		10							X									
trip Blank	—	—	X			X		10							X									
Outfall # 002 MS/MSD	7/26/18	1215	X			X		10							X									
DVT-1	7/26/18	—	X			X		10							X									

6 Remarks

ATTN: Elaine Walker

* Nwtph-w/Sgl vso standard Sgl.

* Benzene + CPAH MUST have a detection limit of 1ug/L

PH-8.15

7/28/18 7:15 7:28-18

Therm. ID: 42 Cor: 6.4 Unc: 6.3

Cooler Disc: Med Blue

Packing: raggie FedEx: _____

Cust. Seal: Yes No UPS: _____

Wet/Packs/Dry Ice/None Lab Cour: _____ Other: 4

7 Turnaround Time Requested (TAT) (please circle)

Standard 5 day 4 day

72 hour 48 hour 24 hour

Relinquished by Jan Little Date 7/28/18 Time 1315

Received by [Signature] Date 7/28/18 Time 1315

8 Data Package Options (please circle if required)

Type I - Full Type VI (Raw Data)

Relinquished by Commercial Carrier: _____

Received by _____ Date _____ Time _____

UPS _____ FedEx _____ Other _____

Temperature Upon Receipt _____ °C

Custody Seals Intact? Yes No

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-79184-1

Login Number: 79184

List Number: 1

Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

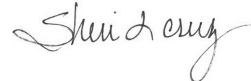
TestAmerica Job ID: 580-79422-1

Client Project/Site: Chevron Edmonds Terminal
Sampling Event: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:
8/17/2018 5:19:23 PM

Sheri Cruz, Project Manager I
(253)922-2310
sheri.cruz@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Job ID: 580-79422-1

Laboratory: TestAmerica Seattle

Narrative

**Job Narrative
580-79422-1**

Comments

No additional comments.

Receipt

The samples were received on 8/7/2018 12:05 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.5° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM: The laboratory control sample duplicate (LCSD) for preparation batch 580-281306 and analytical batch 580-281586 recovered outside control limits for the following analytes: Indeno[1,2,3-cd]pyrene. These analytes were biased high in the LCSD and were not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.

GC Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79422-1

Date Collected: 08/07/18 10:30

Matrix: Water

Date Received: 08/07/18 12:05

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/15/18 04:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					08/15/18 04:49	1
Toluene-d8 (Surr)	107		79 - 122					08/15/18 04:49	1
4-Bromofluorobenzene (Surr)	97		78 - 119					08/15/18 04:49	1
Dibromofluoromethane (Surr)	95		70 - 120					08/15/18 04:49	1
1,2-Dichloroethane-d4 (Surr)	96		70 - 120					08/15/18 04:49	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.26	0.072	ug/L		08/10/18 11:14	08/14/18 21:37	5
Benzo[a]pyrene	ND		0.51	0.056	ug/L		08/10/18 11:14	08/14/18 21:37	5
Benzo[b]fluoranthene	ND		0.26	0.056	ug/L		08/10/18 11:14	08/14/18 21:37	5
Benzo[k]fluoranthene	ND		0.26	0.062	ug/L		08/10/18 11:14	08/14/18 21:37	5
Chrysene	ND		0.51	0.082	ug/L		08/10/18 11:14	08/14/18 21:37	5
Dibenz(a,h)anthracene	ND		0.51	0.051	ug/L		08/10/18 11:14	08/14/18 21:37	5
Indeno[1,2,3-cd]pyrene	ND	*	0.26	0.072	ug/L		08/10/18 11:14	08/14/18 21:37	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	95		53 - 120				08/10/18 11:14	08/14/18 21:37	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/10/18 01:13	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		50 - 150					08/10/18 01:13	1
Trifluorotoluene (Surr)	113		50 - 150					08/10/18 01:13	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		08/08/18 09:57	08/08/18 23:01	1
Motor Oil (>C24-C36)	0.19	J	0.35	0.096	mg/L		08/08/18 09:57	08/08/18 23:01	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	88		50 - 150				08/08/18 09:57	08/08/18 23:01	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Client Sample ID: Trip Blank - 2

Lab Sample ID: 580-79422-2

Date Collected: 08/07/18 00:00

Matrix: Water

Date Received: 08/07/18 12:05

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/15/18 00:01	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		74 - 123					08/15/18 00:01	1
Toluene-d8 (Surr)	107		79 - 122					08/15/18 00:01	1
4-Bromofluorobenzene (Surr)	98		78 - 119					08/15/18 00:01	1
Dibromofluoromethane (Surr)	96		70 - 120					08/15/18 00:01	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 120					08/15/18 00:01	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/10/18 01:43	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		50 - 150					08/10/18 01:43	1
Trifluorotoluene (Surr)	119		50 - 150					08/10/18 01:43	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-281535/5
Matrix: Water
Analysis Batch: 281535

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/14/18 22:16	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123		08/14/18 22:16	1
Toluene-d8 (Surr)	105		79 - 122		08/14/18 22:16	1
4-Bromofluorobenzene (Surr)	96		78 - 119		08/14/18 22:16	1
Dibromofluoromethane (Surr)	94		70 - 120		08/14/18 22:16	1
1,2-Dichloroethane-d4 (Surr)	92		70 - 120		08/14/18 22:16	1

Lab Sample ID: LCS 580-281535/6
Matrix: Water
Analysis Batch: 281535

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.2		ug/L		102	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	97		74 - 123
Toluene-d8 (Surr)	106		79 - 122
4-Bromofluorobenzene (Surr)	98		78 - 119
Dibromofluoromethane (Surr)	95		70 - 120
1,2-Dichloroethane-d4 (Surr)	92		70 - 120

Lab Sample ID: LCSD 580-281535/7
Matrix: Water
Analysis Batch: 281535

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.3		ug/L		103	37 - 151	1	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	97		74 - 123
Toluene-d8 (Surr)	106		79 - 122
4-Bromofluorobenzene (Surr)	97		78 - 119
Dibromofluoromethane (Surr)	94		70 - 120
1,2-Dichloroethane-d4 (Surr)	92		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-281306/1-A
Matrix: Water
Analysis Batch: 281586

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 281306

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		08/10/18 11:14	08/14/18 17:53	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		08/10/18 11:14	08/14/18 17:53	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		08/10/18 11:14	08/14/18 17:53	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-281306/1-A
Matrix: Water
Analysis Batch: 281586

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 281306

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		08/10/18 11:14	08/14/18 17:53	1
Chrysene	ND		0.10	0.016	ug/L		08/10/18 11:14	08/14/18 17:53	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		08/10/18 11:14	08/14/18 17:53	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		08/10/18 11:14	08/14/18 17:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	100		53 - 120				08/10/18 11:14	08/14/18 17:53	1

Lab Sample ID: LCS 580-281306/2-A
Matrix: Water
Analysis Batch: 281586

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 281306

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.94		ug/L		99	61 - 120
Benzo[a]pyrene	4.00	4.36		ug/L		109	65 - 120
Benzo[b]fluoranthene	4.00	4.20		ug/L		105	58 - 120
Benzo[k]fluoranthene	4.00	4.35		ug/L		109	58 - 120
Chrysene	4.00	4.40		ug/L		110	58 - 120
Dibenz(a,h)anthracene	4.00	4.56		ug/L		114	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	4.65		ug/L		116	56 - 120
Surrogate	%Recovery	Qualifier	Limits				
Terphenyl-d14	86		53 - 120				

Lab Sample ID: LCSD 580-281306/3-A
Matrix: Water
Analysis Batch: 281586

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 281306

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	
								RPD	Limit
Benzo[a]anthracene	4.00	4.07		ug/L		102	61 - 120	3	16
Benzo[a]pyrene	4.00	4.52		ug/L		113	65 - 120	4	17
Benzo[b]fluoranthene	4.00	4.19		ug/L		105	58 - 120	0	20
Benzo[k]fluoranthene	4.00	4.73		ug/L		118	58 - 120	9	20
Chrysene	4.00	4.60		ug/L		115	58 - 120	4	16
Dibenz(a,h)anthracene	4.00	4.82		ug/L		121	60 - 125	6	15
Indeno[1,2,3-cd]pyrene	4.00	4.83	*	ug/L		121	56 - 120	4	15
Surrogate	%Recovery	Qualifier	Limits						
Terphenyl-d14	93		53 - 120						

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-281260/5
Matrix: Water
Analysis Batch: 281260

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/09/18 17:13	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		50 - 150					08/09/18 17:13	1
Trifluorotoluene (Surr)	61		50 - 150					08/09/18 17:13	1

Lab Sample ID: LCS 580-281260/6
Matrix: Water
Analysis Batch: 281260

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.972		mg/L		97	79 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	106		50 - 150				
Trifluorotoluene (Surr)	125		50 - 150				

Lab Sample ID: LCSD 580-281260/7
Matrix: Water
Analysis Batch: 281260

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	1.00		mg/L		100	79 - 120	3	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	103		50 - 150						
Trifluorotoluene (Surr)	129		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-281116/1-B
Matrix: Water
Analysis Batch: 281100

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 281116

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		08/08/18 09:57	08/08/18 21:30	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		08/08/18 09:57	08/08/18 21:30	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	90		50 - 150				08/08/18 09:57	08/08/18 21:30	1

Lab Sample ID: LCS 580-281116/2-B
Matrix: Water
Analysis Batch: 281100

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 281116

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.72		mg/L		86	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-281116/2-B
Matrix: Water
Analysis Batch: 281100

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 281116

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.69		mg/L		85	64 - 120
LCS LCS							
Surrogate	%Recovery	Qualifier	Limits				
<i>o-Terphenyl</i>	110		50 - 150				

Lab Sample ID: LCSD 580-281116/3-B
Matrix: Water
Analysis Batch: 281100

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 281116

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.65		mg/L		83	50 - 120	4	26
Motor Oil (>C24-C36)	2.00	1.60		mg/L		80	64 - 120	6	24
LCSD LCSD									
Surrogate	%Recovery	Qualifier	Limits						
<i>o-Terphenyl</i>	103		50 - 150						

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79422-1

Date Collected: 08/07/18 10:30

Matrix: Water

Date Received: 08/07/18 12:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	281535	08/15/18 04:49	RSB	TAL SEA
Total/NA	Prep	3510C			281306	08/10/18 11:14	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		5	281586	08/14/18 21:37	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	281260	08/10/18 01:13	JSM	TAL SEA
Total/NA	Prep	3510C			281116	08/08/18 09:57	JCM	TAL SEA
Total/NA	Cleanup	3630C			281132	08/08/18 11:20	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	281100	08/08/18 23:01	T1W	TAL SEA

Client Sample ID: Trip Blank - 2

Lab Sample ID: 580-79422-2

Date Collected: 08/07/18 00:00

Matrix: Water

Date Received: 08/07/18 12:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	281535	08/15/18 00:01	RSB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	281260	08/10/18 01:43	JSM	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-79422-1	Outfall #002	Water	08/07/18 10:30	08/07/18 12:05
580-79422-2	Trip Blank - 2	Water	08/07/18 00:00	08/07/18 12:05

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- 11

Client ArCADIS		Client Contact Peter Campbell		Date 8/7/18	Chain of Custody Number 37490
Address 11720 UNACO Rd		Telephone Number (Area Code)/Fax Number 206-726-4741		Lab Number	Page 1 of 1
City Seattle	State WA	Zip Code 98199	Sampler Jason Little	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal			Billing Contact		
Contract/Purchase Order/Quote No.					

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Special Instructions/ Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH				
OUTfall #002	8/7/18	1030	X				2			8						Loc: 580 79422 pH = 8.69 * use standard silica gel cleanup * Benzene + CPAH w/quinone level less than 100g/L
Trip Blank	—	—	X							b						



580-79422 Chain of Custody

Therm. ID: **AZ** Cor: **15** Uncl: **4**
Cooler Desc: **SM BKE** FedEx: **A**
Packing: **BUB** UPS:
Cust. Seal: Yes No Lab Cour: **+**
Packs/Dry Ice: None Other:

Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months	(A fee may be assessed if samples are retained longer than 1 month)
---	--	---	---

Turn Around Time Required (business days) <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input type="checkbox"/> 5 Days <input type="checkbox"/> 10 Days <input type="checkbox"/> 15 Days <input checked="" type="checkbox"/> Other Standard	QC Requirements (Specify)
--	---------------------------

1. Relinquished By Sign/Print [Signature] / Jason Little	Date 8/7/18	Time 1205	1. Received By Sign/Print [Signature] Francisco Luna, Jr	Date 8/7/18	Time 1205
2. Relinquished By Sign/Print	Date	Time	2. Received By Sign/Print	Date	Time
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-79422-1

Login Number: 79422

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

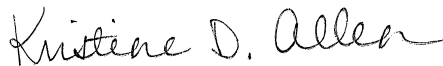
TestAmerica Job ID: 580-79614-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

8/29/2018 2:51:48 PM

Kristine Allen, Manager of Project Management

(253)248-4970

kristine.allen@testamericainc.com

Designee for

Elaine Walker, Project Manager II

(253)248-4972

elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

LINKS

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Job ID: 580-79614-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-79614-1

Comments

No additional comments.

Receipt

The samples were received on 8/15/2018 11:54 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 9.6° C.

GC/MS VOA

Method(s) 624: The surrogate recovery for the blank associated with analytical batch 580-281748 was outside the upper control limits. The associated sample(s) did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Method(s) 624: Surrogate recovery for the following sample was outside the upper control limit: Trip Blank (580-79614-2). This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

Method(s) NWTPH-Gx: Surrogate drift for Trifluorotoluene is high but is within acceptable recovery limits. All samples pass for TFT and have been reported. (CCV 580-282651/27)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79614-1

Date Collected: 08/15/18 10:00

Matrix: Water

Date Received: 08/15/18 11:54

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/16/18 23:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	94		74 - 123					08/16/18 23:28	1
Toluene-d8 (Surr)	106		79 - 122					08/16/18 23:28	1
4-Bromofluorobenzene (Surr)	101		78 - 119					08/16/18 23:28	1
Dibromofluoromethane (Surr)	101		70 - 120					08/16/18 23:28	1
1,2-Dichloroethane-d4 (Surr)	114		70 - 120					08/16/18 23:28	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.053	0.015	ug/L		08/17/18 13:42	08/21/18 00:37	1
Benzo[a]pyrene	ND		0.11	0.012	ug/L		08/17/18 13:42	08/21/18 00:37	1
Benzo[b]fluoranthene	ND		0.053	0.012	ug/L		08/17/18 13:42	08/21/18 00:37	1
Benzo[k]fluoranthene	ND		0.053	0.013	ug/L		08/17/18 13:42	08/21/18 00:37	1
Chrysene	ND		0.11	0.017	ug/L		08/17/18 13:42	08/21/18 00:37	1
Dibenz[a,h]anthracene	ND		0.11	0.011	ug/L		08/17/18 13:42	08/21/18 00:37	1
Indeno[1,2,3-cd]pyrene	ND		0.053	0.015	ug/L		08/17/18 13:42	08/21/18 00:37	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	65		53 - 120				08/17/18 13:42	08/21/18 00:37	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/27/18 19:18	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	108		50 - 150					08/27/18 19:18	1
Trifluorotoluene (Surr)	124		50 - 150					08/27/18 19:18	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.073	mg/L		08/26/18 14:00	08/27/18 14:28	1
Motor Oil (>C24-C36)	ND		0.39	0.11	mg/L		08/26/18 14:00	08/27/18 14:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	77		50 - 150				08/26/18 14:00	08/27/18 14:28	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-79614-2

Date Collected: 08/15/18 10:00

Matrix: Water

Date Received: 08/15/18 11:54

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/16/18 17:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	96		74 - 123					08/16/18 17:46	1
Toluene-d8 (Surr)	104		79 - 122					08/16/18 17:46	1
4-Bromofluorobenzene (Surr)	101		78 - 119					08/16/18 17:46	1
Dibromofluoromethane (Surr)	101		70 - 120					08/16/18 17:46	1
1,2-Dichloroethane-d4 (Surr)	122	X	70 - 120					08/16/18 17:46	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/27/18 20:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	107		50 - 150					08/27/18 20:19	1
Trifluorotoluene (Surr)	123		50 - 150					08/27/18 20:19	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-281748/5

Matrix: Water

Analysis Batch: 281748

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/16/18 15:36	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	95		74 - 123		08/16/18 15:36	1
Toluene-d8 (Surr)	106		79 - 122		08/16/18 15:36	1
4-Bromofluorobenzene (Surr)	100		78 - 119		08/16/18 15:36	1
Dibromofluoromethane (Surr)	103		70 - 120		08/16/18 15:36	1
1,2-Dichloroethane-d4 (Surr)	122	X	70 - 120		08/16/18 15:36	1

Lab Sample ID: LCS 580-281748/6

Matrix: Water

Analysis Batch: 281748

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.24		ug/L		92	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	95		74 - 123
Toluene-d8 (Surr)	104		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	120		70 - 120

Lab Sample ID: LCSD 580-281748/7

Matrix: Water

Analysis Batch: 281748

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.68		ug/L		97	37 - 151	5	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	93		74 - 123
Toluene-d8 (Surr)	104		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	120		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-281829/1-A

Matrix: Water

Analysis Batch: 282033

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 281829

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		08/17/18 10:14	08/20/18 18:17	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		08/17/18 10:14	08/20/18 18:17	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		08/17/18 10:14	08/20/18 18:17	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-281829/1-A

Matrix: Water

Analysis Batch: 282033

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 281829

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		08/17/18 10:14	08/20/18 18:17	1
Chrysene	ND		0.10	0.016	ug/L		08/17/18 10:14	08/20/18 18:17	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		08/17/18 10:14	08/20/18 18:17	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		08/17/18 10:14	08/20/18 18:17	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	79		53 - 120	08/17/18 10:14	08/20/18 18:17	1

Lab Sample ID: LCS 580-281829/2-A

Matrix: Water

Analysis Batch: 282033

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 281829

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.02		ug/L		76	61 - 120
Benzo[a]pyrene	4.00	3.24		ug/L		81	65 - 120
Benzo[b]fluoranthene	4.00	3.11		ug/L		78	58 - 120
Benzo[k]fluoranthene	4.00	3.21		ug/L		80	58 - 120
Chrysene	4.00	3.30		ug/L		83	58 - 120
Dibenz(a,h)anthracene	4.00	3.60		ug/L		90	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.62		ug/L		91	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	70		53 - 120

Lab Sample ID: LCSD 580-281829/3-A

Matrix: Water

Analysis Batch: 282033

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 281829

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	2.95		ug/L		74	61 - 120	2	16
Benzo[a]pyrene	4.00	3.23		ug/L		81	65 - 120	0	17
Benzo[b]fluoranthene	4.00	3.09		ug/L		77	58 - 120	0	20
Benzo[k]fluoranthene	4.00	3.13		ug/L		78	58 - 120	2	20
Chrysene	4.00	3.23		ug/L		81	58 - 120	2	16
Dibenz(a,h)anthracene	4.00	3.58		ug/L		90	60 - 125	1	15
Indeno[1,2,3-cd]pyrene	4.00	3.56		ug/L		89	56 - 120	2	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	70		53 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-282651/6

Matrix: Water

Analysis Batch: 282651

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/27/18 14:45	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		50 - 150					08/27/18 14:45	1
Trifluorotoluene (Surr)	59		50 - 150					08/27/18 14:45	1

Lab Sample ID: LCS 580-282651/7

Matrix: Water

Analysis Batch: 282651

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.916		mg/L		92	79 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	110		50 - 150				
Trifluorotoluene (Surr)	107		50 - 150				

Lab Sample ID: LCSD 580-282651/8

Matrix: Water

Analysis Batch: 282651

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.957		mg/L		96	79 - 120	4	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	105		50 - 150						
Trifluorotoluene (Surr)	112		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-282502/1-B

Matrix: Water

Analysis Batch: 282534

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 282502

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		08/26/18 14:00	08/27/18 13:06	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		08/26/18 14:00	08/27/18 13:06	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	79		50 - 150				08/26/18 14:00	08/27/18 13:06	1

Lab Sample ID: LCS 580-282502/2-B

Matrix: Water

Analysis Batch: 282534

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 282502

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.46		mg/L		73	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

(Continued)

Lab Sample ID: LCS 580-282502/2-B

Matrix: Water

Analysis Batch: 282534

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 282502

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Motor Oil (>C24-C36)	2.00	1.76		mg/L		88	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	81		50 - 150

Lab Sample ID: LCSD 580-282502/3-B

Matrix: Water

Analysis Batch: 282534

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 282502

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.54		mg/L		77	50 - 120	6	26
Motor Oil (>C24-C36)	2.00	1.85		mg/L		93	64 - 120	5	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	86		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79614-1

Date Collected: 08/15/18 10:00

Matrix: Water

Date Received: 08/15/18 11:54

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	281748	08/16/18 23:28	CJ	TAL SEA
Total/NA	Prep	3510C			281829	08/17/18 13:42	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	282033	08/21/18 00:37	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	282651	08/27/18 19:18	RSB	TAL SEA
Total/NA	Prep	3510C			282502	08/26/18 14:00	JCM	TAL SEA
Total/NA	Cleanup	3630C			282526	08/26/18 20:15	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	282534	08/27/18 14:28	CJ	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-79614-2

Date Collected: 08/15/18 10:00

Matrix: Water

Date Received: 08/15/18 11:54

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	281748	08/16/18 17:46	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	282651	08/27/18 20:19	RSB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-79614-1	Outfall #002	Water	08/15/18 10:00	08/15/18 11:54
580-79614-2	Trip Blank	Water	08/15/18 10:00	08/15/18 11:54

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Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-79614-1

Login Number: 79614

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

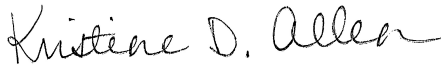
TestAmerica Job ID: 580-79751-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:
8/29/2018 3:35:05 PM

Kristine Allen, Manager of Project Management
(253)248-4970
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Designee for

Elaine Walker, Project Manager II
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elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Job ID: 580-79751-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-79751-1

Comments

No additional comments.

Receipt

The samples were received on 8/21/2018 10:35 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.2° C.

GC/MS VOA

Method(s) NWTPH-Gx: Surrogate drift for Trifluorotoluene is high but is within acceptable recovery limits. All samples pass for TFT and have been reported. (CCV 580-282651/27)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: The continuing calibration verification (CCV) associated with batch 580-282485 recovered above the upper control limit for Benzo[k]fluoranthene. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The following samples are impacted: Outfall #002 (580-79751-1) and (CCVIS 580-282485/3).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79751-1

Date Collected: 08/21/18 10:30

Matrix: Water

Date Received: 08/21/18 10:35

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/22/18 23:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123					08/22/18 23:21	1
Toluene-d8 (Surr)	107		79 - 122					08/22/18 23:21	1
4-Bromofluorobenzene (Surr)	97		78 - 119					08/22/18 23:21	1
Dibromofluoromethane (Surr)	95		70 - 120					08/22/18 23:21	1
1,2-Dichloroethane-d4 (Surr)	90		70 - 120					08/22/18 23:21	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.057	0.016	ug/L		08/23/18 09:46	08/25/18 20:41	1
Benzo[a]pyrene	ND		0.11	0.013	ug/L		08/23/18 09:46	08/25/18 20:41	1
Benzo[b]fluoranthene	ND		0.057	0.013	ug/L		08/23/18 09:46	08/25/18 20:41	1
Benzo[k]fluoranthene	ND		0.057	0.014	ug/L		08/23/18 09:46	08/25/18 20:41	1
Chrysene	ND		0.11	0.018	ug/L		08/23/18 09:46	08/25/18 20:41	1
Dibenz[a,h]anthracene	ND		0.11	0.011	ug/L		08/23/18 09:46	08/25/18 20:41	1
Indeno[1,2,3-cd]pyrene	ND		0.057	0.016	ug/L		08/23/18 09:46	08/25/18 20:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	89		53 - 120				08/23/18 09:46	08/25/18 20:41	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/28/18 00:22	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	111		50 - 150					08/28/18 00:22	1
Trifluorotoluene (Surr)	122		50 - 150					08/28/18 00:22	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.13	0.074	mg/L		08/26/18 14:00	08/27/18 15:23	1
Motor Oil (>C24-C36)	0.12	J	0.40	0.11	mg/L		08/26/18 14:00	08/27/18 15:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	81		50 - 150				08/26/18 14:00	08/27/18 15:23	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-79751-2

Date Collected: 08/21/18 00:00

Matrix: Water

Date Received: 08/21/18 10:35

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/22/18 18:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123					08/22/18 18:09	1
Toluene-d8 (Surr)	104		79 - 122					08/22/18 18:09	1
4-Bromofluorobenzene (Surr)	101		78 - 119					08/22/18 18:09	1
Dibromofluoromethane (Surr)	99		70 - 120					08/22/18 18:09	1
1,2-Dichloroethane-d4 (Surr)	108		70 - 120					08/22/18 18:09	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/28/18 00:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	108		50 - 150					08/28/18 00:52	1
Trifluorotoluene (Surr)	122		50 - 150					08/28/18 00:52	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-282181/5

Matrix: Water

Analysis Batch: 282181

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/22/18 14:14	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	95		74 - 123		08/22/18 14:14	1
Toluene-d8 (Surr)	104		79 - 122		08/22/18 14:14	1
4-Bromofluorobenzene (Surr)	99		78 - 119		08/22/18 14:14	1
Dibromofluoromethane (Surr)	99		70 - 120		08/22/18 14:14	1
1,2-Dichloroethane-d4 (Surr)	109		70 - 120		08/22/18 14:14	1

Lab Sample ID: LCS 580-282181/6

Matrix: Water

Analysis Batch: 282181

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.40		ug/L		94	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	96		74 - 123
Toluene-d8 (Surr)	105		79 - 122
4-Bromofluorobenzene (Surr)	97		78 - 119
Dibromofluoromethane (Surr)	99		70 - 120
1,2-Dichloroethane-d4 (Surr)	108		70 - 120

Lab Sample ID: LCSD 580-282181/7

Matrix: Water

Analysis Batch: 282181

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzene	10.0	9.51		ug/L		95	37 - 151	1	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	96		74 - 123
Toluene-d8 (Surr)	105		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	98		70 - 120
1,2-Dichloroethane-d4 (Surr)	109		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-282259/1-A

Matrix: Water

Analysis Batch: 282485

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 282259

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		08/23/18 09:46	08/25/18 18:37	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		08/23/18 09:46	08/25/18 18:37	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		08/23/18 09:46	08/25/18 18:37	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-282259/1-A

Matrix: Water

Analysis Batch: 282485

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 282259

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		08/23/18 09:46	08/25/18 18:37	1
Chrysene	ND		0.10	0.016	ug/L		08/23/18 09:46	08/25/18 18:37	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		08/23/18 09:46	08/25/18 18:37	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		08/23/18 09:46	08/25/18 18:37	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	90		53 - 120	08/23/18 09:46	08/25/18 18:37	1

Lab Sample ID: LCS 580-282259/2-A

Matrix: Water

Analysis Batch: 282485

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 282259

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	4.07		ug/L		102	61 - 120
Benzo[a]pyrene	4.00	4.35		ug/L		109	65 - 120
Benzo[b]fluoranthene	4.00	4.77		ug/L		119	58 - 120
Benzo[k]fluoranthene	4.00	4.31		ug/L		108	58 - 120
Chrysene	4.00	3.65		ug/L		91	58 - 120
Dibenz(a,h)anthracene	4.00	4.17		ug/L		104	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	4.37		ug/L		109	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	95		53 - 120

Lab Sample ID: LCSD 580-282259/3-A

Matrix: Water

Analysis Batch: 282485

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 282259

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	4.11		ug/L		103	61 - 120	1	16
Benzo[a]pyrene	4.00	4.38		ug/L		110	65 - 120	1	17
Benzo[b]fluoranthene	4.00	4.69		ug/L		117	58 - 120	2	20
Benzo[k]fluoranthene	4.00	4.46		ug/L		112	58 - 120	4	20
Chrysene	4.00	3.74		ug/L		93	58 - 120	2	16
Dibenz(a,h)anthracene	4.00	4.23		ug/L		106	60 - 125	1	15
Indeno[1,2,3-cd]pyrene	4.00	4.36		ug/L		109	56 - 120	0	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	90		53 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-282651/6

Matrix: Water

Analysis Batch: 282651

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/27/18 14:45	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		50 - 150		08/27/18 14:45	1
Trifluorotoluene (Surr)	59		50 - 150		08/27/18 14:45	1

Lab Sample ID: LCS 580-282651/7

Matrix: Water

Analysis Batch: 282651

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.916		mg/L		92	79 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	110		50 - 150
Trifluorotoluene (Surr)	107		50 - 150

Lab Sample ID: LCSD 580-282651/8

Matrix: Water

Analysis Batch: 282651

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.957		mg/L		96	79 - 120	4	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	105		50 - 150
Trifluorotoluene (Surr)	112		50 - 150

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-282502/1-B

Matrix: Water

Analysis Batch: 282534

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 282502

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		08/26/18 14:00	08/27/18 13:06	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		08/26/18 14:00	08/27/18 13:06	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	79		50 - 150	08/26/18 14:00	08/27/18 13:06	1

Lab Sample ID: LCS 580-282502/2-B

Matrix: Water

Analysis Batch: 282534

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 282502

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.46		mg/L		73	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

(Continued)

Lab Sample ID: LCS 580-282502/2-B

Matrix: Water

Analysis Batch: 282534

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 282502

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Motor Oil (>C24-C36)	2.00	1.76		mg/L		88	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	81		50 - 150

Lab Sample ID: LCSD 580-282502/3-B

Matrix: Water

Analysis Batch: 282534

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 282502

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.54		mg/L		77	50 - 120	6	26
Motor Oil (>C24-C36)	2.00	1.85		mg/L		93	64 - 120	5	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	86		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79751-1

Date Collected: 08/21/18 10:30

Matrix: Water

Date Received: 08/21/18 10:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	282181	08/22/18 23:21	TL1	TAL SEA
Total/NA	Prep	3510C			282259	08/23/18 09:46	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		1	282485	08/25/18 20:41	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	282651	08/28/18 00:22	RSB	TAL SEA
Total/NA	Prep	3510C			282502	08/26/18 14:00	JCM	TAL SEA
Total/NA	Cleanup	3630C			282526	08/26/18 20:15	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	282534	08/27/18 15:23	CJ	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-79751-2

Date Collected: 08/21/18 00:00

Matrix: Water

Date Received: 08/21/18 10:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	282181	08/22/18 18:09	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	282651	08/28/18 00:52	RSB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-79751-1	Outfall #002	Water	08/21/18 10:30	08/21/18 10:35
580-79751-2	Trip Blank	Water	08/21/18 00:00	08/21/18 10:35

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- 8
- 9
- 10
- 11

Rush

Short Hold

Chain of Custody Record

Client: Arady Client Contact: Peter Campbell Date: 8/15/18 Chain of Custody Number: 37489
 Address: 1100 Olive Way Suite 899 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jason VNU Lab Contact: _____
 Project Name and Location (State): _____ Billing Contact: _____ Analysis (Attach list if more space is needed):
 Loc: 580 79751 utions/Receipt

Contract/Purchase Order/Quote No. _____ Matrix _____ Containers & Preservatives _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Analysis/Receipt			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH					
<u>Outfall #002</u>	<u>8/21/18</u>	<u>1030</u>	<input checked="" type="checkbox"/>				<u>2</u>			<u>8</u>							<u>Parsons + CAPHS</u>
<u>Trip Work</u>	<u>-</u>	<u>-</u>	<input checked="" type="checkbox"/>							<u>6</u>							<u>have qualitative</u> <u>anal less than</u> <u>1 ug/L</u>



Therm. ID: A2 Cor: 2.2 ° Unc: 2.1 °
 Cooler Desc: Med Blue
 Packing: Bubble FedEx: _____
 Cust. Seal: Yes _____ No UPS: _____
 Wet/Packs/Dry Ice/None Other: _____

- use student SGC
- BH-880

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other Standard QC Requirements (Specify) _____

1. Relinquished By Sign/Print: <u>[Signature]</u>	Date: <u>8/21/18</u>	Time: <u>1035</u>	1. Received By Sign/Print: <u>[Signature] Francisco Luna, Jr</u>	Date: <u>8/21/18</u>	Time: <u>1035</u>
2. Relinquished By Sign/Print: _____	Date: _____	Time: _____	2. Received By Sign/Print: _____	Date: _____	Time: _____
3. Relinquished By Sign/Print: _____	Date: _____	Time: _____	3. Received By Sign/Print: _____	Date: _____	Time: _____

Comments _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-79751-1

Login Number: 79751

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-81046-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
10/22/2018 4:28:33 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Job ID: 580-81046-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-81046-1

Receipt

Two samples were received on 10/10/2018 10:56 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 6.6° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-81046-1

Date Collected: 10/10/18 09:00

Matrix: Water

Date Received: 10/10/18 10:56

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			10/16/18 14:09	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123					10/16/18 14:09	1
Toluene-d8 (Surr)	100		79 - 122					10/16/18 14:09	1
4-Bromofluorobenzene (Surr)	101		78 - 119					10/16/18 14:09	1
Dibromofluoromethane (Surr)	97		70 - 120					10/16/18 14:09	1
1,2-Dichloroethane-d4 (Surr)	97		70 - 120					10/16/18 14:09	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		10/15/18 09:21	10/17/18 18:51	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		10/15/18 09:21	10/17/18 18:51	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		10/15/18 09:21	10/17/18 18:51	1
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		10/15/18 09:21	10/17/18 18:51	1
Chrysene	ND		0.10	0.016	ug/L		10/15/18 09:21	10/17/18 18:51	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		10/15/18 09:21	10/17/18 18:51	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		10/15/18 09:21	10/17/18 18:51	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	68		53 - 120				10/15/18 09:21	10/17/18 18:51	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			10/18/18 02:27	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	84		50 - 150					10/18/18 02:27	1
Trifluorotoluene (Surr)	96		50 - 150					10/18/18 02:27	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		10/17/18 13:44	10/21/18 17:45	1
Motor Oil (>C24-C36)	ND		0.35	0.097	mg/L		10/17/18 13:44	10/21/18 17:45	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	87		50 - 150				10/17/18 13:44	10/21/18 17:45	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-81046-2

Date Collected: 10/10/18 00:00

Matrix: Water

Date Received: 10/10/18 10:56

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			10/16/18 14:36	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		74 - 123					10/16/18 14:36	1
Toluene-d8 (Surr)	106		79 - 122					10/16/18 14:36	1
4-Bromofluorobenzene (Surr)	104		78 - 119					10/16/18 14:36	1
Dibromofluoromethane (Surr)	95		70 - 120					10/16/18 14:36	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 120					10/16/18 14:36	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			10/17/18 20:35	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		50 - 150					10/17/18 20:35	1
Trifluorotoluene (Surr)	96		50 - 150					10/17/18 20:35	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-286583/5
Matrix: Water
Analysis Batch: 286583

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			10/16/18 08:28	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123		10/16/18 08:28	1
Toluene-d8 (Surr)	105		79 - 122		10/16/18 08:28	1
4-Bromofluorobenzene (Surr)	103		78 - 119		10/16/18 08:28	1
Dibromofluoromethane (Surr)	105		70 - 120		10/16/18 08:28	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 120		10/16/18 08:28	1

Lab Sample ID: LCS 580-286583/6
Matrix: Water
Analysis Batch: 286583

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	11.1		ug/L		111	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	97		74 - 123
Toluene-d8 (Surr)	102		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	103		70 - 120
1,2-Dichloroethane-d4 (Surr)	99		70 - 120

Lab Sample ID: LCSD 580-286583/7
Matrix: Water
Analysis Batch: 286583

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	10.3		ug/L		103	37 - 151	7	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	102		79 - 122
4-Bromofluorobenzene (Surr)	101		78 - 119
Dibromofluoromethane (Surr)	97		70 - 120
1,2-Dichloroethane-d4 (Surr)	97		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-286503/1-A
Matrix: Water
Analysis Batch: 286695

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 286503

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		10/15/18 09:21	10/17/18 09:38	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		10/15/18 09:21	10/17/18 09:38	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		10/15/18 09:21	10/17/18 09:38	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-286503/1-A
Matrix: Water
Analysis Batch: 286695

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 286503

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		10/15/18 09:21	10/17/18 09:38	1
Chrysene	ND		0.10	0.016	ug/L		10/15/18 09:21	10/17/18 09:38	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		10/15/18 09:21	10/17/18 09:38	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		10/15/18 09:21	10/17/18 09:38	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	86		53 - 120	10/15/18 09:21	10/17/18 09:38	1

Lab Sample ID: LCS 580-286503/2-A
Matrix: Water
Analysis Batch: 286695

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 286503

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	4.04		ug/L		101	61 - 120
Benzo[a]pyrene	4.00	3.82		ug/L		95	65 - 120
Benzo[b]fluoranthene	4.00	3.99		ug/L		100	58 - 120
Benzo[k]fluoranthene	4.00	3.73		ug/L		93	58 - 120
Chrysene	4.00	3.81		ug/L		95	58 - 120
Dibenz(a,h)anthracene	4.00	3.60		ug/L		90	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.79		ug/L		95	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	76		53 - 120

Lab Sample ID: LCSD 580-286503/3-A
Matrix: Water
Analysis Batch: 286695

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 286503

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.85		ug/L		96	61 - 120	5	16
Benzo[a]pyrene	4.00	3.77		ug/L		94	65 - 120	1	17
Benzo[b]fluoranthene	4.00	3.87		ug/L		97	58 - 120	3	20
Benzo[k]fluoranthene	4.00	3.66		ug/L		92	58 - 120	2	20
Chrysene	4.00	3.62		ug/L		91	58 - 120	5	16
Dibenz(a,h)anthracene	4.00	3.36		ug/L		84	60 - 125	7	15
Indeno[1,2,3-cd]pyrene	4.00	3.78		ug/L		94	56 - 120	0	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	75		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-286768/6
Matrix: Water
Analysis Batch: 286768

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			10/17/18 19:14	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		50 - 150					10/17/18 19:14	1
Trifluorotoluene (Surr)	100		50 - 150					10/17/18 19:14	1

Lab Sample ID: LCS 580-286768/7
Matrix: Water
Analysis Batch: 286768

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.947		mg/L		95	79 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	91		50 - 150				
Trifluorotoluene (Surr)	107		50 - 150				

Lab Sample ID: LCSD 580-286768/8
Matrix: Water
Analysis Batch: 286768

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.910		mg/L		91	79 - 120	4	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	91		50 - 150						
Trifluorotoluene (Surr)	100		50 - 150						

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Client Sample ID: Outfall #002

Date Collected: 10/10/18 09:00

Date Received: 10/10/18 10:56

Lab Sample ID: 580-81046-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	286583	10/16/18 14:09	TL1	TAL SEA
Total/NA	Prep	3510C			286503	10/15/18 09:21	KO	TAL SEA
Total/NA	Analysis	8270C SIM		1	286695	10/17/18 18:51	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	286768	10/18/18 02:27	W1T	TAL SEA
Total/NA	Prep	3510C			286734	10/17/18 13:44	KO	TAL SEA
Total/NA	Cleanup	3630C			286966	10/19/18 14:07	KO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	287044	10/21/18 17:45	TL1	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 10/10/18 00:00

Date Received: 10/10/18 10:56

Lab Sample ID: 580-81046-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	286583	10/16/18 14:36	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	286768	10/17/18 20:35	W1T	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81046-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-81046-1	Outfall #002	Water	10/10/18 09:00	10/10/18 10:56
580-81046-2	Trip Blank	Water	10/10/18 00:00	10/10/18 10:56

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- 9
- 10
- 11

Rush

Short Hold

**Chain of
Custody Record**

Client: Arcadis Client Contact: Peter Campbell Date: 10/10/18 Chain of Custody Number: 37491
Address: 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page: 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Eric Kneeger Lab Contact: Elaine Walker Analysis (Attach list if more space is needed): LOC. JOB 81046
Project Name and Location (State): Edmonds Terminal Billing Contact: _____
Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives										Special Instructions/ Conditions of Receipt						
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	Benzene EPA 624 NUPH-GX NUPH-DX w/ SEC CPAKS 8270C51W										
<u>Outfall #002</u>	<u>10/10/18</u>	<u>0900</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>2</u>															<u>pH = 8.50</u>
<u>Trip Blank</u>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>																			<u>*use standard Silica Gel cleanup</u>



Therm. ID: A2 Cor: 6.6 Unc: 6.3
Cooler Dsc: Med Blue FedEx: _____
Packing: Bubble UPS: _____
Cust. Seal: Yes _____ No Lab Cour:
 WetPacks/Dry Ice/None Other: _____

* Benzene & CPAKs
w/ quantitative
level less than
1 ug/L

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By Sign/Print: <u>[Signature] Eric Kneeger</u>	Date: <u>10/10/18</u> Time: <u>1056</u>	1. Received By Sign/Print: <u>[Signature] Francisco Lunny, Jr</u>	Date: <u>10/10/18</u> Time: <u>1056</u>
2. Relinquished By Sign/Print: _____	Date: _____ Time: _____	2. Received By Sign/Print: _____	Date: _____ Time: _____
3. Relinquished By Sign/Print: _____	Date: _____ Time: _____	3. Received By Sign/Print: _____	Date: _____ Time: _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-81046-1

Login Number: 81046

List Number: 1

Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-81239-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
11/2/2018 2:51:18 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Job ID: 580-81239-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-81239-1

Receipt

Two samples were received on 10/20/2018 12:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 6.2° C.

GC/MS VOA

Method(s) NWTPH-Gx: The method blank for analytical batch 287337 contained gasoline above the reporting limit (RL). The samples associated with this method blank were ND for the target compound; therefore, re-extraction and/or re-analysis of samples were not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-81239-1

Date Collected: 10/18/18 13:30

Matrix: Water

Date Received: 10/20/18 12:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			10/31/18 03:15	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	101		74 - 123					10/31/18 03:15	1
<i>Toluene-d8 (Surr)</i>	105		79 - 122					10/31/18 03:15	1
<i>4-Bromofluorobenzene (Surr)</i>	99		78 - 119					10/31/18 03:15	1
<i>Dibromofluoromethane (Surr)</i>	99		70 - 120					10/31/18 03:15	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	97		70 - 120					10/31/18 03:15	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.051	0.014	ug/L		10/24/18 12:04	10/25/18 21:54	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		10/24/18 12:04	10/25/18 21:54	1
Benzo[b]fluoranthene	ND		0.051	0.011	ug/L		10/24/18 12:04	10/25/18 21:54	1
Benzo[k]fluoranthene	ND		0.051	0.012	ug/L		10/24/18 12:04	10/25/18 21:54	1
Chrysene	ND		0.10	0.016	ug/L		10/24/18 12:04	10/25/18 21:54	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		10/24/18 12:04	10/25/18 21:54	1
Indeno[1,2,3-cd]pyrene	ND		0.051	0.014	ug/L		10/24/18 12:04	10/25/18 21:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Terphenyl-d14</i>	62		53 - 120				10/24/18 12:04	10/25/18 21:54	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			10/25/18 02:36	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	91		50 - 150					10/25/18 02:36	1
<i>Trifluorotoluene (Surr)</i>	94		50 - 150					10/25/18 02:36	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		10/31/18 09:46	10/31/18 20:19	1
Motor Oil (>C24-C36)	ND		0.36	0.098	mg/L		10/31/18 09:46	10/31/18 20:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o-Terphenyl</i>	88		50 - 150				10/31/18 09:46	10/31/18 20:19	1

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-81239-2

Date Collected: 10/18/18 00:00

Matrix: Water

Date Received: 10/20/18 12:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			10/31/18 03:39	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					10/31/18 03:39	1
Toluene-d8 (Surr)	105		79 - 122					10/31/18 03:39	1
4-Bromofluorobenzene (Surr)	96		78 - 119					10/31/18 03:39	1
Dibromofluoromethane (Surr)	104		70 - 120					10/31/18 03:39	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 120					10/31/18 03:39	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			10/25/18 03:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		50 - 150					10/25/18 03:03	1
Trifluorotoluene (Surr)	93		50 - 150					10/25/18 03:03	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-287822/5

Matrix: Water

Analysis Batch: 287822

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			10/31/18 01:37	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123		10/31/18 01:37	1
Toluene-d8 (Surr)	109		79 - 122		10/31/18 01:37	1
4-Bromofluorobenzene (Surr)	100		78 - 119		10/31/18 01:37	1
Dibromofluoromethane (Surr)	100		70 - 120		10/31/18 01:37	1
1,2-Dichloroethane-d4 (Surr)	97		70 - 120		10/31/18 01:37	1

Lab Sample ID: LCS 580-287822/6

Matrix: Water

Analysis Batch: 287822

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.60		ug/L		96	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	97		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	103		70 - 120
1,2-Dichloroethane-d4 (Surr)	100		70 - 120

Lab Sample ID: LCSD 580-287822/7

Matrix: Water

Analysis Batch: 287822

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.93		ug/L		99	37 - 151	3	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	98		78 - 119
Dibromofluoromethane (Surr)	105		70 - 120
1,2-Dichloroethane-d4 (Surr)	97		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-287279/1-A

Matrix: Water

Analysis Batch: 287465

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 287279

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		10/24/18 12:04	10/25/18 19:19	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		10/24/18 12:04	10/25/18 19:19	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		10/24/18 12:04	10/25/18 19:19	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-287279/1-A
Matrix: Water
Analysis Batch: 287465

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 287279

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		10/24/18 12:04	10/25/18 19:19	1
Chrysene	ND		0.10	0.016	ug/L		10/24/18 12:04	10/25/18 19:19	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		10/24/18 12:04	10/25/18 19:19	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		10/24/18 12:04	10/25/18 19:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	102		53 - 120				10/24/18 12:04	10/25/18 19:19	1

Lab Sample ID: LCS 580-287279/2-A
Matrix: Water
Analysis Batch: 287465

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 287279

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzo[a]anthracene	4.00	3.63		ug/L		91	61 - 120		
Benzo[a]pyrene	4.00	3.74		ug/L		93	65 - 120		
Benzo[b]fluoranthene	4.00	3.61		ug/L		90	58 - 120		
Benzo[k]fluoranthene	4.00	3.32		ug/L		83	58 - 120		
Chrysene	4.00	3.23		ug/L		81	58 - 120		
Dibenz(a,h)anthracene	4.00	3.94		ug/L		99	60 - 125		
Indeno[1,2,3-cd]pyrene	4.00	4.45		ug/L		111	56 - 120		
Surrogate	%Recovery	Qualifier	Limits						
Terphenyl-d14	90		53 - 120						

Lab Sample ID: LCSD 580-287279/3-A
Matrix: Water
Analysis Batch: 287465

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 287279

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	
								RPD	Limit
Benzo[a]anthracene	4.00	3.55		ug/L		89	61 - 120	2	16
Benzo[a]pyrene	4.00	3.57		ug/L		89	65 - 120	4	17
Benzo[b]fluoranthene	4.00	3.45		ug/L		86	58 - 120	4	20
Benzo[k]fluoranthene	4.00	3.12		ug/L		78	58 - 120	6	20
Chrysene	4.00	3.21		ug/L		80	58 - 120	1	16
Dibenz(a,h)anthracene	4.00	3.77		ug/L		94	60 - 125	4	15
Indeno[1,2,3-cd]pyrene	4.00	4.25		ug/L		106	56 - 120	5	15
Surrogate	%Recovery	Qualifier	Limits						
Terphenyl-d14	82		53 - 120						

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-287337/6

Matrix: Water

Analysis Batch: 287337

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			10/24/18 19:21	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		50 - 150					10/24/18 19:21	1
Trifluorotoluene (Surr)	100		50 - 150					10/24/18 19:21	1

Lab Sample ID: LCS 580-287337/7

Matrix: Water

Analysis Batch: 287337

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	1.06		mg/L		106	79 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	96		50 - 150				
Trifluorotoluene (Surr)	115		50 - 150				

Lab Sample ID: LCSD 580-287337/8

Matrix: Water

Analysis Batch: 287337

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	1.03		mg/L		103	79 - 120	3	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	98		50 - 150						
Trifluorotoluene (Surr)	112		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-287842/1-B

Matrix: Water

Analysis Batch: 287861

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 287842

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		10/31/18 09:46	10/31/18 18:59	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		10/31/18 09:46	10/31/18 18:59	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	92		50 - 150				10/31/18 09:46	10/31/18 18:59	1

Lab Sample ID: LCS 580-287842/2-B

Matrix: Water

Analysis Batch: 287861

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 287842

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.57		mg/L		78	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-287842/2-B
Matrix: Water
Analysis Batch: 287861

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 287842

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.92		mg/L		96	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	97		50 - 150

Lab Sample ID: LCSD 580-287842/3-B
Matrix: Water
Analysis Batch: 287861

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 287842

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.38		mg/L		69	50 - 120	13	26
Motor Oil (>C24-C36)	2.00	1.71		mg/L		86	64 - 120	11	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	87		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Client Sample ID: Outfall #002

Date Collected: 10/18/18 13:30

Date Received: 10/20/18 12:45

Lab Sample ID: 580-81239-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	287822	10/31/18 03:15	TL1	TAL SEA
Total/NA	Prep	3510C			287279	10/24/18 12:04	KO	TAL SEA
Total/NA	Analysis	8270C SIM		1	287465	10/25/18 21:54	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	287337	10/25/18 02:36	Z1R	TAL SEA
Total/NA	Prep	3510C			287842	10/31/18 09:46	KO	TAL SEA
Total/NA	Cleanup	3630C			287921	10/31/18 18:44	JCM	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	287861	10/31/18 20:19	W1T	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 10/18/18 00:00

Date Received: 10/20/18 12:45

Lab Sample ID: 580-81239-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	287822	10/31/18 03:39	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	287337	10/25/18 03:03	Z1R	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81239-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-81239-1	Outfall #002	Water	10/18/18 13:30	10/20/18 12:45
580-81239-2	Trip Blank	Water	10/18/18 00:00	10/20/18 12:45

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

Client Arcadis		Client Contact Peter Campbell		Date 10/18/18	Chain of Custody Number 36994
Address 1100 olive way, Suite 800		Telephone Number (Area Code)/Fax Number		Lab Number	Page 1 of 1

City Seattle	State WA	Zip Code 98101	Sampler Jason Little	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal			Billing Contact		

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix			Containers & Preservatives						PH	
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH		ZnAc/NaOH
Outfall #002 Trip Blank	10/18/18	1330	X	X									PH = 7.90

BENZENE EPA 024
 NWT PH-6X
 NWT PH-DX w/SGC
 CPAHS 8770 SWA

Loc: 580
81239 pt

* use standard
Silica Gel cleanup

* Benzene & CPAHS
w/ quantitative
level less than
2 ug/L



Therm. ID: 42 Cor: 6.2 ° Unc: 5.9 °
 Cooler Disc: Med Blue
 Packing: Double FedEx:
 Cust. Seal: Yes No X UPS:
 Packs/Dry Ice/None Lab Cour: X
 Other:

Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months	(A fee may be assessed if samples are retained longer than 1 month)
---	--	---	---

Turn Around Time Required (business days) <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input checked="" type="checkbox"/> 5 Days <input type="checkbox"/> 10 Days <input type="checkbox"/> 15 Days <input type="checkbox"/> Other _____	QC Requirements (Specify)
1. Relinquished By Sign/Print JAN LINN	1. Received By Sign/Print Francisco Luna, Jr
2. Relinquished By Sign/Print	2. Received By Sign/Print
3. Relinquished By Sign/Print	3. Received By Sign/Print

Comments

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-81239-1

Login Number: 81239

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	False	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-81378-1

Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:
11/14/2018 2:23:28 PM

Kristine Allen, Manager of Project Management
(253)248-4970
kristine.allen@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

LINKS

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TotalAccess

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Job ID: 580-81378-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-81378-1

Comments

No additional comments.

Receipt

The samples were received on 10/26/2018 12:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 7.3° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: Continuing calibration verification (CCV) standard associated with batch 580-288658 recovered outside %Drift acceptance criteria for o-Terphenyl surrogate. The %Recovery is within acceptance criteria for the surrogate in the CCV and associated samples; therefore, the data are qualified and reported. The following samples are impacted: Outfall #002 (580-81378-1), (CCV 580-288658/27) and (CCVRT 580-288658/3)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-81378-1

Date Collected: 10/26/18 09:00

Matrix: Water

Date Received: 10/26/18 12:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/01/18 23:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					11/01/18 23:27	1
Toluene-d8 (Surr)	121		79 - 122					11/01/18 23:27	1
4-Bromofluorobenzene (Surr)	119		78 - 119					11/01/18 23:27	1
Dibromofluoromethane (Surr)	104		70 - 120					11/01/18 23:27	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120					11/01/18 23:27	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		11/01/18 10:44	11/03/18 06:15	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		11/01/18 10:44	11/03/18 06:15	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		11/01/18 10:44	11/03/18 06:15	1
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		11/01/18 10:44	11/03/18 06:15	1
Chrysene	ND		0.10	0.016	ug/L		11/01/18 10:44	11/03/18 06:15	1
Dibenz[a,h]anthracene	ND		0.10	0.010	ug/L		11/01/18 10:44	11/03/18 06:15	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		11/01/18 10:44	11/03/18 06:15	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	98		53 - 120				11/01/18 10:44	11/03/18 06:15	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/06/18 03:30	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		50 - 150					11/06/18 03:30	1
Trifluorotoluene (Surr)	108		50 - 150					11/06/18 03:30	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.13		0.11	0.067	mg/L		11/08/18 08:17	11/12/18 21:57	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		11/08/18 08:17	11/12/18 21:57	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	127		50 - 150				11/08/18 08:17	11/12/18 21:57	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-81378-2

Date Collected: 10/26/18 09:00

Matrix: Water

Date Received: 10/26/18 12:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/01/18 23:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	106		74 - 123					11/01/18 23:53	1
Toluene-d8 (Surr)	99		79 - 122					11/01/18 23:53	1
4-Bromofluorobenzene (Surr)	100		78 - 119					11/01/18 23:53	1
Dibromofluoromethane (Surr)	103		70 - 120					11/01/18 23:53	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					11/01/18 23:53	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/05/18 19:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		50 - 150					11/05/18 19:21	1
Trifluorotoluene (Surr)	114		50 - 150					11/05/18 19:21	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-288000/5

Matrix: Water

Analysis Batch: 288000

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/01/18 16:03	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123		11/01/18 16:03	1
Toluene-d8 (Surr)	101		79 - 122		11/01/18 16:03	1
4-Bromofluorobenzene (Surr)	97		78 - 119		11/01/18 16:03	1
Dibromofluoromethane (Surr)	102		70 - 120		11/01/18 16:03	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120		11/01/18 16:03	1

Lab Sample ID: LCS 580-288000/6

Matrix: Water

Analysis Batch: 288000

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	8.77		ug/L		88	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	98		79 - 122
4-Bromofluorobenzene (Surr)	98		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	100		70 - 120

Lab Sample ID: LCSD 580-288000/7

Matrix: Water

Analysis Batch: 288000

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzene	10.0	9.79		ug/L		98	37 - 151	11	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	98		74 - 123
Toluene-d8 (Surr)	102		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	99		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-287953/1-A

Matrix: Water

Analysis Batch: 288108

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 287953

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		11/01/18 10:44	11/03/18 02:24	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		11/01/18 10:44	11/03/18 02:24	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		11/01/18 10:44	11/03/18 02:24	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-287953/1-A
Matrix: Water
Analysis Batch: 288108

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 287953

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		11/01/18 10:44	11/03/18 02:24	1
Chrysene	ND		0.10	0.016	ug/L		11/01/18 10:44	11/03/18 02:24	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		11/01/18 10:44	11/03/18 02:24	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		11/01/18 10:44	11/03/18 02:24	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	93		53 - 120	11/01/18 10:44	11/03/18 02:24	1

Lab Sample ID: LCS 580-287953/2-A
Matrix: Water
Analysis Batch: 288108

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 287953

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	8.00	7.22		ug/L		90	61 - 120
Benzo[a]pyrene	8.00	7.53		ug/L		94	65 - 120
Benzo[b]fluoranthene	8.00	7.15		ug/L		89	58 - 120
Benzo[k]fluoranthene	8.00	7.59		ug/L		95	58 - 120
Chrysene	8.00	6.97		ug/L		87	58 - 120
Dibenz(a,h)anthracene	8.00	7.98		ug/L		100	60 - 125
Indeno[1,2,3-cd]pyrene	8.00	7.61		ug/L		95	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	98		53 - 120

Lab Sample ID: LCSD 580-287953/3-A
Matrix: Water
Analysis Batch: 288108

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 287953

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	8.00	7.12		ug/L		89	61 - 120	1	16
Benzo[a]pyrene	8.00	7.12		ug/L		89	65 - 120	6	17
Benzo[b]fluoranthene	8.00	7.03		ug/L		88	58 - 120	2	20
Benzo[k]fluoranthene	8.00	7.21		ug/L		90	58 - 120	5	20
Chrysene	8.00	6.76		ug/L		85	58 - 120	3	16
Dibenz(a,h)anthracene	8.00	7.68		ug/L		96	60 - 125	4	15
Indeno[1,2,3-cd]pyrene	8.00	7.38		ug/L		92	56 - 120	3	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	98		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-288201/6

Matrix: Water

Analysis Batch: 288201

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/05/18 17:33	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		50 - 150					11/05/18 17:33	1
Trifluorotoluene (Surr)	113		50 - 150					11/05/18 17:33	1

Lab Sample ID: LCS 580-288201/7

Matrix: Water

Analysis Batch: 288201

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.978		mg/L		98	79 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	112		50 - 150				
Trifluorotoluene (Surr)	110		50 - 150				

Lab Sample ID: LCSD 580-288201/8

Matrix: Water

Analysis Batch: 288201

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.951		mg/L		95	79 - 120	3	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	97		50 - 150						
Trifluorotoluene (Surr)	105		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-288404/1-B

Matrix: Water

Analysis Batch: 288658

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 288404

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		11/08/18 08:17	11/12/18 14:55	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		11/08/18 08:17	11/12/18 14:55	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	91		50 - 150				11/08/18 08:17	11/12/18 14:55	1

Lab Sample ID: LCS 580-288404/2-B

Matrix: Water

Analysis Batch: 288658

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 288404

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.77		mg/L		88	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

(Continued)

Lab Sample ID: LCS 580-288404/2-B

Matrix: Water

Analysis Batch: 288658

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 288404

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Motor Oil (>C24-C36)	2.00	2.13		mg/L		107	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	104		50 - 150

Lab Sample ID: LCSD 580-288404/3-B

Matrix: Water

Analysis Batch: 288658

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 288404

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.64		mg/L		82	50 - 120	7	26
Motor Oil (>C24-C36)	2.00	1.98		mg/L		99	64 - 120	7	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	96		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-81378-1

Date Collected: 10/26/18 09:00

Matrix: Water

Date Received: 10/26/18 12:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	288000	11/01/18 23:27	W1T	TAL SEA
Total/NA	Prep	3510C			287953	11/01/18 10:44	KO	TAL SEA
Total/NA	Analysis	8270C SIM		1	288108	11/03/18 06:15	ERB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	288201	11/06/18 03:30	CJ	TAL SEA
Total/NA	Prep	3510C			288404	11/08/18 08:17	KO	TAL SEA
Total/NA	Cleanup	3630C			288511	11/09/18 10:48	KO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	288658	11/12/18 21:57	Z1R	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-81378-2

Date Collected: 10/26/18 09:00

Matrix: Water

Date Received: 10/26/18 12:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	288000	11/01/18 23:53	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	288201	11/05/18 19:21	CJ	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-81378-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-81378-1	Outfall #002	Water	10/26/18 09:00	10/26/18 12:45
580-81378-2	Trip Blank	Water	10/26/18 09:00	10/26/18 12:45

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- 8
- 9
- 10
- 11

Rush
 Short Hold

Chain of Custody Record

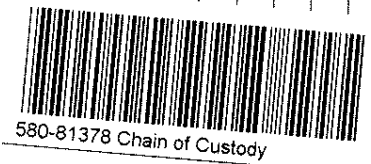
Client: Arcadis Client Contact: Peter Campbell Date: 10/26/18 Chain of Custody Number: 36992
 Address: 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page 1 of 1
 City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Weiler Analysis (Attach list if more space is needed):
 Project Name and Location (State): Edmonds Terminal Billing Contact: _____
 Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt					
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH						
<u>Outfall #002</u>	<u>10/26/18</u>	<u>0900</u>		<input checked="" type="checkbox"/>														
<u>Trip Blank</u>	<u>---</u>	<u>---</u>		<input checked="" type="checkbox"/>														

Benzene EPA 624
NUTCH-6X
NUTPH-DX w/SGC
CPAHS 8270C SIM

Loc: 580
81378

pH = 7.55
* use standard
SGC
* Benzene & CPAHS
w/ quantitative
level less than 1
mg/L



Therm. ID: A2 Cor: 7.3 ° Unc: 7.0 °
 Cooler Desc: Med Blue FedEx: _____
 Packing: Bubble UPS: _____
 Cust. Seal: Yes _____ No Lab Cour:
 Wet/Packs/Dry Ice/None Other: _____

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Disposal By Lab Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify) _____

1. Relinquished By <u>Eric Krucser</u> Date <u>10/26/18</u> Time <u>1245</u>	1. Received By <u>Francisco Luna, Jr.</u> Date <u>10/26/18</u> Time <u>1245</u>
2. Relinquished By _____ Date _____ Time _____	2. Received By _____ Date _____ Time _____
3. Relinquished By _____ Date _____ Time _____	3. Received By _____ Date _____ Time _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-81378-1

Login Number: 81378

List Source: TestAmerica Seattle

List Number: 1

Creator: Hobbs, Kenneth F

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-81704-1

Client Project/Site: Edmonds Terminal
Revision: 1

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
1/9/2019 3:34:59 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS

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results through
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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Job ID: 580-81704-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-81704-1

Revision 1: January 9, 2019

Per request from the client, additional information has been included in the GC Semi VOA section to detail that spike compounds were not added to the MS/MSD samples. See **BOLD** type below.

Receipt

Three samples were received on 11/7/2018 12:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.5° C and 3.1° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 580-289086 and 580-289145 and analytical batch 580-289151 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits. **It should be noted that spike compounds were inadvertently omitted during the extraction process for the matrix spike/matrix spike duplicate (MS/MSD).**

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-81704-1

Date Collected: 11/07/18 09:30

Matrix: Water

Date Received: 11/07/18 12:25

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/19/18 20:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123					11/19/18 20:27	1
Toluene-d8 (Surr)	103		79 - 122					11/19/18 20:27	1
4-Bromofluorobenzene (Surr)	97		78 - 119					11/19/18 20:27	1
Dibromofluoromethane (Surr)	98		70 - 120					11/19/18 20:27	1
1,2-Dichloroethane-d4 (Surr)	94		70 - 120					11/19/18 20:27	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.052	0.015	ug/L		11/13/18 13:58	11/17/18 19:21	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		11/13/18 13:58	11/17/18 19:21	1
Benzo[b]fluoranthene	ND		0.052	0.011	ug/L		11/13/18 13:58	11/17/18 19:21	1
Benzo[k]fluoranthene	ND		0.052	0.012	ug/L		11/13/18 13:58	11/17/18 19:21	1
Chrysene	ND		0.10	0.017	ug/L		11/13/18 13:58	11/17/18 19:21	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		11/13/18 13:58	11/17/18 19:21	1
Indeno[1,2,3-cd]pyrene	ND		0.052	0.015	ug/L		11/13/18 13:58	11/17/18 19:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	74		53 - 120				11/13/18 13:58	11/17/18 19:21	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/18/18 03:26	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		50 - 150					11/18/18 03:26	1
Trifluorotoluene (Surr)	109		50 - 150					11/18/18 03:26	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.076	J F1	0.11	0.067	mg/L		11/16/18 10:14	11/17/18 03:53	1
Motor Oil (>C24-C36)	ND	F1	0.36	0.099	mg/L		11/16/18 10:14	11/17/18 03:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	96		50 - 150				11/16/18 10:14	11/17/18 03:53	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Client Sample ID: Dup-1
Date Collected: 11/07/18 00:01
Date Received: 11/07/18 12:25

Lab Sample ID: 580-81704-2
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/19/18 21:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	95		74 - 123					11/19/18 21:41	1
Toluene-d8 (Surr)	103		79 - 122					11/19/18 21:41	1
4-Bromofluorobenzene (Surr)	103		78 - 119					11/19/18 21:41	1
Dibromofluoromethane (Surr)	97		70 - 120					11/19/18 21:41	1
1,2-Dichloroethane-d4 (Surr)	89		70 - 120					11/19/18 21:41	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.051	0.014	ug/L		11/13/18 13:58	11/17/18 20:34	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		11/13/18 13:58	11/17/18 20:34	1
Benzo[b]fluoranthene	ND		0.051	0.011	ug/L		11/13/18 13:58	11/17/18 20:34	1
Benzo[k]fluoranthene	ND		0.051	0.012	ug/L		11/13/18 13:58	11/17/18 20:34	1
Chrysene	ND		0.10	0.016	ug/L		11/13/18 13:58	11/17/18 20:34	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		11/13/18 13:58	11/17/18 20:34	1
Indeno[1,2,3-cd]pyrene	ND		0.051	0.014	ug/L		11/13/18 13:58	11/17/18 20:34	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	70		53 - 120				11/13/18 13:58	11/17/18 20:34	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/17/18 03:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		50 - 150					11/17/18 03:38	1
Trifluorotoluene (Surr)	125		50 - 150					11/17/18 03:38	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.067	J	0.11	0.066	mg/L		11/16/18 10:14	11/17/18 04:53	1
Motor Oil (>C24-C36)	0.18	J	0.35	0.097	mg/L		11/16/18 10:14	11/17/18 04:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	87		50 - 150				11/16/18 10:14	11/17/18 04:53	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-81704-3

Date Collected: 11/07/18 00:01

Matrix: Water

Date Received: 11/07/18 12:25

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/19/18 22:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123					11/19/18 22:23	1
Toluene-d8 (Surr)	102		79 - 122					11/19/18 22:23	1
4-Bromofluorobenzene (Surr)	102		78 - 119					11/19/18 22:23	1
Dibromofluoromethane (Surr)	98		70 - 120					11/19/18 22:23	1
1,2-Dichloroethane-d4 (Surr)	93		70 - 120					11/19/18 22:23	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/18/18 00:45	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		50 - 150					11/18/18 00:45	1
Trifluorotoluene (Surr)	109		50 - 150					11/18/18 00:45	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-289246/23
Matrix: Water
Analysis Batch: 289246

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/19/18 18:24	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	96		74 - 123		11/19/18 18:24	1
Toluene-d8 (Surr)	101		79 - 122		11/19/18 18:24	1
4-Bromofluorobenzene (Surr)	97		78 - 119		11/19/18 18:24	1
Dibromofluoromethane (Surr)	95		70 - 120		11/19/18 18:24	1
1,2-Dichloroethane-d4 (Surr)	82		70 - 120		11/19/18 18:24	1

Lab Sample ID: LCS 580-289246/24
Matrix: Water
Analysis Batch: 289246

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	10.1		ug/L		101	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	95		74 - 123
Toluene-d8 (Surr)	98		79 - 122
4-Bromofluorobenzene (Surr)	97		78 - 119
Dibromofluoromethane (Surr)	97		70 - 120
1,2-Dichloroethane-d4 (Surr)	84		70 - 120

Lab Sample ID: LCSD 580-289246/25
Matrix: Water
Analysis Batch: 289246

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.58		ug/L		96	37 - 151	5	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	94		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	95		70 - 120
1,2-Dichloroethane-d4 (Surr)	84		70 - 120

Lab Sample ID: 580-81704-1 MS
Matrix: Water
Analysis Batch: 289246

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	ND		11.6	12.3		ug/L		105	37 - 151

Surrogate	MS %Recovery	MS Qualifier	Limits
Trifluorotoluene (Surr)	98		74 - 123
Toluene-d8 (Surr)	104		79 - 122

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 580-81704-1 MS
Matrix: Water
Analysis Batch: 289246

Client Sample ID: Outfall #002
Prep Type: Total/NA

Surrogate	MS %Recovery	MS Qualifier	Limits
4-Bromofluorobenzene (Surr)	103		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	89		70 - 120

Lab Sample ID: 580-81704-1 MSD
Matrix: Water
Analysis Batch: 289246

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	ND		11.6	12.4		ug/L		107	37 - 151	1	30

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Trifluorotoluene (Surr)	98		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	100		70 - 120
1,2-Dichloroethane-d4 (Surr)	91		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-288778/1-A
Matrix: Water
Analysis Batch: 289188

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 288778

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		11/13/18 13:58	11/17/18 13:13	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		11/13/18 13:58	11/17/18 13:13	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		11/13/18 13:58	11/17/18 13:13	1
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		11/13/18 13:58	11/17/18 13:13	1
Chrysene	ND		0.10	0.016	ug/L		11/13/18 13:58	11/17/18 13:13	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		11/13/18 13:58	11/17/18 13:13	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		11/13/18 13:58	11/17/18 13:13	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	84		53 - 120	11/13/18 13:58	11/17/18 13:13	1

Lab Sample ID: LCS 580-288778/2-A
Matrix: Water
Analysis Batch: 289188

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 288778

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.53		ug/L		88	61 - 120
Benzo[a]pyrene	4.00	3.47		ug/L		87	65 - 120
Benzo[b]fluoranthene	4.00	3.62		ug/L		90	58 - 120
Benzo[k]fluoranthene	4.00	3.67		ug/L		92	58 - 120
Chrysene	4.00	3.35		ug/L		84	58 - 120
Dibenz(a,h)anthracene	4.00	3.84		ug/L		96	60 - 125

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: LCS 580-288778/2-A
Matrix: Water
Analysis Batch: 289188

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 288778

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Indeno[1,2,3-cd]pyrene	4.00	3.80		ug/L		95	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	79		53 - 120

Lab Sample ID: LCSD 580-288778/3-A
Matrix: Water
Analysis Batch: 289188

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 288778

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzo[a]anthracene	4.00	3.61		ug/L		90	61 - 120	2	16
Benzo[a]pyrene	4.00	3.47		ug/L		87	65 - 120	0	17
Benzo[b]fluoranthene	4.00	3.82		ug/L		96	58 - 120	6	20
Benzo[k]fluoranthene	4.00	3.81		ug/L		95	58 - 120	4	20
Chrysene	4.00	3.44		ug/L		86	58 - 120	3	16
Dibenz(a,h)anthracene	4.00	3.99		ug/L		100	60 - 125	4	15
Indeno[1,2,3-cd]pyrene	4.00	3.93		ug/L		98	56 - 120	3	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	83		53 - 120

Lab Sample ID: 580-81704-1 MS
Matrix: Water
Analysis Batch: 289188

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 288778

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	ND		4.08	3.22		ug/L		79	61 - 120
Benzo[a]pyrene	ND		4.08	3.18		ug/L		78	65 - 120
Benzo[b]fluoranthene	ND		4.08	3.57		ug/L		87	58 - 120
Benzo[k]fluoranthene	ND		4.08	3.16		ug/L		77	58 - 120
Chrysene	ND		4.08	3.11		ug/L		76	58 - 120
Dibenz(a,h)anthracene	ND		4.08	3.51		ug/L		86	60 - 125
Indeno[1,2,3-cd]pyrene	ND		4.08	3.52		ug/L		86	56 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
Terphenyl-d14	63		53 - 120

Lab Sample ID: 580-81704-1 MSD
Matrix: Water
Analysis Batch: 289188

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 288778

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzo[a]anthracene	ND		4.01	3.54		ug/L		88	61 - 120	9	16
Benzo[a]pyrene	ND		4.01	3.42		ug/L		85	65 - 120	7	17
Benzo[b]fluoranthene	ND		4.01	3.82		ug/L		95	58 - 120	7	20
Benzo[k]fluoranthene	ND		4.01	3.41		ug/L		85	58 - 120	8	20
Chrysene	ND		4.01	3.39		ug/L		84	58 - 120	9	16

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: 580-81704-1 MSD
Matrix: Water
Analysis Batch: 289188

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 288778

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Dibenz(a,h)anthracene	ND		4.01	3.70		ug/L		92	60 - 125	5	15
Indeno[1,2,3-cd]pyrene	ND		4.01	3.70		ug/L		92	56 - 120	5	15
Surrogate	%Recovery	MSD Qualifier	Limits								
Terphenyl-d14	70		53 - 120								

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-289142/6
Matrix: Water
Analysis Batch: 289142

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/16/18 17:43	1
Surrogate	%Recovery	MB Qualifier	Limits						
4-Bromofluorobenzene (Surr)	91		50 - 150						
Trifluorotoluene (Surr)	120		50 - 150						

Lab Sample ID: LCS 580-289142/7
Matrix: Water
Analysis Batch: 289142

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.925		mg/L		93	79 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	96		50 - 150				
Trifluorotoluene (Surr)	113		50 - 150				

Lab Sample ID: LCSD 580-289142/8
Matrix: Water
Analysis Batch: 289142

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.884		mg/L		88	79 - 120	5	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	93		50 - 150						
Trifluorotoluene (Surr)	110		50 - 150						

Lab Sample ID: MB 580-289216/6
Matrix: Water
Analysis Batch: 289216

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/17/18 19:19	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Surrogate	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
4-Bromofluorobenzene (Surr)	92		50 - 150		11/17/18 19:19	1
Trifluorotoluene (Surr)	110		50 - 150		11/17/18 19:19	1

Lab Sample ID: LCS 580-289216/7
Matrix: Water
Analysis Batch: 289216

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.938		mg/L		94	79 - 120

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	94		50 - 150
Trifluorotoluene (Surr)	98		50 - 150

Lab Sample ID: LCSD 580-289216/8
Matrix: Water
Analysis Batch: 289216

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.915		mg/L		91	79 - 120	3	10

Surrogate	LCSD LCSD		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	95		50 - 150
Trifluorotoluene (Surr)	97		50 - 150

Lab Sample ID: 580-81704-1 MS
Matrix: Water
Analysis Batch: 289216

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	ND		1.00	0.859		mg/L		86	79 - 120

Surrogate	MS MS		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	96		50 - 150
Trifluorotoluene (Surr)	111		50 - 150

Lab Sample ID: 580-81704-1 MSD
Matrix: Water
Analysis Batch: 289216

Client Sample ID: Outfall #002
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	ND		1.00	0.854		mg/L		85	79 - 120	0	10

Surrogate	MSD MSD		Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	91		50 - 150
Trifluorotoluene (Surr)	114		50 - 150

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-289086/1-B
Matrix: Water
Analysis Batch: 289151

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 289086

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		11/16/18 10:14	11/17/18 02:53	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		11/16/18 10:14	11/17/18 02:53	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	89		50 - 150	11/16/18 10:14	11/17/18 02:53	1

Lab Sample ID: LCS 580-289086/2-B
Matrix: Water
Analysis Batch: 289151

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 289086

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
#2 Diesel (C10-C24)	2.00	1.46		mg/L		73	50 - 120
Motor Oil (>C24-C36)	2.00	1.62		mg/L		81	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	95		50 - 150

Lab Sample ID: LCSD 580-289086/3-B
Matrix: Water
Analysis Batch: 289151

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 289086

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.68		mg/L		84	50 - 120	14	26
Motor Oil (>C24-C36)	2.00	1.78		mg/L		89	64 - 120	9	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	107		50 - 150

Lab Sample ID: 580-81704-1 MS
Matrix: Water
Analysis Batch: 289151

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 289086

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
#2 Diesel (C10-C24)	0.076	J F1	2.05	0.0695	J F1	mg/L		-0.3	50 - 120
Motor Oil (>C24-C36)	ND	F1	2.05	ND	F1	mg/L		0	64 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
<i>o</i> -Terphenyl	98		50 - 150

Lab Sample ID: 580-81704-1 MSD
Matrix: Water
Analysis Batch: 289151

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 289086

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	0.076	J F1	2.03	ND	F1	mg/L		0	50 - 120	NC	26
Motor Oil (>C24-C36)	ND	F1	2.03	ND	F1	mg/L		0	64 - 120	NC	24

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: 580-81704-1 MSD
Matrix: Water
Analysis Batch: 289151

Client Sample ID: Outfall #002
Prep Type: Total/NA
Prep Batch: 289086

<i>Surrogate</i>	<i>MSD</i> <i>%Recovery</i>	<i>MSD</i> <i>Qualifier</i>	<i>Limits</i>
<i>o-Terphenyl</i>	91		50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Client Sample ID: Outfall #002

Date Collected: 11/07/18 09:30

Date Received: 11/07/18 12:25

Lab Sample ID: 580-81704-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	289246	11/19/18 20:27	E1L	TAL SEA
Total/NA	Prep	3510C			288778	11/13/18 13:58	JSM	TAL SEA
Total/NA	Analysis	8270C SIM		1	289188	11/17/18 19:21	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	289216	11/18/18 03:26	T1W	TAL SEA
Total/NA	Prep	3510C			289086	11/16/18 10:14	KO	TAL SEA
Total/NA	Cleanup	3630C			289145	11/16/18 15:17	KO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	289151	11/17/18 03:53	TL1	TAL SEA

Client Sample ID: Dup-1

Date Collected: 11/07/18 00:01

Date Received: 11/07/18 12:25

Lab Sample ID: 580-81704-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	289246	11/19/18 21:41	E1L	TAL SEA
Total/NA	Prep	3510C			288778	11/13/18 13:58	JSM	TAL SEA
Total/NA	Analysis	8270C SIM		1	289188	11/17/18 20:34	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	289142	11/17/18 03:38	CJB	TAL SEA
Total/NA	Prep	3510C			289086	11/16/18 10:14	KO	TAL SEA
Total/NA	Cleanup	3630C			289145	11/16/18 15:17	KO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	289151	11/17/18 04:53	TL1	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 11/07/18 00:01

Date Received: 11/07/18 12:25

Lab Sample ID: 580-81704-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	289246	11/19/18 22:23	E1L	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	289216	11/18/18 00:45	T1W	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81704-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-81704-1	Outfall #002	Water	11/07/18 09:30	11/07/18 12:25
580-81704-2	Dup-1	Water	11/07/18 00:01	11/07/18 12:25
580-81704-3	Trip Blank	Water	11/07/18 00:01	11/07/18 12:25

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Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-81704-1

Login Number: 81704

List Source: TestAmerica Seattle

List Number: 1

Creator: Gall, Brandon A

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-81805-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:
12/3/2018 3:31:12 PM

Kristine Allen, Manager of Project Management
(253)248-4970
kristine.allen@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Job ID: 580-81805-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-81805-1

Comments

No additional comments.

Receipt

The samples were received on 11/13/2018 11:58 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.6° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: The following sample was diluted due to the nature of the sample matrix: Outfall #002 (580-81805-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC VOA

Method(s) NWTPH-Gx: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with analytical batch 490-559784.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The method blank for preparation batch 580-289897 and analytical batch 580-289986 contained #2 Diesel (C10-C24) above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.

Method(s) NWTPH-Dx: The following sample was prepared outside of preparation holding time due to LCS high : Outfall #002 (580-81805-1) due to a high LCS in the original analysis.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep

Method(s) 3510C: The following sample was prepared outside of preparation holding time due to LCS high : Outfall #002 (580-81805-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

VOA Prep

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
H	Sample was prepped or analyzed beyond the specified holding time
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-81805-1

Date Collected: 11/13/18 10:00

Matrix: Water

Date Received: 11/13/18 11:58

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/21/18 15:30	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					11/21/18 15:30	1
Toluene-d8 (Surr)	106		79 - 122					11/21/18 15:30	1
4-Bromofluorobenzene (Surr)	99		78 - 119					11/21/18 15:30	1
Dibromofluoromethane (Surr)	101		70 - 120					11/21/18 15:30	1
1,2-Dichloroethane-d4 (Surr)	89		70 - 120					11/21/18 15:30	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.26	0.072	ug/L		11/19/18 08:39	11/22/18 02:17	5
Benzo[a]pyrene	ND		0.51	0.056	ug/L		11/19/18 08:39	11/22/18 02:17	5
Benzo[b]fluoranthene	ND		0.26	0.056	ug/L		11/19/18 08:39	11/22/18 02:17	5
Benzo[k]fluoranthene	ND		0.26	0.062	ug/L		11/19/18 08:39	11/22/18 02:17	5
Chrysene	ND		0.51	0.082	ug/L		11/19/18 08:39	11/22/18 02:17	5
Dibenz[a,h]anthracene	ND		0.51	0.051	ug/L		11/19/18 08:39	11/22/18 02:17	5
Indeno[1,2,3-cd]pyrene	ND		0.26	0.072	ug/L		11/19/18 08:39	11/22/18 02:17	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	84		53 - 120				11/19/18 08:39	11/22/18 02:17	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics (GRO) -C6-C12	ND		100	55	ug/L			11/27/18 12:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
a,a,a-Trifluorotoluene	91		50 - 150					11/27/18 12:58	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.25	H B	0.11	0.066	mg/L		11/29/18 09:06	11/30/18 20:07	1
Motor Oil (>C24-C36)	0.42	H	0.35	0.097	mg/L		11/29/18 09:06	11/30/18 20:07	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	97		50 - 150				11/29/18 09:06	11/30/18 20:07	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Client Sample ID: Trip Blank - 2

Lab Sample ID: 580-81805-2

Date Collected: 11/13/18 00:00

Matrix: Water

Date Received: 11/13/18 11:58

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/21/18 15:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123					11/21/18 15:54	1
Toluene-d8 (Surr)	101		79 - 122					11/21/18 15:54	1
4-Bromofluorobenzene (Surr)	98		78 - 119					11/21/18 15:54	1
Dibromofluoromethane (Surr)	100		70 - 120					11/21/18 15:54	1
1,2-Dichloroethane-d4 (Surr)	93		70 - 120					11/21/18 15:54	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics (GRO) -C6-C12	ND		100	55	ug/L			11/27/18 11:47	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
a,a,a-Trifluorotoluene	94		50 - 150					11/27/18 11:47	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-289432/5

Matrix: Water

Analysis Batch: 289432

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/21/18 10:56	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123		11/21/18 10:56	1
Toluene-d8 (Surr)	101		79 - 122		11/21/18 10:56	1
4-Bromofluorobenzene (Surr)	100		78 - 119		11/21/18 10:56	1
Dibromofluoromethane (Surr)	97		70 - 120		11/21/18 10:56	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 120		11/21/18 10:56	1

Lab Sample ID: LCS 580-289432/6

Matrix: Water

Analysis Batch: 289432

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.52		ug/L		95	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	99		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	93		70 - 120

Lab Sample ID: LCSD 580-289432/7

Matrix: Water

Analysis Batch: 289432

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Benzene	10.0	9.40		ug/L		94	37 - 151	1	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	96		74 - 123
Toluene-d8 (Surr)	99		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	94		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-289242/1-A

Matrix: Water

Analysis Batch: 289472

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 289242

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		11/19/18 08:39	11/21/18 17:12	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		11/19/18 08:39	11/21/18 17:12	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		11/19/18 08:39	11/21/18 17:12	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-289242/1-A

Matrix: Water

Analysis Batch: 289472

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 289242

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		11/19/18 08:39	11/21/18 17:12	1
Chrysene	ND		0.10	0.016	ug/L		11/19/18 08:39	11/21/18 17:12	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		11/19/18 08:39	11/21/18 17:12	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		11/19/18 08:39	11/21/18 17:12	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	83		53 - 120	11/19/18 08:39	11/21/18 17:12	1

Lab Sample ID: LCS 580-289242/2-A

Matrix: Water

Analysis Batch: 289472

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 289242

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.87		ug/L		97	61 - 120
Benzo[a]pyrene	4.00	3.42		ug/L		85	65 - 120
Benzo[b]fluoranthene	4.00	2.99		ug/L		75	58 - 120
Benzo[k]fluoranthene	4.00	3.33		ug/L		83	58 - 120
Chrysene	4.00	3.03		ug/L		76	58 - 120
Dibenz(a,h)anthracene	4.00	3.35		ug/L		84	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.22		ug/L		81	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	93		53 - 120

Lab Sample ID: LCSD 580-289242/3-A

Matrix: Water

Analysis Batch: 289472

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 289242

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	3.46		ug/L		87	61 - 120	11	16
Benzo[a]pyrene	4.00	2.89		ug/L		72	65 - 120	17	17
Benzo[b]fluoranthene	4.00	2.66		ug/L		66	58 - 120	12	20
Benzo[k]fluoranthene	4.00	2.84		ug/L		71	58 - 120	16	20
Chrysene	4.00	2.73		ug/L		68	58 - 120	11	16
Dibenz(a,h)anthracene	4.00	2.92		ug/L		73	60 - 125	14	15
Indeno[1,2,3-cd]pyrene	4.00	2.84		ug/L		71	56 - 120	13	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	85		53 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 490-559784/7

Matrix: Water

Analysis Batch: 559784

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline Range Organics (GRO) -C6-C12	ND		100	55	ug/L			11/27/18 09:48	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
a,a,a-Trifluorotoluene	90		50 - 150					11/27/18 09:48	1

Lab Sample ID: LCS 490-559784/5

Matrix: Water

Analysis Batch: 559784

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline Range Organics (GRO) -C6-C12	1000	934		ug/L		93	39 - 143
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
a,a,a-Trifluorotoluene	86		50 - 150				

Lab Sample ID: LCSD 490-559784/6

Matrix: Water

Analysis Batch: 559784

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline Range Organics (GRO) -C6-C12	1000	950		ug/L		95	39 - 143	2	18
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
a,a,a-Trifluorotoluene	82		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-289897/1-B

Matrix: Water

Analysis Batch: 289986

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 289897

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0687	J	0.11	0.065	mg/L		11/29/18 09:06	11/30/18 16:50	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		11/29/18 09:06	11/30/18 16:50	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	94		50 - 150				11/29/18 09:06	11/30/18 16:50	1

Lab Sample ID: LCS 580-289897/2-B

Matrix: Water

Analysis Batch: 289986

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 289897

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	2.04		mg/L		102	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

(Continued)

Lab Sample ID: LCS 580-289897/2-B

Matrix: Water

Analysis Batch: 289986

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 289897

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Motor Oil (>C24-C36)	2.00	2.30		mg/L		115	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	88		50 - 150

Lab Sample ID: LCSD 580-289897/3-B

Matrix: Water

Analysis Batch: 289986

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 289897

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	2.01		mg/L		101	50 - 120	1	26
Motor Oil (>C24-C36)	2.00	2.27		mg/L		113	64 - 120	1	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	93		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-81805-1

Date Collected: 11/13/18 10:00

Matrix: Water

Date Received: 11/13/18 11:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	289432	11/21/18 15:30	W1T	TAL SEA
Total/NA	Prep	3510C			289242	11/19/18 08:39	KO	TAL SEA
Total/NA	Analysis	8270C SIM		5	289472	11/22/18 02:17	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	559784	11/27/18 12:58	GWM	TAL NSH
Total/NA	Prep	3510C			289897	11/29/18 09:06	KO	TAL SEA
Total/NA	Cleanup	3630C			289951	11/29/18 15:16	KO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	289986	11/30/18 20:07	TL1	TAL SEA

Client Sample ID: Trip Blank - 2

Lab Sample ID: 580-81805-2

Date Collected: 11/13/18 00:00

Matrix: Water

Date Received: 11/13/18 11:58

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	289432	11/21/18 15:54	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	559784	11/27/18 11:47	GWM	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Laboratory: TestAmerica Nashville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	ISO/IEC 17025		0453.07	12-31-19
Alaska (UST)	State Program	10	UST-087	06-30-19
Arizona	State Program	9	AZ0473	05-05-19
Arkansas DEQ	State Program	6	88-0737	04-25-19
California	State Program	9	2938	10-31-18 *
Connecticut	State Program	1	PH-0220	12-31-19
Florida	NELAP	4	E87358	06-30-19
Georgia	State Program	4	NA: NELAP & A2LA	12-31-19
Illinois	NELAP	5	200010	12-09-18
Iowa	State Program	7	131	04-01-20
Kansas	NELAP	7	E-10229	10-31-18 *
Kentucky (UST)	State Program	4	19	06-30-19
Kentucky (WW)	State Program	4	90038	12-31-18
Louisiana	NELAP	6	30613	06-30-19
Maine	State Program	1	TN00032	11-03-19
Maryland	State Program	3	316	03-31-19
Massachusetts	State Program	1	M-TN032	06-30-19
Minnesota	NELAP	5	047-999-345	12-31-18
Mississippi	State Program	4	N/A	06-30-19
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-19
New Hampshire	NELAP	1	2963	10-09-19
New Jersey	NELAP	2	TN965	06-30-19
New York	NELAP	2	11342	03-31-19
North Carolina (WW/SW)	State Program	4	387	12-31-18
North Dakota	State Program	8	R-146	06-30-19
Ohio VAP	State Program	5	CL0033	07-06-19
Oklahoma	State Program	6	9412	08-31-19
Oregon	NELAP	10	TN200001	04-26-19
Pennsylvania	NELAP	3	68-00585	07-31-19
Rhode Island	State Program	1	LAO00268	12-30-18
South Carolina	State Program	4	84009 (001)	02-28-19
Tennessee	State Program	4	2008	02-23-20
Texas	NELAP	6	T104704077	08-31-19
USDA	Federal		P330-13-00306	12-01-19
Utah	NELAP	8	TN00032	07-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica Seattle

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Laboratory: TestAmerica Nashville (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Virginia	NELAP	3	460152	06-14-19
Washington	State Program	10	C789	07-19-19
West Virginia DEP	State Program	3	219	02-28-19
Wisconsin	State Program	5	998020430	08-31-19
Wyoming (UST)	A2LA	8	453.07	12-31-19



Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-81805-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-81805-1	Outfall #002	Water	11/13/18 10:00	11/13/18 11:58
580-81805-2	Trip Blank - 2	Water	11/13/18 00:00	11/13/18 11:58

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Rush
 Short Hold

Chain of Custody Record

Client: Arcadis Client Contact: Peter Campbell Date: 11/13/18 Chain of Custody Number: 34920
Address: 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Walker Analysis (Attach list if more space is needed):
Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Loc: 580
Contract/Purchase Order/Quote No.: _____ 81805 s/ipt

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Analysis								
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH									
<u>Outfall #002</u> <u>Trip Blank</u>	<u>11/13/18</u>	<u>1000</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>2</u>			<u>8</u>				<u>XX</u>	<u>XX</u>	<u>XX</u>				<u>PH = 8.66</u>	
																					<u>* USE standard SGL</u>
																					<u>* Benzene & cPHTs w/ quantitative level less than 1 mg/L</u>



Therm. ID: BZ Cor: 0.6 ° Unc: 0.3 °
Cooler Desc: Med Blue FedEx: _____
Packing: Bubble UPS: _____
Cust. Seal: Yes No Lab Cour: X
Blue Ice: Wet, Dry, None Other: _____

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal: Disposal By Lab Return to Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By: <u>Jason Little</u> Sign/Print: _____ Date: <u>11/13/18</u> Time: <u>1158</u>	1. Received By: <u>Francisco Luna Jr</u> Sign/Print: _____ Date: <u>11/13/18</u> Time: <u>1158</u>
2. Relinquished By: _____ Sign/Print: _____ Date: _____ Time: _____	2. Received By: _____ Sign/Print: _____ Date: _____ Time: _____
3. Relinquished By: _____ Sign/Print: _____ Date: _____ Time: _____	3. Received By: _____ Sign/Print: _____ Date: _____ Time: _____

Comments: _____

COOLER RECEIPT FORM



Cooler Received/Opened On 11/27/2018@_0925

Time Samples Removed From Cooler 10:53 Time Samples Placed In Storage 11:04 (2 Hour Window)

1. Tracking # 2469 (last 4 digits, FedEx) Courier: FedEx
IR Gun ID 31470368 pH Strip Lot _____ Chlorine Strip Lot _____

2. Temperature of rep. sample or temp blank when opened: 0.5 Degrees Celsius

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES YES...NO...NA

If yes, how many and where: 2 front & back

5. Were the seals intact, signed, and dated correctly? YES YES...NO...NA

6. Were custody papers inside cooler? YES YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (initial) EL

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES NO...NA



Larger than this.

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence # 2.0

I certify that I unloaded the cooler and answered questions 7-14 (initial) EL

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) EL

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) EL

I certify that I attached a label with the unique LIMS number to each container (initial) EL

21. Were there Non-Conformance issues at login? YES NO Was a NCM generated? YES...NO...# _____

Chain of Custody Record

580-81805

Client Information (Sub Contract Lab) Shipping/Receiving Company: TestAmerica Laboratories, Inc Address: 2960 Foster Creighton Drive, City: Nashville State, Zip: TN, 37204 Phone: 615-726-0177(Tel) 615-726-3404(Fax) Email: Project Name: Edmonds Terminal Site: Chevron Edmonds Terminal		Lab PIV: Walker, Elaine M E-Mail: elaine.walker@testamericainc.com Accreditations Required (See note): Washington							
Due Date Requested: 11/26/2018 TAT Requested (days): PO #: WO #: Project #: 58011413 SSOW#:		Job #: 580-81805-1 Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other: M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - NCA W - pH 4-5 Z - other (specify)							
Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=wastefoil)	Field/Filtered Sample (Yes or No)	Retention/MSD (Yes or No)	NMTPH Gx/5030B C6-C12 Range	Total Number of Containers	Special Instructions/Note:
Outfall #002 (580-81805-1)	11/13/18	10:00 Pacific		Water	X	X	X	3	
Trip Blank - 2 (580-81805-2)	11/13/18	Pacific		Water			X	2	
Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.									
Possible Hazard Identification Unconfirmed Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2 Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months Special Instructions/QC Requirements:									
Empty Kit Relinquished by: _____ Date: _____ Time: _____ Method of Shipment: _____ Relinquished by: Tom Blanks Date/Time: 11/26/18 10:25 Company: TA-Sea Company Relinquished by: _____ Date/Time: _____ Company: _____ Relinquished by: _____ Date/Time: _____ Company: _____ Custody Seal No.: _____ Cooler Temperature(s) °C and Other Remarks: 0.5									



Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-81805-1

Login Number: 81805

List Number: 1

Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-82036-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:
12/3/2018 1:55:16 PM

Kristine Allen, Manager of Project Management
(253)248-4970

kristine.allen@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Job ID: 580-82036-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-82036-1

Comments

No additional comments.

Receipt

The samples were received on 11/21/2018 12:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.5° C.

GC/MS VOA

Method(s) NWTPH-Gx: The following continuing calibration verification (CCV) standard associated with batch 580-289814 recovered outside acceptance criteria for %D for surrogate Trifluorotoluene (Surr). Since the %Rec is within the acceptance criteria for the surrogate in the CCV and associated samples, the data have been reported. The following samples are impacted: Outfall #002 (580-82036-1), Trip Blank (580-82036-2), (CCV 580-289814/16), (CCV 580-289814/27) and (CCV 580-289814/5)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

Method(s) 8270C SIM, 8270D SIM: Surrogate recovery for the following sample was outside control limits: Outfall #002 (580-82036-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The method blank for preparation batch 580-289897 and analytical batch 580-289986 contained #2 Diesel (C10-C24) above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits

GC Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-82036-1

Date Collected: 11/21/18 08:00

Matrix: Water

Date Received: 11/21/18 12:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/29/18 22:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					11/29/18 22:21	1
Toluene-d8 (Surr)	107		79 - 122					11/29/18 22:21	1
4-Bromofluorobenzene (Surr)	101		78 - 119					11/29/18 22:21	1
Dibromofluoromethane (Surr)	97		70 - 120					11/29/18 22:21	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 120					11/29/18 22:21	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.051	0.014	ug/L		11/28/18 08:33	11/29/18 01:07	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		11/28/18 08:33	11/29/18 01:07	1
Benzo[b]fluoranthene	ND		0.051	0.011	ug/L		11/28/18 08:33	11/29/18 01:07	1
Benzo[k]fluoranthene	ND		0.051	0.012	ug/L		11/28/18 08:33	11/29/18 01:07	1
Chrysene	ND		0.10	0.016	ug/L		11/28/18 08:33	11/29/18 01:07	1
Dibenz[a,h]anthracene	ND		0.10	0.010	ug/L		11/28/18 08:33	11/29/18 01:07	1
Indeno[1,2,3-cd]pyrene	ND		0.051	0.014	ug/L		11/28/18 08:33	11/29/18 01:07	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	8	X	53 - 120				11/28/18 08:33	11/29/18 01:07	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/28/18 23:39	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		50 - 150					11/28/18 23:39	1
Trifluorotoluene (Surr)	119		50 - 150					11/28/18 23:39	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.17	B	0.11	0.066	mg/L		11/29/18 09:06	11/30/18 21:12	1
Motor Oil (>C24-C36)	0.23	J	0.36	0.098	mg/L		11/29/18 09:06	11/30/18 21:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	93		50 - 150				11/29/18 09:06	11/30/18 21:12	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-82036-2

Date Collected: 11/21/18 00:01

Matrix: Water

Date Received: 11/21/18 12:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/29/18 21:56	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123					11/29/18 21:56	1
Toluene-d8 (Surr)	106		79 - 122					11/29/18 21:56	1
4-Bromofluorobenzene (Surr)	99		78 - 119					11/29/18 21:56	1
Dibromofluoromethane (Surr)	96		70 - 120					11/29/18 21:56	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 120					11/29/18 21:56	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/28/18 15:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	85		50 - 150					11/28/18 15:55	1
Trifluorotoluene (Surr)	120		50 - 150					11/28/18 15:55	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-289927/14

Matrix: Water

Analysis Batch: 289927

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/29/18 20:42	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123		11/29/18 20:42	1
Toluene-d8 (Surr)	107		79 - 122		11/29/18 20:42	1
4-Bromofluorobenzene (Surr)	100		78 - 119		11/29/18 20:42	1
Dibromofluoromethane (Surr)	95		70 - 120		11/29/18 20:42	1
1,2-Dichloroethane-d4 (Surr)	90		70 - 120		11/29/18 20:42	1

Lab Sample ID: LCS 580-289927/15

Matrix: Water

Analysis Batch: 289927

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	8.94		ug/L		89	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	97		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	97		70 - 120
1,2-Dichloroethane-d4 (Surr)	90		70 - 120

Lab Sample ID: LCSD 580-289927/16

Matrix: Water

Analysis Batch: 289927

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	8.94		ug/L		89	37 - 151	0	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	103		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	93		70 - 120
1,2-Dichloroethane-d4 (Surr)	90		70 - 120

Lab Sample ID: MB 580-289928/14

Matrix: Water

Analysis Batch: 289928

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/29/18 20:42	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123		11/29/18 20:42	1
Toluene-d8 (Surr)	107		79 - 122		11/29/18 20:42	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-289928/14

Matrix: Water

Analysis Batch: 289928

Client Sample ID: Method Blank

Prep Type: Total/NA

Surrogate	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
4-Bromofluorobenzene (Surr)	100		78 - 119		11/29/18 20:42	1
Dibromofluoromethane (Surr)	95		70 - 120		11/29/18 20:42	1
1,2-Dichloroethane-d4 (Surr)	90		70 - 120		11/29/18 20:42	1

Lab Sample ID: LCS 580-289928/15

Matrix: Water

Analysis Batch: 289928

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.
							Limits
Benzene	10.0	8.94		ug/L		89	37 - 151

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
Trifluorotoluene (Surr)	97		74 - 123
Toluene-d8 (Surr)	101		79 - 122
4-Bromofluorobenzene (Surr)	100		78 - 119
Dibromofluoromethane (Surr)	97		70 - 120
1,2-Dichloroethane-d4 (Surr)	90		70 - 120

Lab Sample ID: LCSD 580-289928/16

Matrix: Water

Analysis Batch: 289928

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.	RPD	Limit
							Limits		
Benzene	10.0	8.94		ug/L		89	37 - 151	0	30

Surrogate	LCSD LCSD		Limits
	%Recovery	Qualifier	
Trifluorotoluene (Surr)	99		74 - 123
Toluene-d8 (Surr)	103		79 - 122
4-Bromofluorobenzene (Surr)	99		78 - 119
Dibromofluoromethane (Surr)	93		70 - 120
1,2-Dichloroethane-d4 (Surr)	90		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-289798/1-A

Matrix: Water

Analysis Batch: 289863

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 289798

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Benzo[a]anthracene	ND		0.050	0.014	ug/L		11/28/18 08:33	11/28/18 17:45	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		11/28/18 08:33	11/28/18 17:45	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		11/28/18 08:33	11/28/18 17:45	1
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		11/28/18 08:33	11/28/18 17:45	1
Chrysene	ND		0.10	0.016	ug/L		11/28/18 08:33	11/28/18 17:45	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		11/28/18 08:33	11/28/18 17:45	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		11/28/18 08:33	11/28/18 17:45	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-289798/1-A
Matrix: Water
Analysis Batch: 289863

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 289798

Surrogate	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
Terphenyl-d14	99		53 - 120	11/28/18 08:33	11/28/18 17:45	1

Lab Sample ID: LCS 580-289798/2-A
Matrix: Water
Analysis Batch: 289863

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 289798

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.	
							Limits	
Benzo[a]anthracene	4.00	4.45		ug/L		111	61 - 120	
Benzo[a]pyrene	4.00	3.94		ug/L		99	65 - 120	
Benzo[b]fluoranthene	4.00	3.65		ug/L		91	58 - 120	
Benzo[k]fluoranthene	4.00	3.71		ug/L		93	58 - 120	
Chrysene	4.00	3.58		ug/L		89	58 - 120	
Dibenz(a,h)anthracene	4.00	3.92		ug/L		98	60 - 125	
Indeno[1,2,3-cd]pyrene	4.00	3.64		ug/L		91	56 - 120	

Surrogate	LCS LCS		Limits
	%Recovery	Qualifier	
Terphenyl-d14	114		53 - 120

Lab Sample ID: LCSD 580-289798/3-A
Matrix: Water
Analysis Batch: 289863

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 289798

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.		RPD	
							Limits		RPD	Limit
Benzo[a]anthracene	4.00	4.31		ug/L		108	61 - 120	3	16	
Benzo[a]pyrene	4.00	3.85		ug/L		96	65 - 120	2	17	
Benzo[b]fluoranthene	4.00	3.51		ug/L		88	58 - 120	4	20	
Benzo[k]fluoranthene	4.00	3.63		ug/L		91	58 - 120	2	20	
Chrysene	4.00	3.53		ug/L		88	58 - 120	1	16	
Dibenz(a,h)anthracene	4.00	3.78		ug/L		95	60 - 125	4	15	
Indeno[1,2,3-cd]pyrene	4.00	3.48		ug/L		87	56 - 120	4	15	

Surrogate	LCSD LCSD		Limits
	%Recovery	Qualifier	
Terphenyl-d14	102		53 - 120

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-289814/6
Matrix: Water
Analysis Batch: 289814

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Gasoline	ND		0.25	0.10	mg/L		11/28/18 13:20	1	

Surrogate	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
4-Bromofluorobenzene (Surr)	87		50 - 150		11/28/18 13:20	1
Trifluorotoluene (Surr)	111		50 - 150		11/28/18 13:20	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-289814/7

Matrix: Water

Analysis Batch: 289814

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	1.08		mg/L		108	79 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	92		50 - 150
Trifluorotoluene (Surr)	126		50 - 150

Lab Sample ID: LCSD 580-289814/8

Matrix: Water

Analysis Batch: 289814

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	1.14		mg/L		114	79 - 120	5	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	94		50 - 150
Trifluorotoluene (Surr)	129		50 - 150

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-289897/1-B

Matrix: Water

Analysis Batch: 289986

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 289897

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0687	J	0.11	0.065	mg/L		11/29/18 09:06	11/30/18 16:50	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		11/29/18 09:06	11/30/18 16:50	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	94		50 - 150	11/29/18 09:06	11/30/18 16:50	1

Lab Sample ID: LCS 580-289897/2-B

Matrix: Water

Analysis Batch: 289986

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 289897

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	2.04		mg/L		102	50 - 120
Motor Oil (>C24-C36)	2.00	2.30		mg/L		115	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	88		50 - 150

Lab Sample ID: LCSD 580-289897/3-B

Matrix: Water

Analysis Batch: 289986

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 289897

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	2.01		mg/L		101	50 - 120	1	26

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCSD 580-289897/3-B

Matrix: Water

Analysis Batch: 289986

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 289897

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Motor Oil (>C24-C36)	2.00	2.27		mg/L		113	64 - 120	1	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	93		50 - 150

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- 10
- 11

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-82036-1

Date Collected: 11/21/18 08:00

Matrix: Water

Date Received: 11/21/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	289927	11/29/18 22:21	RSB	TAL SEA
Total/NA	Prep	3510C			289798	11/28/18 08:33	KO	TAL SEA
Total/NA	Analysis	8270C SIM		1	289863	11/29/18 01:07	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	289814	11/28/18 23:39	CJB	TAL SEA
Total/NA	Prep	3510C			289897	11/29/18 09:06	KO	TAL SEA
Total/NA	Cleanup	3630C			289951	11/29/18 15:16	KO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	289986	11/30/18 21:12	TL1	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-82036-2

Date Collected: 11/21/18 00:01

Matrix: Water

Date Received: 11/21/18 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	289928	11/29/18 21:56	RSB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	289814	11/28/18 15:55	CJB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-82036-1	Outfall #002	Water	11/21/18 08:00	11/21/18 12:00
580-82036-2	Trip Blank	Water	11/21/18 00:01	11/21/18 12:00

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Loc: 580
82036

TestAmerica Seattle
5755 8th Street E.
Tacoma, WA 98424
Tel. 253-922-2310
Fax 253-922-5047
www.testamericainc.com

Rush
 Short Hold

Chain of Custody Record

Client Arcadis		Client Contact Peter Campbell		Date 11/21/18	Chain of Custody Number 34917
Address 1100 Olive Way, Suite 800		Telephone Number (Area Code)/Fax Number		Lab Number	Page 1 of 1

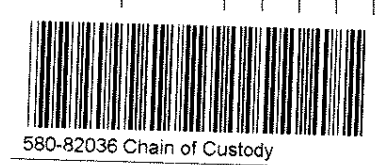
City Seattle	State WA	Zip Code 98101	Sampler Eric Krueger	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal			Billing Contact		

Contract/Purchase Order/Quote No. _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Special Instructions/ Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH				
Outfall #002	11/21/18	0800	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			2			8						pH = 7.86
Trip Blank			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					6							
																* use standard SGL

BENZENE EPA 624
 N,N-DITH-LPX
 N,N-DITH-DX W/ SGL
 CPATHS 8270C SIA

Therm. ID: **A2** Cor: **1.5** Unc: **1.2**
 Cooler Dsc: **Med Blw**
 Packing: **Bubble** FedEx: _____
 Cust. Seal: Yes No UPS: _____
 Blue Ice: Wet, Dry, None Other: _____



Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Archive For _____ Months	<input type="checkbox"/> Disposal By Lab (A fee may be assessed if samples are retained longer than 1 month)
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Turn Around Time Required (business days)
 24 Hours 48 Hours 5 Days 10 Days 15 Days Other **STAT**

1. Relinquished By Sign/Print		Date	Time	1. Received By Sign/Print		Date	Time
Eric Krueger		11/21/18	1200	Francisco Lamy Jr		11/21/18	1200
2. Relinquished By Sign/Print		Date	Time	2. Received By Sign/Print		Date	Time
3. Relinquished By Sign/Print		Date	Time	3. Received By Sign/Print		Date	Time

Comments _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-82036-1

Login Number: 82036

List Source: TestAmerica Seattle

List Number: 1

Creator: Gall, Brandon A

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-82599-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
12/19/2018 5:02:30 PM

Elaine Walker, Project Manager II
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Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Job ID: 580-82599-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-82599-1

Receipt

Two samples were received on 12/11/2018 1:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.9° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-82599-1

Date Collected: 12/10/18 13:00

Matrix: Water

Date Received: 12/11/18 13:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/18/18 22:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		74 - 123					12/18/18 22:28	1
Toluene-d8 (Surr)	104		79 - 122					12/18/18 22:28	1
4-Bromofluorobenzene (Surr)	101		78 - 119					12/18/18 22:28	1
Dibromofluoromethane (Surr)	106		70 - 120					12/18/18 22:28	1
1,2-Dichloroethane-d4 (Surr)	114		70 - 120					12/18/18 22:28	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.25	0.071	ug/L		12/16/18 06:57	12/17/18 20:24	5
Benzo[a]pyrene	ND		0.51	0.056	ug/L		12/16/18 06:57	12/17/18 20:24	5
Benzo[b]fluoranthene	ND		0.25	0.056	ug/L		12/16/18 06:57	12/17/18 20:24	5
Benzo[k]fluoranthene	ND		0.25	0.061	ug/L		12/16/18 06:57	12/17/18 20:24	5
Chrysene	ND		0.51	0.081	ug/L		12/16/18 06:57	12/17/18 20:24	5
Dibenz(a,h)anthracene	ND		0.51	0.051	ug/L		12/16/18 06:57	12/17/18 20:24	5
Indeno[1,2,3-cd]pyrene	ND		0.25	0.071	ug/L		12/16/18 06:57	12/17/18 20:24	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	76		53 - 120				12/16/18 06:57	12/17/18 20:24	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			12/14/18 14:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		50 - 150					12/14/18 14:44	1
Trifluorotoluene (Surr)	117		50 - 150					12/14/18 14:44	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		12/13/18 15:47	12/16/18 19:51	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		12/13/18 15:47	12/16/18 19:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	75		50 - 150				12/13/18 15:47	12/16/18 19:51	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-82599-2

Date Collected: 12/10/18 00:01

Matrix: Water

Date Received: 12/11/18 13:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/18/18 22:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	99		74 - 123					12/18/18 22:53	1
<i>Toluene-d8 (Surr)</i>	106		79 - 122					12/18/18 22:53	1
<i>4-Bromofluorobenzene (Surr)</i>	102		78 - 119					12/18/18 22:53	1
<i>Dibromofluoromethane (Surr)</i>	97		70 - 120					12/18/18 22:53	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	109		70 - 120					12/18/18 22:53	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			12/14/18 13:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	70		50 - 150					12/14/18 13:23	1
<i>Trifluorotoluene (Surr)</i>	107		50 - 150					12/14/18 13:23	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-291496/5

Matrix: Water

Analysis Batch: 291496

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/18/18 16:39	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		74 - 123		12/18/18 16:39	1
Toluene-d8 (Surr)	105		79 - 122		12/18/18 16:39	1
4-Bromofluorobenzene (Surr)	99		78 - 119		12/18/18 16:39	1
Dibromofluoromethane (Surr)	99		70 - 120		12/18/18 16:39	1
1,2-Dichloroethane-d4 (Surr)	109		70 - 120		12/18/18 16:39	1

Lab Sample ID: LCS 580-291496/6

Matrix: Water

Analysis Batch: 291496

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.96		ug/L		100	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	100		74 - 123
Toluene-d8 (Surr)	104		79 - 122
4-Bromofluorobenzene (Surr)	104		78 - 119
Dibromofluoromethane (Surr)	104		70 - 120
1,2-Dichloroethane-d4 (Surr)	112		70 - 120

Lab Sample ID: LCSD 580-291496/7

Matrix: Water

Analysis Batch: 291496

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.85		ug/L		99	37 - 151	1	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	102		74 - 123
Toluene-d8 (Surr)	100		79 - 122
4-Bromofluorobenzene (Surr)	98		78 - 119
Dibromofluoromethane (Surr)	101		70 - 120
1,2-Dichloroethane-d4 (Surr)	104		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-291255/1-A

Matrix: Water

Analysis Batch: 291323

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 291255

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		12/16/18 06:57	12/17/18 15:21	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		12/16/18 06:57	12/17/18 15:21	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		12/16/18 06:57	12/17/18 15:21	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-291255/1-A
Matrix: Water
Analysis Batch: 291323

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 291255

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		12/16/18 06:57	12/17/18 15:21	1
Chrysene	ND		0.10	0.016	ug/L		12/16/18 06:57	12/17/18 15:21	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		12/16/18 06:57	12/17/18 15:21	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		12/16/18 06:57	12/17/18 15:21	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	96		53 - 120	12/16/18 06:57	12/17/18 15:21	1

Lab Sample ID: LCS 580-291255/2-A
Matrix: Water
Analysis Batch: 291323

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 291255

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	3.89		ug/L		97	61 - 120
Benzo[a]pyrene	4.00	3.22		ug/L		80	65 - 120
Benzo[b]fluoranthene	4.00	3.03		ug/L		76	58 - 120
Benzo[k]fluoranthene	4.00	3.31		ug/L		83	58 - 120
Chrysene	4.00	3.29		ug/L		82	58 - 120
Dibenz(a,h)anthracene	4.00	3.64		ug/L		91	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.36		ug/L		84	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	105		53 - 120

Lab Sample ID: LCSD 580-291255/3-A
Matrix: Water
Analysis Batch: 291323

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 291255

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	4.13		ug/L		103	61 - 120	6	16
Benzo[a]pyrene	4.00	3.53		ug/L		88	65 - 120	9	17
Benzo[b]fluoranthene	4.00	3.32		ug/L		83	58 - 120	9	20
Benzo[k]fluoranthene	4.00	3.35		ug/L		84	58 - 120	1	20
Chrysene	4.00	3.27		ug/L		82	58 - 120	1	16
Dibenz(a,h)anthracene	4.00	3.82		ug/L		96	60 - 125	5	15
Indeno[1,2,3-cd]pyrene	4.00	3.53		ug/L		88	56 - 120	5	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	104		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-291165/6

Matrix: Water

Analysis Batch: 291165

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			12/14/18 12:02	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	75		50 - 150					12/14/18 12:02	1
Trifluorotoluene (Surr)	109		50 - 150					12/14/18 12:02	1

Lab Sample ID: LCS 580-291165/7

Matrix: Water

Analysis Batch: 291165

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.880		mg/L		88	79 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	77		50 - 150				
Trifluorotoluene (Surr)	103		50 - 150				

Lab Sample ID: LCSD 580-291165/8

Matrix: Water

Analysis Batch: 291165

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.830		mg/L		83	79 - 120	6	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	74		50 - 150						
Trifluorotoluene (Surr)	99		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-291074/1-A

Matrix: Water

Analysis Batch: 291263

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 291074

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		12/13/18 15:47	12/16/18 20:35	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		12/13/18 15:47	12/16/18 20:35	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	70		50 - 150				12/13/18 15:47	12/16/18 20:35	1

Lab Sample ID: LCS 580-291074/2-A

Matrix: Water

Analysis Batch: 291263

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 291074

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.61		mg/L		80	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-291074/2-A
Matrix: Water
Analysis Batch: 291263

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 291074

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.83		mg/L		92	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	94		50 - 150

Lab Sample ID: LCSD 580-291074/3-A
Matrix: Water
Analysis Batch: 291263

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 291074

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.71		mg/L		86	50 - 120	6	26
Motor Oil (>C24-C36)	2.00	2.04		mg/L		102	64 - 120	11	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	104		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Client Sample ID: Outfall #002

Date Collected: 12/10/18 13:00

Date Received: 12/11/18 13:00

Lab Sample ID: 580-82599-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	291496	12/18/18 22:28	T1W	TAL SEA
Total/NA	Prep	3510C			291255	12/16/18 06:57	KO	TAL SEA
Total/NA	Analysis	8270C SIM		5	291323	12/17/18 20:24	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	291165	12/14/18 14:44	T1W	TAL SEA
Total/NA	Prep	3510C			291074	12/13/18 15:47	DSO	TAL SEA
Total/NA	Cleanup	3630C			291093	12/13/18 17:44	DSO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	291263	12/16/18 19:51	Z1R	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 12/10/18 00:01

Date Received: 12/11/18 13:00

Lab Sample ID: 580-82599-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	291496	12/18/18 22:53	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	291165	12/14/18 13:23	T1W	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-82599-1	Outfall #002	Water	12/10/18 13:00	12/11/18 13:00
580-82599-2	Trip Blank	Water	12/10/18 00:01	12/11/18 13:00

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Client Arcadis		Client Contact Ophelie Enceve		Date 12/10/18	Chain of Custody Number 34918
Address 1100 olive way, suite 800		Telephone Number (Area Code)/Fax Number		Lab Number	Page 1 of 1

City Seattle	State WA	Zip Code 98101	Sampler JASON LITTLE	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal			Billing Contact		

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives										Special Instructions/ Conditions of Receipt							
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Benzene EPA 624	NWTPH-6x	NWTPH-Dx w/SGC	CPAN 8270CSM								
Outfall #002	12/10/18	1300		<input checked="" type="checkbox"/>				2																pH = 7.38
Trip Blank				<input checked="" type="checkbox"/>																				* use standard SGC
																								* Benzene & CPAH w/ quantitative level less than 1 mg/L

Therm. ID: **A7** Cor: **3.4** ° Unc: **3.6** °
Cooler Desc: **Red Blue**
Packing: **Bubble** FedEx: _____
Cust. Seal: Yes No UPS: _____
Blue Ice, Wet, Dry, None Lab Cour: **7**
Other: _____



Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____	Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown	Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Archive For _____ Months	Disposal By Lab <input type="checkbox"/> Disposal By Lab	(A fee may be assessed if samples are retained longer than 1 month)
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Turn Around Time Required (business days)
 24 Hours 48 Hours 5 Days 10 Days 15 Days Other **STAT**

1. Relinquished By Sign/Print		Date	Time	1. Received By Sign/Print		Date	Time
[Signature] Eric Krueser		12/11/18	1300	[Signature] Francisco Luna, Jr.		12/11/18	1300
2. Relinquished By Sign/Print		Date	Time	2. Received By Sign/Print		Date	Time
3. Relinquished By Sign/Print		Date	Time	3. Received By Sign/Print		Date	Time

Comments

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-82599-1

Login Number: 82599

List Source: TestAmerica Seattle

List Number: 1

Creator: Gall, Brandon A

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-82864-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
12/31/2018 5:22:13 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Job ID: 580-82864-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-82864-1

Receipt

Two samples were received on 12/21/2018 11:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.9° C.

GC/MS VOA

Method(s) NWTPH-Gx: The surrogate recovery for the blank associated with analytical batch 580-292156 was outside the upper control limits.

Method(s) NWTPH-Gx: The surrogate recovery for the blank associated with analytical batch 580-292117 was outside the upper control limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The Diesel Range Organics (DRO) concentration reported for the following sample is due to the presence of discrete peaks: Outfall #002 (580-82864-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Qualifiers

GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
X	Surrogate is outside control limits

GC Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-82864-1

Date Collected: 12/20/18 14:00

Matrix: Water

Date Received: 12/21/18 11:15

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/27/18 21:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					12/27/18 21:49	1
Toluene-d8 (Surr)	97		79 - 122					12/27/18 21:49	1
4-Bromofluorobenzene (Surr)	101		78 - 119					12/27/18 21:49	1
Dibromofluoromethane (Surr)	104		70 - 120					12/27/18 21:49	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					12/27/18 21:49	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.25	0.071	ug/L		12/27/18 15:06	12/28/18 21:08	5
Benzo[a]pyrene	ND		0.51	0.056	ug/L		12/27/18 15:06	12/28/18 21:08	5
Benzo[b]fluoranthene	ND		0.25	0.056	ug/L		12/27/18 15:06	12/28/18 21:08	5
Benzo[k]fluoranthene	ND		0.25	0.061	ug/L		12/27/18 15:06	12/28/18 21:08	5
Chrysene	ND		0.51	0.081	ug/L		12/27/18 15:06	12/28/18 21:08	5
Dibenz(a,h)anthracene	ND		0.51	0.051	ug/L		12/27/18 15:06	12/28/18 21:08	5
Indeno[1,2,3-cd]pyrene	ND		0.25	0.071	ug/L		12/27/18 15:06	12/28/18 21:08	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	78		53 - 120				12/27/18 15:06	12/28/18 21:08	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	0.15	J	0.25	0.10	mg/L			12/28/18 02:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	84		50 - 150					12/28/18 02:28	1
Trifluorotoluene (Surr)	112		50 - 150					12/28/18 02:28	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.098	J	0.11	0.066	mg/L		12/31/18 07:32	12/31/18 14:40	1
Motor Oil (>C24-C36)	0.21	J	0.36	0.098	mg/L		12/31/18 07:32	12/31/18 14:40	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	100		50 - 150				12/31/18 07:32	12/31/18 14:40	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-82864-2

Date Collected: 12/20/18 00:01

Matrix: Water

Date Received: 12/21/18 11:15

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/27/18 19:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	103		74 - 123					12/27/18 19:19	1
<i>Toluene-d8 (Surr)</i>	96		79 - 122					12/27/18 19:19	1
<i>4-Bromofluorobenzene (Surr)</i>	102		78 - 119					12/27/18 19:19	1
<i>Dibromofluoromethane (Surr)</i>	105		70 - 120					12/27/18 19:19	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	103		70 - 120					12/27/18 19:19	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			12/27/18 16:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	82		50 - 150					12/27/18 16:00	1
<i>Trifluorotoluene (Surr)</i>	109		50 - 150					12/27/18 16:00	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-292137/5

Matrix: Water

Analysis Batch: 292137

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/27/18 16:50	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		74 - 123		12/27/18 16:50	1
Toluene-d8 (Surr)	98		79 - 122		12/27/18 16:50	1
4-Bromofluorobenzene (Surr)	102		78 - 119		12/27/18 16:50	1
Dibromofluoromethane (Surr)	103		70 - 120		12/27/18 16:50	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120		12/27/18 16:50	1

Lab Sample ID: LCS 580-292137/6

Matrix: Water

Analysis Batch: 292137

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.55		ug/L		95	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	102		74 - 123
Toluene-d8 (Surr)	98		79 - 122
4-Bromofluorobenzene (Surr)	104		78 - 119
Dibromofluoromethane (Surr)	104		70 - 120
1,2-Dichloroethane-d4 (Surr)	102		70 - 120

Lab Sample ID: LCSD 580-292137/7

Matrix: Water

Analysis Batch: 292137

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	8.87		ug/L		89	37 - 151	7	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	101		74 - 123
Toluene-d8 (Surr)	97		79 - 122
4-Bromofluorobenzene (Surr)	102		78 - 119
Dibromofluoromethane (Surr)	103		70 - 120
1,2-Dichloroethane-d4 (Surr)	101		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-292144/1-A

Matrix: Water

Analysis Batch: 292183

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 292144

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		12/27/18 15:06	12/28/18 15:06	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		12/27/18 15:06	12/28/18 15:06	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		12/27/18 15:06	12/28/18 15:06	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-292144/1-A
Matrix: Water
Analysis Batch: 292183

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 292144

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		12/27/18 15:06	12/28/18 15:06	1
Chrysene	ND		0.10	0.016	ug/L		12/27/18 15:06	12/28/18 15:06	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		12/27/18 15:06	12/28/18 15:06	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		12/27/18 15:06	12/28/18 15:06	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	73		53 - 120	12/27/18 15:06	12/28/18 15:06	1

Lab Sample ID: LCS 580-292144/2-A
Matrix: Water
Analysis Batch: 292183

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 292144

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	4.21		ug/L		105	61 - 120
Benzo[a]pyrene	4.00	3.98		ug/L		100	65 - 120
Benzo[b]fluoranthene	4.00	3.91		ug/L		98	58 - 120
Benzo[k]fluoranthene	4.00	3.79		ug/L		95	58 - 120
Chrysene	4.00	3.45		ug/L		86	58 - 120
Dibenz(a,h)anthracene	4.00	3.71		ug/L		93	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.42		ug/L		85	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	90		53 - 120

Lab Sample ID: LCSD 580-292144/3-A
Matrix: Water
Analysis Batch: 292183

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 292144

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	4.12		ug/L		103	61 - 120	2	16
Benzo[a]pyrene	4.00	3.89		ug/L		97	65 - 120	2	17
Benzo[b]fluoranthene	4.00	3.92		ug/L		98	58 - 120	0	20
Benzo[k]fluoranthene	4.00	3.73		ug/L		93	58 - 120	2	20
Chrysene	4.00	3.38		ug/L		85	58 - 120	2	16
Dibenz(a,h)anthracene	4.00	3.94		ug/L		98	60 - 125	6	15
Indeno[1,2,3-cd]pyrene	4.00	3.50		ug/L		88	56 - 120	2	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	86		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-292117/8

Matrix: Water

Analysis Batch: 292117

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			12/27/18 14:12	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		50 - 150					12/27/18 14:12	1
Trifluorotoluene (Surr)	609	X	50 - 150					12/27/18 14:12	1

Lab Sample ID: LCS 580-292117/6

Matrix: Water

Analysis Batch: 292117

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.915		mg/L		91	79 - 120
Surrogate	%Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	90		50 - 150				
Trifluorotoluene (Surr)	116		50 - 150				

Lab Sample ID: LCSD 580-292117/7

Matrix: Water

Analysis Batch: 292117

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.830		mg/L		83	79 - 120	10	10
Surrogate	%Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	87		50 - 150						
Trifluorotoluene (Surr)	107		50 - 150						

Lab Sample ID: MB 580-292156/6

Matrix: Water

Analysis Batch: 292156

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			12/27/18 18:19	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		50 - 150					12/27/18 18:19	1
Trifluorotoluene (Surr)	603	X	50 - 150					12/27/18 18:19	1

Lab Sample ID: LCS 580-292156/7

Matrix: Water

Analysis Batch: 292156

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.893		mg/L		89	79 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-292156/7
Matrix: Water
Analysis Batch: 292156

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	92		50 - 150
Trifluorotoluene (Surr)	112		50 - 150

Lab Sample ID: LCSD 580-292156/8
Matrix: Water
Analysis Batch: 292156

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.815		mg/L		81	79 - 120	9	10

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	87		50 - 150
Trifluorotoluene (Surr)	104		50 - 150

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-292312/1-B
Matrix: Water
Analysis Batch: 292338

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 292312

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		12/31/18 07:32	12/31/18 13:35	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		12/31/18 07:32	12/31/18 13:35	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	92		50 - 150	12/31/18 07:32	12/31/18 13:35	1

Lab Sample ID: LCS 580-292312/2-B
Matrix: Water
Analysis Batch: 292338

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 292312

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.82		mg/L		91	50 - 120
Motor Oil (>C24-C36)	2.00	1.96		mg/L		98	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	91		50 - 150

Lab Sample ID: LCSD 580-292312/3-B
Matrix: Water
Analysis Batch: 292338

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 292312

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.80		mg/L		90	50 - 120	1	26
Motor Oil (>C24-C36)	2.00	1.96		mg/L		98	64 - 120	0	24

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCSD 580-292312/3-B
Matrix: Water
Analysis Batch: 292338

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 292312

<i>Surrogate</i>	<i>LCSD</i> <i>%Recovery</i>	<i>LCSD</i> <i>Qualifier</i>	<i>Limits</i>
<i>o-Terphenyl</i>	91		50 - 150

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Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Client Sample ID: Outfall #002

Date Collected: 12/20/18 14:00

Date Received: 12/21/18 11:15

Lab Sample ID: 580-82864-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	292137	12/27/18 21:49	TL1	TAL SEA
Total/NA	Prep	3510C			292144	12/27/18 15:06	JCM	TAL SEA
Total/NA	Analysis	8270C SIM		5	292183	12/28/18 21:08	DSO	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	292156	12/28/18 02:28	CJB	TAL SEA
Total/NA	Prep	3510C			292312	12/31/18 07:32	KO	TAL SEA
Total/NA	Cleanup	3630C			292322	12/31/18 10:01	KO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	292338	12/31/18 14:40	Z1R	TAL SEA

Client Sample ID: Trip Blank

Date Collected: 12/20/18 00:01

Date Received: 12/21/18 11:15

Lab Sample ID: 580-82864-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	292137	12/27/18 19:19	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	292117	12/27/18 16:00	CJB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82864-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-82864-1	Outfall #002	Water	12/20/18 14:00	12/21/18 11:15
580-82864-2	Trip Blank	Water	12/20/18 00:01	12/21/18 11:15

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- 11

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-82864-1

Login Number: 82864
List Number: 1
Creator: Gall, Brandon A

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-82965-1

Client Project/Site: Edmonds Terminal

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
1/3/2019 3:08:07 PM

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Job ID: 580-82965-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-82965-1

Receipt

Two samples were received on 12/28/2018 12:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8° C.

GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA

Method(s) NWTPH-Dx: The Diesel Range Organics (DRO) concentration reported for the following sample is due to the presence of discrete peaks: Outfall #002 (580-82965-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-82965-1

Date Collected: 12/27/18 10:55

Matrix: Water

Date Received: 12/28/18 12:25

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/31/18 18:54	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	104		74 - 123					12/31/18 18:54	1
Toluene-d8 (Surr)	97		79 - 122					12/31/18 18:54	1
4-Bromofluorobenzene (Surr)	101		78 - 119					12/31/18 18:54	1
Dibromofluoromethane (Surr)	104		70 - 120					12/31/18 18:54	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120					12/31/18 18:54	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.052	0.014	ug/L		01/02/19 07:47	01/02/19 16:48	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		01/02/19 07:47	01/02/19 16:48	1
Benzo[b]fluoranthene	ND		0.052	0.011	ug/L		01/02/19 07:47	01/02/19 16:48	1
Benzo[k]fluoranthene	ND		0.052	0.012	ug/L		01/02/19 07:47	01/02/19 16:48	1
Chrysene	ND		0.10	0.017	ug/L		01/02/19 07:47	01/02/19 16:48	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		01/02/19 07:47	01/02/19 16:48	1
Indeno[1,2,3-cd]pyrene	ND		0.052	0.014	ug/L		01/02/19 07:47	01/02/19 16:48	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	62		53 - 120				01/02/19 07:47	01/02/19 16:48	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			01/02/19 20:10	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	80		50 - 150					01/02/19 20:10	1
Trifluorotoluene (Surr)	117		50 - 150					01/02/19 20:10	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.091	J	0.11	0.067	mg/L		12/31/18 07:32	12/31/18 15:02	1
Motor Oil (>C24-C36)	0.12	J	0.36	0.099	mg/L		12/31/18 07:32	12/31/18 15:02	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	91		50 - 150				12/31/18 07:32	12/31/18 15:02	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-82965-2

Date Collected: 12/27/18 00:00

Matrix: Water

Date Received: 12/28/18 12:25

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/31/18 18:30	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123		12/31/18 18:30	1
Toluene-d8 (Surr)	96		79 - 122		12/31/18 18:30	1
4-Bromofluorobenzene (Surr)	102		78 - 119		12/31/18 18:30	1
Dibromofluoromethane (Surr)	105		70 - 120		12/31/18 18:30	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120		12/31/18 18:30	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			01/02/19 16:05	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	76		50 - 150		01/02/19 16:05	1
Trifluorotoluene (Surr)	115		50 - 150		01/02/19 16:05	1

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-292330/5

Matrix: Water

Analysis Batch: 292330

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/31/18 11:40	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	104		74 - 123		12/31/18 11:40	1
Toluene-d8 (Surr)	95		79 - 122		12/31/18 11:40	1
4-Bromofluorobenzene (Surr)	102		78 - 119		12/31/18 11:40	1
Dibromofluoromethane (Surr)	104		70 - 120		12/31/18 11:40	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 120		12/31/18 11:40	1

Lab Sample ID: LCS 580-292330/6

Matrix: Water

Analysis Batch: 292330

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.69		ug/L		97	37 - 151

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Trifluorotoluene (Surr)	104		74 - 123
Toluene-d8 (Surr)	97		79 - 122
4-Bromofluorobenzene (Surr)	104		78 - 119
Dibromofluoromethane (Surr)	105		70 - 120
1,2-Dichloroethane-d4 (Surr)	103		70 - 120

Lab Sample ID: LCSD 580-292330/7

Matrix: Water

Analysis Batch: 292330

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	9.60		ug/L		96	37 - 151	1	30

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	101		74 - 123
Toluene-d8 (Surr)	96		79 - 122
4-Bromofluorobenzene (Surr)	104		78 - 119
Dibromofluoromethane (Surr)	102		70 - 120
1,2-Dichloroethane-d4 (Surr)	102		70 - 120

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 580-292389/1-A

Matrix: Water

Analysis Batch: 292406

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 292389

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		01/02/19 07:47	01/02/19 13:47	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		01/02/19 07:47	01/02/19 13:47	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		01/02/19 07:47	01/02/19 13:47	1

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: MB 580-292389/1-A
Matrix: Water
Analysis Batch: 292406

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 292389

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		01/02/19 07:47	01/02/19 13:47	1
Chrysene	ND		0.10	0.016	ug/L		01/02/19 07:47	01/02/19 13:47	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		01/02/19 07:47	01/02/19 13:47	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		01/02/19 07:47	01/02/19 13:47	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Terphenyl-d14	71		53 - 120	01/02/19 07:47	01/02/19 13:47	1

Lab Sample ID: LCS 580-292389/2-A
Matrix: Water
Analysis Batch: 292406

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 292389

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	4.00	4.20		ug/L		105	61 - 120
Benzo[a]pyrene	4.00	4.03		ug/L		101	65 - 120
Benzo[b]fluoranthene	4.00	3.82		ug/L		95	58 - 120
Benzo[k]fluoranthene	4.00	3.81		ug/L		95	58 - 120
Chrysene	4.00	3.60		ug/L		90	58 - 120
Dibenz(a,h)anthracene	4.00	3.70		ug/L		92	60 - 125
Indeno[1,2,3-cd]pyrene	4.00	3.31		ug/L		83	56 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	83		53 - 120

Lab Sample ID: LCSD 580-292389/3-A
Matrix: Water
Analysis Batch: 292406

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 292389

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	4.00	4.52		ug/L		113	61 - 120	7	16
Benzo[a]pyrene	4.00	4.28		ug/L		107	65 - 120	6	17
Benzo[b]fluoranthene	4.00	4.18		ug/L		104	58 - 120	9	20
Benzo[k]fluoranthene	4.00	4.12		ug/L		103	58 - 120	8	20
Chrysene	4.00	3.91		ug/L		98	58 - 120	8	16
Dibenz(a,h)anthracene	4.00	4.01		ug/L		100	60 - 125	8	15
Indeno[1,2,3-cd]pyrene	4.00	3.81		ug/L		95	56 - 120	14	15

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Terphenyl-d14	99		53 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-292417/6

Matrix: Water

Analysis Batch: 292417

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			01/02/19 14:16	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	83		50 - 150					01/02/19 14:16	1
Trifluorotoluene (Surr)	116		50 - 150					01/02/19 14:16	1

Lab Sample ID: LCS 580-292417/7

Matrix: Water

Analysis Batch: 292417

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Gasoline	1.00	0.841		mg/L		84	79 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	81		50 - 150				
Trifluorotoluene (Surr)	109		50 - 150				

Lab Sample ID: LCSD 580-292417/8

Matrix: Water

Analysis Batch: 292417

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline	1.00	0.899		mg/L		90	79 - 120	7	10
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	85		50 - 150						
Trifluorotoluene (Surr)	109		50 - 150						

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Lab Sample ID: MB 580-292312/1-B

Matrix: Water

Analysis Batch: 292338

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 292312

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		12/31/18 07:32	12/31/18 13:35	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		12/31/18 07:32	12/31/18 13:35	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	92		50 - 150				12/31/18 07:32	12/31/18 13:35	1

Lab Sample ID: LCS 580-292312/2-B

Matrix: Water

Analysis Batch: 292338

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 292312

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.82		mg/L		91	50 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup (Continued)

Lab Sample ID: LCS 580-292312/2-B
Matrix: Water
Analysis Batch: 292338

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 292312

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.96		mg/L		98	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
<i>o</i> -Terphenyl	91		50 - 150

Lab Sample ID: LCSD 580-292312/3-B
Matrix: Water
Analysis Batch: 292338

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 292312

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)	2.00	1.80		mg/L		90	50 - 120	1	26
Motor Oil (>C24-C36)	2.00	1.96		mg/L		98	64 - 120	0	24

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
<i>o</i> -Terphenyl	91		50 - 150

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-82965-1

Date Collected: 12/27/18 10:55

Matrix: Water

Date Received: 12/28/18 12:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	292330	12/31/18 18:54	JSM	TAL SEA
Total/NA	Prep	3510C			292389	01/02/19 07:47	KO	TAL SEA
Total/NA	Analysis	8270C SIM		1	292406	01/02/19 16:48	T1W	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	292417	01/02/19 20:10	CJB	TAL SEA
Total/NA	Prep	3510C			292312	12/31/18 07:32	KO	TAL SEA
Total/NA	Cleanup	3630C			292322	12/31/18 10:01	KO	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	292338	12/31/18 15:02	Z1R	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-82965-2

Date Collected: 12/27/18 00:00

Matrix: Water

Date Received: 12/28/18 12:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	292330	12/31/18 18:30	JSM	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	292417	01/02/19 16:05	CJB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82965-1

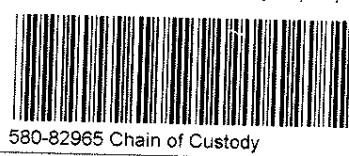
Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-82965-1	Outfall #002	Water	12/27/18 10:55	12/28/18 12:25
580-82965-2	Trip Blank	Water	12/27/18 00:00	12/28/18 12:25

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- 11

Client: Arcadis Client Contact: Peter Campbell Date: 12/27/18 Chain of Custody Number: 34919
Address: 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page 1 of _____

City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Ebina Walk
Project Name and Location (State): Edmonds terminal (WA) Billing Contact: _____ Analysis (Attach list if more space is needed): _____
Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Analysis	Sp Cc		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH				
<u>Outfall #002</u>	<u>12/27/18</u>	<u>1055</u>		<u>X</u>			<u>2</u>			<u>8</u>						<u>pH-7.51</u>
<u>TRIP Blank</u>	<u>-</u>	<u>-</u>		<u>X</u>						<u>6</u>						



Therm. ID: A2 Cor: 3-8 ° Unc: 4.0 °
Cooler Desc: Insulated Blue
Packing: Bubble FedEx: _____
Cust. Seal: Yes ___ No X UPS: _____
Blue Ice, Set, Dry, None Lab Cour: X
Other: _____

Loc: 580
82965

* use standard silica gel cleanup

* BZZZ + CPAHs w/quantitative level less than 1ug/L

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other STAT QC Requirements (Specify): _____

1. Relinquished By: <u>[Signature]</u> Date: <u>12/28/18</u> Time: <u>1225</u>	1. Received By: <u>[Signature]</u> Date: <u>12/28/18</u> Time: <u>1225</u>
2. Relinquished By: _____ Date: _____ Time: _____	2. Received By: _____ Date: _____ Time: _____
3. Relinquished By: _____ Date: _____ Time: _____	3. Received By: _____ Date: _____ Time: _____

Comments: _____

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-82965-1

Login Number: 82965

List Number: 1

Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX J

DPE System Vapor Laboratory Analytical Results and Chain of Custody Documentation



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-73617-1

Client Project/Site: Chevron Edmonds Terminal
Revision: 1

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

1/22/2018 4:11:16 PM

Kim Presley, Project Management Assistant I
(253)922-2310

kim.presley@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Job ID: 580-73617-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE **Client: ARCADIS U.S. Inc** **Project: Chevron Edmonds Terminal** **Report Number: 580-73617-1**

Revision 1: January 22, 2018

Per Client email 1/22/2018, the Outfall #2 sample date has been reported separately.

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Two samples were received on 12/14/2017 3:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.2° C.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

FIXED GASES

Samples VSP 801 (580-73617-3) and VSP 802 (580-73617-4) were analyzed for Fixed Gases in accordance with D1946. The samples were analyzed on 12/18/2017 and 12/19/2017.

Samples VSP 801 (580-73617-3)[1.54X] and VSP 802 (580-73617-4)[1.53X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

VOLATILE ORGANIC COMPOUNDS IN AMBIENT AIR

Samples VSP 801 (580-73617-3) and VSP 802 (580-73617-4) were analyzed for volatile organic compounds in ambient air in accordance with EPA Method TO15. The samples were analyzed on 12/21/2017.

1,2-Dichloroethane-d4 (Surr) failed the surrogate recovery criteria high for VSP 801 (580-73617-3). 1,2-Dichloroethane-d4 (Surr) failed the surrogate recovery criteria high for LCS 320-200839/7. 1,2-Dichloroethane-d4 (Surr) failed the surrogate recovery criteria high for LCSD 320-200839/8. This analyte is not use as a monitoring analyte.

Sample VSP 801 (580-73617-3)[62.9X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits

Air - GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Client Sample ID: VSP 801

Lab Sample ID: 580-73617-3

Date Collected: 12/14/17 09:35

Matrix: Air

Date Received: 12/14/17 15:40

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	2400		25	5.0	ppb v/v			12/21/17 17:22	62.9
Ethylbenzene	3600		25	4.0	ppb v/v			12/21/17 17:22	62.9
Toluene	29		25	3.2	ppb v/v			12/21/17 17:22	62.9
m,p-Xylene	2500		50	6.3	ppb v/v			12/21/17 17:22	62.9
o-Xylene	240		25	3.4	ppb v/v			12/21/17 17:22	62.9
TPH (as Gasoline)	290000		6300	2500	ppb v/v			12/21/17 17:22	62.9

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	105		70 - 130		12/21/17 17:22	62.9
1,2-Dichloroethane-d4 (Surr)	167	X	70 - 130		12/21/17 17:22	62.9
Toluene-d8 (Surr)	100		70 - 130		12/21/17 17:22	62.9

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.34	J	0.77	0.016	% v/v			12/18/17 11:49	1.54
Methane (FID)	0.0072		0.00015	0.000031	% v/v			12/19/17 10:27	1.54
Oxygen	19		0.31	0.011	% v/v			12/18/17 11:49	1.54

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Client Sample ID: VSP 802

Lab Sample ID: 580-73617-4

Date Collected: 12/14/17 09:45

Matrix: Air

Date Received: 12/14/17 15:40

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	2.0		0.40	0.079	ppb v/v			12/21/17 18:13	1
Ethylbenzene	11		0.40	0.063	ppb v/v			12/21/17 18:13	1
Toluene	1.5		0.40	0.051	ppb v/v			12/21/17 18:13	1
m,p-Xylene	12		0.80	0.10	ppb v/v			12/21/17 18:13	1
o-Xylene	1.8		0.40	0.054	ppb v/v			12/21/17 18:13	1
TPH (as Gasoline)	570		100	40	ppb v/v			12/21/17 18:13	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		12/21/17 18:13	1
1,2-Dichloroethane-d4 (Surr)	108		70 - 130		12/21/17 18:13	1
Toluene-d8 (Surr)	101		70 - 130		12/21/17 18:13	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.57	J	0.77	0.016	% v/v			12/18/17 12:02	1.53
Methane (FID)	0.0061		0.00015	0.000031	% v/v			12/19/17 10:46	1.53
Oxygen	18		0.31	0.011	% v/v			12/18/17 12:02	1.53

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-200839/11

Matrix: Air

Analysis Batch: 200839

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			12/21/17 16:38	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			12/21/17 16:38	1
Toluene	ND		0.40	0.051	ppb v/v			12/21/17 16:38	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			12/21/17 16:38	1
o-Xylene	ND		0.40	0.054	ppb v/v			12/21/17 16:38	1
TPH (as Gasoline)	ND		100	40	ppb v/v			12/21/17 16:38	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		70 - 130		12/21/17 16:38	1
1,2-Dichloroethane-d4 (Surr)	97		70 - 130		12/21/17 16:38	1
Toluene-d8 (Surr)	97		70 - 130		12/21/17 16:38	1

Lab Sample ID: LCS 320-200839/4

Matrix: Air

Analysis Batch: 200839

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	19.0		ppb v/v		95	68 - 128
Ethylbenzene	20.0	23.0		ppb v/v		115	64 - 124
Toluene	20.0	21.1		ppb v/v		106	68 - 128
m,p-Xylene	40.0	46.9		ppb v/v		117	65 - 125
o-Xylene	20.0	23.8		ppb v/v		119	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	100		70 - 130
1,2-Dichloroethane-d4 (Surr)	100		70 - 130
Toluene-d8 (Surr)	101		70 - 130

Lab Sample ID: LCS 320-200839/7

Matrix: Air

Analysis Batch: 200839

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	5000	4650		ppb v/v		93	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	115		70 - 130
1,2-Dichloroethane-d4 (Surr)	149	X	70 - 130
Toluene-d8 (Surr)	105		70 - 130

Lab Sample ID: LCSD 320-200839/5

Matrix: Air

Analysis Batch: 200839

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	18.3		ppb v/v		91	68 - 128	4	25
Ethylbenzene	20.0	21.5		ppb v/v		108	64 - 124	7	25

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-200839/5
Matrix: Air
Analysis Batch: 200839

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Toluene	20.0	19.8		ppb v/v		99	68 - 128	7	25
m,p-Xylene	40.0	43.6		ppb v/v		109	65 - 125	7	25
o-Xylene	20.0	22.2		ppb v/v		111	65 - 125	7	25

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	106		70 - 130
1,2-Dichloroethane-d4 (Surr)	102		70 - 130
Toluene-d8 (Surr)	101		70 - 130

Lab Sample ID: LCSD 320-200839/8
Matrix: Air
Analysis Batch: 200839

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	5000	4830		ppb v/v		97	70 - 130	4	25

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	117		70 - 130
1,2-Dichloroethane-d4 (Surr)	142	X	70 - 130
Toluene-d8 (Surr)	107		70 - 130

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-200219/11
Matrix: Air
Analysis Batch: 200219

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			12/18/17 10:27	1
Methane (TCD)	ND		0.50	0.14	% v/v			12/18/17 10:27	1
Oxygen	ND		0.20	0.0074	% v/v			12/18/17 10:27	1

Lab Sample ID: LCS 320-200219/2
Matrix: Air
Analysis Batch: 200219

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon Dioxide (TCD)	24.4	26.1		% v/v		107	80 - 120
Methane (TCD)	26.1	28.7		% v/v		110	80 - 120

Lab Sample ID: LCS 320-200219/5
Matrix: Air
Analysis Batch: 200219

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oxygen	15.7	13.7		% v/v		87	80 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: LCSD 320-200219/3
Matrix: Air
Analysis Batch: 200219

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	24.4	26.1		% v/v	-	107	80 - 120	0	20
Methane (TCD)	26.1	28.6		% v/v	-	109	80 - 120	0	20

Lab Sample ID: LCSD 320-200219/6
Matrix: Air
Analysis Batch: 200219

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	15.7	13.7		% v/v	-	87	80 - 120	0	20

Lab Sample ID: MB 320-200409/5
Matrix: Air
Analysis Batch: 200409

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.00010	0.000020	% v/v	-		12/19/17 09:42	1
Oxygen	ND		0.20	0.0074	% v/v	-		12/19/17 09:42	1

Lab Sample ID: LCS 320-200409/2
Matrix: Air
Analysis Batch: 200409

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0225		% v/v	-	90	80 - 120		

Lab Sample ID: LCSD 320-200409/3
Matrix: Air
Analysis Batch: 200409

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0237		% v/v	-	95	80 - 120	5	20

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Client Sample ID: VSP 801

Date Collected: 12/14/17 09:35

Date Received: 12/14/17 15:40

Lab Sample ID: 580-73617-3

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		62.9	200839	12/21/17 17:22	AP1	TAL SAC
Total/NA	Analysis	D1946		1.54	200409	12/19/17 10:27	EMJ	TAL SAC
Total/NA	Analysis	D1946		1.54	200219	12/18/17 11:49	EMJ	TAL SAC

Client Sample ID: VSP 802

Date Collected: 12/14/17 09:45

Date Received: 12/14/17 15:40

Lab Sample ID: 580-73617-4

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	200839	12/21/17 18:13	AP1	TAL SAC
Total/NA	Analysis	D1946		1.53	200409	12/19/17 10:46	EMJ	TAL SAC
Total/NA	Analysis	D1946		1.53	200219	12/18/17 12:02	EMJ	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-73617-3	VSP 801	Air	12/14/17 09:35	12/14/17 15:40
580-73617-4	VSP 802	Air	12/14/17 09:45	12/14/17 15:40

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TestAmerica Seattle

5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Chain of Custody Record

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Client Information		Sampler: <u>Eric Krueger</u>		Lab PM: Walker, Elaine M		Carrier Tracking No(s):		COC No: 580-27035-8908.1					
Client Contact: Jason Little		Phone: 303-519-7192		E-Mail: elaine.walker@testamericainc.com				Page: Page 1 of 1					
Company: ARCADIS U.S. Inc		Due Date Requested:		Analysis Requested						Job #: 73617			
Address: 1100 Olive Way Suite 800		TAT Requested (days): Five days		Field Filtered Sample (Yes or No) <input type="checkbox"/> Perform MS/MS (Yes or No) <input type="checkbox"/> 8270C_SIM - cPAHS <input type="checkbox"/> NNTPH_DX - Northwest - DROIRRO <input type="checkbox"/> 624_5ml_NNTPH_Gx <input type="checkbox"/> Benzene by EPA 624 <input type="checkbox"/> BTEX by TO-15 <input type="checkbox"/> TPH GRO by EPA TO-15 <input type="checkbox"/> Fixed Gas CH4, O2, CO2 <input type="checkbox"/>						Preservation Codes:			
City: Seattle		PO #: B0045362.0010								A - HCL		M - Hexane	
State, Zip: WA, 98101		WO #: 0015254061								B - NaOH		N - None	
Phone: 206-726-4720(Tel)		Project #: 58011413								C - Zn Acetate		O - AsNaO2	
Email: Jason.Little@arcadis.com		SSOW#:								D - Nitric Acid		P - Na2O4S	
Project Name: Chevron Edmonds Terminal				E - NaHSO4		Q - Na2SO3							
Site: Washington				F - MeOH		R - Na2S2O3							
				G - Amchlor		S - H2SO4							
				H - Ascorbic Acid		T - TSP Dodecahydrate							
				I - Ice		U - Acetone							
				J - DI Water		V - MCAA							
				K - EDTA		W - pH 4-5							
				L - EDA		Z - other (specify)							
				Other:									
				Total Number of containers									
				Special Instructions/Note:									
Sample Identification		Sample Date		Sample Time		Sample Type (C=Comp, G=grab)		Matrix (W=water, S=solid, O=waste/soil)					
								BT=Tissue, A=Air					
								Preservation Code:					
Outfall # 002		12/14/17		0900		G		Water					
Trip blank						G		Water					
VSP 801		12/14/17		0935		G		Air					
VSP 802		12/14/17		0945		G		Air					
								PH = 8.02					
								PID = 301.5 ppm					
								PID = 0.1 ppm					
								Therm. ID <u>4R4</u> Cor <u>2.2</u> Unc <u>2.3</u>					
								Cooler Desc <u>in blue</u> @ Lab					
								Wet/Packs Packing <u>Bvb</u>					
								Labco Custody Seal: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>					
								580-73617 Chain of Custody					
Possible Hazard Identification					Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)								
<input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological					<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months								
Deliverable Requested: I, II, III, IV, Other (specify)					Special Instructions/QC Requirements:								
Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:							
Relinquished by: <u>Peter Campbell</u>		Date/Time: 12/14/17 10:05		Company: <u>ARCADIS</u>		Received by: <u>[Signature]</u>		Date/Time: 12/14/17 10:15					
Relinquished by: <u>[Signature]</u>		Date/Time: 12/14/17 1540		Company: <u>ARCADIS</u>		Received by: <u>Tom [Signature]</u>		Date/Time: 12/14/17 1540					
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time: Company:					
Custody Seals Intact: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:									

Chain of Custody Record



Client Information (Sub Contract Lab)		Sampler: Walker, Elaine M		Lab PM: Elaine M Walker		Carrier Tracking Note:		COC No: 580-52003.1	
Client Contact: Elaine Walker		Phone: elaine.walker@testamericainc.com		E-Mail: elaine.walker@testamericainc.com		State of Origin: Washington		Page: Page 1 of 1	
Shipping/Receiving		Accreditations Required (See Note):		Job #: 580-73617-1		Preservation Codes:		M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - PH 4.5 X - EDTA Y - EDA Z - other (specify)	
Company: TestAmerica Laboratories, Inc.		Address: 880 Riverside Parkway		City: West Sacramento		State: CA		Zip: 95605	
Phone: 916-373-5600(Tel) 916-372-1059(Fax)		Email:		Project #: 58011413		Site: Chevron Edmonds Terminal		Project Name: Chevron Edmonds Terminal	
Due Date Requested: 12/21/2017		TAT Requested (days):		Sample Date		Sample Time		Sample Type (C=Comp, G=grab)	
Field Filtered Sample (Yes or No)		Perform MS/MSD (Yes or No)		D196/Air_Tedlar_Bag (MOD) Local Method		T015/Air_Tedlar_Bag (MOD) MBTEX Only		Analysis Requested	
Sample Identification - Client ID (Lab ID)		Sample Date		Sample Time		Sample Type (C=Comp, G=grab)		Matrix (W=water, S=solid, D=wasteoil, BT=tissue, A=air)	
VSP 801 (580-73617-3)		12/14/17		09:35 Pacific		Air		Preservation Code: X	
VSP 802 (580-73617-4)		12/14/17		09:45 Pacific		Air		Preservation Code: X	
Special Instructions/Note:		Total Number of Containers		1		1			

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
 Unconfirmed
 Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return To Client Disposal By Lab Archive For _____ Months

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by: Tom Blanks	12/15/17		
Relinquished by:			
Relinquished by:			
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No	Cooler Temperature(s) °C and Other Remarks:		



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Airbill Here

4156 3209 3908



580-73617 Field Sheet

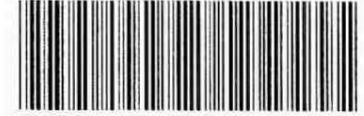
TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Sample Receiving

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations. File in the job folder with the COC.

Notes:	Cooler Custody Seal: <u>246974</u>
	# Bags: <u>2</u> 1L, <u> </u> 2L, <u> </u> 10L
	# Canisters: <u> </u> 1L, <u> </u> 6L, TA <input type="checkbox"/> Non TA <input type="checkbox"/>
	Transferred by Sacramento - Yes <input type="checkbox"/> No <input type="checkbox"/>
	# Canisters Unused: <u> </u> 1L, <u> </u> 6L
	# Flow Regulators: <u> </u> , # Gauges: <u> </u>
	Co-locator <u> </u>
	Initial & Date <u>AW 12-16-17</u>

Date Cleaned/Batch ID 12-8-17 320-34118
 Date of QC 12/11/2017
 Data File Number C:\msdchem\1\DATA\171211\MS9121107.d
 (File ID for certification analysis of canister designated below)



320-34118 Chain of Custody

CANISTER ID NUMBERS

*	34001065
	34000674
	8502
	34000731
	34000740
	34001243
	8934
	34000863

	34001093
	34001036
	34001964
	34001950 ^{ex 12-11-17}
	34001950
	34001622
	34000660
	8937
	34001051

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

[Signature]
1st level Reviewed By:

12/12/17
Date:

[Signature]
2nd level Reviewed By:

12/14/17
Date:

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34118-1
 SDG No.: _____
 Client Sample ID: 34001065 Lab Sample ID: 320-34118-1
 Matrix: Air Lab File ID: MS9121107.D
 Analysis Method: TO-15 Date Collected: 12/08/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/11/2017 17:26
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 199336 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.34	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	ND		0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34118-1
 SDG No.: _____
 Client Sample ID: 34001065 Lab Sample ID: 320-34118-1
 Matrix: Air Lab File ID: MS9121107.D
 Analysis Method: TO-15 Date Collected: 12/08/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/11/2017 17:26
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 199336 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34118-1
 SDG No.: _____
 Client Sample ID: 34001065 Lab Sample ID: 320-34118-1
 Matrix: Air Lab File ID: MS9121107.D
 Analysis Method: TO-15 Date Collected: 12/08/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/11/2017 17:26
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 199336 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	93		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	103		70-130
2037-26-5	Toluene-d8 (Surr)	102		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171211-51603.b\MS9121107.D
 Lims ID: 320-34118-A-1
 Client ID: 34001065
 Sample Type: Client
 Inject. Date: 11-Dec-2017 17:26:30 ALS Bottle#: 5 Worklist Smp#: 7
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Sample Info: 320-34118-A-1
 Misc. Info.: 500 mL CAN CERT
 Operator ID: LHS/GKI Instrument ID: ATMS9
 Method: \\ChromNA\Sacramento\ChromData\ATMS9\20171211-51603.b\TO15_ATMS9N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 11-Dec-2017 20:51:54 Calib Date: 27-Oct-2017 12:09:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS9\20171026-49584.b\MS9102628.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK001

First Level Reviewer: phanthasena

Date:

12-Dec-2017 12:16:43

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	12.325	12.331	-0.006	91	42216	4.00	
* 2 1,4-Difluorobenzene	114	14.417	14.423	-0.006	97	172750	4.00	
* 3 Chlorobenzene-d5 (IS)	117	20.337	20.331	0.006	92	113188	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	13.499	13.505	-0.006	97	68147	4.10	
\$ 5 Toluene-d8 (Surr)	100	17.575	17.581	-0.006	98	89938	4.08	
\$ 6 4-Bromofluorobenzene (Surr	174	22.259	22.259	0.000	82	47155	3.71	
14 Propene	41	4.300	4.252	0.048	66	896	0.0720	
22 Butane	43	5.024	4.988	0.036	21	916	0.0368	
31 Acetone	43	7.725	7.640	0.085	96	8248	0.3419	
47 Methylene Chloride	49	8.906	8.899	0.007	70	1168	0.0603	
87 2-Hexanone	58	18.408	18.378	0.030	89	831	0.0360	
110 4-Ethyltoluene	120	22.709	22.709	0.000	94	143	0.006668	M
112 Alpha Methyl Styrene	118	23.190	23.178	0.012	87	764	0.0272	
114 tert-Butylbenzene	91	23.269	23.281	-0.012	79	593	0.0137	
115 1,2,4-Trimethylbenzene	120	23.318	23.324	-0.006	88	524	0.0180	
121 4-Isopropyltoluene	119	23.762	23.762	0.000	94	1498	0.0214	
117 1,3-Dichlorobenzene	146	23.859	23.859	0.000	92	1397	0.0422	
120 1,4-Dichlorobenzene	146	23.987	23.987	0.000	89	1531	0.0461	
118 Benzyl chloride	91	24.096	24.096	0.000	93	2611	0.0413	
123 n-Butylbenzene	92	24.303	24.303	0.000	95	1002	0.0270	
122 1,2-Dichlorobenzene	146	24.473	24.473	0.000	91	1759	0.0558	
126 1,2,4-Trichlorobenzene	180	26.706	26.700	0.006	91	3399	0.1292	
127 Naphthalene	128	27.065	27.071	-0.006	97	11785	0.2990	

[QC Flag Legend](#)

Review Flags

M - Manually Integrated

[Reagents:](#)

VAMSIS20_00080

Amount Added: 50.00

Units: mL

Run Reagent

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171211-51603.b\MS9121107.D

Injection Date: 11-Dec-2017 17:26:30

Instrument ID: ATMS9

Operator ID: LHS/GKI

Lims ID: 320-34118-A-1

Lab Sample ID: 320-34118-1

Worklist Smp#: 7

Client ID: 34001065

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

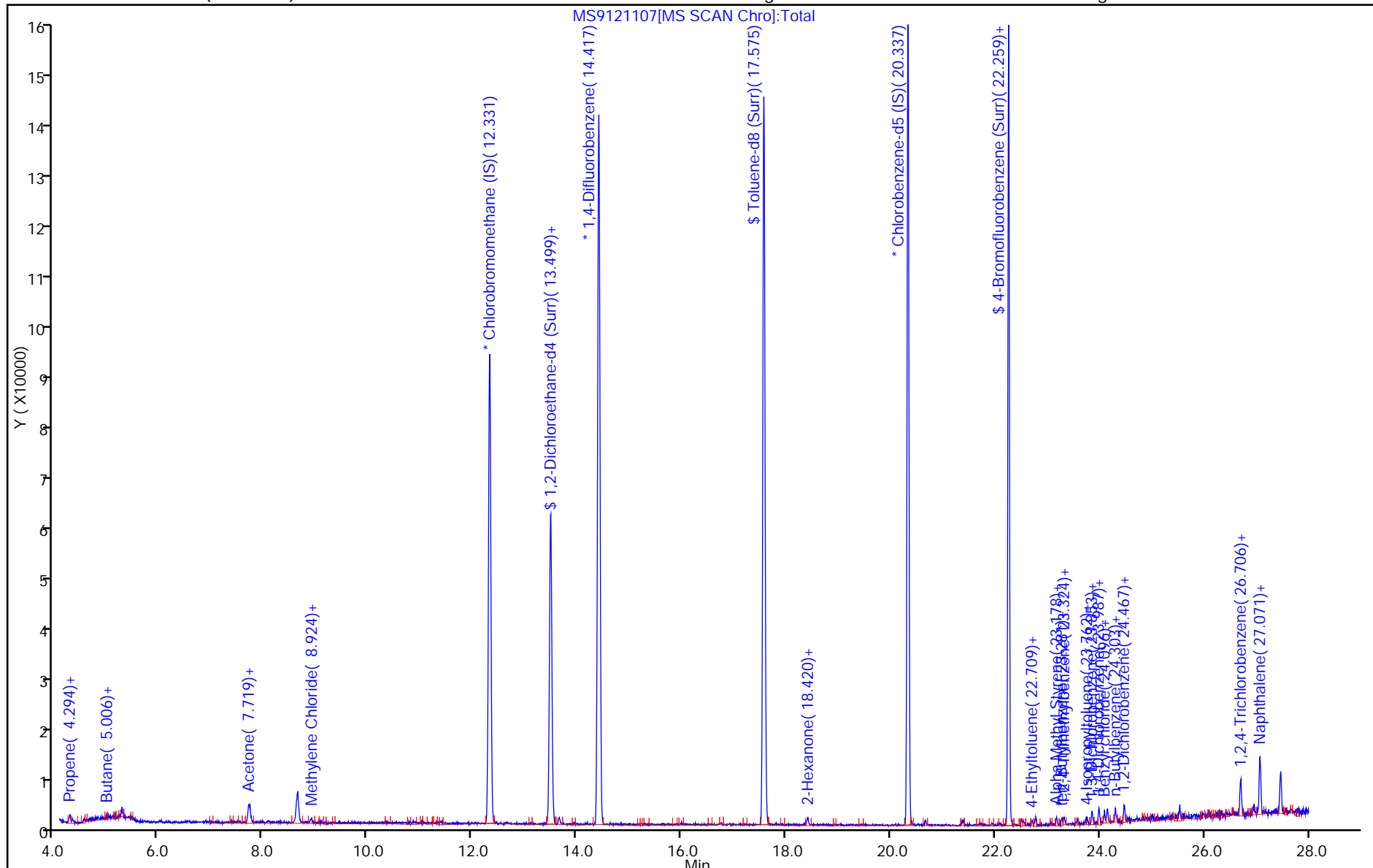
ALS Bottle#: 5

Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Y Scaling: Method Defined: Scale to the Nth Largest Peak: 2



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171211-51603.b\MS9121107.D

Injection Date: 11-Dec-2017 17:26:30

Instrument ID: ATMS9

Lims ID: 320-34118-A-1

Lab Sample ID: 320-34118-1

Client ID: 34001065

Operator ID: LHS/GKI

ALS Bottle#: 5 Worklist Smp#: 7

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

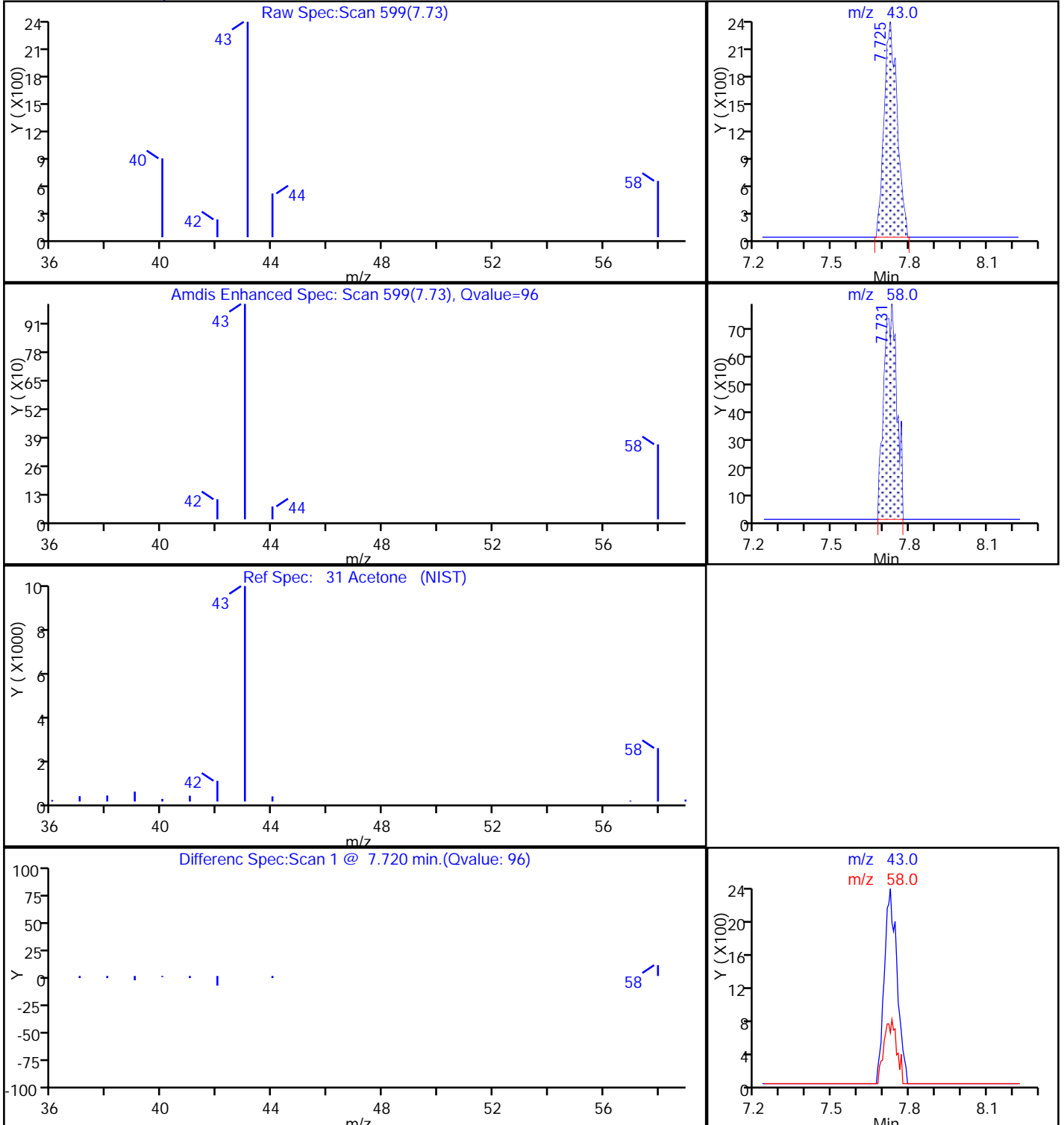
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

31 Acetone, CAS: 67-64-1



TestAmerica Sacramento

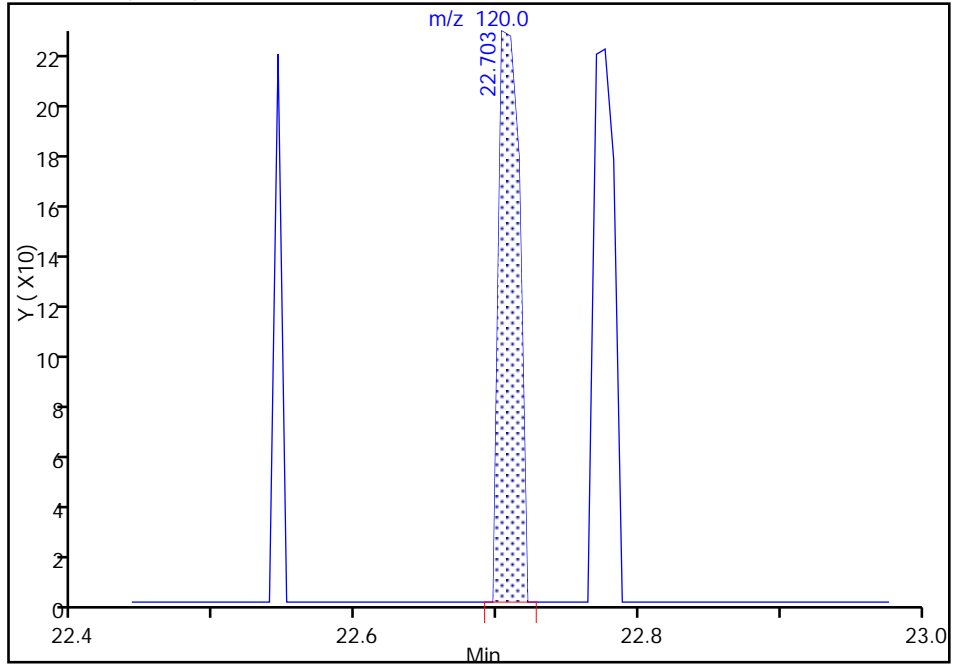
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Injection Date: 11-Dec-2017 17:26:30 Instrument ID: ATMS9
Lims ID: 320-34118-A-1 Lab Sample ID: 320-34118-1
Client ID: 34001065
Operator ID: LHS/GKI ALS Bottle#: 5 Worklist Smp#: 7
Purge Vol: 5.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

110 4-Ethyltoluene, CAS: 622-96-8

Signal: 1

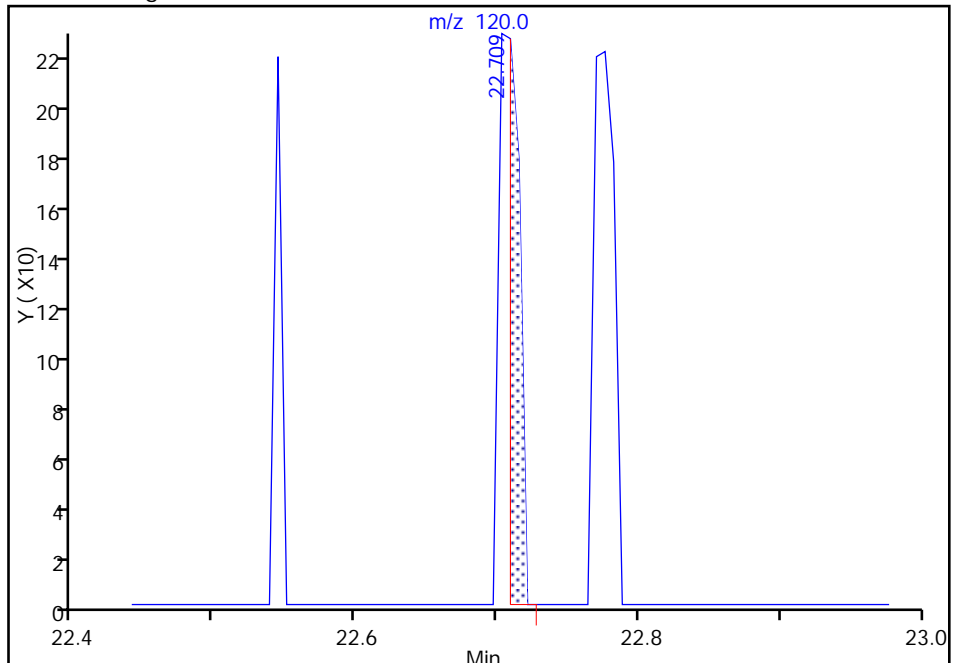
RT: 22.70
Area: 224
Amount: 0.010446
Amount Units: ppb v/v

Processing Integration Results



RT: 22.71
Area: 143
Amount: 0.006668
Amount Units: ppb v/v

Manual Integration Results



Reviewer: iliev, 11-Dec-2017 18:13:04

Audit Action: Split an Integrated Peak

Audit Reason: Shouldering

TestAmerica Sacramento

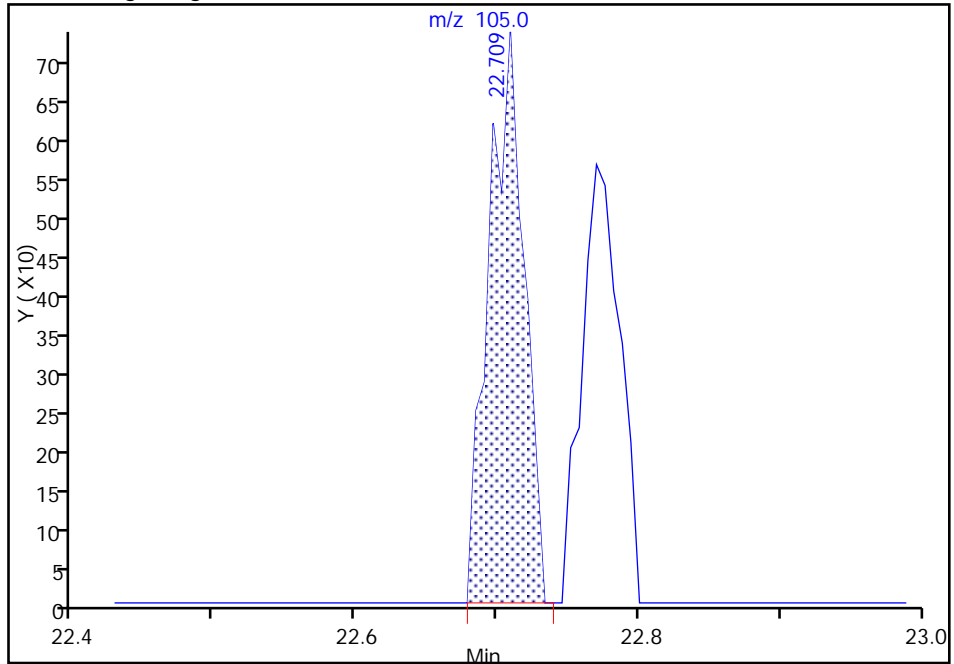
Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171211-51603.b\MS9121107.D
Injection Date: 11-Dec-2017 17:26:30 Instrument ID: ATMS9
Lims ID: 320-34118-A-1 Lab Sample ID: 320-34118-1
Client ID: 34001065
Operator ID: LHS/GKI ALS Bottle#: 5 Worklist Smp#: 7
Purge Vol: 5.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

110 4-Ethyltoluene, CAS: 622-96-8

Signal: 2

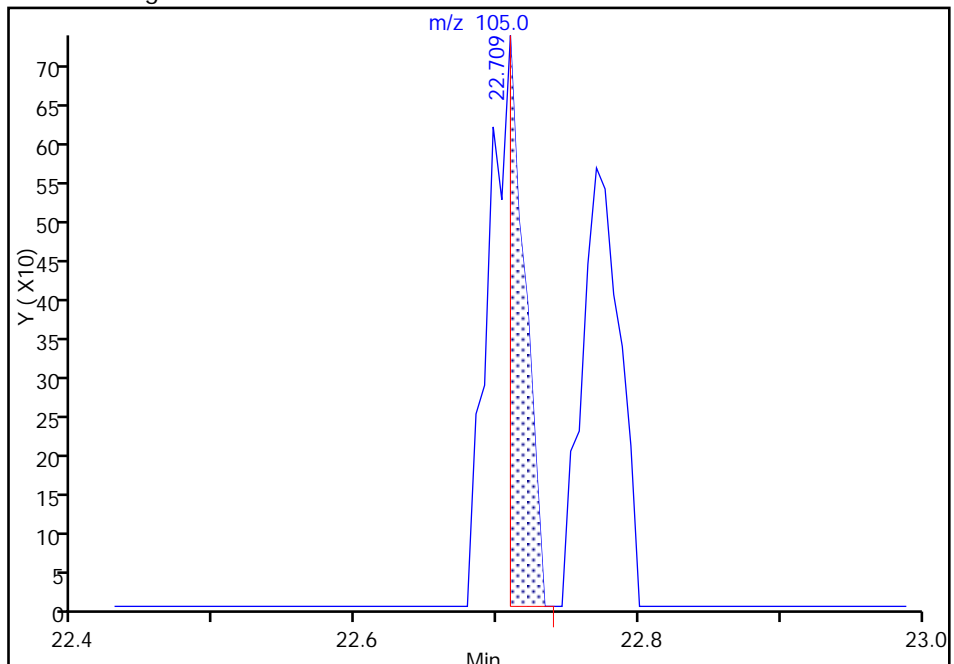
RT: 22.71
Area: 1275
Amount: 0.010446
Amount Units: ppb v/v

Processing Integration Results



RT: 22.71
Area: 663
Amount: 0.006668
Amount Units: ppb v/v

Manual Integration Results



Reviewer: iliev, 11-Dec-2017 18:13:11

Audit Action: Split an Integrated Peak

Audit Reason: Shouldering



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-73804-1

Client Project/Site: Chevron Edmonds Terminal
Revision: 1

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:
1/23/2018 10:35:48 AM

Kim Presley, Project Management Assistant I
(253)922-2310

kim.presley@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Job ID: 580-73804-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-73804-1

Revision 1: January 23, 2018

Per client email 1/22/18, the outfall #2 sample data has been reported separately.

Receipt

Two samples were received on 12/21/2017 1:55 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.2° C.

Receipt Exceptions

The following samples were received in air sample bags: VSP-801 (580-73804-3) and VSP-802 (580-73804-4). In order to extend the holding times, these samples were transferred from the air sample bags into Summa canisters. Sample 3 was transferred on 12/22/17 at 12:22 to canister 34001693. Sample 4 was transferred on 12/22/17 at 12:23 to canister 34001704.

Air - GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA

Method(s) TO-15: 1,2-Dichloroethane-d4 (Surrogate) recovery for the following samples were outside control limits: VSP-801 (580-73804-3), (CCV 320-201429/5), (LCS 320-201429/6) and (LCSD 320-201429/7). This analyte is not use as a monitoring analytes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits

Air - GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Client Sample ID: VSP-801

Lab Sample ID: 580-73804-3

Date Collected: 12/20/17 16:30

Matrix: Air

Date Received: 12/21/17 13:55

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	910		6.2	1.2	ppb v/v			12/27/17 21:56	15.6
Toluene	13		6.2	0.80	ppb v/v			12/27/17 21:56	15.6
m,p-Xylene	1600		12	1.6	ppb v/v			12/27/17 21:56	15.6
o-Xylene	160		6.2	0.84	ppb v/v			12/27/17 21:56	15.6
TPH (as Gasoline)	160000		1600	620	ppb v/v			12/27/17 21:56	15.6

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	113		70 - 130		12/27/17 21:56	15.6
1,2-Dichloroethane-d4 (Surr)	134	X	70 - 130		12/27/17 21:56	15.6
Toluene-d8 (Surr)	100		70 - 130		12/27/17 21:56	15.6

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylbenzene	2500		23	3.7	ppb v/v			12/28/17 09:20	58.5

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130		12/28/17 09:20	58.5
1,2-Dichloroethane-d4 (Surr)	127		70 - 130		12/28/17 09:20	58.5
Toluene-d8 (Surr)	99		70 - 130		12/28/17 09:20	58.5

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.32	J	0.78	0.017	% v/v			12/26/17 10:09	1.56
Methane (FID)	0.0048		0.00047	0.000094	% v/v			12/28/17 09:28	4.68
Oxygen	19		0.31	0.012	% v/v			12/26/17 10:09	1.56

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Client Sample ID: VSP-802

Lab Sample ID: 580-73804-4

Date Collected: 12/20/17 16:45

Matrix: Air

Date Received: 12/21/17 13:55

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.67		0.40	0.079	ppb v/v			12/27/17 22:47	1
Ethylbenzene	8.2		0.40	0.063	ppb v/v			12/27/17 22:47	1
Toluene	0.60		0.40	0.051	ppb v/v			12/27/17 22:47	1
m,p-Xylene	8.6		0.80	0.10	ppb v/v			12/27/17 22:47	1
o-Xylene	1.2		0.40	0.054	ppb v/v			12/27/17 22:47	1
TPH (as Gasoline)	600		100	40	ppb v/v			12/27/17 22:47	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		12/27/17 22:47	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 130		12/27/17 22:47	1
Toluene-d8 (Surr)	100		70 - 130		12/27/17 22:47	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.43	J	0.74	0.016	% v/v			12/26/17 10:21	1.47
Methane (FID)	0.0033		0.00026	0.000052	% v/v			12/28/17 09:49	2.58
Oxygen	19		0.29	0.011	% v/v			12/26/17 10:21	1.47

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-201429/10
Matrix: Air
Analysis Batch: 201429

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			12/27/17 18:05	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			12/27/17 18:05	1
Toluene	ND		0.40	0.051	ppb v/v			12/27/17 18:05	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			12/27/17 18:05	1
o-Xylene	ND		0.40	0.054	ppb v/v			12/27/17 18:05	1
TPH (as Gasoline)	ND		100	40	ppb v/v			12/27/17 18:05	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		12/27/17 18:05	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		12/27/17 18:05	1
Toluene-d8 (Surr)	97		70 - 130		12/27/17 18:05	1

Lab Sample ID: LCS 320-201429/3
Matrix: Air
Analysis Batch: 201429

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	17.6		ppb v/v		88	68 - 128
Ethylbenzene	20.0	19.4		ppb v/v		97	64 - 124
Toluene	20.0	18.0		ppb v/v		90	68 - 128
m,p-Xylene	40.0	39.3		ppb v/v		98	65 - 125
o-Xylene	20.0	19.9		ppb v/v		100	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	106		70 - 130
1,2-Dichloroethane-d4 (Surr)	109		70 - 130
Toluene-d8 (Surr)	103		70 - 130

Lab Sample ID: LCS 320-201429/6
Matrix: Air
Analysis Batch: 201429

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	5000	4840		ppb v/v		97	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	118		70 - 130
1,2-Dichloroethane-d4 (Surr)	146	X	70 - 130
Toluene-d8 (Surr)	106		70 - 130

Lab Sample ID: LCSD 320-201429/4
Matrix: Air
Analysis Batch: 201429

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	14.2		ppb v/v		71	68 - 128	21	25
Ethylbenzene	20.0	16.5		ppb v/v		82	64 - 124	16	25

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-201429/4
Matrix: Air
Analysis Batch: 201429

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Toluene	20.0	15.0		ppb v/v		75	68 - 128	18	25
m,p-Xylene	40.0	33.4		ppb v/v		84	65 - 125	16	25
o-Xylene	20.0	17.0		ppb v/v		85	65 - 125	16	25

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	107		70 - 130
1,2-Dichloroethane-d4 (Surr)	110		70 - 130
Toluene-d8 (Surr)	101		70 - 130

Lab Sample ID: LCSD 320-201429/7
Matrix: Air
Analysis Batch: 201429

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	5000	4520		ppb v/v		90	70 - 130	7	25

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	115		70 - 130
1,2-Dichloroethane-d4 (Surr)	139	X	70 - 130
Toluene-d8 (Surr)	106		70 - 130

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-201255/11
Matrix: Air
Analysis Batch: 201255

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			12/26/17 09:38	1
Methane (TCD)	ND		0.50	0.14	% v/v			12/26/17 09:38	1
Oxygen	ND		0.20	0.0074	% v/v			12/26/17 09:38	1

Lab Sample ID: LCS 320-201255/2
Matrix: Air
Analysis Batch: 201255

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon Dioxide (TCD)	24.4	26.1		% v/v		107	80 - 120
Methane (TCD)	26.1	28.6		% v/v		109	80 - 120

Lab Sample ID: LCS 320-201255/5
Matrix: Air
Analysis Batch: 201255

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oxygen	15.7	13.8		% v/v		88	80 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: LCSD 320-201255/3
Matrix: Air
Analysis Batch: 201255

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	24.4	26.2		% v/v		107	80 - 120	0	20
Methane (TCD)	26.1	28.7		% v/v		110	80 - 120	1	20

Lab Sample ID: LCSD 320-201255/6
Matrix: Air
Analysis Batch: 201255

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	15.7	13.7		% v/v		87	80 - 120	1	20

Lab Sample ID: MB 320-201585/5
Matrix: Air
Analysis Batch: 201585

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.00010	0.000020	% v/v			12/28/17 09:14	1

Lab Sample ID: LCS 320-201585/2
Matrix: Air
Analysis Batch: 201585

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0225		% v/v		90	80 - 120		

Lab Sample ID: LCSD 320-201585/3
Matrix: Air
Analysis Batch: 201585

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0230		% v/v		92	80 - 120	2	20

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Client Sample ID: VSP-801

Date Collected: 12/20/17 16:30

Date Received: 12/21/17 13:55

Lab Sample ID: 580-73804-3

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		15.6	201429	12/27/17 21:56	AP1	TAL SAC
Total/NA	Analysis	TO-15	DL	58.5	201429	12/28/17 09:20	AP1	TAL SAC
Total/NA	Analysis	D1946		4.68	201585	12/28/17 09:28	EMJ	TAL SAC
Total/NA	Analysis	D1946		1.56	201255	12/26/17 10:09	EMJ	TAL SAC

Client Sample ID: VSP-802

Date Collected: 12/20/17 16:45

Date Received: 12/21/17 13:55

Lab Sample ID: 580-73804-4

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	201429	12/27/17 22:47	AP1	TAL SAC
Total/NA	Analysis	D1946		2.58	201585	12/28/17 09:49	EMJ	TAL SAC
Total/NA	Analysis	D1946		1.47	201255	12/26/17 10:21	EMJ	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-28-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-73804-3	VSP-801	Air	12/20/17 16:30	12/21/17 13:55
580-73804-4	VSP-802	Air	12/20/17 16:45	12/21/17 13:55

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73804-1

Login Number: 73804

List Source: TestAmerica Seattle

List Number: 1

Creator: Gall, Brandon A

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73804-1

Login Number: 73804
List Number: 2
Creator: James, Emily M

List Source: TestAmerica Sacramento
List Creation: 12/22/17 12:28 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	247001
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

JOB # **580-73804**
Sample # **3**

Client/Project:		VFR ID:	
Canister Serial #:	34001693	Duration:	<input type="checkbox"/> Hrs <input type="checkbox"/> Min
Cleaning Job:		Flow:	mL/min
Client ID:		Initials:	
Site Location:			

FIELD				
READING	TIME	PRESS.	DATE	INITIALS
INITIAL FIELD VACUUM				
FINAL FIELD READING				

LABORATORY				
READING	PRESS.	DATE	INITIALS	
INITIAL VACUUM CHECK (INCHES Hg)	29.8		JMT	
<input type="checkbox"/> Helium Pre-dilution - Final Pressure (INCHES Hg)				
INITIAL PRESSURE (PSIA)	14.48	12/26/17	EJ	
FINAL PRESSURE (PSIA)	22.58	12/26/17	EJ	
Pressurization Gas: <input type="checkbox"/> N2 <input type="checkbox"/> He	SCREENED <input type="checkbox"/>	SCRN DIL. VS 250mLs:		
Initial Canister Dilution Factor =	1.56			

CANISTER REPRESSURIZATION					
Date	Pi (PSIA)	Pf (PSIA)	Initial DF	Initials	NEW DF
12/27/17	14.70	44.10	1.56	SV	4.68
			4.68		#DIV/0!
			#DIV/0!		#DIV/0!

Analytical Dilution Factors									
	Date	Instr.	File #						
Canister DF = 1.56	12/27/2017	ATMS2		X	Load DF = 10	X	Bag DF = 1	=	FINAL DF 15.59392265
					250		BVf (mLs)		
					25		Bvi (mLs)		
Canister DF = 1.56	12/28/2017	ATMS2		X	Load DF = 12.5	X	Bag DF = 3	=	FINAL DF 58.4720994
					LVf (mLs) 250		BVf (mLs) 3		
					LVi (mLs) 20		Bvi (mLs) 1		
Canister DF = 1.56				X	Load DF = #DIV/0!	X	Bag DF = 1	=	FINAL DF #DIV/0!
					LVf (mLs)		BVf (mLs)		
					LVi (mLs)		Bvi (mLs)		



JOB # **580-73804**
Sample # **4**

Client/Project:		VFR ID:	
Canister Serial #:	34001704	Duration:	<input type="checkbox"/> Hrs <input type="checkbox"/> Min
Cleaning Job:		Flow:	mL/min
Client ID:		Initials:	
Site Location:			

FIELD				
READING	TIME	PRESS.	DATE	INITIALS
INITIAL FIELD VACUUM				
FINAL FIELD READING				

LABORATORY				
READING	PRESS.	DATE	INITIALS	
INITIAL VACUUM CHECK (INCHES Hg)	29.8		JMT	
<input type="checkbox"/> Helium Pre-dilution - Final Pressure (INCHES Hg)				
INITIAL PRESSURE (PSIA)	14.44	12/26/17	EJ	
FINAL PRESSURE (PSIA)	21.27	12/26/17	EJ	
Pressurization Gas: <input type="checkbox"/> N2 <input type="checkbox"/> He	SCREENED <input type="checkbox"/>	SCRN DIL. VS 250mLs:		
Initial Canister Dilution Factor =	1.47			

CANISTER REPRESSURIZATION					
Date	Pi (PSIA)	Pf (PSIA)	Initial DF	Initials	NEW DF
12/28/17	12.15	21.25	1.47	EJ	2.58
			2.58		#DIV/0!
			#DIV/0!		#DIV/0!

Analytical Dilution Factors						
	Date	Instr.	File #			
Canister DF =	12/27/2017	ATMS2				
1.47				X	Load DF =	0.6849315
						250
						365
					Bag DF =	1
					BVf (mLs)	
					Bvi (mLs)	
					=	1.008898418
					FINAL DF	
Canister DF =					Load DF =	#DIV/0!
1.47				X	LVf (mLs)	
					LVi (mLs)	
					Bag DF =	1
					BVf (mLs)	
					Bvi (mLs)	
					=	#DIV/0!
					FINAL DF	
Canister DF =					Load DF =	#DIV/0!
1.47				X	LVf (mLs)	
					LVi (mLs)	
					Bag DF =	1
					BVf (mLs)	
					Bvi (mLs)	
					=	#DIV/0!
					FINAL DF	



Airbill Here

2 Tedlar Bags. 1L



580-73804 Field Sheet

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Sample Receiver

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations:
File in the job folder with the COC.

Notes: <u>P.O.</u>	Cooler Custody Seal: <u>Yes, 247001</u>
<u>4156 3209 4525</u>	# Bags: <u>2</u> 1L, <u> </u> 2L, <u> </u> 10L
	# Canisters: <u> </u> 1L, <u> </u> 6L, TA <input type="checkbox"/> Non TA <input type="checkbox"/>
	Transferred by Sacramento - Yes <input type="checkbox"/> No <input type="checkbox"/>
	# Canisters Unused: <u> </u> 1L, <u> </u> 6L
	# Flow Regulators: <u> </u> , # Gauges: <u> </u>
	Co-locator <u> </u>
	Initial & Date <u>ET 12/22/17</u>

Date Cleaned/Batch ID 12-12-17 320-34257
 Date of QC 12/15/2017
 Data File Number C:\msdchem\1\DATA\171215\MS9121516.d
 (File ID for certification analysis of canister designated below)



320-34257 Chain of Custody

CANISTER ID NUMBERS

*	34001771
	34001869
	34001865
	34001803
	34001881
	34001958
	34001704
	34001840

	7509
	34001754
	34001857
	34001866
	34001929
	34001908
	34001693
	34001902

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

[Signature]
1st level Reviewed By:

12/18/17
Date:

[Signature]
2nd level Reviewed By:

12/19/17
Date:

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34257-1
 SDG No.: _____
 Client Sample ID: 34001771 Lab Sample ID: 320-34257-1
 Matrix: Air Lab File ID: MS9121516.D
 Analysis Method: TO-15 Date Collected: 12/12/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/16/2017 02:15
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 200130 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.81	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	0.53	J	0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34257-1
 SDG No.: _____
 Client Sample ID: 34001771 Lab Sample ID: 320-34257-1
 Matrix: Air Lab File ID: MS9121516.D
 Analysis Method: TO-15 Date Collected: 12/12/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/16/2017 02:15
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 200130 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	0.15	J	0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34257-1
 SDG No.: _____
 Client Sample ID: 34001771 Lab Sample ID: 320-34257-1
 Matrix: Air Lab File ID: MS9121516.D
 Analysis Method: TO-15 Date Collected: 12/12/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/16/2017 02:15
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 200130 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	93		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	107		70-130
2037-26-5	Toluene-d8 (Surr)	103		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171215-51808.b\MS9121516.D
 Lims ID: 320-34257-A-1
 Client ID: 34001771
 Sample Type: Client
 Inject. Date: 16-Dec-2017 02:15:30 ALS Bottle#: 13 Worklist Smp#: 16
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Sample Info: 320-34257-A-1
 Misc. Info.: 500 mL CAN CERT
 Operator ID: LHS/GKI Instrument ID: ATMS9
 Method: \\ChromNA\Sacramento\ChromData\ATMS9\20171215-51808.b\TO15_ATMS9N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 18-Dec-2017 13:02:17 Calib Date: 27-Oct-2017 12:09:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS9\20171026-49584.b\MS9102628.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK005

First Level Reviewer: phanthasena

Date: 18-Dec-2017 13:02:17

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	12.325	12.331	-0.006	91	34016	4.00	
* 2 1,4-Difluorobenzene	114	14.411	14.417	-0.006	97	146626	4.00	
* 3 Chlorobenzene-d5 (IS)	117	20.337	20.337	0.001	94	97872	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	13.486	13.499	-0.013	96	57476	4.29	
\$ 5 Toluene-d8 (Surr)	100	17.575	17.575	0.000	97	76860	4.11	
\$ 6 4-Bromofluorobenzene (Surr	174	22.259	22.265	-0.006	81	41026	3.73	
14 Propene	41	4.270	4.245	0.025	49	1535	0.1531	
15 Dichlorodifluoromethane	85	4.331	4.318	0.019	35	787	0.0362	
31 Acetone	43	7.707	7.640	0.067	96	15807	0.8133	
48 Carbon disulfide	76	8.942	8.948	-0.006	99	13761	0.5256	
68 Benzene	78	13.809	13.815	-0.006	91	2447	0.0758	
85 Toluene	91	17.721	17.733	-0.012	18	1222	0.0303	
121 4-Isopropyltoluene	119	23.768	23.761	0.007	96	3610	0.0595	

Reagents:

VAMSIS20_00080 Amount Added: 50.00 Units: mL Run Reagent

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171215-51808.b\MS9121516.D

Injection Date: 16-Dec-2017 02:15:30

Instrument ID: ATMS9

Operator ID: LHS/GKI

Lims ID: 320-34257-A-1

Lab Sample ID: 320-34257-1

Worklist Smp#: 16

Client ID: 34001771

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

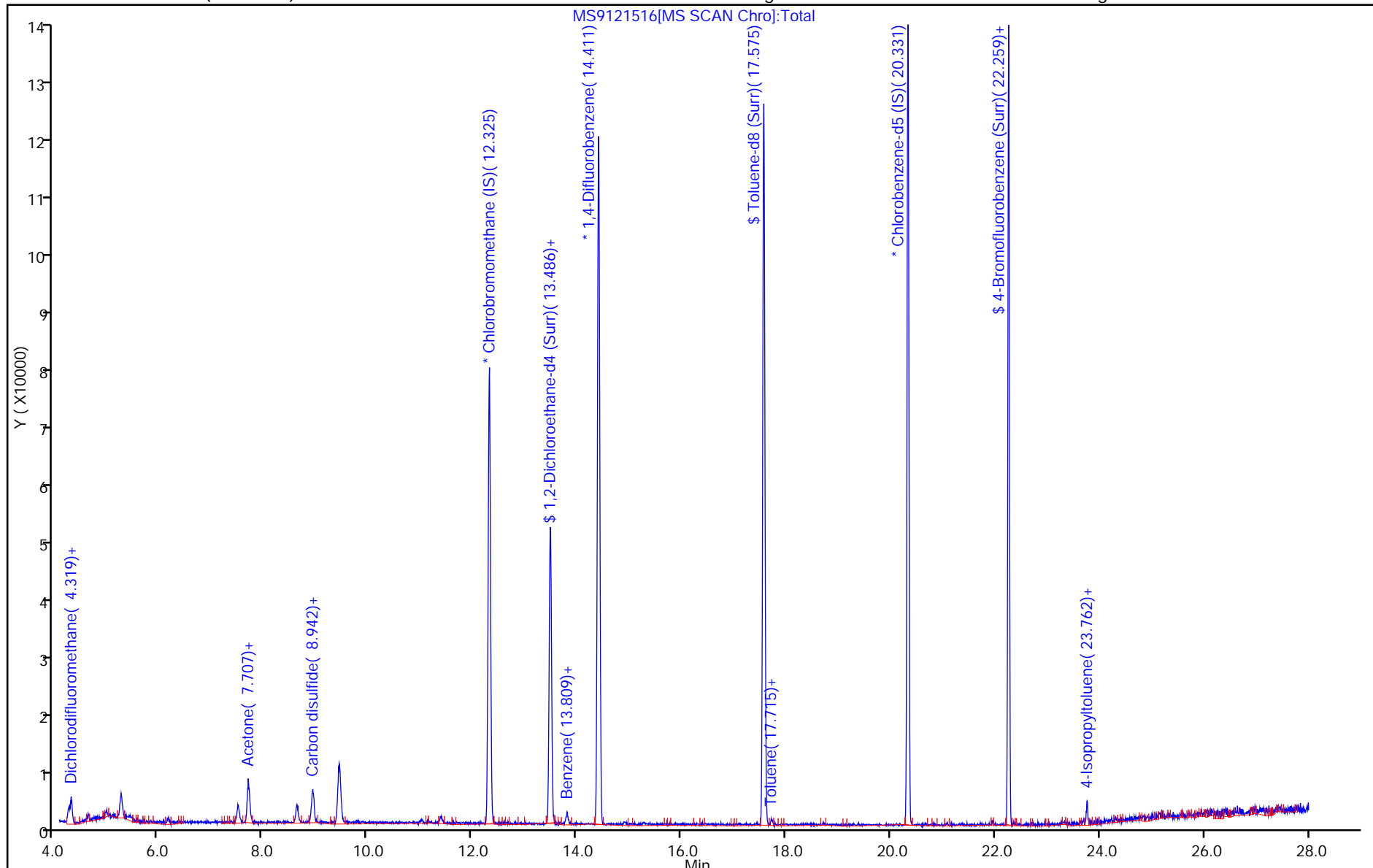
ALS Bottle#: 13

Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Y Scaling: Method Defined: Scale to the Nth Largest Peak: 2



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171215-51808.b\MS9121516.D

Injection Date: 16-Dec-2017 02:15:30

Instrument ID: ATMS9

Lims ID: 320-34257-A-1

Lab Sample ID: 320-34257-1

Client ID: 34001771

Operator ID: LHS/GKI

ALS Bottle#: 13

Worklist Smp#: 16

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

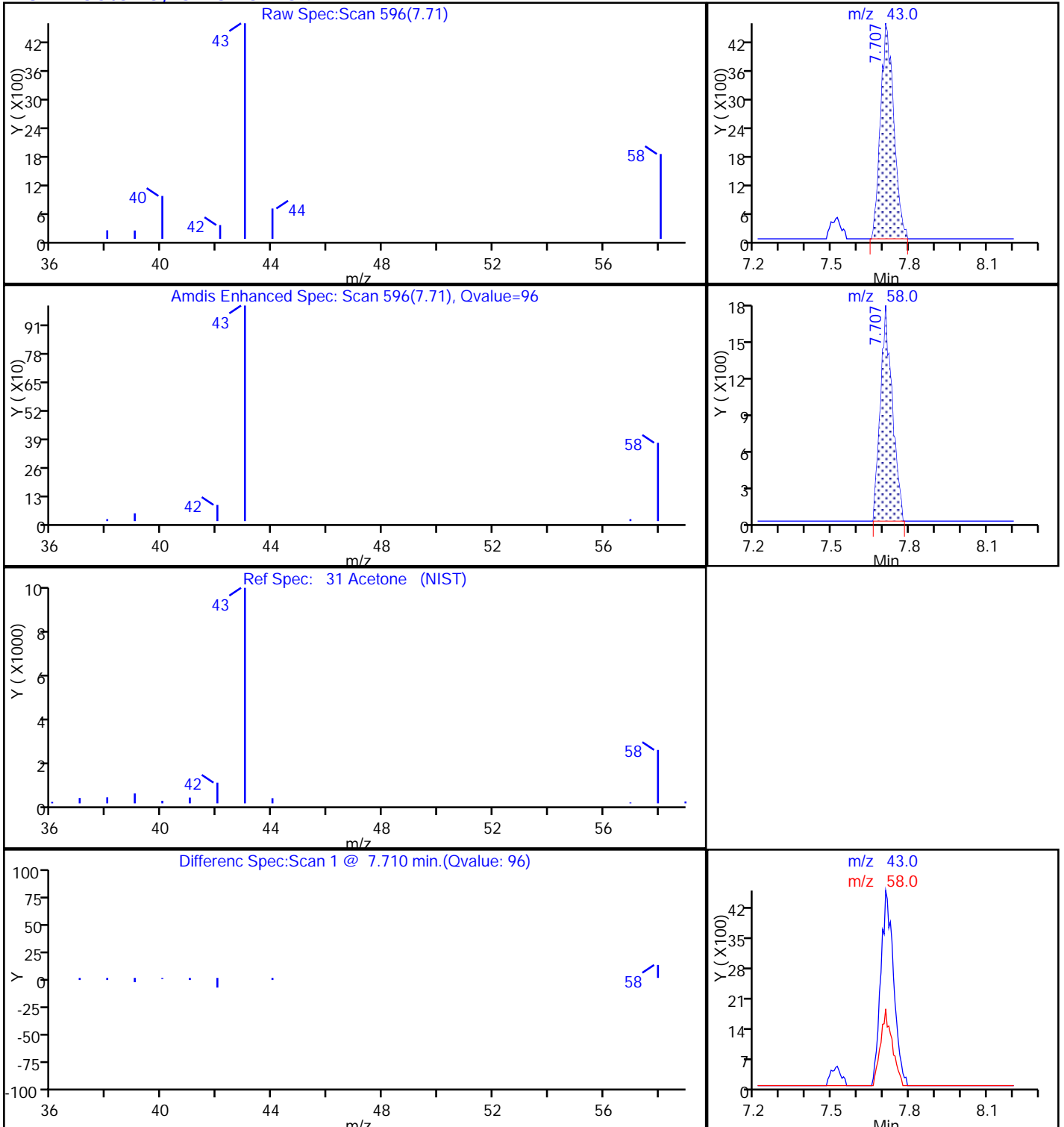
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

31 Acetone, CAS: 67-64-1



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171215-51808.b\MS9121516.D

Injection Date: 16-Dec-2017 02:15:30

Instrument ID: ATMS9

Lims ID: 320-34257-A-1

Lab Sample ID: 320-34257-1

Client ID: 34001771

Operator ID: LHS/GKI

ALS Bottle#: 13

Worklist Smp#: 16

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

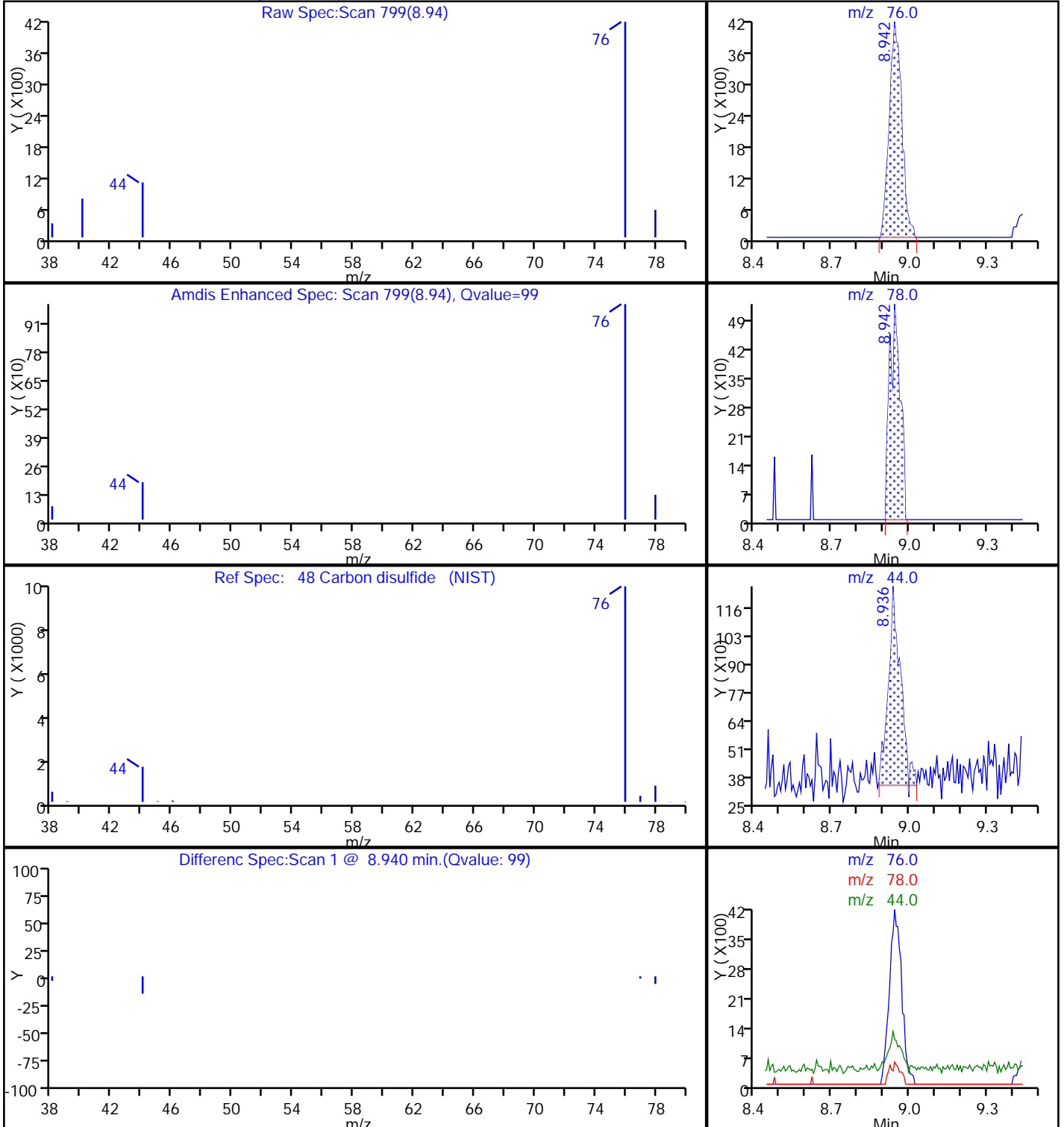
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

48 Carbon disulfide, CAS: 75-15-0



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20171215-51808.b\MS9121516.D

Injection Date: 16-Dec-2017 02:15:30

Instrument ID: ATMS9

Lims ID: 320-34257-A-1

Lab Sample ID: 320-34257-1

Client ID: 34001771

Operator ID: LHS/GKI

ALS Bottle#: 13 Worklist Smp#: 16

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

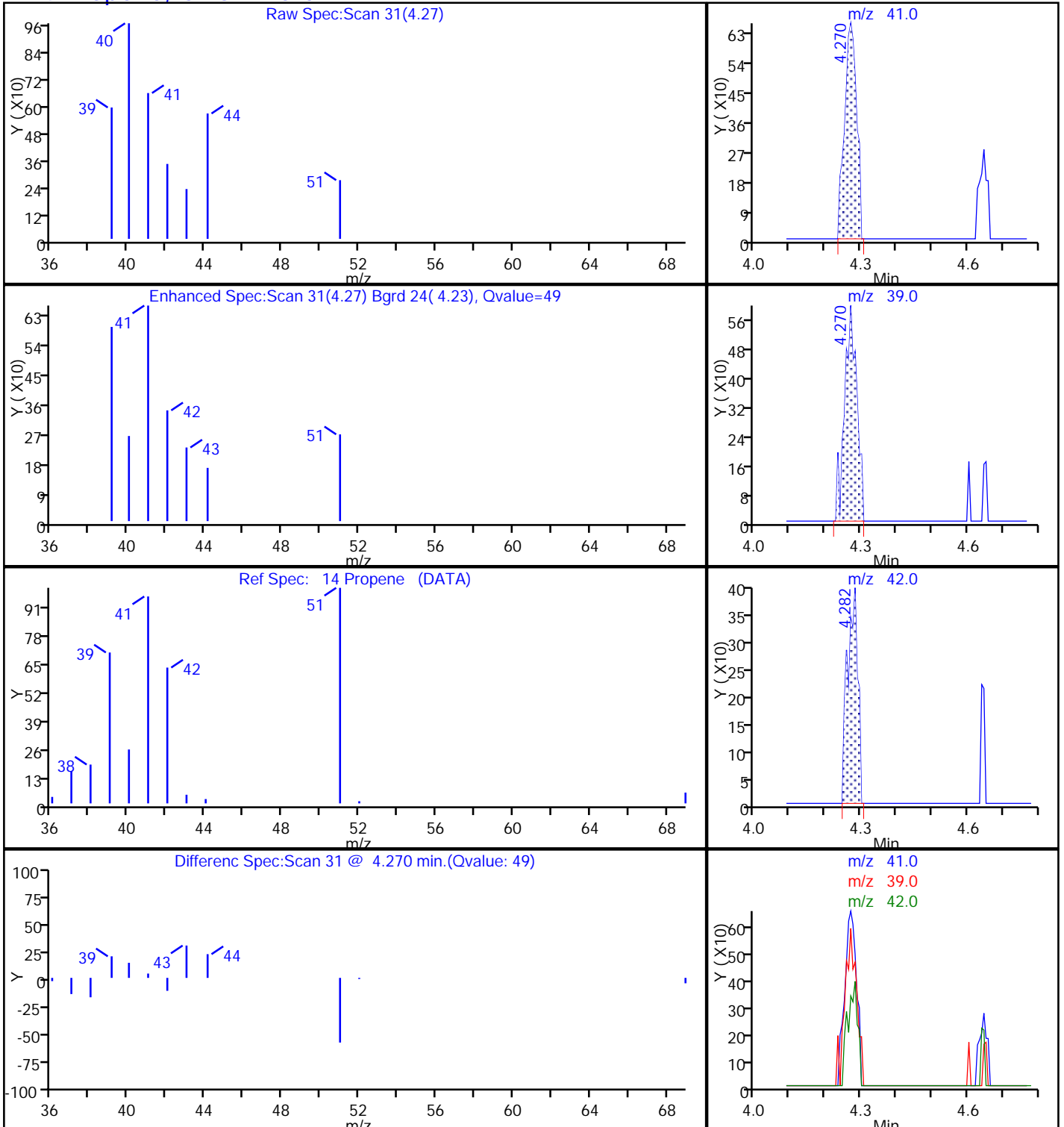
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

14 Propene, CAS: 115-07-1



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-73946-1

Client Project/Site: Edmonds Terminal
Revision: 1

For:

ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles



Authorized for release by:

1/23/2018 11:12:58 AM

Kim Presley, Project Management Assistant I
(253)922-2310

kim.presley@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972

elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Job ID: 580-73946-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-73946-1

Revision 1: January 23, 2018

Per client email 1/22/18, the outfall #2 sample data has been reported separately.

Receipt

Two samples were received on 12/28/2017 2:55 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was -0.4° C.

Receipt Exceptions

The following samples were received in air sample bags: VSP-801 (580-73946-3) and VSP-802 (580-73946-4). EPA Method TO-15 describes the use of canisters for sampling and analysis, therefore, the use of air sample bags constitutes a modification to the method. In order to extend the holding times, these samples were transferred: VSP-801 (580-73946-3) was transferred from the air sample bag into 1L Summa canister #34001768 at 16:27 on 12/29/2017, and VSP-802 (580-73946-4) was transferred from the air sample bag into 1L Summa canister #34001930 at 16:29 on 12/29/2017.

Air - GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA

Method(s) TO-15: 1,2-Dichloroethane-d4 (Surrogate) recovery for the following sample was outside control limits: VSP-801 (580-73946-3). This analyte is not use as a monitoring analyte.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits
E	Result exceeded calibration range.

Air - GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Client Sample ID: VSP-801

Lab Sample ID: 580-73946-3

Date Collected: 12/28/17 11:20

Matrix: Air

Date Received: 12/28/17 14:55

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	480		7.5	1.5	ppb v/v			01/04/18 00:47	18.78
Ethylbenzene	1300	E	7.5	1.2	ppb v/v			01/04/18 00:47	18.78
Toluene	8.1		7.5	0.96	ppb v/v			01/04/18 00:47	18.78
m,p-Xylene	1100		15	1.9	ppb v/v			01/04/18 00:47	18.78
o-Xylene	110		7.5	1.0	ppb v/v			01/04/18 00:47	18.78
TPH (as Gasoline)	100000		1900	750	ppb v/v			01/04/18 00:47	18.78

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	110		70 - 130		01/04/18 00:47	18.78
1,2-Dichloroethane-d4 (Surr)	165	X	70 - 130		01/04/18 00:47	18.78
Toluene-d8 (Surr)	101		70 - 130		01/04/18 00:47	18.78

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.39	J	0.73	0.016	% v/v			01/02/18 13:25	1.45
Methane (FID)	0.0076		0.00015	0.000029	% v/v			01/03/18 09:30	1.45
Oxygen	18		0.29	0.011	% v/v			01/02/18 13:25	1.45

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Client Sample ID: VSP-802

Lab Sample ID: 580-73946-4

Date Collected: 12/28/17 11:15

Matrix: Air

Date Received: 12/28/17 14:55

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.58		0.40	0.079	ppb v/v			01/04/18 01:38	1
Ethylbenzene	5.7		0.40	0.063	ppb v/v			01/04/18 01:38	1
Toluene	1.4		0.40	0.051	ppb v/v			01/04/18 01:38	1
m,p-Xylene	7.8		0.80	0.10	ppb v/v			01/04/18 01:38	1
o-Xylene	1.5		0.40	0.054	ppb v/v			01/04/18 01:38	1
TPH (as Gasoline)	180		100	40	ppb v/v			01/04/18 01:38	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		01/04/18 01:38	1
1,2-Dichloroethane-d4 (Surr)	96		70 - 130		01/04/18 01:38	1
Toluene-d8 (Surr)	104		70 - 130		01/04/18 01:38	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.45	J	0.73	0.016	% v/v			01/02/18 13:40	1.46
Methane (FID)	0.0087		0.00015	0.000029	% v/v			01/03/18 09:45	1.46
Oxygen	18		0.29	0.011	% v/v			01/02/18 13:40	1.46

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-202269/13

Matrix: Air

Analysis Batch: 202269

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			01/03/18 18:39	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			01/03/18 18:39	1
Toluene	ND		0.40	0.051	ppb v/v			01/03/18 18:39	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			01/03/18 18:39	1
o-Xylene	ND		0.40	0.054	ppb v/v			01/03/18 18:39	1
TPH (as Gasoline)	ND		100	40	ppb v/v			01/03/18 18:39	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		01/03/18 18:39	1
1,2-Dichloroethane-d4 (Surr)	91		70 - 130		01/03/18 18:39	1
Toluene-d8 (Surr)	101		70 - 130		01/03/18 18:39	1

Lab Sample ID: LCS 320-202269/3

Matrix: Air

Analysis Batch: 202269

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	19.8		ppb v/v		99	68 - 128
Ethylbenzene	20.0	20.5		ppb v/v		103	64 - 124
Toluene	20.0	18.7		ppb v/v		93	68 - 128
m,p-Xylene	40.0	41.5		ppb v/v		104	65 - 125
o-Xylene	20.0	21.1		ppb v/v		106	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	113		70 - 130
1,2-Dichloroethane-d4 (Surr)	100		70 - 130
Toluene-d8 (Surr)	101		70 - 130

Lab Sample ID: LCS 320-202269/9

Matrix: Air

Analysis Batch: 202269

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	5000	4320		ppb v/v		86	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	108		70 - 130
1,2-Dichloroethane-d4 (Surr)	129		70 - 130
Toluene-d8 (Surr)	105		70 - 130

Lab Sample ID: LCSD 320-202269/10

Matrix: Air

Analysis Batch: 202269

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	5000	4430		ppb v/v		89	70 - 130	2	25

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-202269/10
Matrix: Air
Analysis Batch: 202269

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCS	LCS	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	105		70 - 130
1,2-Dichloroethane-d4 (Surr)	124		70 - 130
Toluene-d8 (Surr)	102		70 - 130

Lab Sample ID: LCSD 320-202269/4
Matrix: Air
Analysis Batch: 202269

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
		Result	Qualifier						
Benzene	20.0	21.3		ppb v/v		107	68 - 128	7	25
Ethylbenzene	20.0	22.4		ppb v/v		112	64 - 124	9	25
Toluene	20.0	21.0		ppb v/v		105	68 - 128	12	25
m,p-Xylene	40.0	45.4		ppb v/v		114	65 - 125	9	25
o-Xylene	20.0	22.9		ppb v/v		114	65 - 125	8	25

Surrogate	LCS	LCS	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	108		70 - 130
1,2-Dichloroethane-d4 (Surr)	97		70 - 130
Toluene-d8 (Surr)	106		70 - 130

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-202122/8
Matrix: Air
Analysis Batch: 202122

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			01/02/18 12:28	1
Methane (TCD)	ND		0.50	0.14	% v/v			01/02/18 12:28	1
Oxygen	ND		0.20	0.0074	% v/v			01/02/18 12:28	1

Lab Sample ID: LCS 320-202122/2
Matrix: Air
Analysis Batch: 202122

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Carbon Dioxide (TCD)	24.4	26.2		% v/v		107	80 - 120
Methane (TCD)	26.1	28.7		% v/v		110	80 - 120

Lab Sample ID: LCS 320-202122/5
Matrix: Air
Analysis Batch: 202122

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Oxygen	15.7	13.7		% v/v		87	80 - 120

TestAmerica Seattle

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: LCSD 320-202122/3
Matrix: Air
Analysis Batch: 202122

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	24.4	26.1		% v/v		107	80 - 120	0	20
Methane (TCD)	26.1	28.6		% v/v		109	80 - 120	0	20

Lab Sample ID: LCSD 320-202122/6
Matrix: Air
Analysis Batch: 202122

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	15.7	13.7		% v/v		87	80 - 120	0	20

Lab Sample ID: MB 320-202244/5
Matrix: Air
Analysis Batch: 202244

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.00010	0.000020	% v/v			01/03/18 09:17	1

Lab Sample ID: LCS 320-202244/2
Matrix: Air
Analysis Batch: 202244

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0235		% v/v		94	80 - 120		

Lab Sample ID: LCSD 320-202244/3
Matrix: Air
Analysis Batch: 202244

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0234		% v/v		94	80 - 120	1	20

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Client Sample ID: VSP-801

Date Collected: 12/28/17 11:20

Date Received: 12/28/17 14:55

Lab Sample ID: 580-73946-3

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		18.78	202269	01/04/18 00:47	AP1	TAL SAC
Total/NA	Analysis	D1946		1.45	202244	01/03/18 09:30	EMJ	TAL SAC
Total/NA	Analysis	D1946		1.45	202122	01/02/18 13:25	EMJ	TAL SAC

Client Sample ID: VSP-802

Date Collected: 12/28/17 11:15

Date Received: 12/28/17 14:55

Lab Sample ID: 580-73946-4

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	202269	01/04/18 01:38	AP1	TAL SAC
Total/NA	Analysis	D1946		1.46	202244	01/03/18 09:45	EMJ	TAL SAC
Total/NA	Analysis	D1946		1.46	202122	01/02/18 13:40	EMJ	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	01-31-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-73946-3	VSP-801	Air	12/28/17 11:20	12/28/17 14:55
580-73946-4	VSP-802	Air	12/28/17 11:15	12/28/17 14:55

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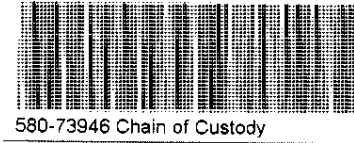
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Client: Arcadis Client Contact: Peter Campbell Date: 12/28/17 Chain of Custody Number: 36552
 Address: 1100 Olive Way Ste 80 Telephone Number (Area Code)/Fax Number: 206-910-0217 Lab Number: 73946 Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jan Littel Lab Contact: Elaine
 Project Name and Location (State): Edmonds terminal Billing Contact: _____ Analysis (Attach list if more space is needed):
Bengal EPA 624
GRO (MTH-6x)
DAG/HO (NMT-6x VIST)
CIAH
DTEX (EPA 821)
petroleum 70-B
5-ppt gpl (aristol)

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives										Special Instructions/ Conditions of Receipt									
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	Tedlo	Bengal EPA 624	GRO (MTH-6x)	DAG/HO (NMT-6x VIST)		CIAH	DTEX (EPA 821)	petroleum 70-B	5-ppt gpl (aristol)					
<u>OUT Fall #002</u>	<u>12/28/17</u>	<u>1020</u>		<input checked="" type="checkbox"/>			<u>2</u>			<u>8</u>							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<u>Any questions call Peter Campbell.</u>
<u>Trip Blank</u>				<input checked="" type="checkbox"/>			<u>0</u>			<u>6</u>							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<u>PID - 137.6</u>	
<u>VSP-801</u>	<u>12/28/17</u>	<u>1120</u>		<input checked="" type="checkbox"/>										<u>1</u>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<u>PID - 0.3</u>	
<u>VSP-802</u>	<u>12/28/17</u>	<u>1115</u>		<input checked="" type="checkbox"/>										<u>1</u>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			



Therm. ID: AZ Cor: 0.4 Unc: 0.5
 Cooler Disc: See Red @Lab: _____
 Wet/Packs Packing: Bubble
 Custody Seal: Yes _____ No X

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By: <u>Jan Littel</u> Date: <u>12/28/17</u> Time: <u>1125</u>	1. Received By: <u>Francisco Luna Jr</u> Date: <u>12/28/17</u> Time: <u>1125</u>
2. Relinquished By: <u>Francisco Luna Jr</u> Date: <u>12/28/17</u> Time: <u>1455</u>	2. Received By: <u>Tom Blunt</u> Date: <u>12/28/17</u> Time: <u>1455</u>
3. Relinquished By: _____ Date: _____ Time: _____	3. Received By: _____ Date: _____ Time: _____

Comments: _____

Rush
 Short Hold

Chain of Custody Record

Client: **Accordis** Client Contact: **Peter Campbell** Date: **12/28/17** Chain of Custody Number: **36552**
 Address: **1100 Olive Way Ste 80** Telephone Number (Alpha Code)/Fax Number: **206-910-5217** Lab Number: **Page 1 of 1**
 City: **Seattle** State: **WA** Zip Code: **98101** Sampler: **Jana Little** Lab Contact: **Elaine**

Project Name and Location (State): **Edwards Terminal** Billing Contact: **Elaine**
 Contract/Purchase Order/Quote No.:

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix						Containers & Preservatives					Analysis (Attach list if more space is needed)	Special Instructions/ Conditions of Receipt			
			Air	Sed	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	Tedlo	DRQ/HTH-6X			GRQ/HTH-6X	CLH	DTX (EPA)
OUT Fall #002	12/28/17	1020	✓				2			8				✓	✓	✓	✓	Any questions call Peter Campbell.
Trip Blank							0			6				✓	✓	✓	✓	PIB - 137.6
VSP-801	12/28/17	1120	✓											✓	✓	✓	✓	PIB - 0.3
VSP-802	12/28/17	1115	✓											✓	✓	✓	✓	



580-73946 Chain of Custody

Therm. ID **A2** Cor-**0.4** Unc-**0.5**
 Cooler Dsc **Sr Sed @ Lab**
 Wet/Packs **Packing Bbb/bw**
 Custody Seal: Yes No

OC Requirements (Specify):
 Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Disposal By Lab Archive For _____ Months
 Cooler: Yes No Cooler Temp: _____
 Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____
 1. Relinquished By: **Jana Little** Date: **12/28/17** Time: **1125** Received By: **Francisco Luna Jr** Date: **12/29/17** Time: **1125**
 2. Relinquished By: **Jana Little** Date: **12/28/17** Time: **1155** Received By: **Elaine** Date: **12/29/17** Time: **10:30**
 3. Relinquished By: _____ Date: _____ Time: _____ Received By: _____ Date: _____ Time: _____

Comments:



Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73946-1

Login Number: 73946

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-73946-1

Login Number: 73946

List Source: TestAmerica Sacramento

List Number: 2

Creator: Iliev, Gabriela K

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	247019
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	Received as Subcontract
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	N/A	

JOB # **580-73946**
Sample # **3**

Client/Project:		VFR ID:	
Canister Serial #:	34001768	Duration:	<input type="checkbox"/> Hrs <input type="checkbox"/> Min
Cleaning Job:		Flow:	mL/min
Client ID:		Initials:	
Site Location:			

FIELD				
READING	TIME	PRESS.	DATE	INITIALS
INITIAL FIELD VACUUM				
FINAL FIELD READING				

LABORATORY				
READING	PRESS.	DATE	INITIALS	
INITIAL VACUUM CHECK (INCHES Hg)	29.8		JMT	
<input type="checkbox"/> Helium Pre-dilution - Final Pressure (INCHES Hg)				
INITIAL PRESSURE (PSIA)	14.58	01/02/18	EJ	
FINAL PRESSURE (PSIA)	21.17	01/02/18	EJ	
Pressurization Gas: <input type="checkbox"/> N2 <input type="checkbox"/> He	SCREENED <input type="checkbox"/>	SCRN DIL. VS 250mLs:		
Initial Canister Dilution Factor =	1.45			

CANISTER REPRESSURIZATION					
Date	Pi (PSIA)	Pf (PSIA)	Initial DF	Initials	NEW DF
			1.45		#DIV/0!
			#DIV/0!		#DIV/0!
			#DIV/0!		#DIV/0!

Analytical Dilution Factors						
Canister DF = 1.45 X	Load DF = 4.3103448 X	=	Bag DF = 3	=	FINAL DF	Date
						Instr.
						File #
						1/3/2018 MS2
						18.77572016
			BVf (mLs)			3
			BVi (mLs)			1
Canister DF = 1.45 X	Load DF = #DIV/0! X	=	Bag DF = 1	=	FINAL DF	Date
						Instr.
						File #
						#DIV/0!
			BVf (mLs)			
			BVi (mLs)			
Canister DF = 1.45 X	Load DF = #DIV/0! X	=	Bag DF = 1	=	FINAL DF	Date
						Instr.
						File #
						#DIV/0!
			BVf (mLs)			
			BVi (mLs)			



JOB # **580-73946**
Sample # **4**

Client/Project:		VFR ID:	
Canister Serial #:	34001930	Duration:	<input type="checkbox"/> Hrs <input type="checkbox"/> Min
Cleaning Job:		Flow:	mL/min
Client ID:		Initials:	
Site Location:			

FIELD				
READING	TIME	PRESS.	DATE	INITIALS
INITIAL FIELD VACUUM				
FINAL FIELD READING				

LABORATORY				
READING	PRESS.	DATE	INITIALS	
INITIAL VACUUM CHECK (INCHES Hg)	29.8		JMT	
<input type="checkbox"/> Helium Pre-dilution - Final Pressure (INCHES Hg)				
INITIAL PRESSURE (PSIA)	14.42	01/02/18	EJ	
FINAL PRESSURE (PSIA)	21.10	01/02/18	EJ	
Pressurization Gas: <input type="checkbox"/> N2 <input type="checkbox"/> He	SCREENED <input type="checkbox"/>	SCRN DIL. VS 250mLs:		
Initial Canister Dilution Factor =	1.46			

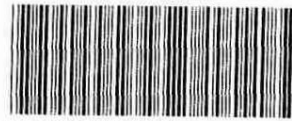
CANISTER REPRESSURIZATION					
Date	Pi (PSIA)	Pf (PSIA)	Initial DF	Initials	NEW DF
			1.46		#DIV/0!
			#DIV/0!		#DIV/0!
			#DIV/0!		#DIV/0!

Analytical Dilution Factors						
	Date	Instr.	File #			
Canister DF = 1.46 X	1/3/2018	MS2		Load DF = 0.6849315 X	Bag DF = 1 =	FINAL DF 1.00222294
				250	BVf (mLs)	
				365	Bvi (mLs)	
Canister DF = 1.46 X				Load DF = #DIV/0! X	Bag DF = 1 =	FINAL DF #DIV/0!
				LVf (mLs)	BVf (mLs)	
				LVi (mLs)	Bvi (mLs)	
Canister DF = 1.46 X				Load DF = #DIV/0! X	Bag DF = 1 =	FINAL DF #DIV/0!
				LVf (mLs)	BVf (mLs)	
				LVi (mLs)	Bvi (mLs)	



Airbill Here

Two tedlar Bags: 1L



TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Sample Re

580-73946 Field Sheet

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations:
File in the job folder with the COC.

Notes: P.O.	Cooler Custody Seal: Yes, 247019
	# Bags: 2 1L, 2L, 10L
	# Canisters: 1L, 6L, TA <input type="checkbox"/> Non TA <input type="checkbox"/>
	Transferred by Sacramento - Yes <input type="checkbox"/> No <input type="checkbox"/>
	# Canisters Unused: 1L, 6L
	# Flow Regulators: , # Gauges:
	Co-locator
	Initial & Date EJ 12/29/17

Date Cleaned/Batch ID

12-27-17 320-34705

Date of QC

12/27/2017

Data File Number

C:\MSDCHEM\1\DATA\171227\



320-34705 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

34001909	SS 122717 34001709
	34001715
	34001705
	34001773
	34001752
	34001870
	7540
	34001768

	34001930
	34001873
	34001887
	34001957
	34001858
	34001820
	34001698
	34001884

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

1st level Reviewed By:

12/28/17
Date:

2nd level Reviewed By:

12/28/17
Date:

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34705-1
 SDG No.: _____
 Client Sample ID: 34001709 Lab Sample ID: 320-34705-1
 Matrix: Air Lab File ID: MS6122725.D
 Analysis Method: TO-15 Date Collected: 12/26/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/28/2017 12:20
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 201510 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.45	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	0.17	J	0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	0.25	J	0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34705-1
 SDG No.: _____
 Client Sample ID: 34001709 Lab Sample ID: 320-34705-1
 Matrix: Air Lab File ID: MS6122725.D
 Analysis Method: TO-15 Date Collected: 12/26/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/28/2017 12:20
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 201510 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	0.11	J B	0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	0.059	J B	0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34705-1
 SDG No.: _____
 Client Sample ID: 34001709 Lab Sample ID: 320-34705-1
 Matrix: Air Lab File ID: MS6122725.D
 Analysis Method: TO-15 Date Collected: 12/26/2017 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 12/28/2017 12:20
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 201510 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	100		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	103		70-130
2037-26-5	Toluene-d8 (Surr)	100		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\MS6122725.D
 Lims ID: 320-34705-A-1
 Client ID: 34001709
 Sample Type: Client
 Inject. Date: 28-Dec-2017 12:20:30 ALS Bottle#: 6 Worklist Smp#: 25
 Purge Vol: 25.000 mL Dil. Factor: 1.0000
 Sample Info: 320-33801-A-1
 Misc. Info.: 500 mL
 Operator ID: LHS Instrument ID: ATMS6
 Method: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\TO15_ATMS6.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 28-Dec-2017 13:13:56 Calib Date: 27-Dec-2017 16:18:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\MS6122704.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK014

First Level Reviewer: leeh Date: 28-Dec-2017 13:13:56

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	13.308	13.295	0.013	91	30883	4.00	
* 2 1,4-Difluorobenzene	114	15.437	15.431	0.006	95	160287	4.00	
* 3 Chlorobenzene-d5 (IS)	117	22.159	22.159	0.000	87	250994	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	14.512	14.506	0.012	40	61413	4.11	
\$ 5 Toluene-d8 (Surr)	100	18.886	18.888	0.006	99	154378	4.01	
\$ 6 4-Bromofluorobenzene (Surr	95	24.720	24.714	0.006	91	227658	3.98	
12 Chlorodifluoromethane	51	4.669	4.671	0.000	97	6428	0.1424	
17 Butane	43	5.478	5.474	0.006	83	10922	0.1665	
26 Trichlorofluoromethane	101	7.400	7.386	0.018	59	1970	0.0333	
27 Pentane	43	7.443	7.453	-0.006	94	4151	0.0836	
32 Acetone	43	8.459	8.426	0.036	97	35317	0.4458	
36 2-Methyl-2-propanol	59	9.146	9.096	0.054	78	1790	0.0360	
39 Methylene Chloride	49	9.712	9.717	0.000	59	3590	0.1103	
40 Carbon disulfide	76	9.779	9.796	-0.012	95	9959	0.2456	
48 2-Butanone (MEK)	72	12.316	12.279	0.043	93	1798	0.1517	
58 Isooctane	57	14.397	14.414	-0.013	80	3005	0.0264	
63 Benzene	78	14.841	14.846	0.000	95	3465	0.0435	
75 Toluene	91	19.063	19.058	0.012	98	5717	0.0587	
87 m-Xylene & p-Xylene	91	22.573	22.573	0.000	93	3605	0.0416	
120 Hexachlorobutadiene	225	31.716	31.722	-0.007	77	1096	0.0271	

Reagents:

VAMIS20_00090 Amount Added: 50.00 Units: mL Run Reagent

Data File: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\MS6122725.D

Injection Date: 28-Dec-2017 12:20:30

Instrument ID: ATMS6

Operator ID: LHS

Lims ID: 320-34705-A-1

Lab Sample ID: 320-34705-1

Worklist Smp#: 25

Client ID: 34001709

Purge Vol: 25.000 mL

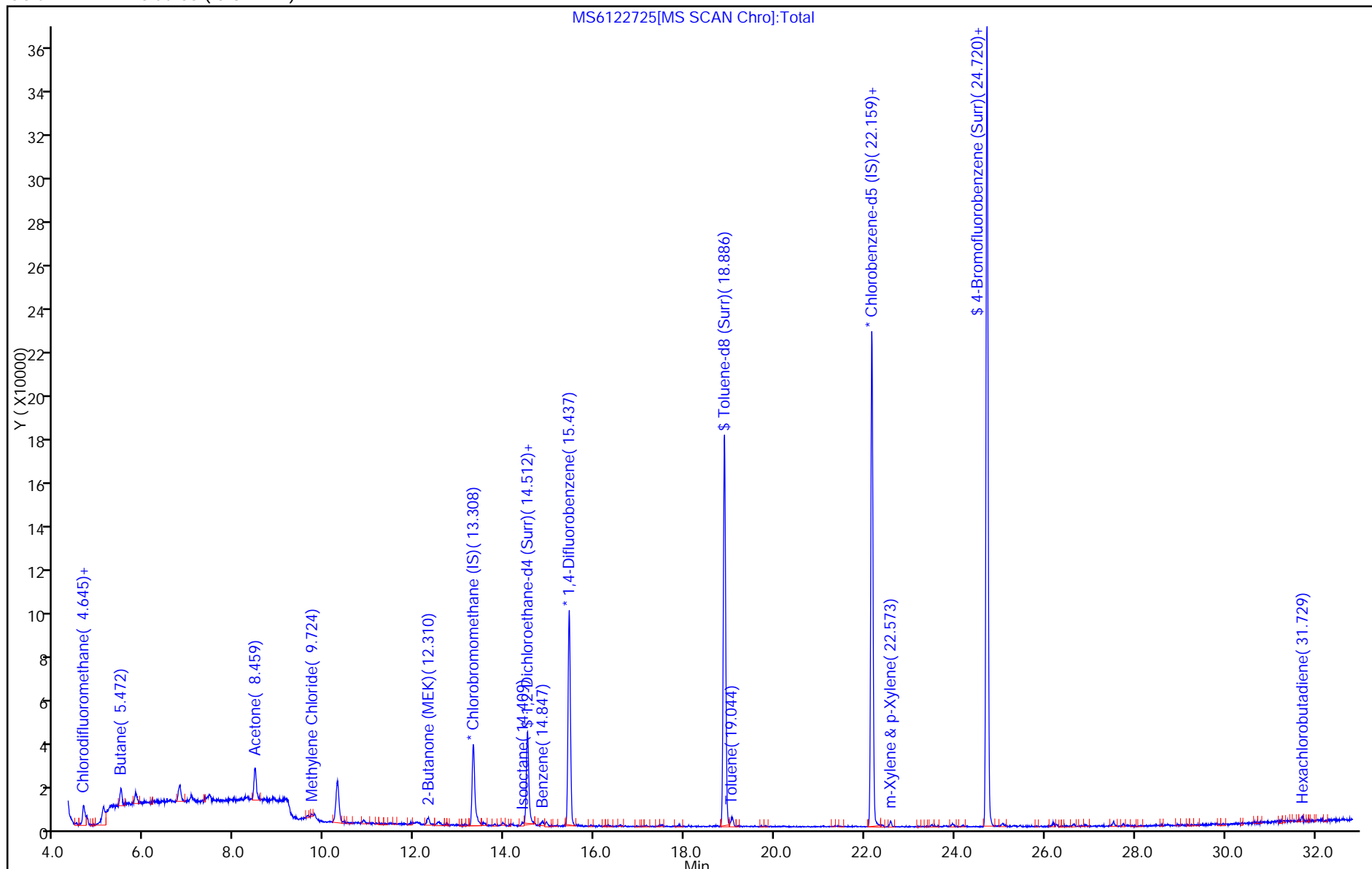
Dil. Factor: 1.0000

ALS Bottle#: 6

Method: TO15_ATMS6

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\MS6122725.D

Injection Date: 28-Dec-2017 12:20:30

Instrument ID: ATMS6

Lims ID: 320-34705-A-1

Lab Sample ID: 320-34705-1

Client ID: 34001709

Operator ID: LHS

ALS Bottle#: 6 Worklist Smp#: 25

Purge Vol: 25.000 mL

Dil. Factor: 1.0000

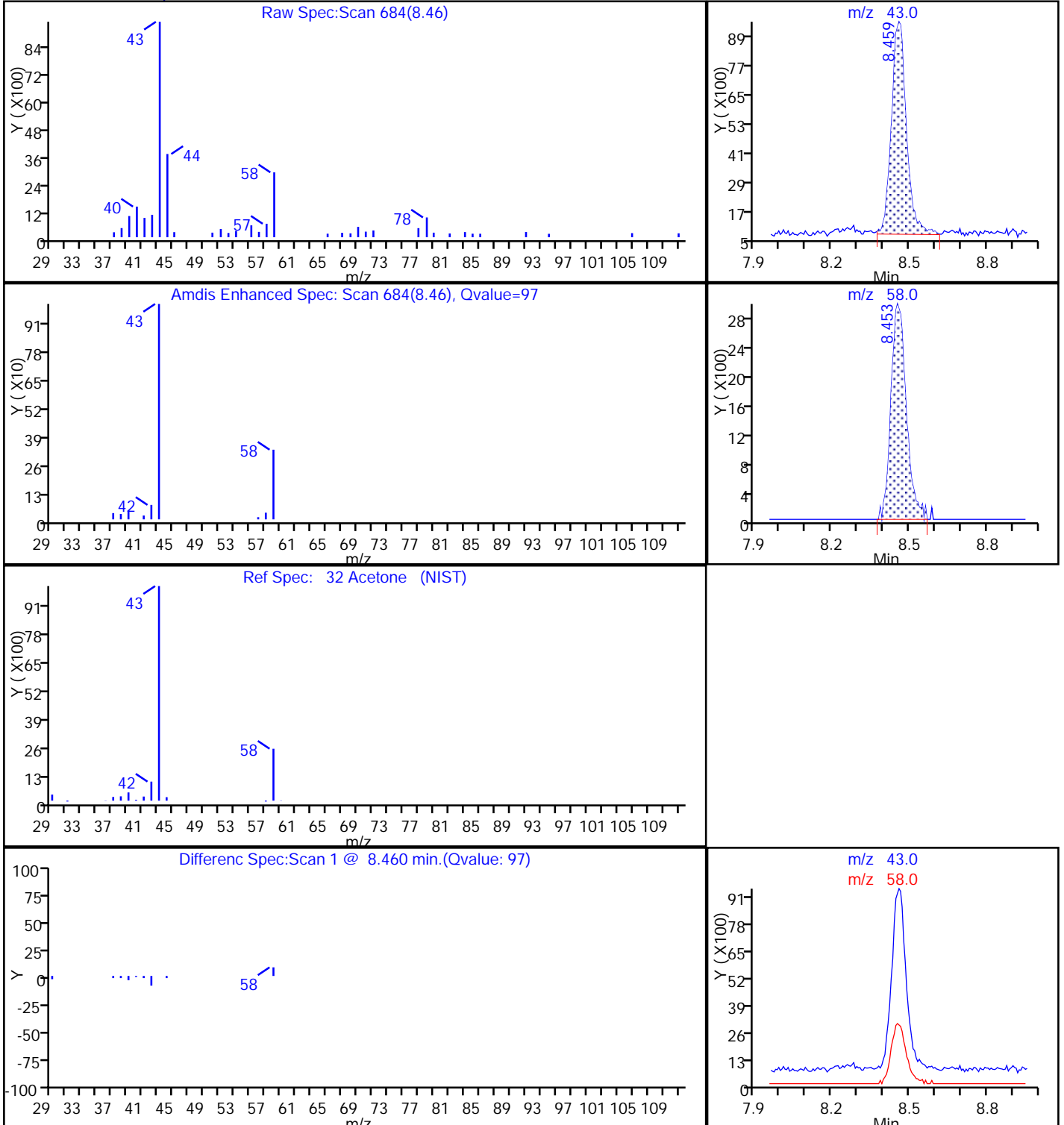
Method: TO15_ATMS6

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

32 Acetone, CAS: 67-64-1



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\MS6122725.D

Injection Date: 28-Dec-2017 12:20:30

Instrument ID: ATMS6

Lims ID: 320-34705-A-1

Lab Sample ID: 320-34705-1

Client ID: 34001709

Operator ID: LHS

ALS Bottle#: 6 Worklist Smp#: 25

Purge Vol: 25.000 mL

Dil. Factor: 1.0000

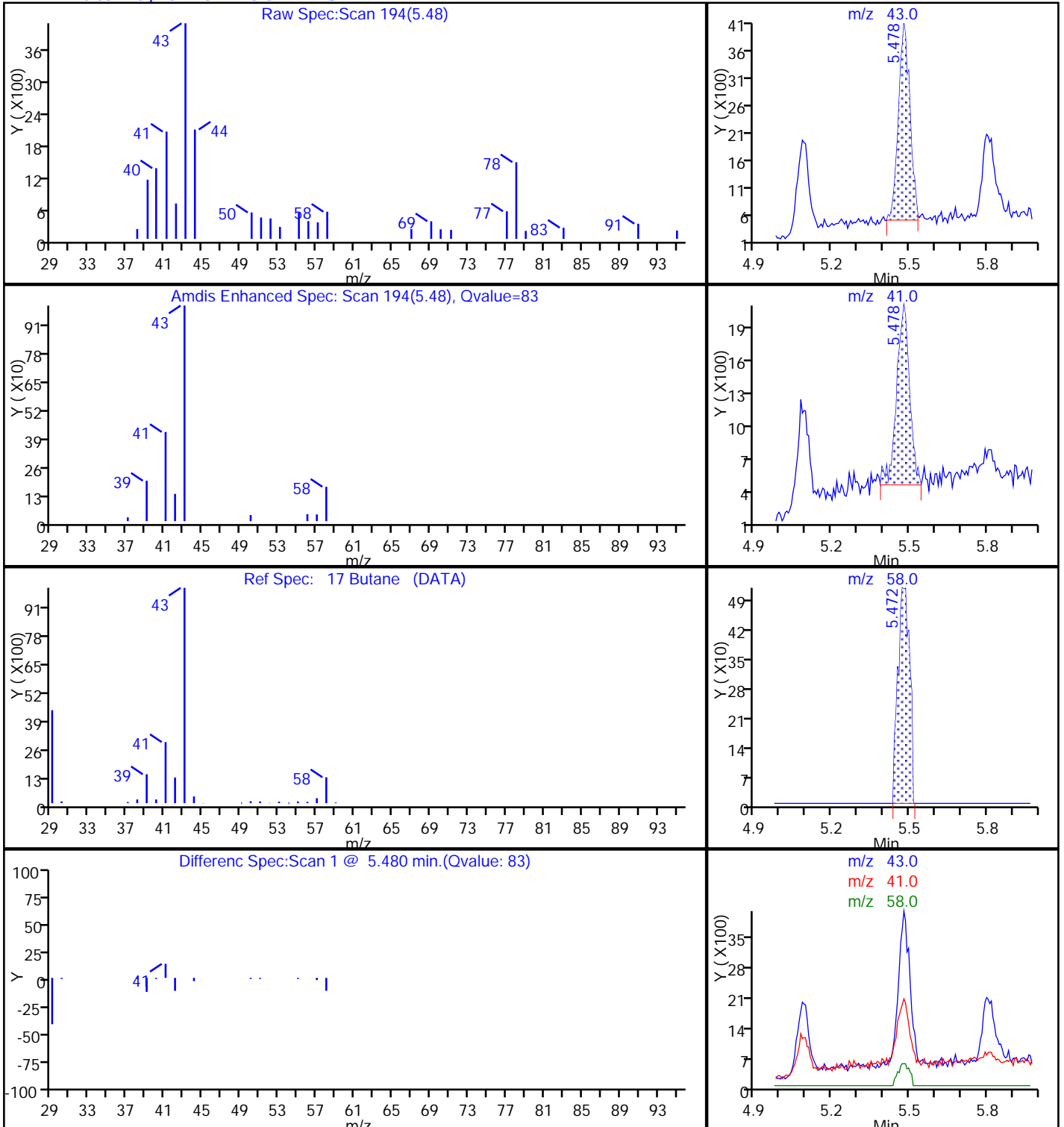
Method: TO15_ATMS6

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

17 Butane, CAS: 106-97-8



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\MS6122725.D

Injection Date: 28-Dec-2017 12:20:30

Instrument ID: ATMS6

Lims ID: 320-34705-A-1

Lab Sample ID: 320-34705-1

Client ID: 34001709

Operator ID: LHS

ALS Bottle#: 6 Worklist Smp#: 25

Purge Vol: 25.000 mL

Dil. Factor: 1.0000

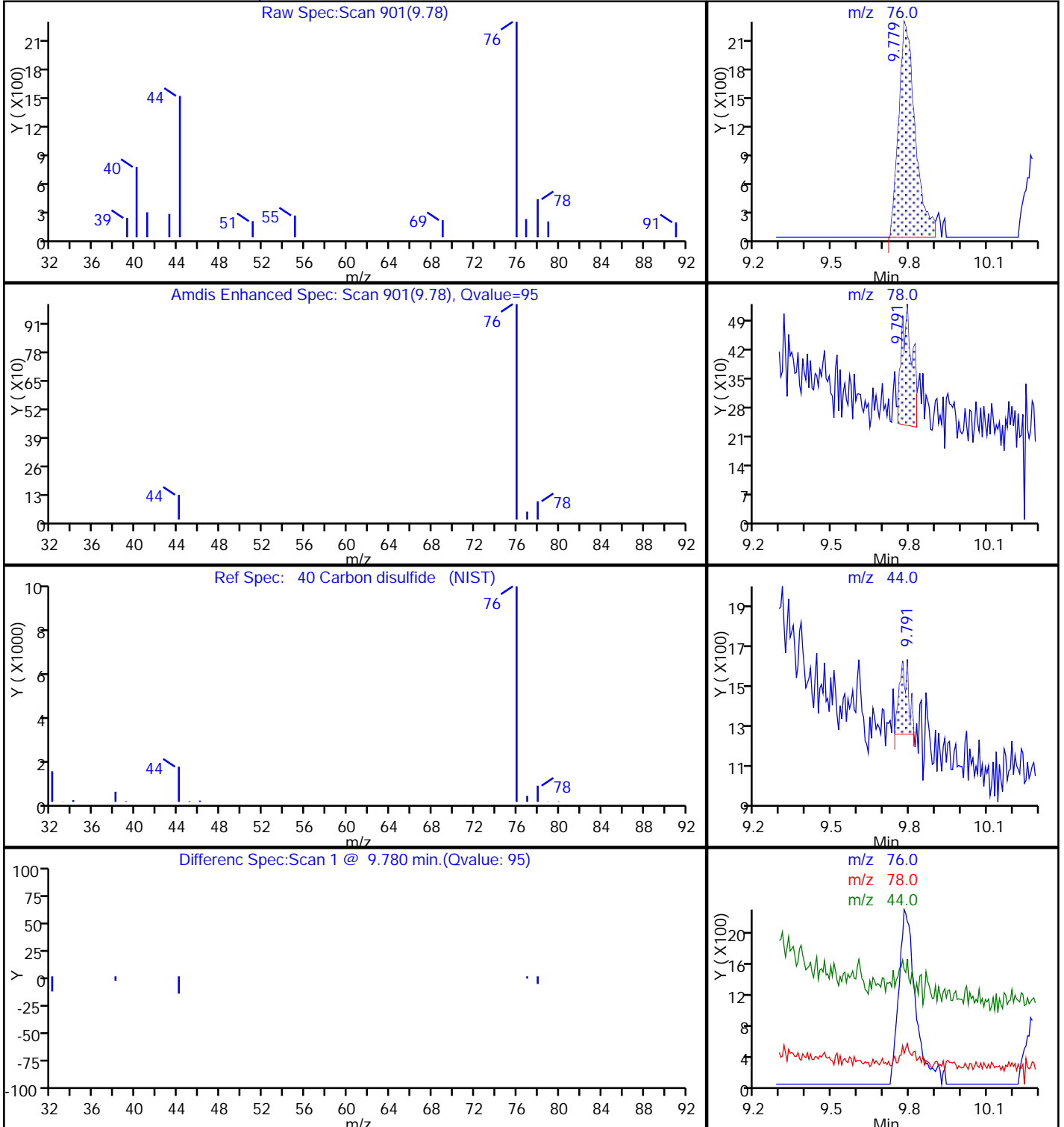
Method: TO15_ATMS6

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

40 Carbon disulfide, CAS: 75-15-0



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\MS6122725.D

Injection Date: 28-Dec-2017 12:20:30

Instrument ID: ATMS6

Lims ID: 320-34705-A-1

Lab Sample ID: 320-34705-1

Client ID: 34001709

Operator ID: LHS

ALS Bottle#: 6 Worklist Smp#: 25

Purge Vol: 25.000 mL

Dil. Factor: 1.0000

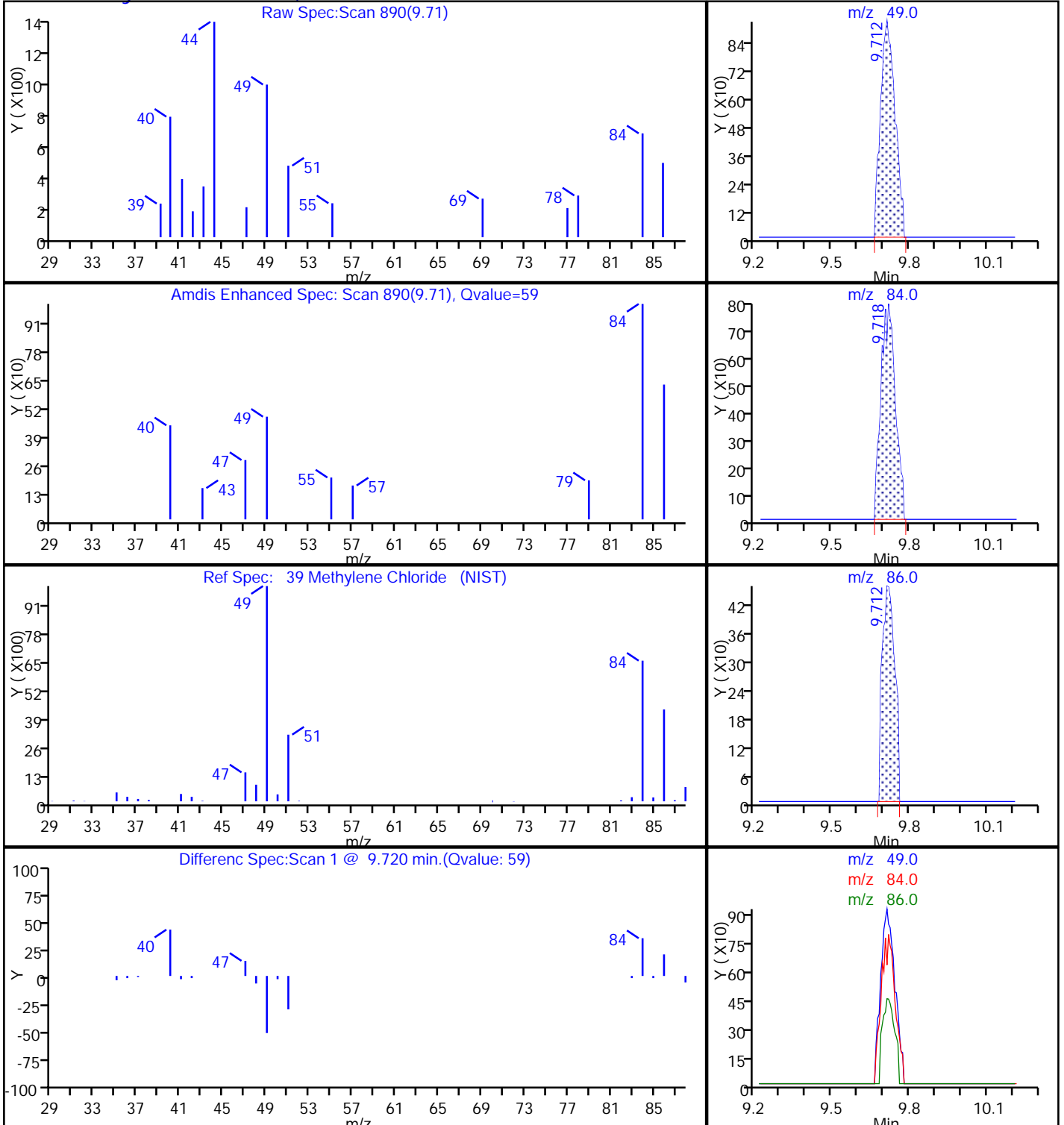
Method: TO15_ATMS6

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

39 Methylene Chloride, CAS: 75-09-2



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS6\20171227-52183.b\MS6122725.D

Injection Date: 28-Dec-2017 12:20:30

Instrument ID: ATMS6

Lims ID: 320-34705-A-1

Lab Sample ID: 320-34705-1

Client ID: 34001709

Operator ID: LHS

ALS Bottle#: 6 Worklist Smp#: 25

Purge Vol: 25.000 mL

Dil. Factor: 1.0000

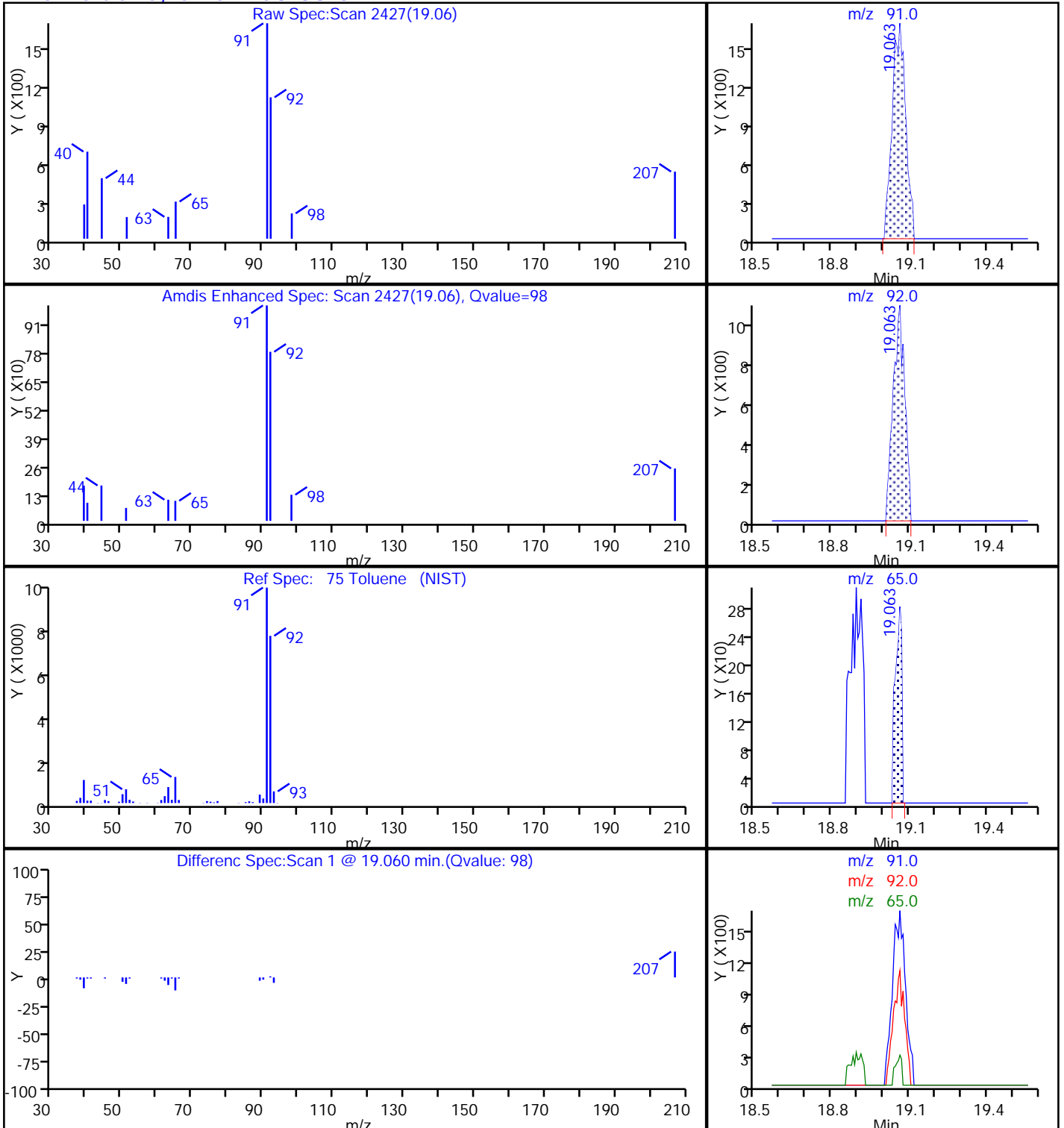
Method: TO15_ATMS6

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

75 Toluene, CAS: 108-88-3



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-36324-1
Client Project/Site: Chevron Edmonds Terminal

For:
ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
3/2/2018 2:25:51 PM

Elaine Walker, Project Manager II
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elaine.walker@testamericainc.com

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Air - GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Job ID: 320-36324-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-36324-1

Receipt

Two samples were received on 2/22/2018 9:00 AM; the samples arrived in good condition, properly preserved.

Air - GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA

Method(s) TO-15: 1,2-Dichloroethane-d4 (Surrogate) recovery for the following sample was outside control limits: VSP - 801 (320-36324-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Method(s) TO-15: The Gasoline Range Organics (GRO) concentration reported for the following sample is due to the presence of discrete peaks: VSP - 802 (320-36324-2). Isopropyl alcohol

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



Detection Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Client Sample ID: VSP - 801

Lab Sample ID: 320-36324-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	280		2.6	0.51	ppb v/v	6.45		TO-15	Total/NA
Ethylbenzene	26		2.6	0.41	ppb v/v	6.45		TO-15	Total/NA
Toluene	1.2	J	2.6	0.33	ppb v/v	6.45		TO-15	Total/NA
m,p-Xylene	25		5.2	0.65	ppb v/v	6.45		TO-15	Total/NA
o-Xylene	3.0		2.6	0.35	ppb v/v	6.45		TO-15	Total/NA
TPH (as Gasoline)	18000		650	260	ppb v/v	6.45		TO-15	Total/NA
Carbon Dioxide (TCD)	0.50	J	0.84	0.018	% v/v	1.68		D1946	Total/NA
Methane (FID)	0.016		0.00017	0.000034	% v/v	1.68		D1946	Total/NA
Oxygen	18		0.34	0.012	% v/v	1.68		D1946	Total/NA

Client Sample ID: VSP - 802

Lab Sample ID: 320-36324-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.17	J	0.40	0.079	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	0.83		0.40	0.063	ppb v/v	1		TO-15	Total/NA
Toluene	0.66		0.40	0.051	ppb v/v	1		TO-15	Total/NA
m,p-Xylene	1.9		0.80	0.10	ppb v/v	1		TO-15	Total/NA
o-Xylene	0.49		0.40	0.054	ppb v/v	1		TO-15	Total/NA
TPH (as Gasoline)	320		100	40	ppb v/v	1		TO-15	Total/NA
Carbon Dioxide (TCD)	0.35	J	1.0	0.022	% v/v	2.08		D1946	Total/NA
Methane (FID)	0.0030		0.00021	0.000042	% v/v	2.08		D1946	Total/NA
Oxygen	18		0.42	0.015	% v/v	2.08		D1946	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Client Sample ID: VSP - 801

Lab Sample ID: 320-36324-1

Date Collected: 02/20/18 15:30

Matrix: Air

Date Received: 02/22/18 09:00

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	280		2.6	0.51	ppb v/v			03/01/18 22:22	6.45
Ethylbenzene	26		2.6	0.41	ppb v/v			03/01/18 22:22	6.45
Toluene	1.2	J	2.6	0.33	ppb v/v			03/01/18 22:22	6.45
m,p-Xylene	25		5.2	0.65	ppb v/v			03/01/18 22:22	6.45
o-Xylene	3.0		2.6	0.35	ppb v/v			03/01/18 22:22	6.45
TPH (as Gasoline)	18000		650	260	ppb v/v			03/01/18 22:22	6.45

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		03/01/18 22:22	6.45
1,2-Dichloroethane-d4 (Surr)	132	X	70 - 130		03/01/18 22:22	6.45
Toluene-d8 (Surr)	101		70 - 130		03/01/18 22:22	6.45

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.50	J	0.84	0.018	% v/v			02/26/18 13:22	1.68
Methane (FID)	0.016		0.00017	0.000034	% v/v			02/26/18 14:47	1.68
Methane (TCD)	ND		0.84	0.23	% v/v			02/26/18 13:22	1.68
Oxygen	18		0.34	0.012	% v/v			02/26/18 13:22	1.68

Client Sample ID: VSP - 802

Lab Sample ID: 320-36324-2

Date Collected: 02/20/18 15:45

Matrix: Air

Date Received: 02/22/18 09:00

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.17	J	0.40	0.079	ppb v/v			03/01/18 23:14	1
Ethylbenzene	0.83		0.40	0.063	ppb v/v			03/01/18 23:14	1
Toluene	0.66		0.40	0.051	ppb v/v			03/01/18 23:14	1
m,p-Xylene	1.9		0.80	0.10	ppb v/v			03/01/18 23:14	1
o-Xylene	0.49		0.40	0.054	ppb v/v			03/01/18 23:14	1
TPH (as Gasoline)	320		100	40	ppb v/v			03/01/18 23:14	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		03/01/18 23:14	1
1,2-Dichloroethane-d4 (Surr)	88		70 - 130		03/01/18 23:14	1
Toluene-d8 (Surr)	96		70 - 130		03/01/18 23:14	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.35	J	1.0	0.022	% v/v			02/26/18 13:32	2.08
Methane (FID)	0.0030		0.00021	0.000042	% v/v			02/26/18 15:07	2.08
Methane (TCD)	ND		1.0	0.28	% v/v			02/26/18 13:32	2.08
Oxygen	18		0.42	0.015	% v/v			02/26/18 13:32	2.08

TestAmerica Sacramento

Surrogate Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Matrix: Air

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB (70-130)	DCA (70-130)	TOL (70-130)
320-36324-1	VSP - 801	96	132 X	101
320-36324-2	VSP - 802	98	88	96
LCS 320-210733/3	Lab Control Sample	100	92	97
LCS 320-210733/6	Lab Control Sample	103	116	99
LCSD 320-210733/4	Lab Control Sample Dup	99	95	99
LCSD 320-210733/7	Lab Control Sample Dup	105	117	101
MB 320-210733/10	Method Blank	96	89	98

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DCA = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-210733/10
Matrix: Air
Analysis Batch: 210733

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			03/01/18 19:55	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			03/01/18 19:55	1
Toluene	ND		0.40	0.051	ppb v/v			03/01/18 19:55	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			03/01/18 19:55	1
o-Xylene	ND		0.40	0.054	ppb v/v			03/01/18 19:55	1
TPH (as Gasoline)	ND		100	40	ppb v/v			03/01/18 19:55	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		03/01/18 19:55	1
1,2-Dichloroethane-d4 (Surr)	89		70 - 130		03/01/18 19:55	1
Toluene-d8 (Surr)	98		70 - 130		03/01/18 19:55	1

Lab Sample ID: LCS 320-210733/3
Matrix: Air
Analysis Batch: 210733

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	17.6		ppb v/v		88	68 - 128
Ethylbenzene	20.0	21.5		ppb v/v		107	64 - 124
Toluene	20.0	18.8		ppb v/v		94	68 - 128
m,p-Xylene	40.0	44.8		ppb v/v		112	65 - 125
o-Xylene	20.0	20.8		ppb v/v		104	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	100		70 - 130
1,2-Dichloroethane-d4 (Surr)	92		70 - 130
Toluene-d8 (Surr)	97		70 - 130

Lab Sample ID: LCS 320-210733/6
Matrix: Air
Analysis Batch: 210733

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	5000	3690		ppb v/v		74	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	103		70 - 130
1,2-Dichloroethane-d4 (Surr)	116		70 - 130
Toluene-d8 (Surr)	99		70 - 130

Lab Sample ID: LCSD 320-210733/4
Matrix: Air
Analysis Batch: 210733

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	20.3		ppb v/v		101	68 - 128	14	25
Ethylbenzene	20.0	23.7		ppb v/v		118	64 - 124	10	25

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-210733/4
Matrix: Air
Analysis Batch: 210733

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Toluene	20.0	21.9		ppb v/v		110	68 - 128	16	25
m,p-Xylene	40.0	49.0		ppb v/v		123	65 - 125	9	25
o-Xylene	20.0	22.8		ppb v/v		114	65 - 125	9	25

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	99		70 - 130
1,2-Dichloroethane-d4 (Surr)	95		70 - 130
Toluene-d8 (Surr)	99		70 - 130

Lab Sample ID: LCSD 320-210733/7
Matrix: Air
Analysis Batch: 210733

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	5000	4000		ppb v/v		80	70 - 130	8	25

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	105		70 - 130
1,2-Dichloroethane-d4 (Surr)	117		70 - 130
Toluene-d8 (Surr)	101		70 - 130

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-210033/5
Matrix: Air
Analysis Batch: 210033

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.00010	0.000020	% v/v			02/26/18 10:11	1

Lab Sample ID: LCS 320-210033/2
Matrix: Air
Analysis Batch: 210033

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0222		% v/v		89	80 - 120		

Lab Sample ID: LCSD 320-210033/3
Matrix: Air
Analysis Batch: 210033

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0223		% v/v		89	80 - 120	0	20

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: MB 320-210035/11
Matrix: Air
Analysis Batch: 210035

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			02/26/18 11:35	1
Methane (TCD)	ND		0.50	0.14	% v/v			02/26/18 11:35	1
Oxygen	ND		0.20	0.0074	% v/v			02/26/18 11:35	1

Lab Sample ID: LCS 320-210035/2
Matrix: Air
Analysis Batch: 210035

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon Dioxide (TCD)	24.4	24.7		% v/v		101	80 - 120
Methane (TCD)	26.1	26.2		% v/v		100	80 - 120

Lab Sample ID: LCS 320-210035/5
Matrix: Air
Analysis Batch: 210035

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oxygen	15.7	13.4		% v/v		85	80 - 120

Lab Sample ID: LCSD 320-210035/3
Matrix: Air
Analysis Batch: 210035

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	24.4	24.8		% v/v		101	80 - 120	0	20
Methane (TCD)	26.1	26.2		% v/v		100	80 - 120	0	20

Lab Sample ID: LCSD 320-210035/6
Matrix: Air
Analysis Batch: 210035

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	15.7	13.4		% v/v		85	80 - 120	0	20

QC Association Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Air - GC/MS VOA

Analysis Batch: 210733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36324-1	VSP - 801	Total/NA	Air	TO-15	
320-36324-2	VSP - 802	Total/NA	Air	TO-15	
MB 320-210733/10	Method Blank	Total/NA	Air	TO-15	
LCS 320-210733/3	Lab Control Sample	Total/NA	Air	TO-15	
LCS 320-210733/6	Lab Control Sample	Total/NA	Air	TO-15	
LCSD 320-210733/4	Lab Control Sample Dup	Total/NA	Air	TO-15	
LCSD 320-210733/7	Lab Control Sample Dup	Total/NA	Air	TO-15	

Air - GC VOA

Analysis Batch: 210033

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36324-1	VSP - 801	Total/NA	Air	D1946	
320-36324-2	VSP - 802	Total/NA	Air	D1946	
MB 320-210033/5	Method Blank	Total/NA	Air	D1946	
LCS 320-210033/2	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-210033/3	Lab Control Sample Dup	Total/NA	Air	D1946	

Analysis Batch: 210035

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-36324-1	VSP - 801	Total/NA	Air	D1946	
320-36324-2	VSP - 802	Total/NA	Air	D1946	
MB 320-210035/11	Method Blank	Total/NA	Air	D1946	
LCS 320-210035/2	Lab Control Sample	Total/NA	Air	D1946	
LCS 320-210035/5	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-210035/3	Lab Control Sample Dup	Total/NA	Air	D1946	
LCSD 320-210035/6	Lab Control Sample Dup	Total/NA	Air	D1946	

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Client Sample ID: VSP - 801

Date Collected: 02/20/18 15:30

Date Received: 02/22/18 09:00

Lab Sample ID: 320-36324-1

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		6.45	65 mL	250 mL	210733	03/01/18 22:22	AP1	TAL SAC
Total/NA	Analysis	D1946		1.68	50 mL	50 mL	210033	02/26/18 14:47	EMJ	TAL SAC
Total/NA	Analysis	D1946		1.68	50 mL	50 mL	210035	02/26/18 13:22	EMJ	TAL SAC

Client Sample ID: VSP - 802

Date Collected: 02/20/18 15:45

Date Received: 02/22/18 09:00

Lab Sample ID: 320-36324-2

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	520 mL	250 mL	210733	03/01/18 23:14	AP1	TAL SAC
Total/NA	Analysis	D1946		2.08	50 mL	50 mL	210033	02/26/18 15:07	EMJ	TAL SAC
Total/NA	Analysis	D1946		2.08	50 mL	50 mL	210035	02/26/18 13:32	EMJ	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18 *
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL SAC
D1946	Fixed Gases in Air (GC)	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-36324-1	VSP - 801	Air	02/20/18 15:30	02/22/18 09:00
320-36324-2	VSP - 802	Air	02/20/18 15:45	02/22/18 09:00

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

Canister Samples Chain of Custody Record

TestAmerica Sacramento
880 Riverside Parkway

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

West Sacramento, CA 95605
phone 916.374.4378 fax 916.372.1059

TestAmerica Laboratories, Inc.

Client Contact Information		Project Manager:		Samples Collected By:		COC No.:	
Company Name:	Arcoadis	Project Manager:	Jason Little	COC No.:		COCs	
Address:	1100 Olive Way Suite 800	Phone:		For Lab Use Only:			
City/State/Zip:	Seattle/WA/98101	Email:		Walk-in Client:			
Phone:		Site Contact:		Lab Sampling:			
FAX:		TA Contact:		Job / SDG No.:		(See below for Add'l Items)	
Project Name:	Edwards Terminal	Analysis Turnaround Time	STAT	Other (Please specify in notes section):		EPA TO-15 for BTEX & TRH-G	
Site/Location:	1170 University, Edwards WA	Standard (Specific):	STAT	Other (Please specify in notes section):		Other: Fixed Gas (methane, O ₂ , CO ₂)	
P O #		Rush (Specify):		Sample Type			
Sample Identification		Sample Date(s)		TO-15 (Med / Std / Low / SIM)			
VSP-801		2/20/18	1530	MA-APH			
VSP-802		2/20/18	1545	EPA 3C			
				EPA 25C / 25.3			
				ASTM D-1946 / 1945 / 3588			
				EPA 9/16			
				TO-3			
				Other (Please specify in notes section)			
				Indoor Air			
				Ambient Air			
				Soil Gas			
				Landfill Gas			
				Other (Please specify in notes section)			

Sample ID	Canister ID	Flow Controller ID	Temperature (Fahrenheit)	
			Interior	Ambient
3400936				
3400066				

Sample ID	Canister Vacuum in Field, 'Hg (Start)	Canister Vacuum in Field, 'Hg (Stop)	Time Start	Time Stop	Temperature (Fahrenheit)	
					Interior	Ambient

Special Instructions/QC Requirements & Comments:

Samples Shipped by: _____ Date / Time: _____

Samples Relinquished by: _____ Date / Time: 2/21/18 / 1030

Relinquished by: _____ Date / Time: 2/21/18 1200

Lab Use Only: _____ Shipper Name: _____

Samples Received by: _____

Received by: _____

Relinquished by: _____

Received by: _____

Condition: _____



Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 320-36324-1

Login Number: 36324

List Source: TestAmerica Sacramento

List Number: 1

Creator: Iliev, Gabriela K

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	247138
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Date Cleaned/Batch ID 1-10-18 320-34970
 Date of QC 1/21/2018
 Data File Number C:\msdchem\1\DATA\180121\18012131.d
 (File ID for certification analysis of canister designated below)



CANISTER ID NUMBERS

*	34000934
	34001014
	34001220
	34001635
	34001103
	34000328
	34000661
	34001669

	34000808
	34000668
	34000654
	8933
	34000665
	34001244
	34000762
	34001936

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

[Signature]
1st level Reviewed By:

1/22/18
Date:

[Signature]
2nd level Reviewed By:

1/30/18
Date:

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34970-1
 SDG No.: _____
 Client Sample ID: 34000934 Lab Sample ID: 320-34970-1
 Matrix: Air Lab File ID: 18012131.D
 Analysis Method: TO-15 Date Collected: 01/10/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 01/22/2018 10:16
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 204839 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.30	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	ND		0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34970-1
 SDG No.: _____
 Client Sample ID: 34000934 Lab Sample ID: 320-34970-1
 Matrix: Air Lab File ID: 18012131.D
 Analysis Method: TO-15 Date Collected: 01/10/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 01/22/2018 10:16
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 204839 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-34970-1
 SDG No.: _____
 Client Sample ID: 34000934 Lab Sample ID: 320-34970-1
 Matrix: Air Lab File ID: 18012131.D
 Analysis Method: TO-15 Date Collected: 01/10/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 01/22/2018 10:16
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 204839 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	103		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	99		70-130
2037-26-5	Toluene-d8 (Surr)	104		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180121-53148.b\18012131.D
 Lims ID: 320-34970-A-1
 Client ID: 34000934
 Sample Type: Client
 Inject. Date: 22-Jan-2018 10:16:30 ALS Bottle#: 7 Worklist Smp#: 27
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Sample Info: 320-34970-A-1
 Misc. Info.: 500 mL CAN CERT
 Operator ID: RG Instrument ID: ATMS2
 Method: \\ChromNA\Sacramento\ChromData\ATMS2\20180121-53148.b\TO15_ATMS2N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 22-Jan-2018 11:23:39 Calib Date: 20-Jan-2018 11:26:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS2\20180119-53125.b\18011923.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK014

First Level Reviewer: vanommens

Date: 22-Jan-2018 11:23:39

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	11.386	11.386	0.000	94	74029	4.00	
* 2 1,4-Difluorobenzene	114	13.472	13.479	-0.007	95	307580	4.00	
* 3 Chlorobenzene-d5 (IS)	117	19.532	19.532	0.000	86	282466	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	12.536	12.530	0.000	0	102650	3.96	
\$ 5 Toluene-d8 (Surr)	100	16.703	16.695	0.000	99	196061	4.17	
\$ 6 4-Bromofluorobenzene (Surr	95	21.551	21.558	-0.007	91	207892	4.14	
10 Propene	41	3.939	3.931	0.006	91	752	0.0460	
18 Butane	43	4.566	4.564	0.000	97	2543	0.0810	
32 Acetone	43	6.963	6.899	0.061	95	5395	0.3048	
39 Methylene Chloride	49	8.101	8.090	0.006	68	742	0.0329	
73 n-Octane	43	16.697	16.793	-0.103	42	1296	0.0234	
123 1,2,4-Trichlorobenzene	180	25.986	25.980	0.006	69	775	0.0149	

Reagents:

VAMSIS20_00101

Amount Added: 50.00

Units: mL

Run Reagent

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180121-53148.b\18012131.D

Injection Date: 22-Jan-2018 10:16:30

Instrument ID: ATMS2

Operator ID: RG

Lims ID: 320-34970-A-1

Lab Sample ID: 320-34970-1

Worklist Smp#: 27

Client ID: 34000934

Purge Vol: 250.000 mL

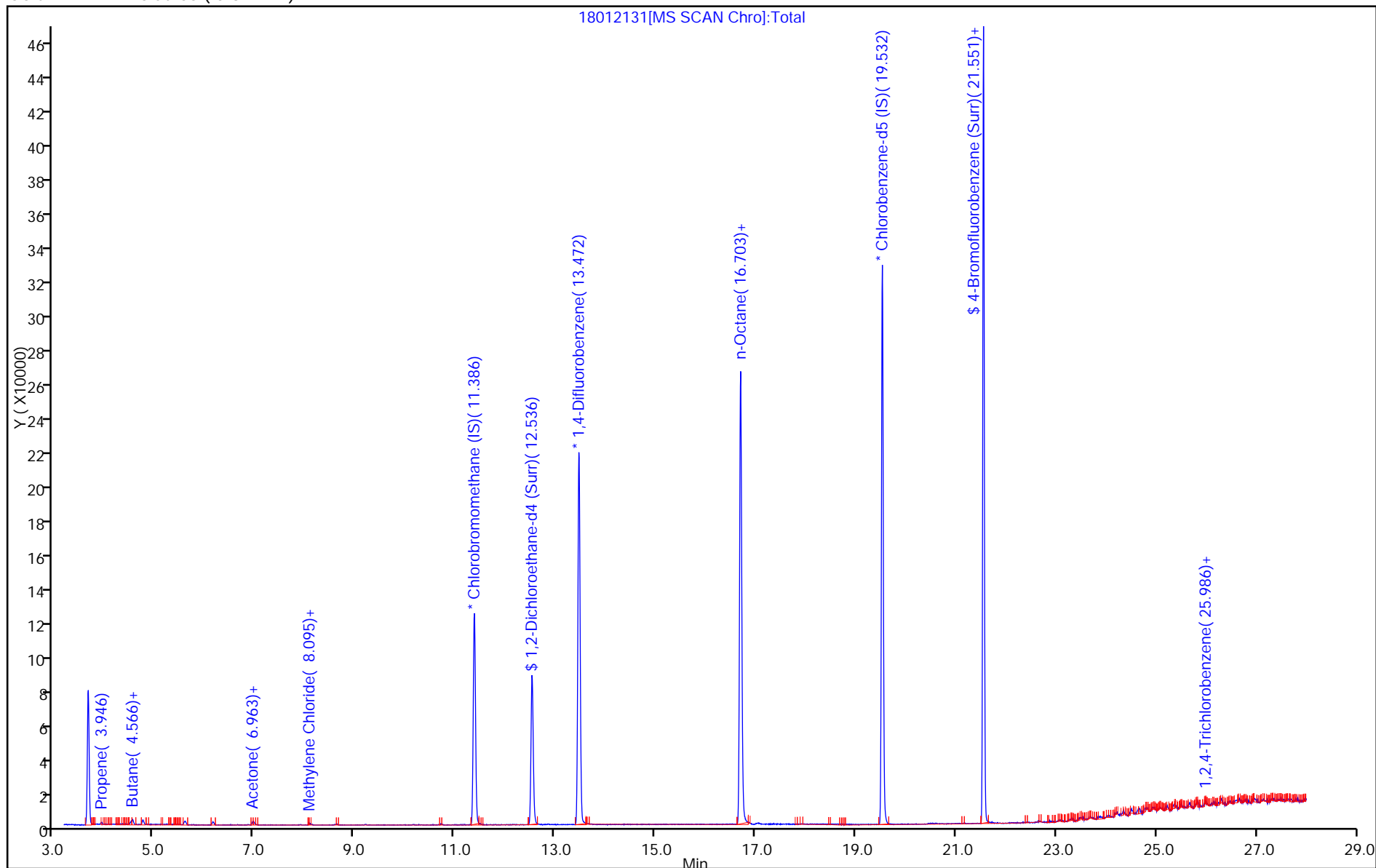
Dil. Factor: 1.0000

ALS Bottle#: 7

Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180121-53148.b\18012131.D

Injection Date: 22-Jan-2018 10:16:30

Instrument ID: ATMS2

Lims ID: 320-34970-A-1

Lab Sample ID: 320-34970-1

Client ID: 34000934

Operator ID: RG

ALS Bottle#: 7 Worklist Smp#: 27

Purge Vol: 250.000 mL

Dil. Factor: 1.0000

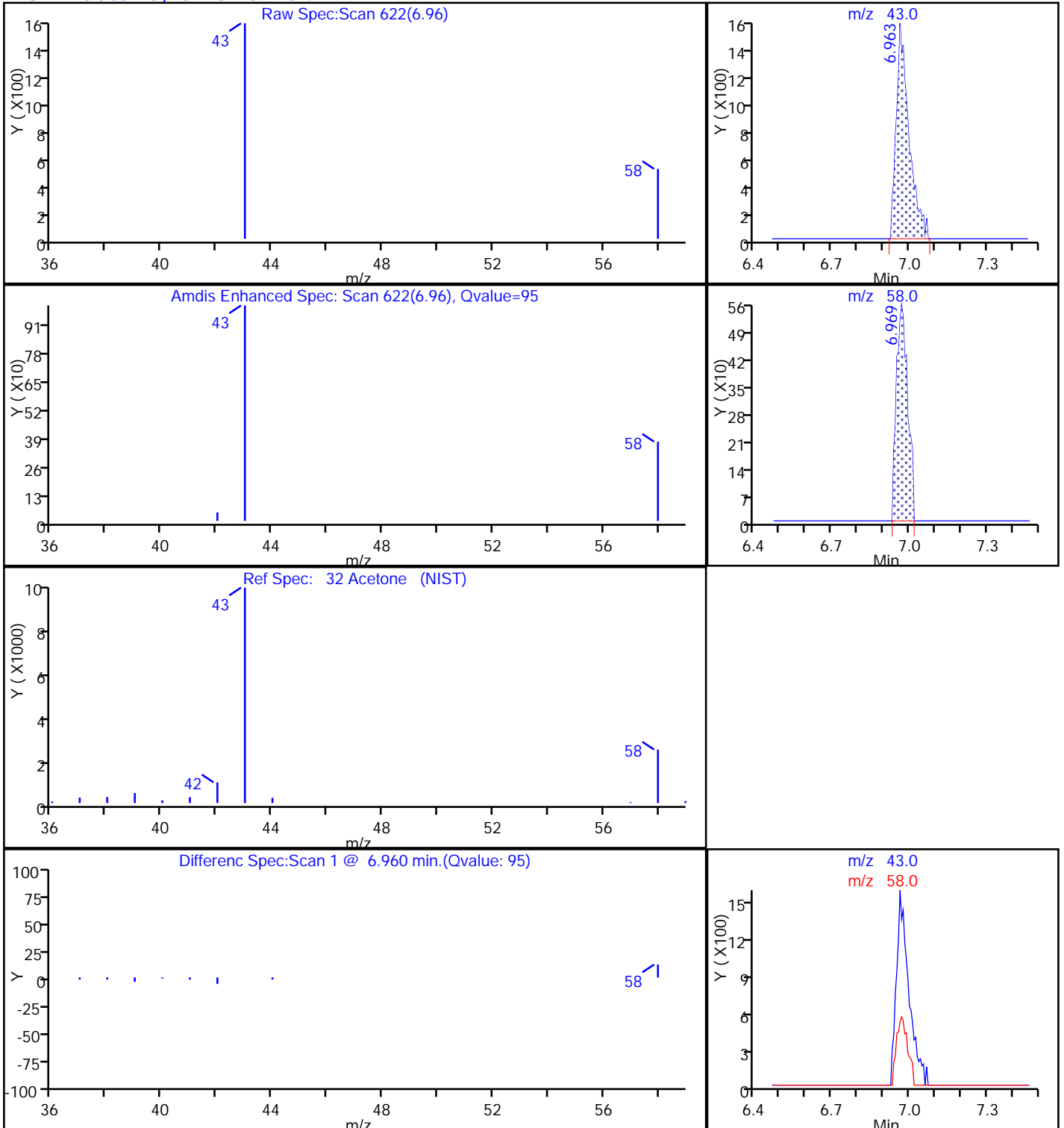
Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

32 Acetone, CAS: 67-64-1



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-37147-1
Client Project/Site: Chevron Edmonds Terminal

For:
ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
4/3/2018 12:09:34 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Job ID: 320-37147-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-37147-1

Receipt

Two samples were received on 3/16/2018 9:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice.

Air - GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA

Method(s) TO-15: 1,2-Dichloroethane-d4 (Surrogate) recovery for the following sample was outside control limits: VSP-801 (320-37147-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



Detection Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Client Sample ID: VSP-801

Lab Sample ID: 320-37147-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	170		2.0	0.39	ppb v/v	4.93		TO-15	Total/NA
Ethylbenzene	260		2.0	0.31	ppb v/v	4.93		TO-15	Total/NA
Toluene	17		2.0	0.25	ppb v/v	4.93		TO-15	Total/NA
m,p-Xylene	440		3.9	0.49	ppb v/v	4.93		TO-15	Total/NA
o-Xylene	60		2.0	0.27	ppb v/v	4.93		TO-15	Total/NA
TPH (as Gasoline)	20000		490	200	ppb v/v	4.93		TO-15	Total/NA
Methane (FID)	0.0044		0.00064	0.00013	% v/v	6.38		D1946	Total/NA
Oxygen	17		1.3	0.047	% v/v	6.38		D1946	Total/NA

Client Sample ID: VSP-802

Lab Sample ID: 320-37147-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.11	J	0.40	0.079	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	0.47		0.40	0.063	ppb v/v	1		TO-15	Total/NA
Toluene	0.99		0.40	0.051	ppb v/v	1		TO-15	Total/NA
m,p-Xylene	1.8		0.80	0.10	ppb v/v	1		TO-15	Total/NA
o-Xylene	0.60		0.40	0.054	ppb v/v	1		TO-15	Total/NA
TPH (as Gasoline)	220		100	40	ppb v/v	1		TO-15	Total/NA
Methane (FID)	0.0041		0.0014	0.00029	% v/v	14.33		D1946	Total/NA
Oxygen	20		2.9	0.11	% v/v	14.33		D1946	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Client Sample ID: VSP-801

Lab Sample ID: 320-37147-1

Date Collected: 03/14/18 10:10

Matrix: Air

Date Received: 03/16/18 09:05

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	170		2.0	0.39	ppb v/v			03/27/18 23:26	4.93
Ethylbenzene	260		2.0	0.31	ppb v/v			03/27/18 23:26	4.93
Toluene	17		2.0	0.25	ppb v/v			03/27/18 23:26	4.93
m,p-Xylene	440		3.9	0.49	ppb v/v			03/27/18 23:26	4.93
o-Xylene	60		2.0	0.27	ppb v/v			03/27/18 23:26	4.93
TPH (as Gasoline)	20000		490	200	ppb v/v			03/27/18 23:26	4.93

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	110		70 - 130		03/27/18 23:26	4.93
1,2-Dichloroethane-d4 (Surr)	135	X	70 - 130		03/27/18 23:26	4.93
Toluene-d8 (Surr)	108		70 - 130		03/27/18 23:26	4.93

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		3.2	0.068	% v/v			03/28/18 16:11	6.38
Methane (FID)	0.0044		0.00064	0.00013	% v/v			03/29/18 11:21	6.38
Oxygen	17		1.3	0.047	% v/v			03/28/18 16:11	6.38

Client Sample ID: VSP-802

Lab Sample ID: 320-37147-2

Date Collected: 03/14/18 10:20

Matrix: Air

Date Received: 03/16/18 09:05

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.11	J	0.40	0.079	ppb v/v			03/28/18 00:29	1
Ethylbenzene	0.47		0.40	0.063	ppb v/v			03/28/18 00:29	1
Toluene	0.99		0.40	0.051	ppb v/v			03/28/18 00:29	1
m,p-Xylene	1.8		0.80	0.10	ppb v/v			03/28/18 00:29	1
o-Xylene	0.60		0.40	0.054	ppb v/v			03/28/18 00:29	1
TPH (as Gasoline)	220		100	40	ppb v/v			03/28/18 00:29	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		03/28/18 00:29	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		03/28/18 00:29	1
Toluene-d8 (Surr)	102		70 - 130		03/28/18 00:29	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		7.2	0.15	% v/v			03/28/18 16:21	14.33
Methane (FID)	0.0041		0.0014	0.00029	% v/v			03/29/18 11:36	14.33
Oxygen	20		2.9	0.11	% v/v			03/28/18 16:21	14.33

TestAmerica Sacramento

Surrogate Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Matrix: Air

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB (70-130)	DCA (70-130)	TOL (70-130)
320-37147-1	VSP-801	110	135 X	108
320-37147-2	VSP-802	96	95	102
LCS 320-215022/3	Lab Control Sample	108	100	106
LCS 320-215022/6	Lab Control Sample	104	124	102
LCSD 320-215022/4	Lab Control Sample Dup	101	99	102
LCSD 320-215022/7	Lab Control Sample Dup	109	126	103
MB 320-215022/10	Method Blank	98	94	101

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DCA = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-215022/10

Matrix: Air

Analysis Batch: 215022

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			03/27/18 19:36	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			03/27/18 19:36	1
Toluene	ND		0.40	0.051	ppb v/v			03/27/18 19:36	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			03/27/18 19:36	1
o-Xylene	ND		0.40	0.054	ppb v/v			03/27/18 19:36	1
TPH (as Gasoline)	ND		100	40	ppb v/v			03/27/18 19:36	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		03/27/18 19:36	1
1,2-Dichloroethane-d4 (Surr)	94		70 - 130		03/27/18 19:36	1
Toluene-d8 (Surr)	101		70 - 130		03/27/18 19:36	1

Lab Sample ID: LCS 320-215022/3

Matrix: Air

Analysis Batch: 215022

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	18.6		ppb v/v		93	68 - 128
Ethylbenzene	20.0	17.2		ppb v/v		86	64 - 124
Toluene	20.0	23.5		ppb v/v		117	68 - 128
m,p-Xylene	40.0	34.6		ppb v/v		86	65 - 125
o-Xylene	20.0	15.8		ppb v/v		79	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	108		70 - 130
1,2-Dichloroethane-d4 (Surr)	100		70 - 130
Toluene-d8 (Surr)	106		70 - 130

Lab Sample ID: LCS 320-215022/6

Matrix: Air

Analysis Batch: 215022

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	5000	4110		ppb v/v		82	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	104		70 - 130
1,2-Dichloroethane-d4 (Surr)	124		70 - 130
Toluene-d8 (Surr)	102		70 - 130

Lab Sample ID: LCSD 320-215022/4

Matrix: Air

Analysis Batch: 215022

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	20.1		ppb v/v		100	68 - 128	8	25
Ethylbenzene	20.0	19.8		ppb v/v		99	64 - 124	14	25

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-215022/4
Matrix: Air
Analysis Batch: 215022

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Toluene	20.0	23.1		ppb v/v		116	68 - 128	2	25
m,p-Xylene	40.0	40.2		ppb v/v		100	65 - 125	15	25
o-Xylene	20.0	18.3		ppb v/v		92	65 - 125	15	25
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	101		70 - 130						
1,2-Dichloroethane-d4 (Surr)	99		70 - 130						
Toluene-d8 (Surr)	102		70 - 130						

Lab Sample ID: LCSD 320-215022/7
Matrix: Air
Analysis Batch: 215022

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	5000	4260		ppb v/v		85	70 - 130	4	25
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
4-Bromofluorobenzene (Surr)	109		70 - 130						
1,2-Dichloroethane-d4 (Surr)	126		70 - 130						
Toluene-d8 (Surr)	103		70 - 130						

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-215262/7
Matrix: Air
Analysis Batch: 215262

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			03/28/18 15:57	1
Methane (TCD)	ND		0.50	0.14	% v/v			03/28/18 15:57	1
Oxygen	ND		0.20	0.0074	% v/v			03/28/18 15:57	1

Lab Sample ID: LCS 320-215262/2
Matrix: Air
Analysis Batch: 215262

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon Dioxide (TCD)	24.4	24.8		% v/v		101	80 - 120
Methane (TCD)	26.1	26.3		% v/v		101	80 - 120

Lab Sample ID: LCS 320-215262/5
Matrix: Air
Analysis Batch: 215262

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oxygen	15.7	13.5		% v/v		86	80 - 120

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: LCSD 320-215262/3
Matrix: Air
Analysis Batch: 215262

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	24.4	24.9		% v/v	-	102	80 - 120	0	20
Methane (TCD)	26.1	26.4		% v/v	-	101	80 - 120	1	20

Lab Sample ID: LCSD 320-215262/6
Matrix: Air
Analysis Batch: 215262

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	15.7	13.5		% v/v	-	86	80 - 120	0	20

Lab Sample ID: MB 320-215408/6
Matrix: Air
Analysis Batch: 215408

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.00010	0.000020	% v/v	-		03/29/18 11:06	1
Oxygen	ND		0.20	0.0074	% v/v	-		03/29/18 11:06	1

Lab Sample ID: LCS 320-215408/2
Matrix: Air
Analysis Batch: 215408

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0246		% v/v	-	98	80 - 120		

Lab Sample ID: LCSD 320-215408/3
Matrix: Air
Analysis Batch: 215408

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0248		% v/v	-	99	80 - 120	1	20

QC Association Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Air - GC/MS VOA

Analysis Batch: 215022

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-37147-1	VSP-801	Total/NA	Air	TO-15	
320-37147-2	VSP-802	Total/NA	Air	TO-15	
MB 320-215022/10	Method Blank	Total/NA	Air	TO-15	
LCS 320-215022/3	Lab Control Sample	Total/NA	Air	TO-15	
LCS 320-215022/6	Lab Control Sample	Total/NA	Air	TO-15	
LCSD 320-215022/4	Lab Control Sample Dup	Total/NA	Air	TO-15	
LCSD 320-215022/7	Lab Control Sample Dup	Total/NA	Air	TO-15	

Air - GC VOA

Analysis Batch: 215262

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-37147-1	VSP-801	Total/NA	Air	D1946	
320-37147-2	VSP-802	Total/NA	Air	D1946	
MB 320-215262/7	Method Blank	Total/NA	Air	D1946	
LCS 320-215262/2	Lab Control Sample	Total/NA	Air	D1946	
LCS 320-215262/5	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-215262/3	Lab Control Sample Dup	Total/NA	Air	D1946	
LCSD 320-215262/6	Lab Control Sample Dup	Total/NA	Air	D1946	

Analysis Batch: 215408

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-37147-1	VSP-801	Total/NA	Air	D1946	
320-37147-2	VSP-802	Total/NA	Air	D1946	
MB 320-215408/6	Method Blank	Total/NA	Air	D1946	
LCS 320-215408/2	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-215408/3	Lab Control Sample Dup	Total/NA	Air	D1946	

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Client Sample ID: VSP-801

Date Collected: 03/14/18 10:10

Date Received: 03/16/18 09:05

Lab Sample ID: 320-37147-1

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		4.93	100 mL	250 mL	215022	03/27/18 23:26	AP1	TAL SAC
Total/NA	Analysis	D1946		6.38	50 mL	50 mL	215408	03/29/18 11:21	EMJ	TAL SAC
Total/NA	Analysis	D1946		6.38	50 mL	50 mL	215262	03/28/18 16:11	EMJ	TAL SAC

Client Sample ID: VSP-802

Date Collected: 03/14/18 10:20

Date Received: 03/16/18 09:05

Lab Sample ID: 320-37147-2

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	515 mL	250 mL	215022	03/28/18 00:29	AP1	TAL SAC
Total/NA	Analysis	D1946		14.33	50 mL	50 mL	215408	03/29/18 11:36	EMJ	TAL SAC
Total/NA	Analysis	D1946		14.33	50 mL	50 mL	215262	03/28/18 16:21	EMJ	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18 *
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18 *
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-18 *
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL SAC
D1946	Fixed Gases in Air (GC)	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

- 1
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- 13
- 14
- 15
- 16


Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-37147-1	VSP-801	Air	03/14/18 10:10	03/16/18 09:05
320-37147-2	VSP-802	Air	03/14/18 10:20	03/16/18 09:05

- 1
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- 12
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- 14
- 15
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Client Contact Information		Project Manager: <u>Scott Zorn</u>		Samples Collected By: <u>JASON LITTLE</u>		COC No: <u>1</u> of <u>1</u> COCs										
Company Name: <u>Arcadis</u>	Phone: _____	Site Contact: <u>Peter Campio</u>	Canister Vacuum in Field, 'Hg (Start)	Canister Vacuum in Field, 'Hg (Stop)	Flow Controller ID	Canister ID	Other (Please specify in notes section)									
Address: <u>100 Olive Way, Suite 800</u>	Email: <u>scott.zorn@arcadis.com</u>	TA Contact: <u>Elaine Walker</u>	Time Start	Time Stop			Landfill Gas									
City/State/Zip: <u>Seattle WA 98101</u>	Phone: _____	Analyst's Turnaround Time					Soil Gas									
FAX: _____	Standard (Specific): <u>STAT</u>	Rush (Specify): _____					Ambient Air									
Project Name: <u>Edmonds Terminal</u>							Indoor Air									
Site/Location: <u>1720 Woodward</u>							Sample Type									
P O # _____							Other (Please specify in notes section)									
Sample Identification	Sample Date(s)	Time Start	Time Stop	Canister Vacuum in Field, 'Hg (Start)	Canister Vacuum in Field, 'Hg (Stop)	Flow Controller ID	Canister ID	Other (Please specify in notes section)	MA-APH	EPA 3C	EPA 25C / 25.3	ASTM D-1946 / 1945 / 3588	EPA 15/16	TO-3	Other (Please specify in notes section)	Sample Specific Notes:
<u>VSP-801</u>	<u>3/14/18</u>	<u>1010</u>					<u>320-34158</u>									<u>Fixed Gas: Methane</u>
<u>VSP-802</u>	<u>3/14/18</u>	<u>1020</u>					<u>320-35825</u>									<u>O₂ & CO₂</u>
 320-37147 Chain of Custody																
Special Instructions/QC Requirements & Comments: <u>Any questions call 303-514-7192</u>																
Samples Shipped by:		Date / Time:		Samples Received by:		Date / Time:		Received by: <u>[Signature]</u> Received by: <u>[Signature]</u> Condition: <u>TA-SAC</u>								
Samples Relinquished by:		Date / Time:		Relinquished by:		Date / Time:		Relinquished by: <u>[Signature]</u> Relinquished by: <u>[Signature]</u> Condition: <u>TA-SAC</u>								
Lab Use Only:		Shipper Name:		Opened by:		Date / Time:		Shipped by: <u>[Signature]</u> Shipper Name: <u>SEA TA</u> Opened by: <u>[Signature]</u> Date / Time: <u>3/15/18 0845</u>								



1 - no end times ID 3400684
2 - ID 3400098

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 320-37147-1

Login Number: 37147

List Source: TestAmerica Sacramento

List Number: 1

Creator: Branscum, Cassie

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	SIGN
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	tag ID's don't match
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Date Cleaned/Batch ID 1-25-18 320-35438
Date of QC 2/8/18
Data File Number 18020820



320-35438 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

*	34000999
	34000684
	34000670
	34001100
	34001632
	34001642
	34000662
	34000620

	8782
	34002001
	34000806
	34000982
	34002005
	34001245
	34000633
	34001120

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

W for AP
1st level Reviewed By:

2/9/18
Date:

[Signature]
2nd level Reviewed By:

zks
Date:

Date Cleaned/Batch ID 2-6-18 320-35825
Date of QC 2/9/18
Data File Number MS9020920



320-35825 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

*	34000932
	34000908
	7706
	8962
	34000968
	34001106
	34001058
	34000658

	34000628
	34001947
	34000994
	34001105
	34000977
	34000771
	34001110
	34001649

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

[Signature]
1st level Reviewed By:

2/12/18
Date:

[Signature]
2nd level Reviewed By:

2/12/18
Date:

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35438-1
 SDG No.: _____
 Client Sample ID: 34000999 Lab Sample ID: 320-35438-1
 Matrix: Air Lab File ID: 18020820.D
 Analysis Method: TO-15 Date Collected: 01/25/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 02:44
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	ND		5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	0.19	J	0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35438-1
 SDG No.: _____
 Client Sample ID: 34000999 Lab Sample ID: 320-35438-1
 Matrix: Air Lab File ID: 18020820.D
 Analysis Method: TO-15 Date Collected: 01/25/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 02:44
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	0.076	J	0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35438-1
 SDG No.: _____
 Client Sample ID: 34000999 Lab Sample ID: 320-35438-1
 Matrix: Air Lab File ID: 18020820.D
 Analysis Method: TO-15 Date Collected: 01/25/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 02:44
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	94		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	97		70-130
2037-26-5	Toluene-d8 (Surr)	97		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020820.D
 Lims ID: 320-35438-A-1
 Client ID: 34000999
 Sample Type: Client
 Inject. Date: 09-Feb-2018 02:44:30 ALS Bottle#: 14 Worklist Smp#: 19
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Sample Info: 320-35438-A-1
 Misc. Info.: 500mL
 Operator ID: SV Instrument ID: ATMS2
 Method: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\TO15_ATMS2N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 09-Feb-2018 18:25:18 Calib Date: 06-Feb-2018 23:01:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS2\20180206-53757.b\18020612.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK008

First Level Reviewer: phanthasena

Date: 09-Feb-2018 18:25:18

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	11.386	11.380	0.006	98	56371	4.00	
* 2 1,4-Difluorobenzene	114	13.472	13.472	0.000	99	229631	4.00	
* 3 Chlorobenzene-d5 (IS)	117	19.532	19.532	0.000	100	213900	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	12.535	12.535	-0.001	38	82391	3.86	
\$ 5 Toluene-d8 (Surr)	100	16.697	16.697	0.000	100	142544	3.88	
\$ 6 4-Bromofluorobenzene (Surr	95	21.551	21.551	0.000	99	147142	3.74	
10 Propene	41	3.927	3.927	0.000	90	1007	0.0632	
18 Butane	43	4.560	4.560	0.000	92	541	0.0193	
32 Acetone	43	6.975	6.896	0.079	96	4016	-0.7640	
39 Methylene Chloride	49	8.088	8.088	0.000	53	1485	0.0756	
40 Carbon disulfide	76	8.125	8.131	-0.006	98	6264	0.1916	

Reagents:

VAMSIS20_00106

Amount Added: 50.00

Units: mL

Run Reagent

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020820.D

Injection Date: 09-Feb-2018 02:44:30

Instrument ID: ATMS2

Operator ID: SV

Lims ID: 320-35438-A-1

Lab Sample ID: 320-35438-1

Worklist Smp#: 19

Client ID: 34000999

Purge Vol: 250.000 mL

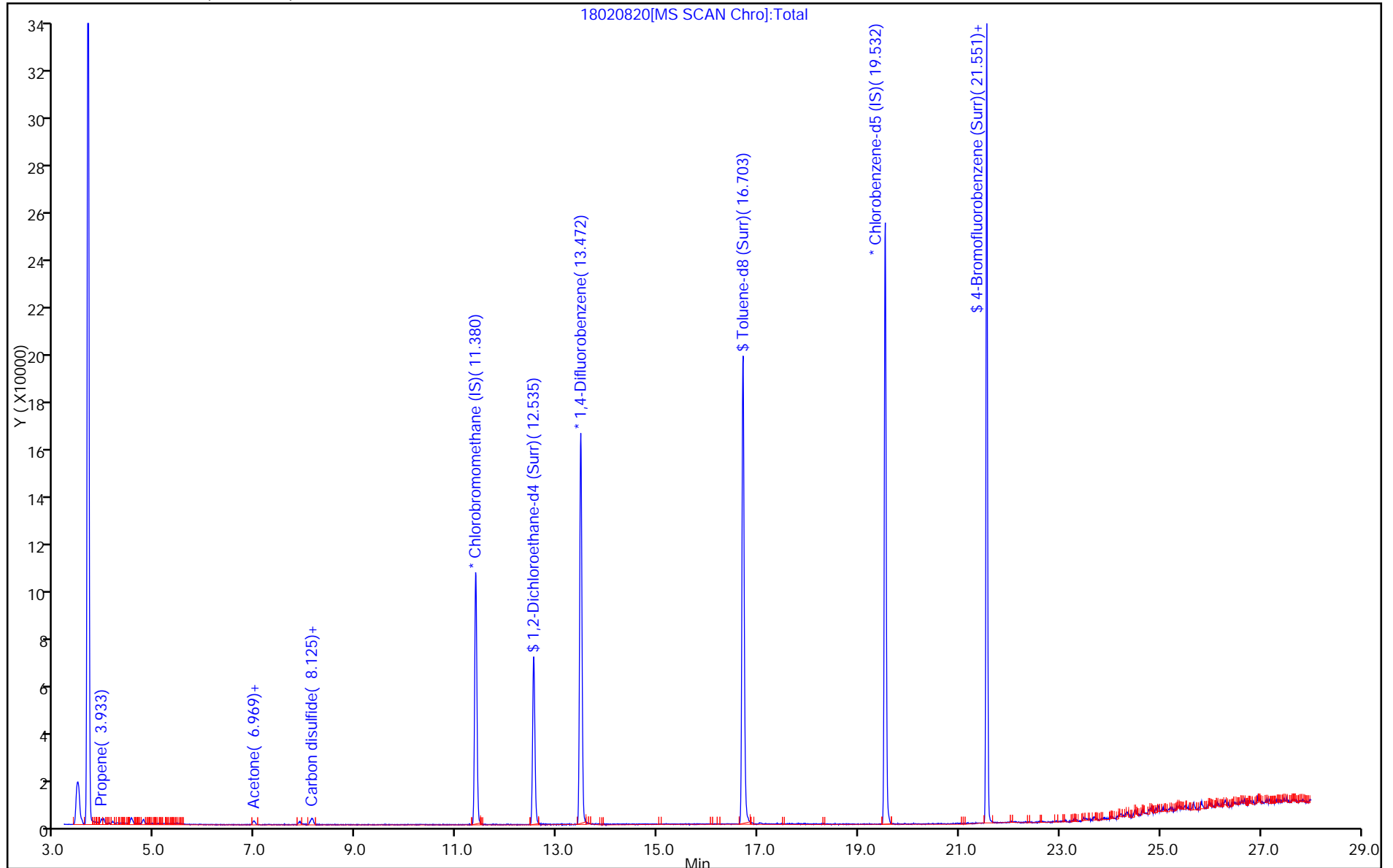
Dil. Factor: 1.0000

ALS Bottle#: 14

Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020820.D

Injection Date: 09-Feb-2018 02:44:30

Instrument ID: ATMS2

Lims ID: 320-35438-A-1

Lab Sample ID: 320-35438-1

Client ID: 34000999

Operator ID: SV

ALS Bottle#: 14 Worklist Smp#: 19

Purge Vol: 250.000 mL

Dil. Factor: 1.0000

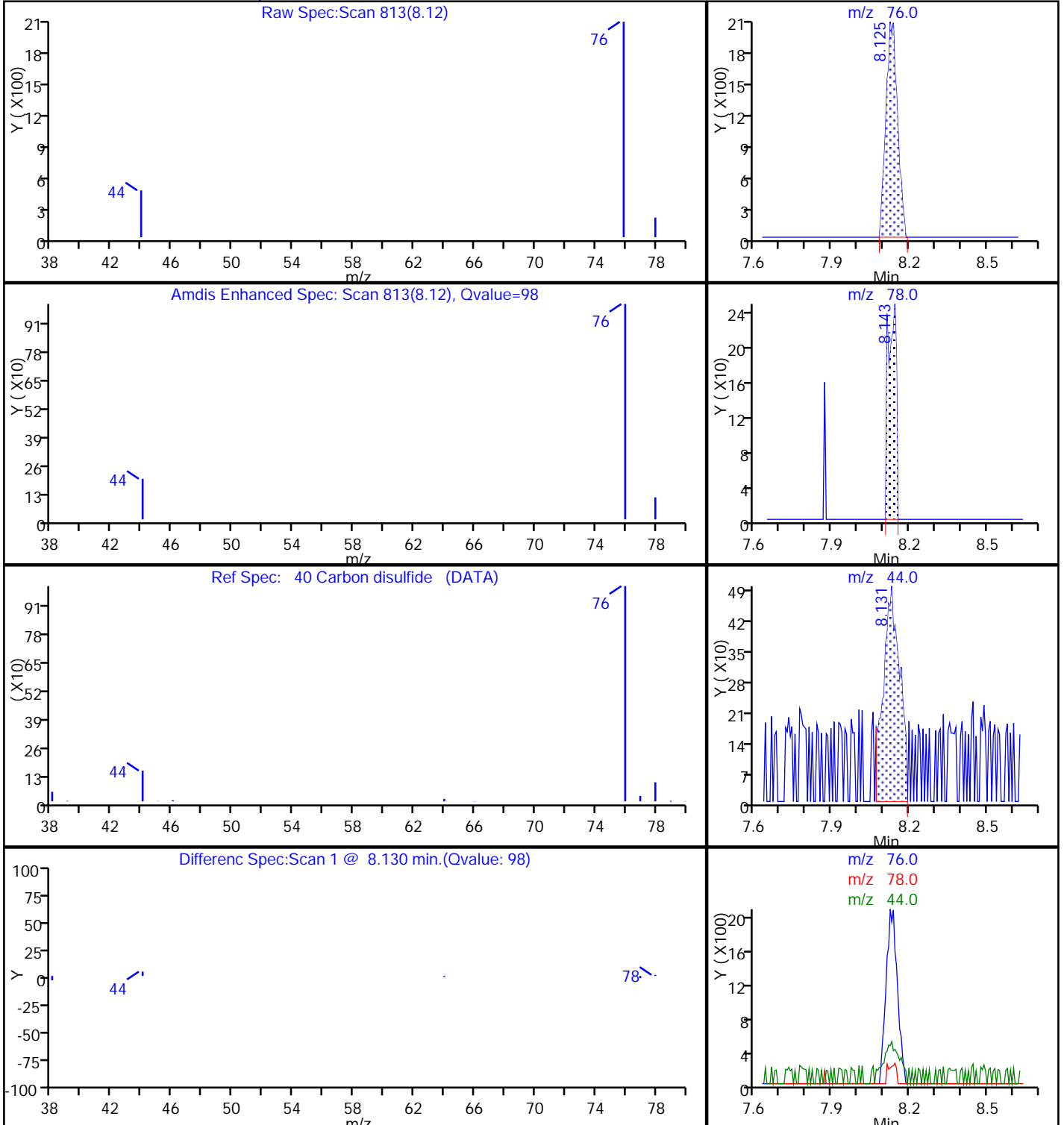
Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

40 Carbon disulfide, CAS: 75-15-0



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020820.D

Injection Date: 09-Feb-2018 02:44:30

Instrument ID: ATMS2

Lims ID: 320-35438-A-1

Lab Sample ID: 320-35438-1

Client ID: 34000999

Operator ID: SV

ALS Bottle#: 14 Worklist Smp#: 19

Purge Vol: 250.000 mL

Dil. Factor: 1.0000

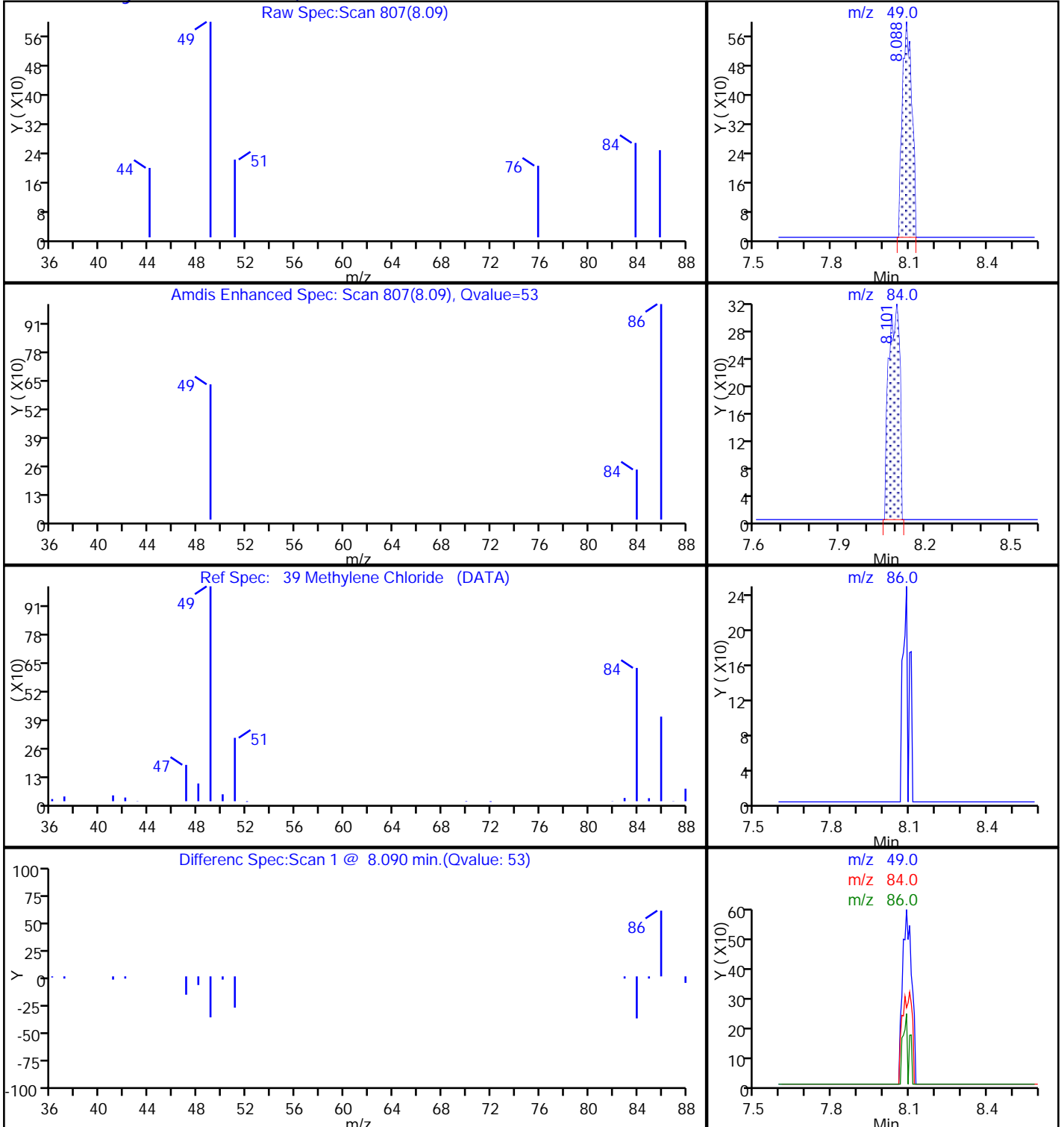
Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

39 Methylene Chloride, CAS: 75-09-2

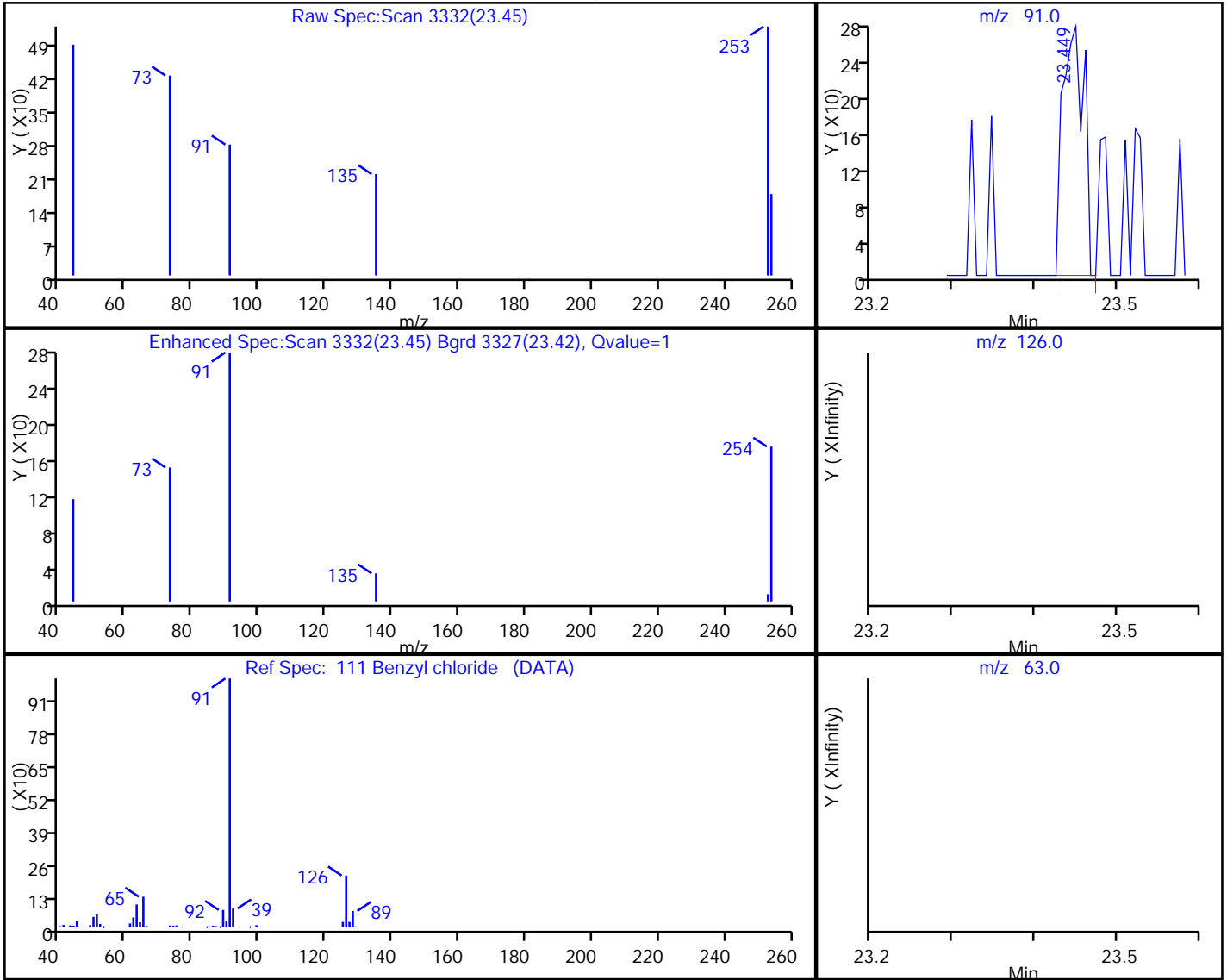


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020820.D
 Injection Date: 09-Feb-2018 02:44:30 Instrument ID: ATMS2
 Lims ID: 320-35438-A-1 Lab Sample ID: 320-35438-1
 Client ID: 34000999
 Operator ID: SV ALS Bottle#: 14 Worklist Smp#: 19
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

111 Benzyl chloride, CAS: 100-44-7

Processing Results



RT	Mass	Response	Amount
23.45	91.00	497	0.007955
23.44	126.00	0	
23.44	63.00	0	

Reviewer: phanhasena, 09-Feb-2018 18:25:18

Audit Action: Marked Compound Undetected

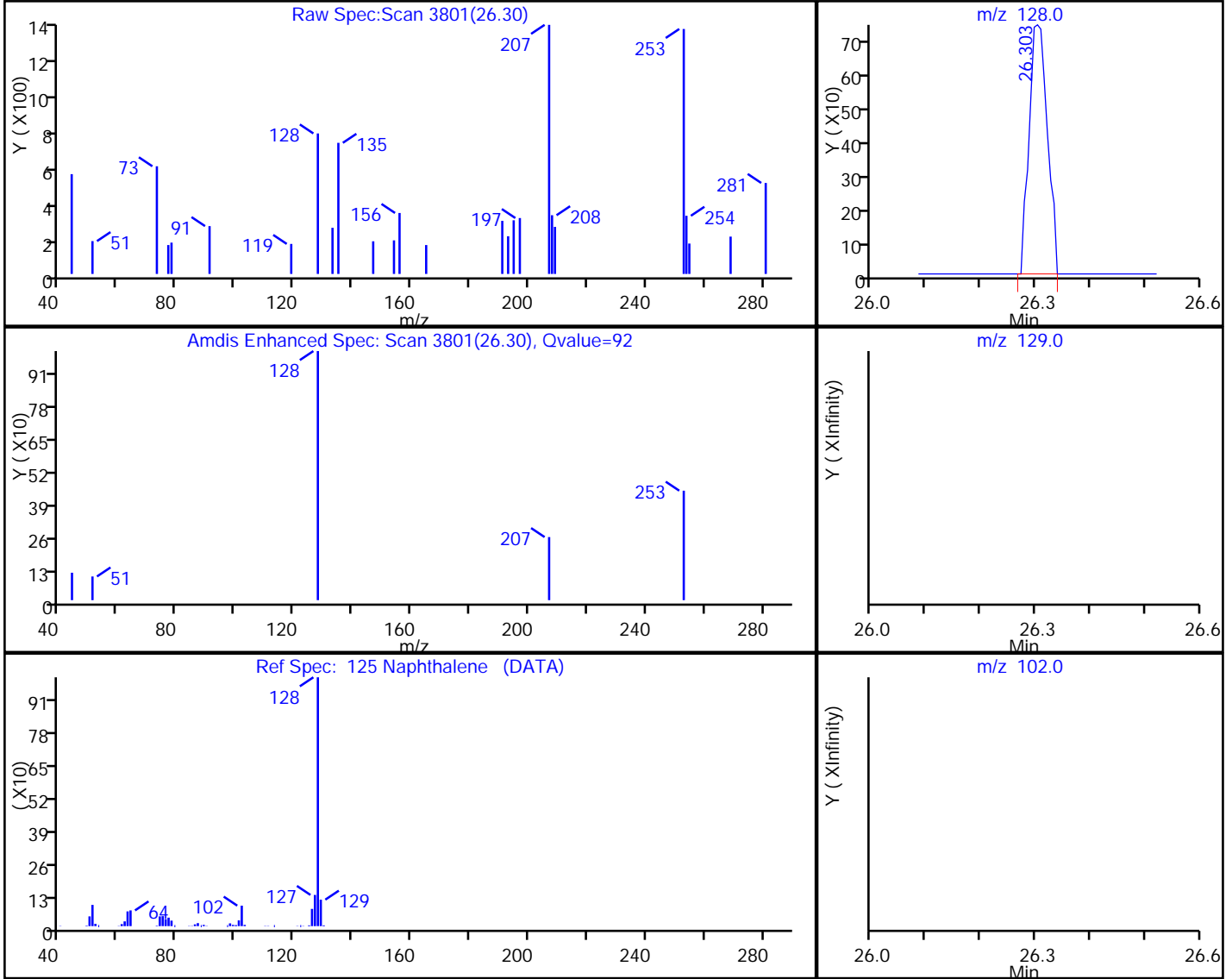
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020820.D
 Injection Date: 09-Feb-2018 02:44:30 Instrument ID: ATMS2
 Lims ID: 320-35438-A-1 Lab Sample ID: 320-35438-1
 Client ID: 34000999
 Operator ID: SV ALS Bottle#: 14 Worklist Smp#: 19
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

125 Naphthalene, CAS: 91-20-3

Processing Results



RT	Mass	Response	Amount
26.30	128.00	1750	0.025376
26.30	129.00	0	
26.30	102.00	0	

Reviewer: phanhasena, 09-Feb-2018 18:25:18

Audit Action: Marked Compound Undetected

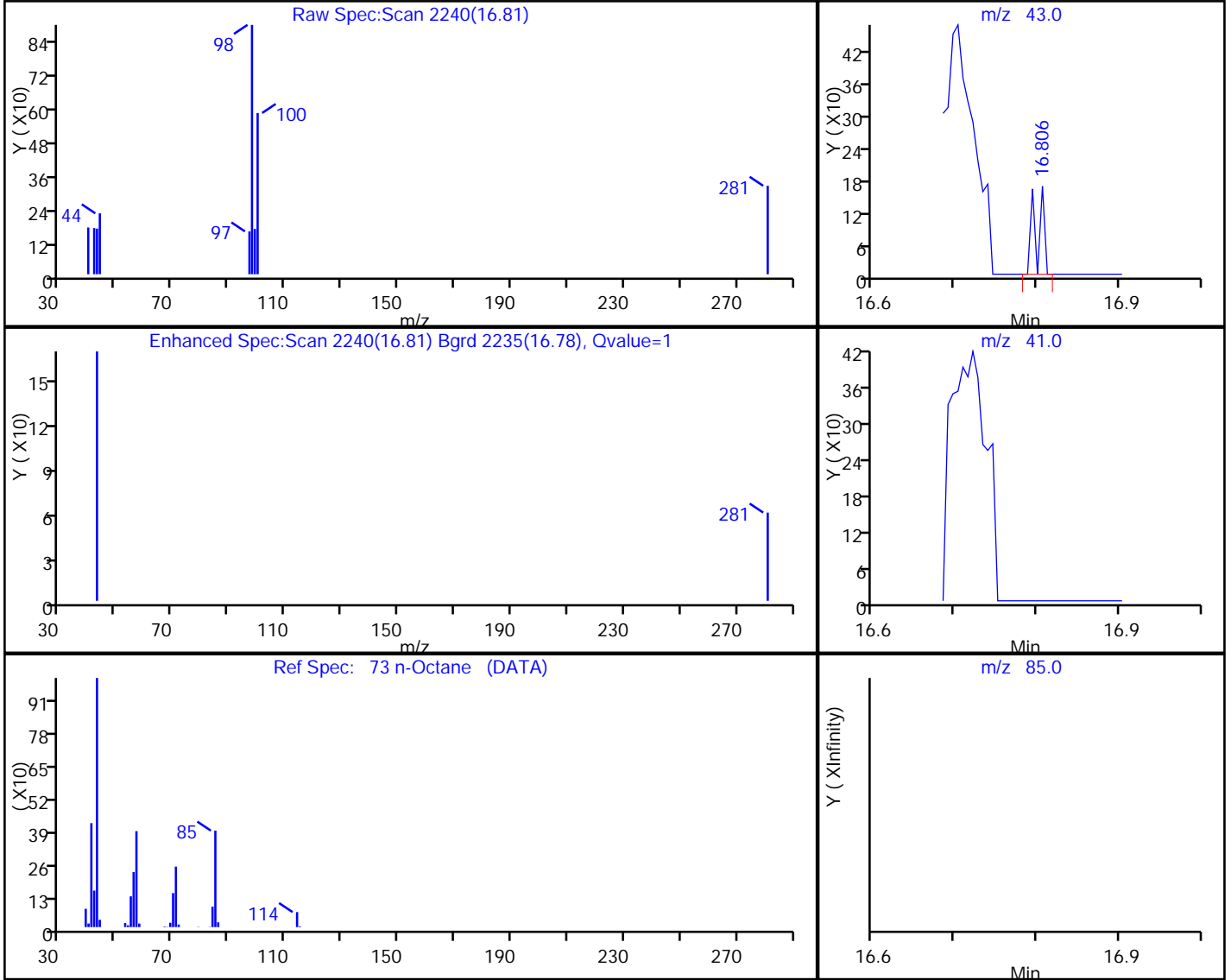
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020820.D
 Injection Date: 09-Feb-2018 02:44:30 Instrument ID: ATMS2
 Lims ID: 320-35438-A-1 Lab Sample ID: 320-35438-1
 Client ID: 34000999
 Operator ID: SV ALS Bottle#: 14 Worklist Smp#: 19
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

73 n-Octane, CAS: 111-65-9

Processing Results



RT	Mass	Response	Amount
16.81	43.00	118	0.002733
16.79	41.00	0	
16.79	85.00	0	

Reviewer: phanhasena, 09-Feb-2018 18:25:18

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35825-1
 SDG No.: _____
 Client Sample ID: 34000932 Lab Sample ID: 320-35825-1
 Matrix: Air Lab File ID: MS9020920.D
 Analysis Method: TO-15 Date Collected: 02/06/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/10/2018 03:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207738 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.35	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	0.50	J B	0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35825-1
 SDG No.: _____
 Client Sample ID: 34000932 Lab Sample ID: 320-35825-1
 Matrix: Air Lab File ID: MS9020920.D
 Analysis Method: TO-15 Date Collected: 02/06/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/10/2018 03:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207738 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35825-1
 SDG No.: _____
 Client Sample ID: 34000932 Lab Sample ID: 320-35825-1
 Matrix: Air Lab File ID: MS9020920.D
 Analysis Method: TO-15 Date Collected: 02/06/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/10/2018 03:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207738 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	93		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	93		70-130
2037-26-5	Toluene-d8 (Surr)	98		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Lims ID: 320-35825-A-1
 Client ID: 34000932
 Sample Type: Client
 Inject. Date: 10-Feb-2018 03:50:30 ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Sample Info: 320-35825-A-1
 Misc. Info.: 500
 Operator ID: RG Instrument ID: ATMS9
 Method: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\TO15_ATMS9N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 12-Feb-2018 09:59:02 Calib Date: 09-Feb-2018 00:05:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS9\20180208-53859.b\MS9020812.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK023

First Level Reviewer: girr

Date: 12-Feb-2018 09:59:04

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	12.318	12.324	-0.006	97	68548	4.00	
* 2 1,4-Difluorobenzene	114	14.411	14.411	0.000	100	279384	4.00	
* 3 Chlorobenzene-d5 (IS)	117	20.330	20.330	0.000	99	189414	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	13.480	13.498	-0.012	97	102059	3.71	
\$ 5 Toluene-d8 (Surr)	100	17.575	17.582	0.000	98	139736	3.93	
\$ 6 4-Bromofluorobenzene (Surr	174	22.259	22.259	0.000	99	92985	3.73	
31 Acetone	43	7.689	7.624	0.061	95	9992	0.3488	
47 Methylene Chloride	49	8.881	8.893	-0.012	67	1210	0.0503	
48 Carbon disulfide	76	8.936	8.942	-0.006	99	20879	0.4993	
76 Trichloroethene	130	15.153	15.172	-0.012	90	2170	0.0785	
85 Toluene	91	17.733	17.734	0.006	13	729	0.009082	
93 Tetrachloroethene	166	18.998	19.010	-0.012	89	1403	0.0367	
103 1,1,2,2-Tetrachloroethane	83	22.089	22.089	0.000	86	849	0.0144	
110 4-Ethyltoluene	120	22.703	22.703	-0.006	95	289	0.007845	
111 1,3,5-Trimethylbenzene	120	22.764	22.770	-0.006	84	598	0.0115	
114 tert-Butylbenzene	91	23.287	23.287	0.006	73	1409	0.0188	M
115 1,2,4-Trimethylbenzene	120	23.317	23.324	-0.007	91	718	0.0142	
117 1,3-Dichlorobenzene	146	23.859	23.859	0.000	89	1012	0.0148	
120 1,4-Dichlorobenzene	146	23.993	23.987	0.006	93	1131	0.0164	
123 n-Butylbenzene	92	24.303	24.297	0.006	95	955	0.0134	
122 1,2-Dichlorobenzene	146	24.473	24.473	0.000	91	1114	0.0170	
126 1,2,4-Trichlorobenzene	180	26.706	26.700	0.006	88	1343	0.0521	
127 Naphthalene	128	27.071	27.065	0.006	96	4881	0.0281	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

VAMSIS20_00109

Amount Added: 50.00

Units: mL

Run Reagent

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D

Injection Date: 10-Feb-2018 03:50:30

Instrument ID: ATMS9

Operator ID: RG

Lims ID: 320-35825-A-1

Lab Sample ID: 320-35825-1

Worklist Smp#: 20

Client ID: 34000932

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

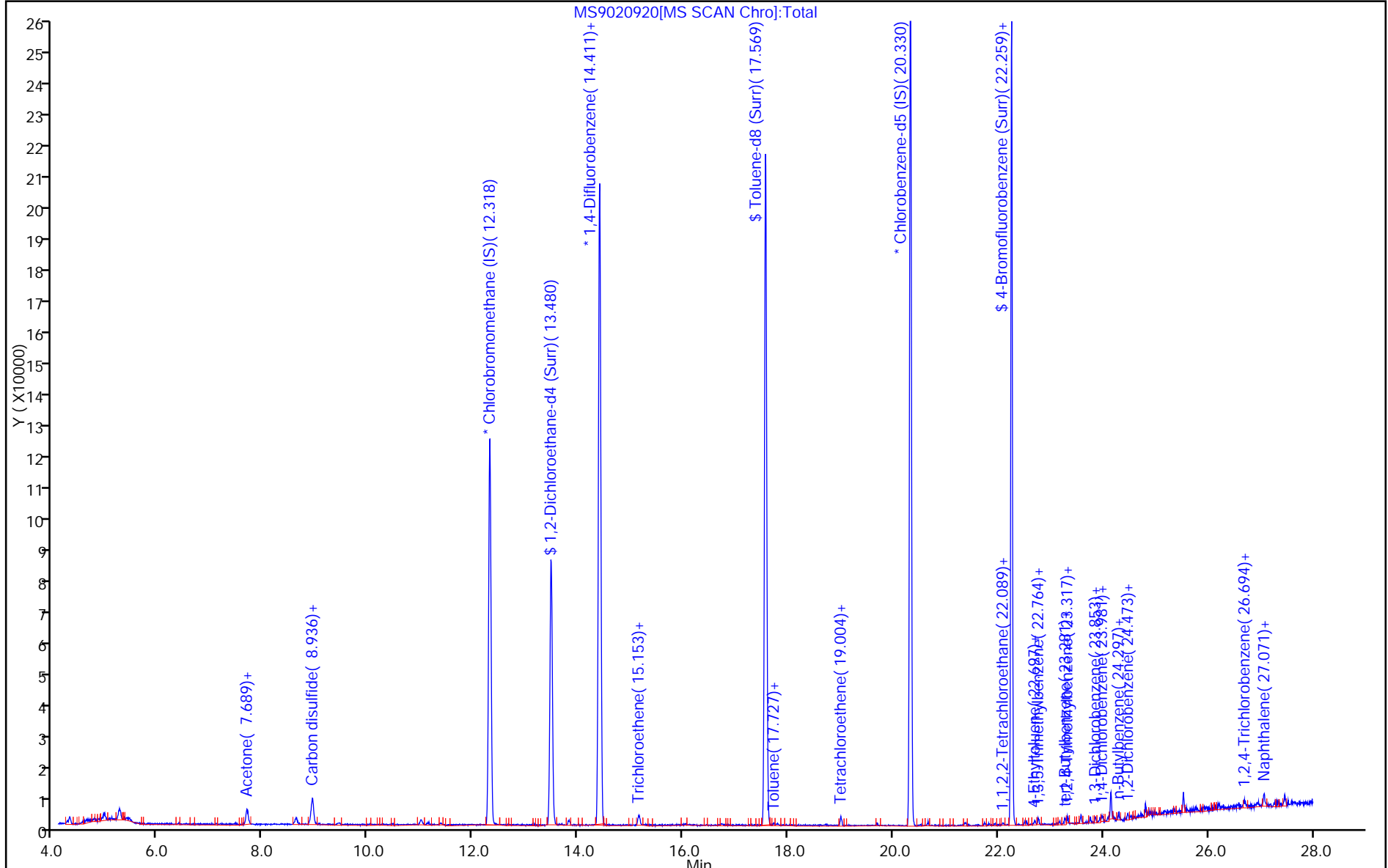
ALS Bottle#: 15

Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Y Scaling: Method Defined: Scale to the Nth Largest Peak: 2



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D

Injection Date: 10-Feb-2018 03:50:30

Instrument ID: ATMS9

Lims ID: 320-35825-A-1

Lab Sample ID: 320-35825-1

Client ID: 34000932

Operator ID: RG

ALS Bottle#: 15 Worklist Smp#: 20

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

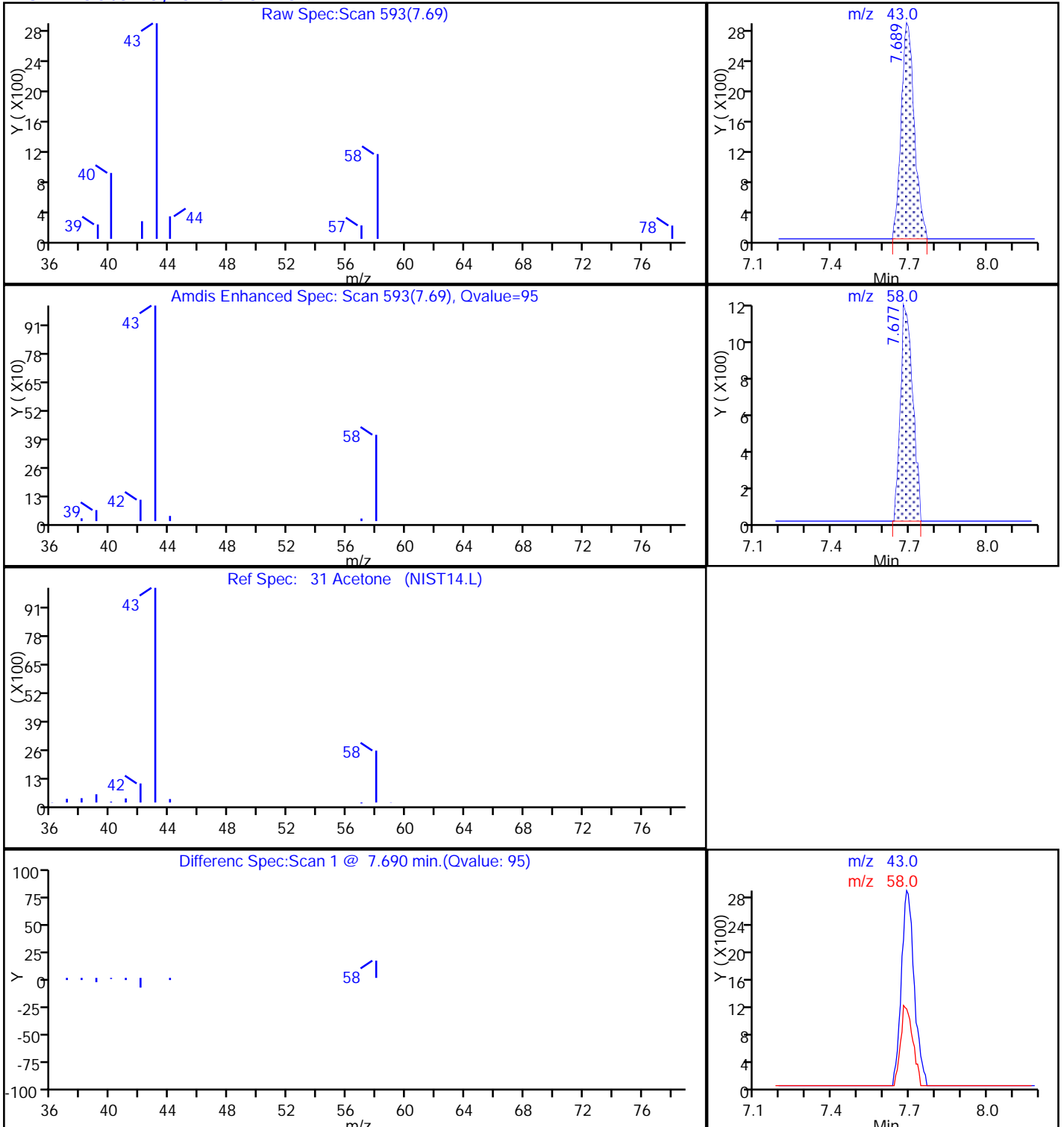
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

31 Acetone, CAS: 67-64-1



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D

Injection Date: 10-Feb-2018 03:50:30

Instrument ID: ATMS9

Lims ID: 320-35825-A-1

Lab Sample ID: 320-35825-1

Client ID: 34000932

Operator ID: RG

ALS Bottle#: 15 Worklist Smp#: 20

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

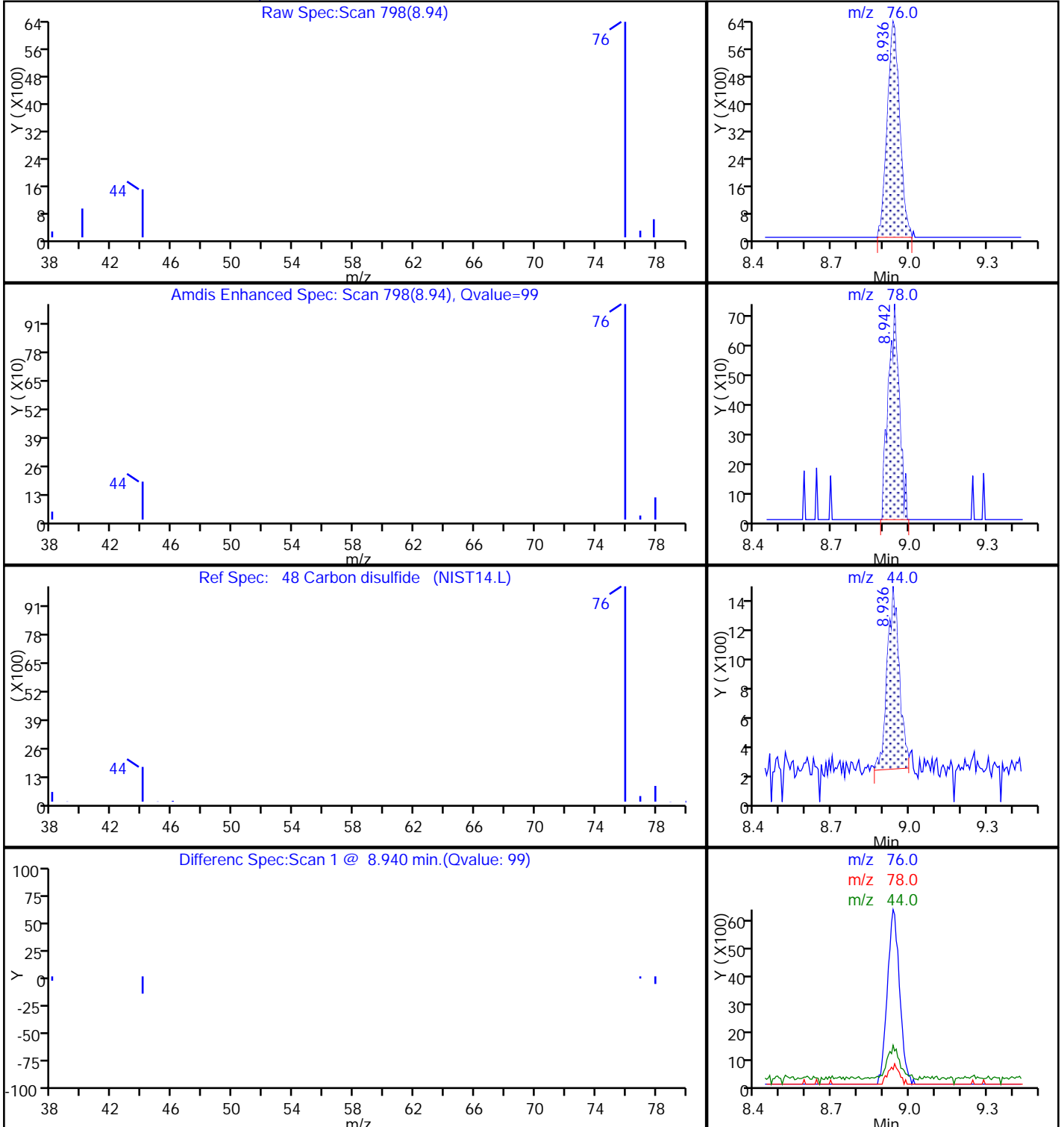
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

48 Carbon disulfide, CAS: 75-15-0

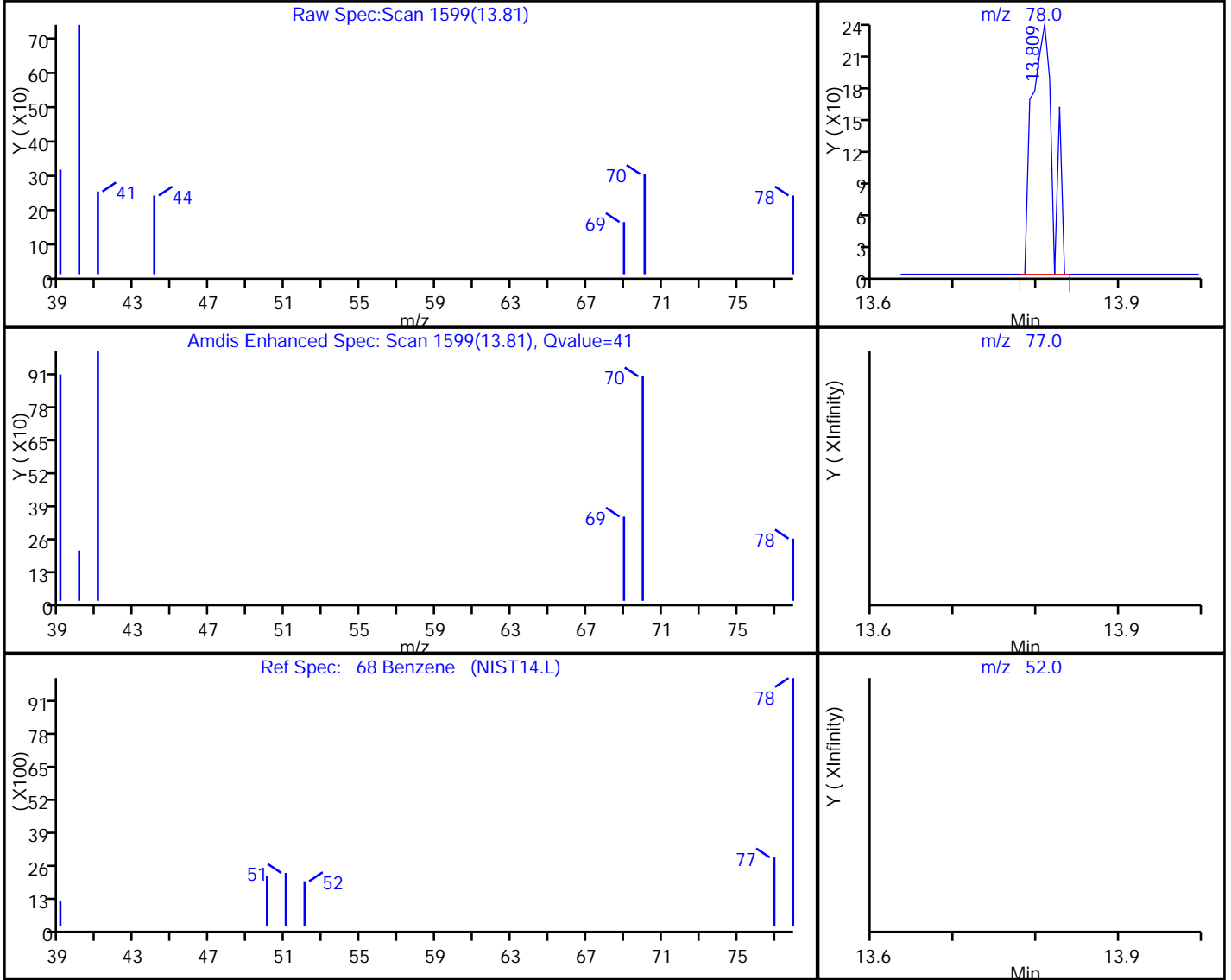


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

68 Benzene, CAS: 71-43-2

Processing Results



RT	Mass	Response	Amount
13.81	78.00	403	0.006407
13.81	77.00	0	
13.81	52.00	0	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

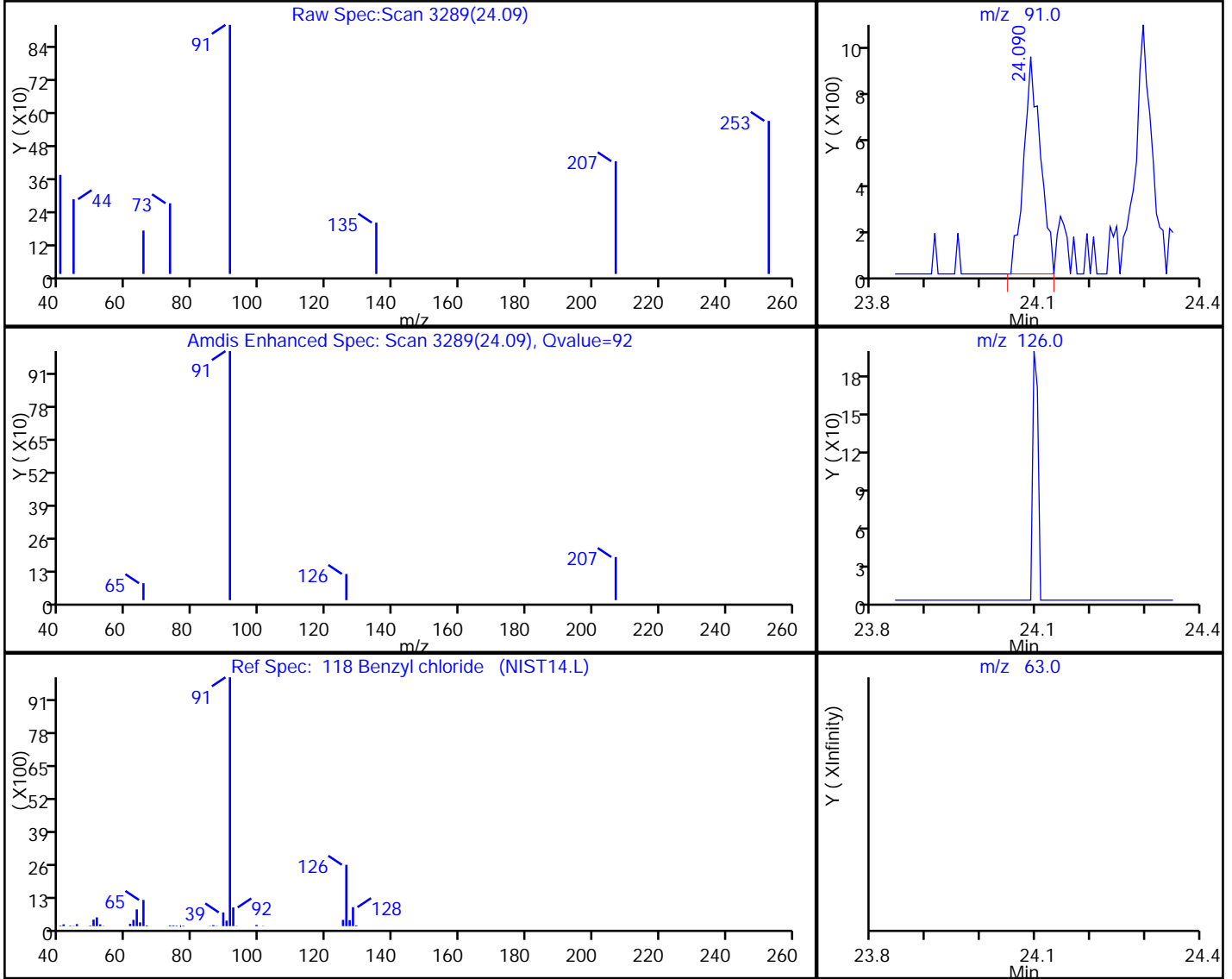
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

118 Benzyl chloride, CAS: 100-44-7

Processing Results



RT	Mass	Response	Amount
24.09	91.00	1947	0.015137
24.10	126.00	0	
24.10	63.00	0	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

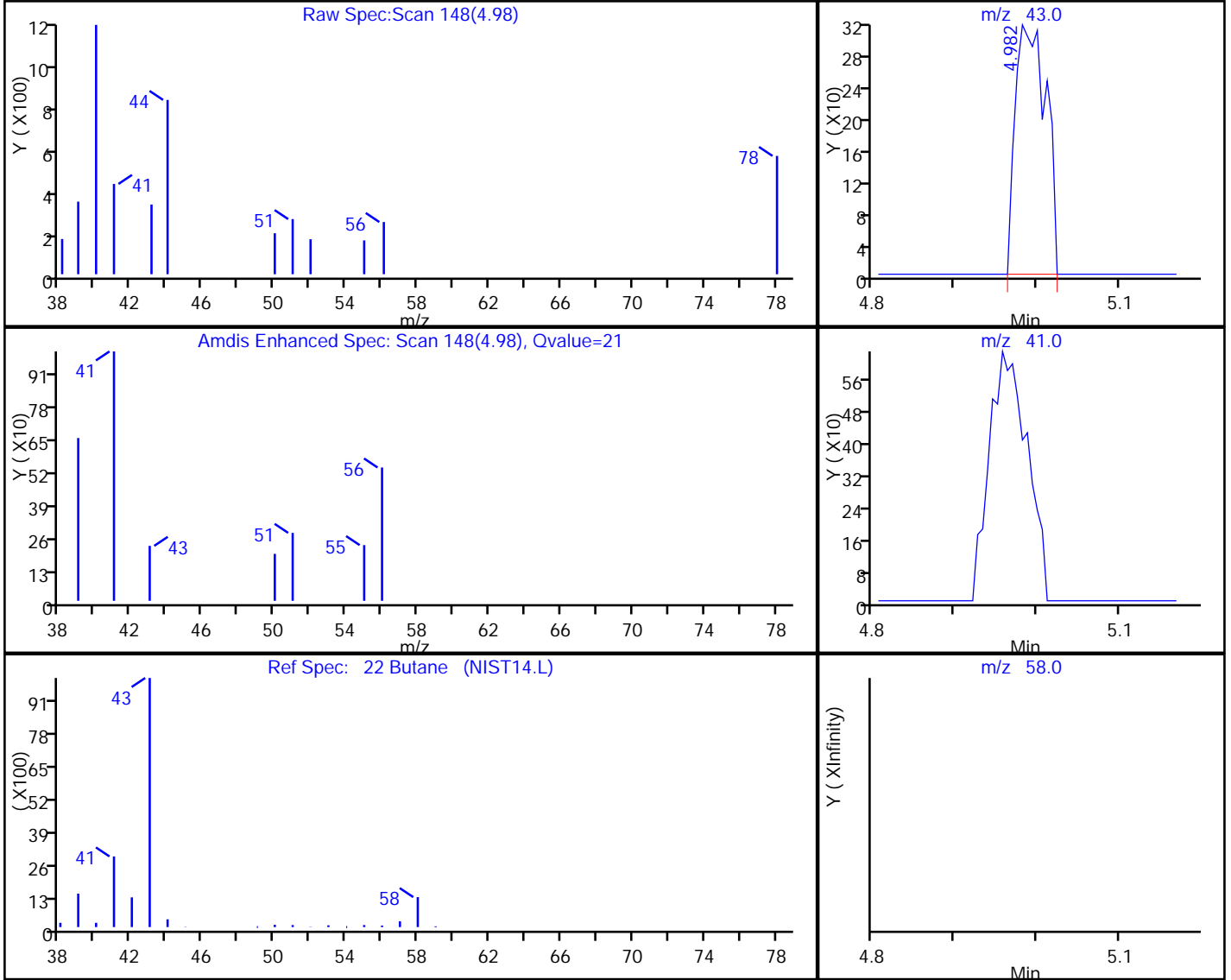
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

22 Butane, CAS: 106-97-8

Processing Results



RT	Mass	Response	Amount
4.98	43.00	812	0.023784
4.99	41.00	0	
4.99	58.00	0	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

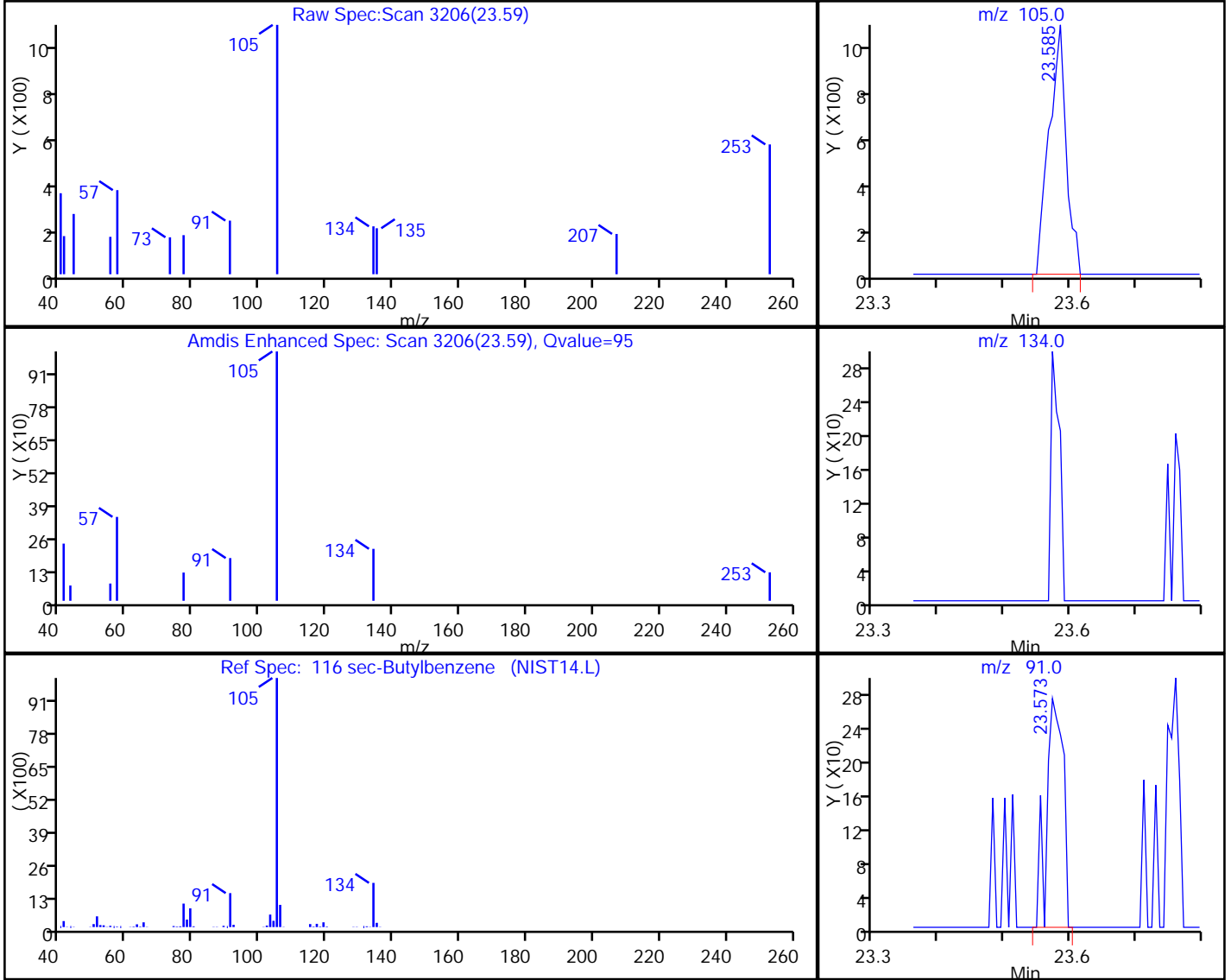
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

116 sec-Butylbenzene, CAS: 135-98-8

Processing Results



RT	Mass	Response	Amount
23.59	105.00	1902	0.012652
23.58	134.00	0	
23.57	91.00	469	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

TestAmerica Sacramento

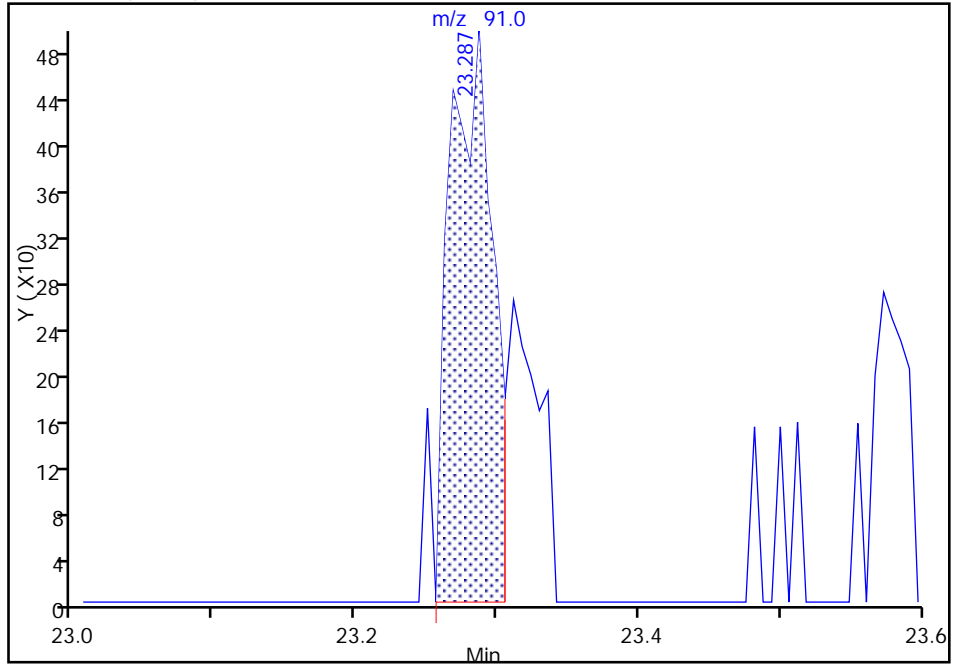
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Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
Client ID: 34000932
Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
Purge Vol: 5.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

114 tert-Butylbenzene, CAS: 98-06-6

Signal: 1

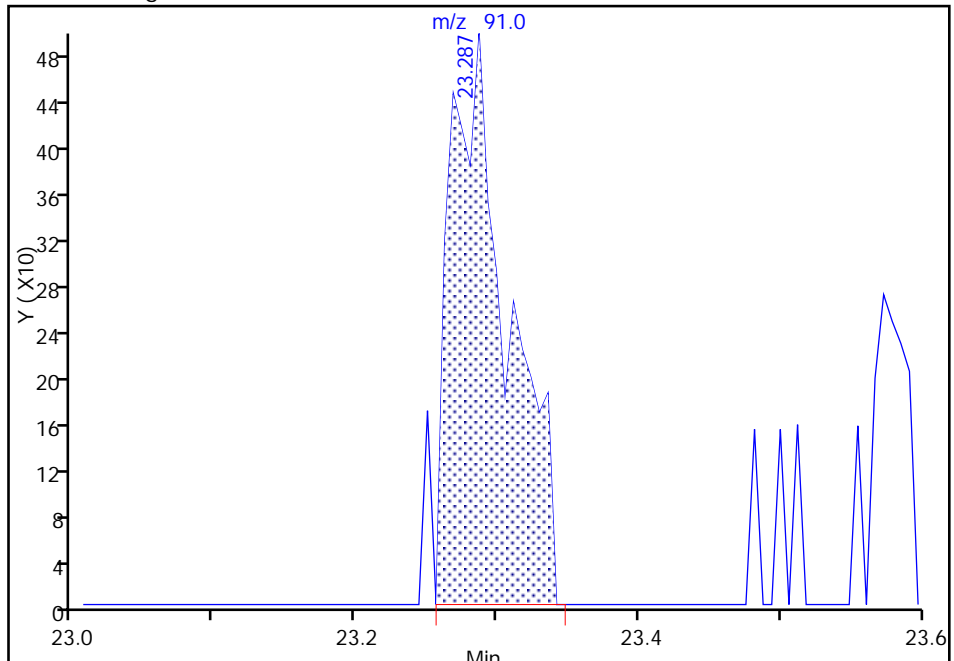
RT: 23.29
Area: 1036
Amount: 0.013851
Amount Units: ppb v/v

Processing Integration Results



RT: 23.29
Area: 1409
Amount: 0.018838
Amount Units: ppb v/v

Manual Integration Results



Reviewer: girr, 12-Feb-2018 09:58:12
Audit Action: Manually Integrated

Audit Reason: Incomplete Integration

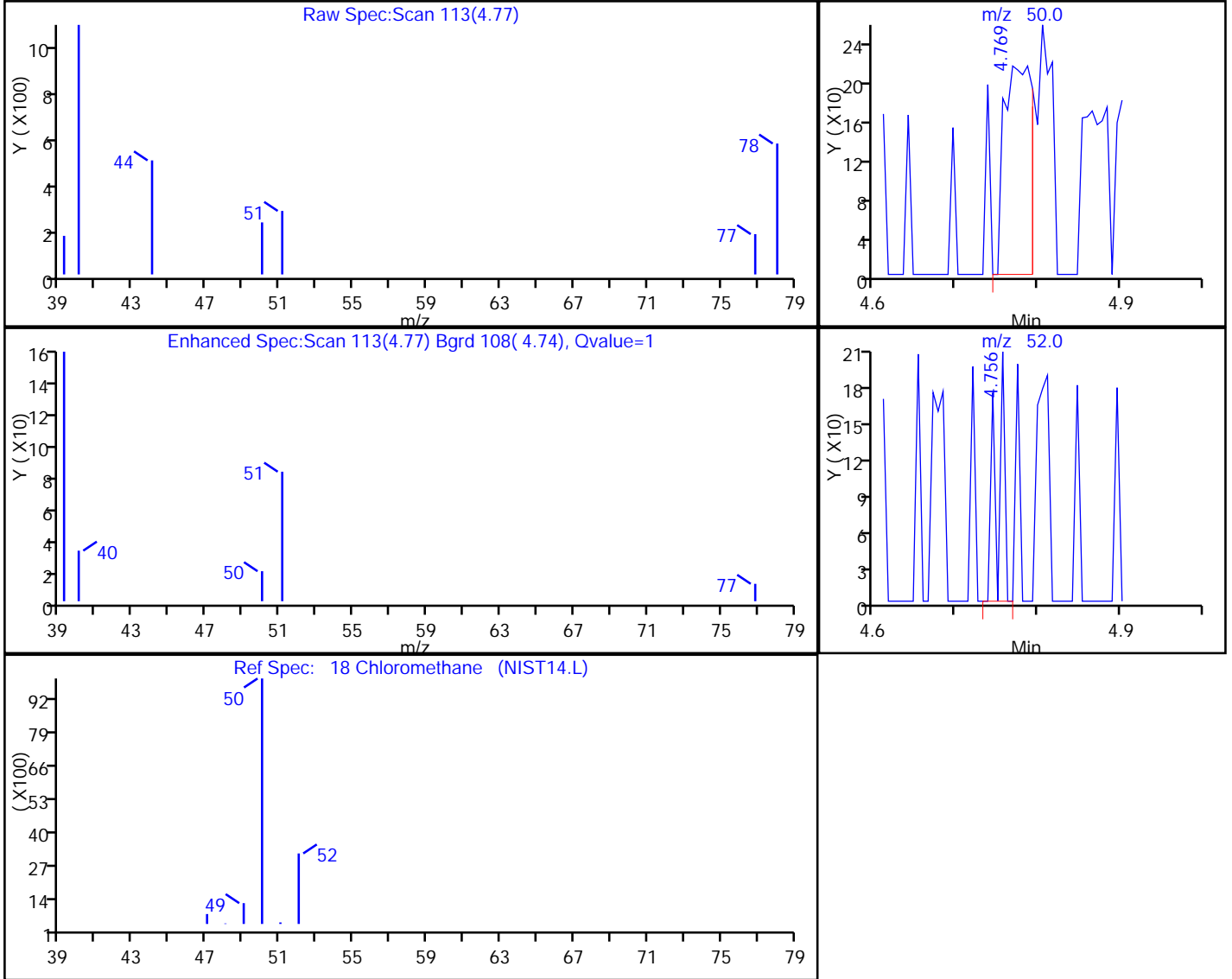


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

18 Chloromethane, CAS: 74-87-3

Processing Results



RT	Mass	Response	Amount
4.77	50.00	503	0.026839
4.76	52.00	135	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

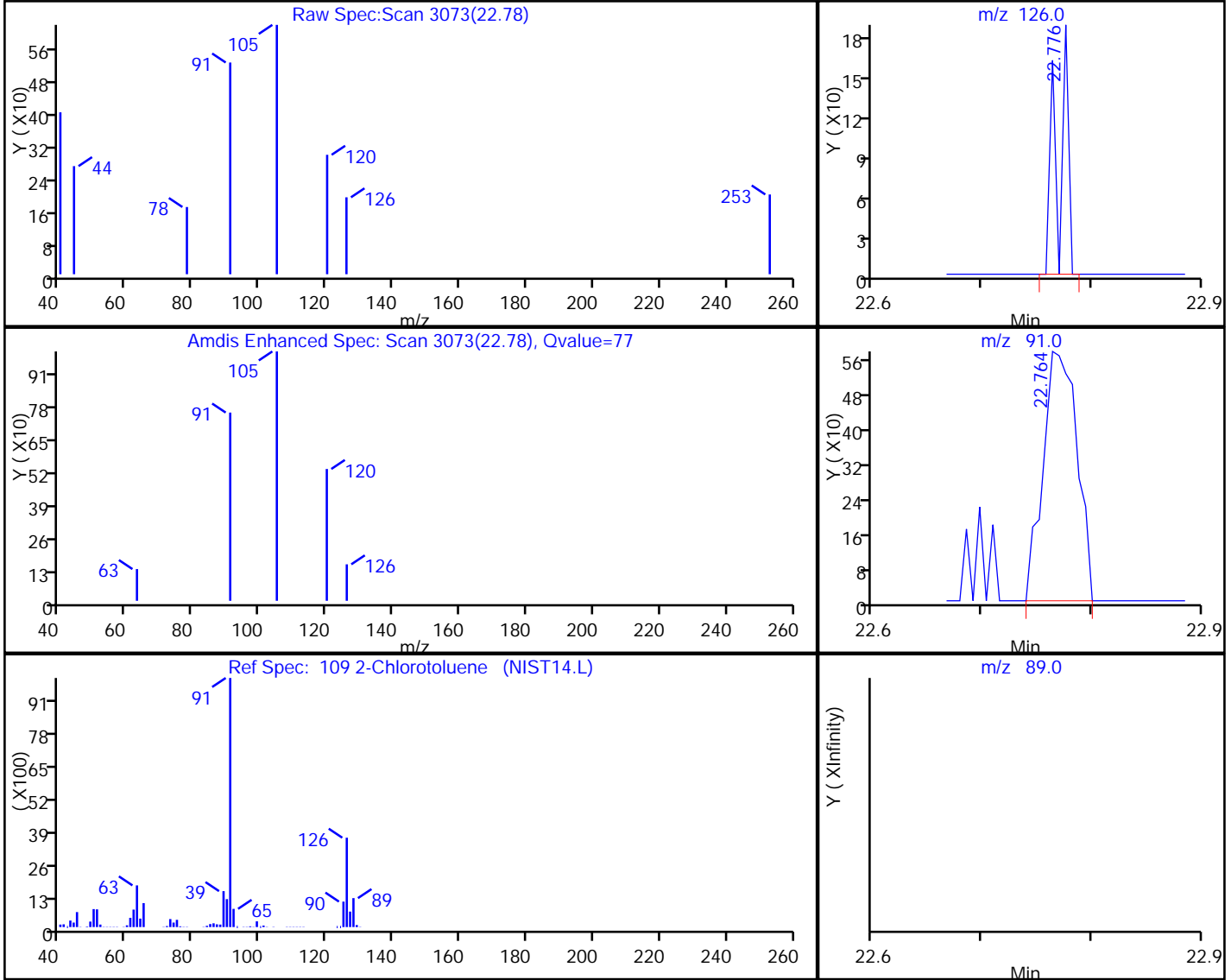
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

109 2-Chlorotoluene, CAS: 95-49-8

Processing Results



RT	Mass	Response	Amount
22.78	126.00	129	0.004423
22.76	91.00	1240	
22.78	89.00	0	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

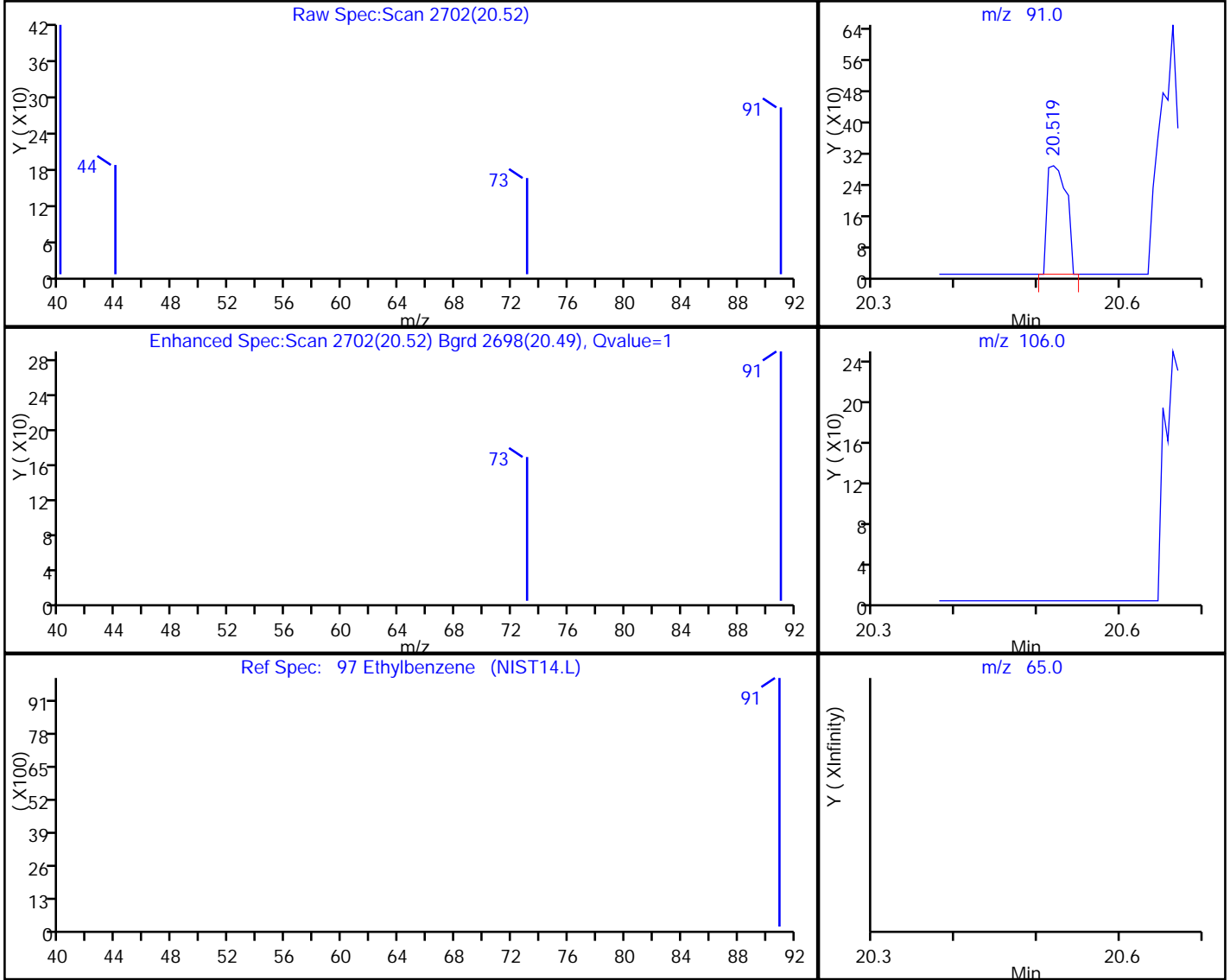
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

97 Ethylbenzene, CAS: 100-41-4

Processing Results



RT	Mass	Response	Amount
20.52	91.00	457	0.004230
20.53	106.00	0	
20.53	65.00	0	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

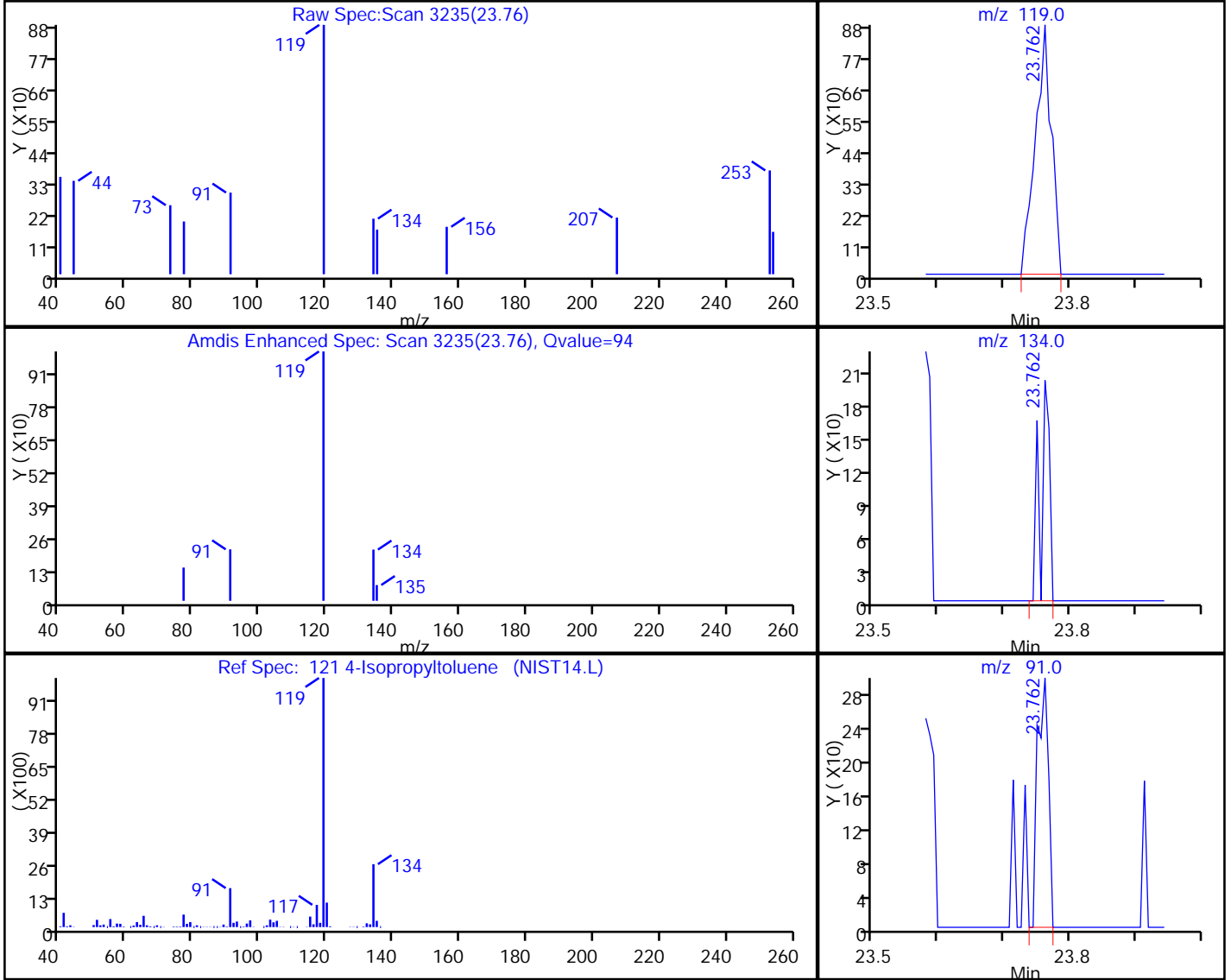
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TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

121 4-Isopropyltoluene, CAS: 99-87-6

Processing Results



RT	Mass	Response	Amount
23.76	119.00	1515	0.011619
23.76	134.00	188	
23.76	91.00	336	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

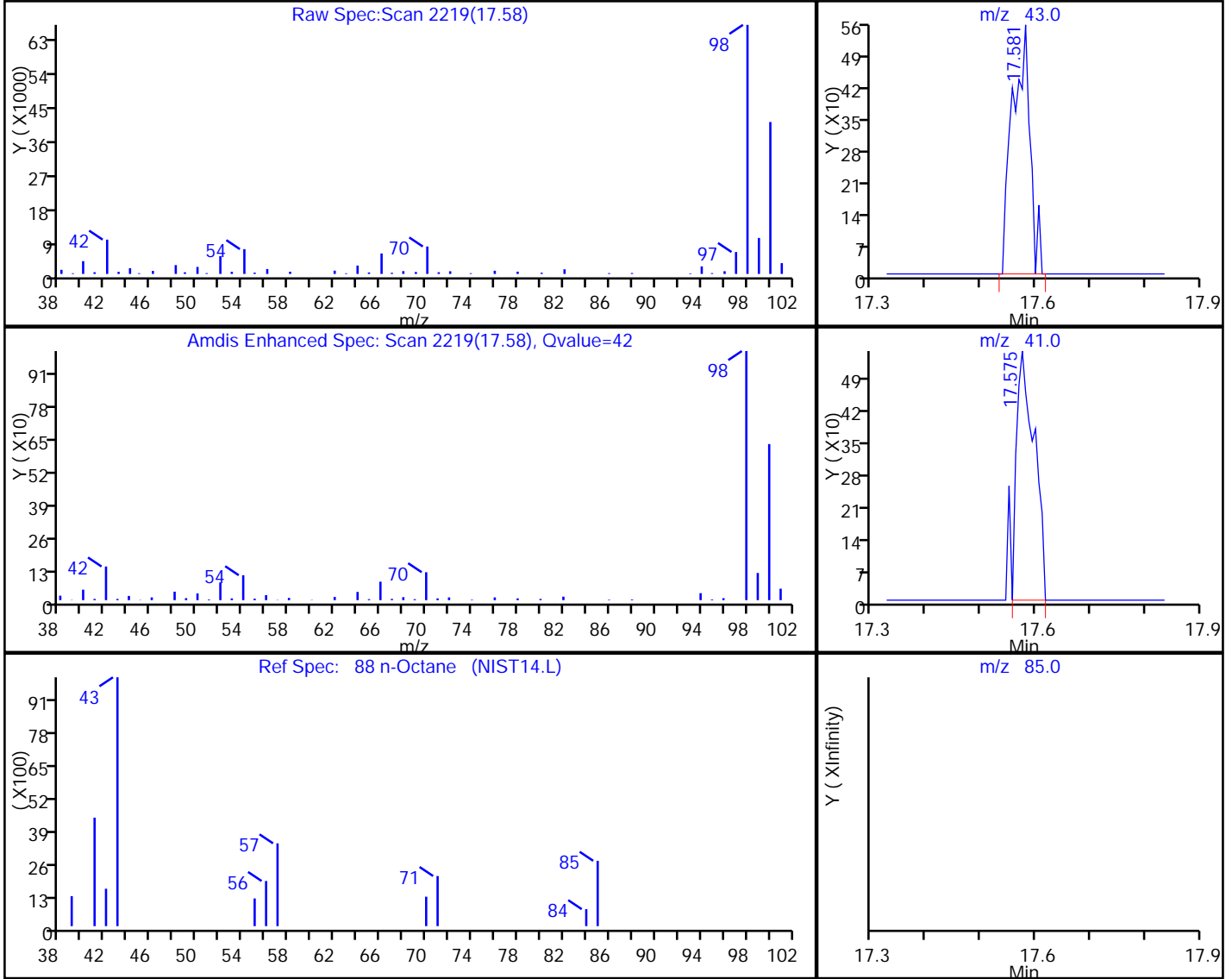
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

88 n-Octane, CAS: 111-65-9

Processing Results



RT	Mass	Response	Amount
17.58	43.00	1242	0.022800
17.57	41.00	1224	
17.58	85.00	0	

Reviewer: gjrr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

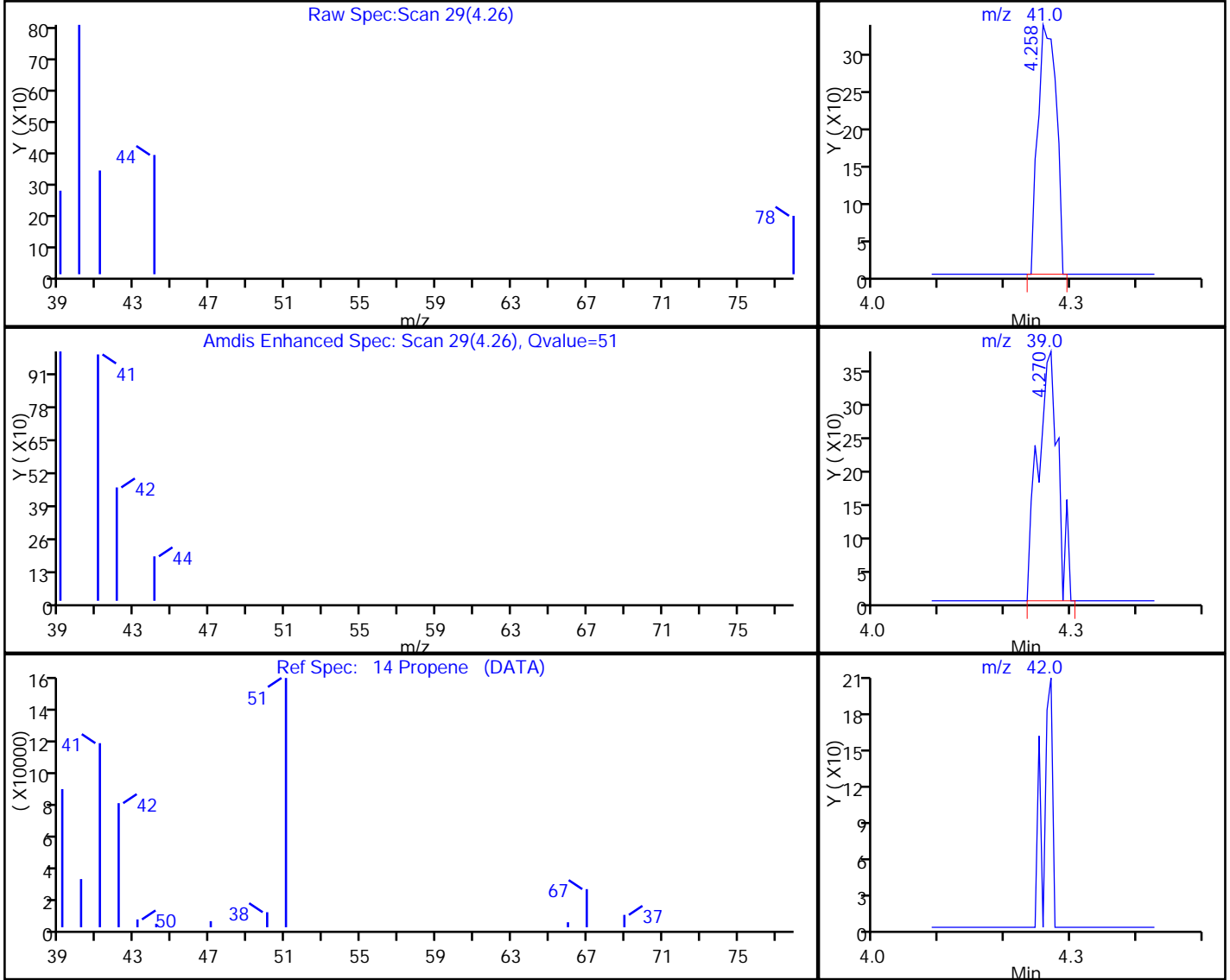
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

14 Propene, CAS: 115-07-1

Processing Results



RT	Mass	Response	Amount
4.26	41.00	646	0.041507
4.27	39.00	804	
4.25	42.00	0	

Reviewer: gjrr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

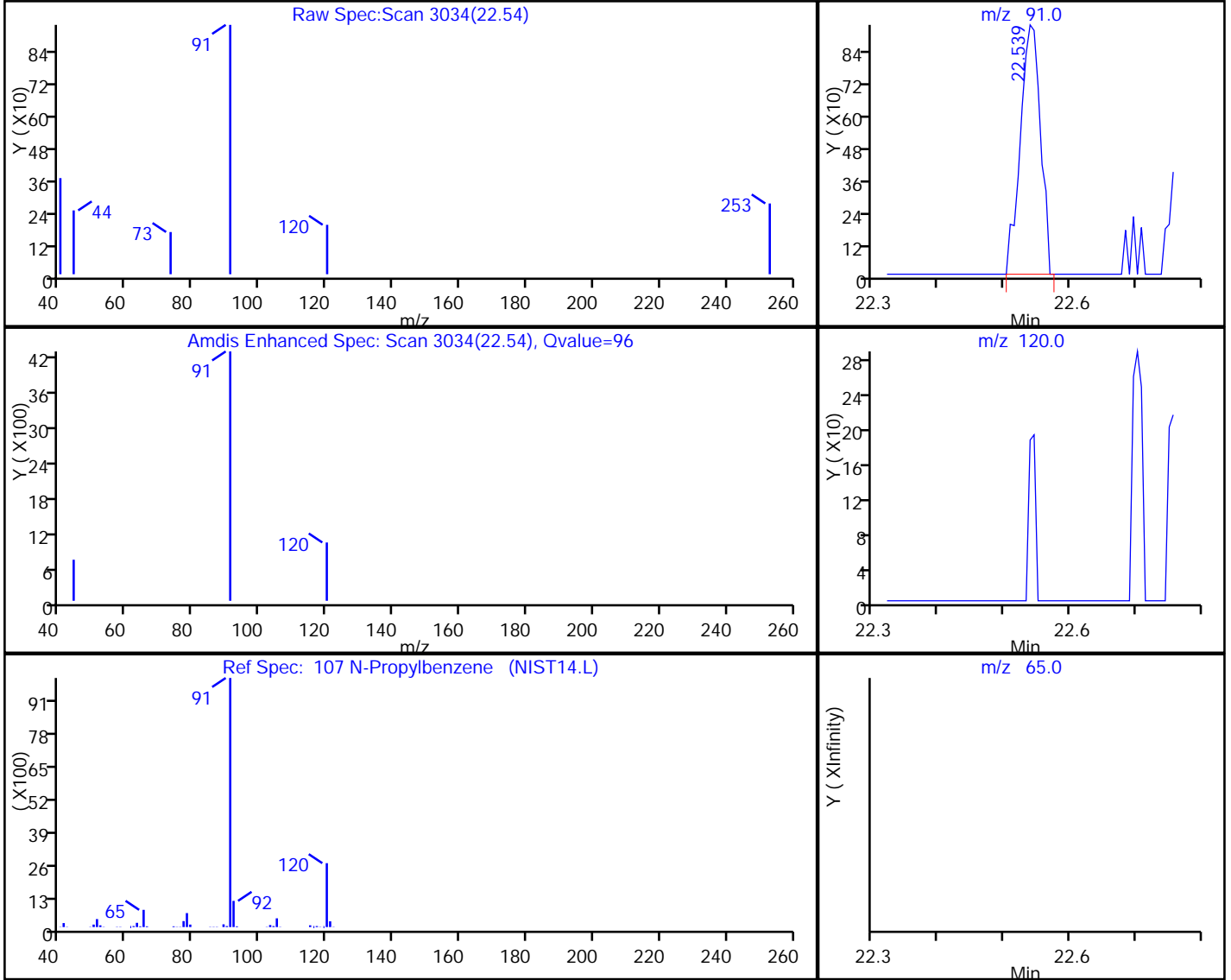
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

107 N-Propylbenzene, CAS: 103-65-1

Processing Results



RT	Mass	Response	Amount
22.54	91.00	1994	0.013273
22.54	120.00	0	
22.54	65.00	0	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

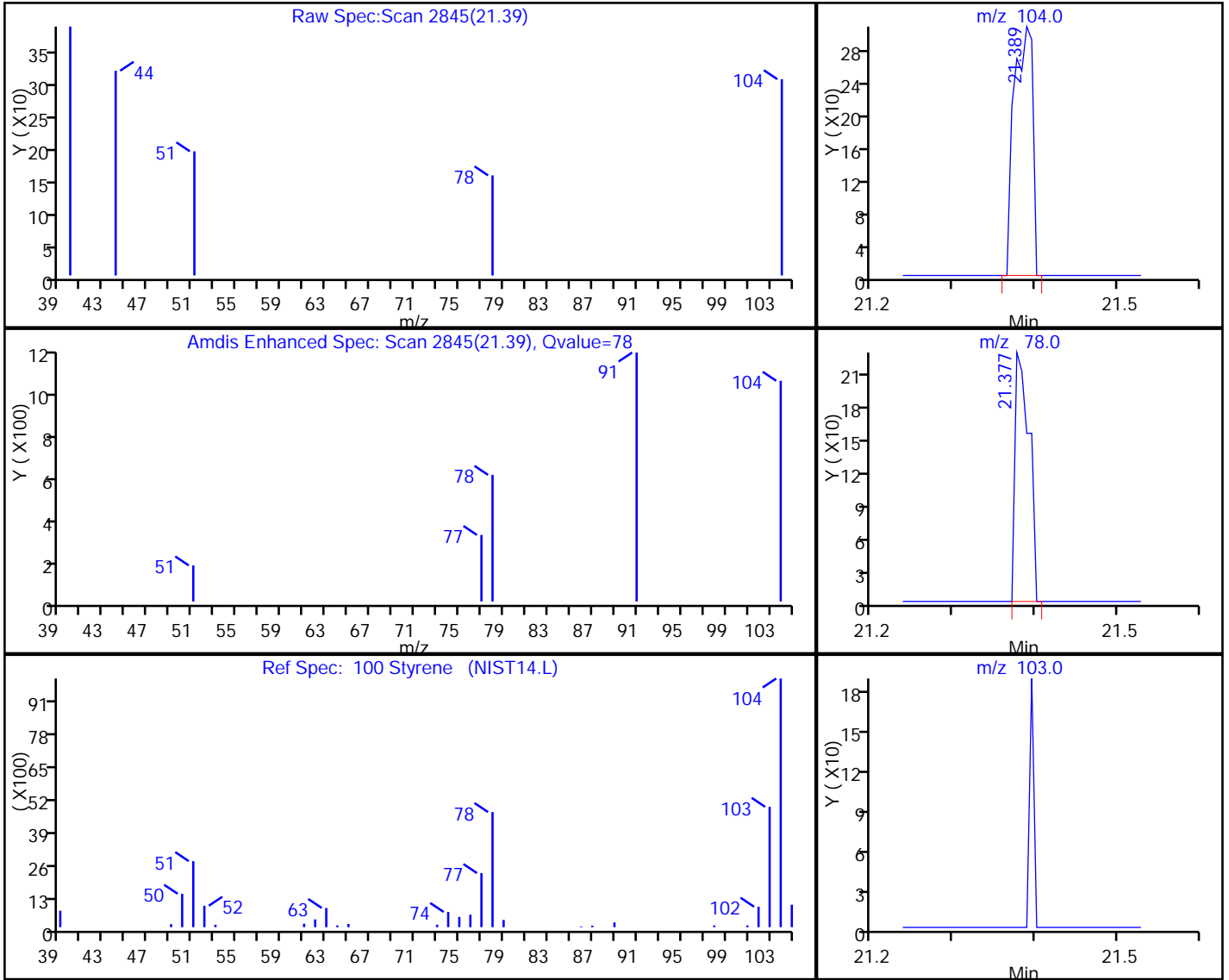
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

100 Styrene, CAS: 100-42-5

Processing Results



RT	Mass	Response	Amount
21.39	104.00	476	0.007093
21.38	78.00	273	
21.38	103.00	0	

Reviewer: gjrr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

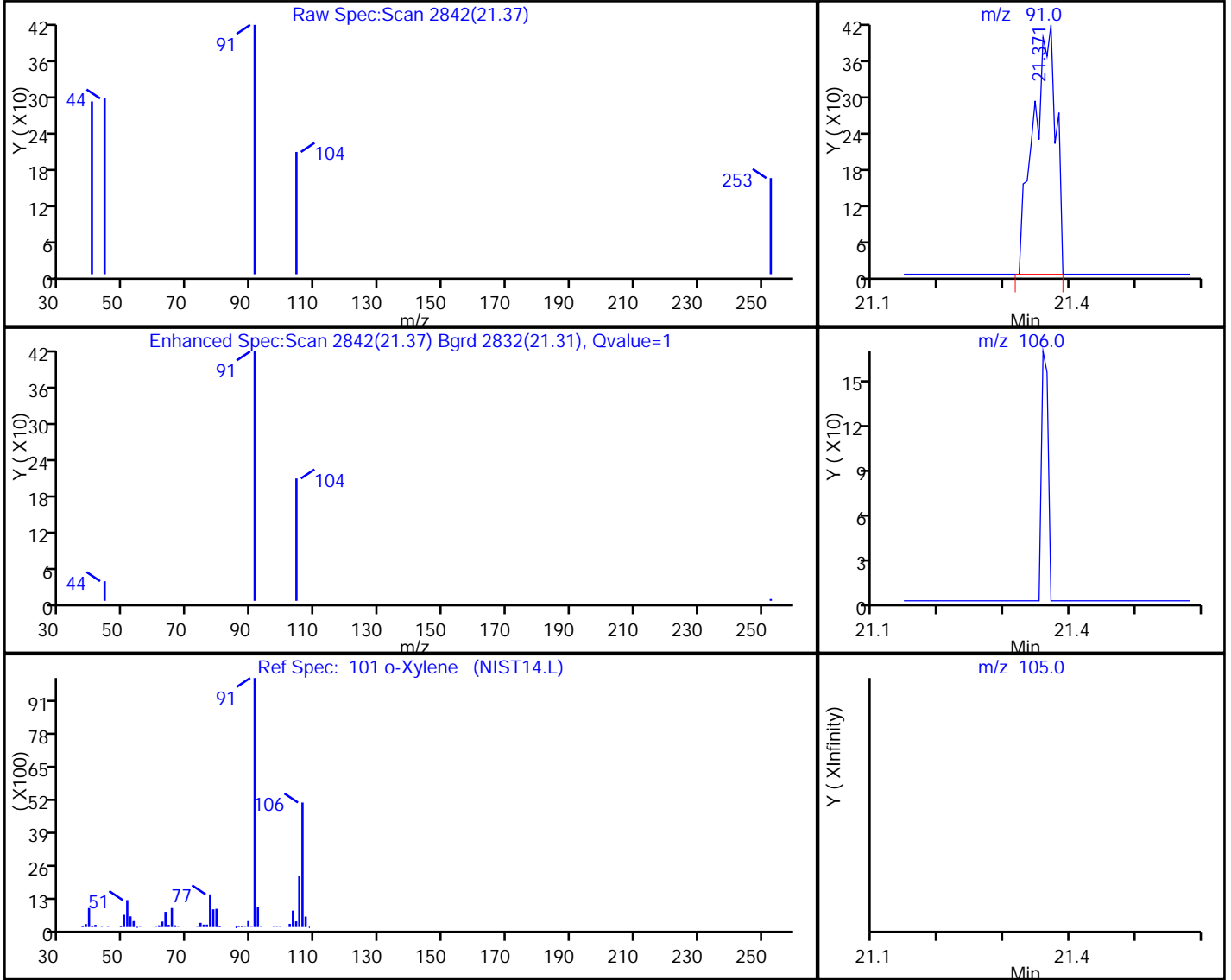
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180209-53885.b\MS9020920.D
 Injection Date: 10-Feb-2018 03:50:30 Instrument ID: ATMS9
 Lims ID: 320-35825-A-1 Lab Sample ID: 320-35825-1
 Client ID: 34000932
 Operator ID: RG ALS Bottle#: 15 Worklist Smp#: 20
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

101 o-Xylene, CAS: 95-47-6

Processing Results



RT	Mass	Response	Amount
21.37	91.00	995	0.011526
21.36	106.00	0	
21.36	105.00	0	
21.38	78.00	273	

Reviewer: girr, 12-Feb-2018 09:59:04

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-39559-1
Client Project/Site: Chevron Edmonds Terminal

For:
ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
5/31/2018 4:33:34 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Air - GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Job ID: 320-39559-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-39559-1

Receipt

Two samples were received on 5/19/2018 9:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice.

Receipt Exceptions

The container label for the following samples did not match the information listed on the Chain-of-Custody (COC): VSP-801 (320-39559-1) and VSP-802 (320-39559-2).

The container labels list the canister ID's as 34001953 and 8282 for samples 1 and 2 respectively, while the COC lists the canister ID's as 34001853 and 8202 for samples 1 and 2 respectively.

Air - GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA

Method(s) TO-15: 4-Bromofluorobenzene (Surrogate) and 1,2-Dichloroethane-d4 (Surrogate) recovery for the following sample was outside control limits: VSP-801 (320-39559-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Method(s) TO-15: 1,2-Dichloroethane-d4 (Surrogate) recovery for the following samples were outside control limits: (CCV 320-226146/3), (LCS 320-226146/4) and (LCSD 320-226146/5). This analyte is not used as a monitoring TPH (as Gasoline).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Client Sample ID: VSP-801

Lab Sample ID: 320-39559-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	1.1		0.40	0.079	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	1.9		0.40	0.063	ppb v/v	1		TO-15	Total/NA
Toluene	1.1		0.40	0.051	ppb v/v	1		TO-15	Total/NA
m,p-Xylene	8.3		0.80	0.10	ppb v/v	1		TO-15	Total/NA
o-Xylene	2.1		0.40	0.054	ppb v/v	1		TO-15	Total/NA
TPH (as Gasoline) - DL	34000		990	400	ppb v/v	9.92		TO-15	Total/NA
Carbon Dioxide (TCD)	0.35	J	0.90	0.019	% v/v	1.79		D1946	Total/NA
Methane (FID)	0.0011		0.00018	0.000036	% v/v	1.79		D1946	Total/NA
Oxygen	18		0.36	0.013	% v/v	1.79		D1946	Total/NA

Client Sample ID: VSP-802

Lab Sample ID: 320-39559-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.087	J	0.40	0.079	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	0.12	J	0.40	0.063	ppb v/v	1		TO-15	Total/NA
Toluene	0.14	J	0.40	0.051	ppb v/v	1		TO-15	Total/NA
m,p-Xylene	0.23	J	0.80	0.10	ppb v/v	1		TO-15	Total/NA
o-Xylene	0.069	J	0.40	0.054	ppb v/v	1		TO-15	Total/NA
TPH (as Gasoline)	280		100	40	ppb v/v	1		TO-15	Total/NA
Carbon Dioxide (TCD)	0.39	J	1.1	0.024	% v/v	2.22		D1946	Total/NA
Methane (FID)	0.0010		0.00022	0.000044	% v/v	2.22		D1946	Total/NA
Oxygen	18		0.44	0.016	% v/v	2.22		D1946	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Client Sample ID: VSP-801

Lab Sample ID: 320-39559-1

Date Collected: 05/17/18 17:00

Matrix: Air

Date Received: 05/19/18 09:15

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.1		0.40	0.079	ppb v/v			05/31/18 01:01	1
Ethylbenzene	1.9		0.40	0.063	ppb v/v			05/31/18 01:01	1
Toluene	1.1		0.40	0.051	ppb v/v			05/31/18 01:01	1
m,p-Xylene	8.3		0.80	0.10	ppb v/v			05/31/18 01:01	1
o-Xylene	2.1		0.40	0.054	ppb v/v			05/31/18 01:01	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	251	X	70 - 130		05/31/18 01:01	1
1,2-Dichloroethane-d4 (Surr)	226	X	70 - 130		05/31/18 01:01	1
Toluene-d8 (Surr)	106		70 - 130		05/31/18 01:01	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TPH (as Gasoline)	34000		990	400	ppb v/v			05/31/18 08:27	9.92

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	115		70 - 130		05/31/18 08:27	9.92
1,2-Dichloroethane-d4 (Surr)	107		70 - 130		05/31/18 08:27	9.92
Toluene-d8 (Surr)	98		70 - 130		05/31/18 08:27	9.92

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.35	J	0.90	0.019	% v/v			05/23/18 09:53	1.79
Methane (FID)	0.0011		0.00018	0.000036	% v/v			05/23/18 13:20	1.79
Oxygen	18		0.36	0.013	% v/v			05/23/18 09:53	1.79

Client Sample ID: VSP-802

Lab Sample ID: 320-39559-2

Date Collected: 05/17/18 17:05

Matrix: Air

Date Received: 05/19/18 09:15

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.087	J	0.40	0.079	ppb v/v			05/31/18 01:59	1
Ethylbenzene	0.12	J	0.40	0.063	ppb v/v			05/31/18 01:59	1
Toluene	0.14	J	0.40	0.051	ppb v/v			05/31/18 01:59	1
m,p-Xylene	0.23	J	0.80	0.10	ppb v/v			05/31/18 01:59	1
o-Xylene	0.069	J	0.40	0.054	ppb v/v			05/31/18 01:59	1
TPH (as Gasoline)	280		100	40	ppb v/v			05/31/18 01:59	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130		05/31/18 01:59	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		05/31/18 01:59	1
Toluene-d8 (Surr)	101		70 - 130		05/31/18 01:59	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.39	J	1.1	0.024	% v/v			05/23/18 10:07	2.22
Methane (FID)	0.0010		0.00022	0.000044	% v/v			05/23/18 13:33	2.22
Oxygen	18		0.44	0.016	% v/v			05/23/18 10:07	2.22

TestAmerica Sacramento

Surrogate Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Matrix: Air

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB (70-130)	DCA (70-130)	TOL (70-130)
320-39559-1	VSP-801	251 X	226 X	106
320-39559-1 - DL	VSP-801	115	107	98
320-39559-2	VSP-802	94	101	101
LCS 320-226146/4	Lab Control Sample	113	146 X	106
LCS 320-226146/6	Lab Control Sample	107	109	101
LCSD 320-226146/5	Lab Control Sample Dup	113	146 X	104
LCSD 320-226146/7	Lab Control Sample Dup	108	109	103
MB 320-226146/13	Method Blank	86	100	101

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DCA = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-226146/13

Matrix: Air

Analysis Batch: 226146

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			05/30/18 20:31	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			05/30/18 20:31	1
Toluene	ND		0.40	0.051	ppb v/v			05/30/18 20:31	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			05/30/18 20:31	1
o-Xylene	ND		0.40	0.054	ppb v/v			05/30/18 20:31	1
TPH (as Gasoline)	ND		100	40	ppb v/v			05/30/18 20:31	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		70 - 130		05/30/18 20:31	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 130		05/30/18 20:31	1
Toluene-d8 (Surr)	101		70 - 130		05/30/18 20:31	1

Lab Sample ID: LCS 320-226146/4

Matrix: Air

Analysis Batch: 226146

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	5000	5230		ppb v/v		105	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	113		70 - 130
1,2-Dichloroethane-d4 (Surr)	146	X	70 - 130
Toluene-d8 (Surr)	106		70 - 130

Lab Sample ID: LCS 320-226146/6

Matrix: Air

Analysis Batch: 226146

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	21.9		ppb v/v		110	68 - 128
Ethylbenzene	20.0	22.0		ppb v/v		110	64 - 124
Toluene	20.0	20.8		ppb v/v		104	68 - 128
m,p-Xylene	40.0	42.9		ppb v/v		107	65 - 125
o-Xylene	20.0	21.1		ppb v/v		105	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	107		70 - 130
1,2-Dichloroethane-d4 (Surr)	109		70 - 130
Toluene-d8 (Surr)	101		70 - 130

Lab Sample ID: LCSD 320-226146/5

Matrix: Air

Analysis Batch: 226146

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	5000	5250		ppb v/v		105	70 - 130	0	25

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-226146/5
Matrix: Air
Analysis Batch: 226146

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCS	LCS	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	113		70 - 130
1,2-Dichloroethane-d4 (Surr)	146	X	70 - 130
Toluene-d8 (Surr)	104		70 - 130

Lab Sample ID: LCSD 320-226146/7
Matrix: Air
Analysis Batch: 226146

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
		Result	Qualifier						
Benzene	20.0	22.2		ppb v/v		111	68 - 128	1	25
Ethylbenzene	20.0	21.1		ppb v/v		106	64 - 124	4	25
Toluene	20.0	21.0		ppb v/v		105	68 - 128	1	25
m,p-Xylene	40.0	41.3		ppb v/v		103	65 - 125	4	25
o-Xylene	20.0	20.3		ppb v/v		101	65 - 125	4	25

Surrogate	LCS	LCS	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	108		70 - 130
1,2-Dichloroethane-d4 (Surr)	109		70 - 130
Toluene-d8 (Surr)	103		70 - 130

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-224136/6
Matrix: Air
Analysis Batch: 224136

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Methane (FID)	ND		0.00010	0.000020	% v/v			05/23/18 11:52	1

Lab Sample ID: LCS 320-224136/3
Matrix: Air
Analysis Batch: 224136

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Methane (FID)	0.0250	0.0233		% v/v		93	80 - 120

Lab Sample ID: LCSD 320-224136/4
Matrix: Air
Analysis Batch: 224136

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
		Result	Qualifier						
Methane (FID)	0.0250	0.0259		% v/v		104	80 - 120	11	20

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: MB 320-224915/11
Matrix: Air
Analysis Batch: 224915

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			05/23/18 09:13	1
Methane (TCD)	ND		0.50	0.14	% v/v			05/23/18 09:13	1
Oxygen	ND		0.20	0.0074	% v/v			05/23/18 09:13	1

Lab Sample ID: LCS 320-224915/2
Matrix: Air
Analysis Batch: 224915

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon Dioxide (TCD)	24.4	24.3		% v/v		99	80 - 120
Methane (TCD)	26.1	24.4		% v/v		93	80 - 120

Lab Sample ID: LCS 320-224915/5
Matrix: Air
Analysis Batch: 224915

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oxygen	15.9	13.8		% v/v		87	80 - 120

Lab Sample ID: LCSD 320-224915/3
Matrix: Air
Analysis Batch: 224915

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	24.4	24.2		% v/v		99	80 - 120	0	20
Methane (TCD)	26.1	24.4		% v/v		93	80 - 120	0	20

Lab Sample ID: LCSD 320-224915/6
Matrix: Air
Analysis Batch: 224915

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	15.9	13.8		% v/v		87	80 - 120	0	20

QC Association Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Air - GC/MS VOA

Analysis Batch: 226146

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39559-1	VSP-801	Total/NA	Air	TO-15	
320-39559-1 - DL	VSP-801	Total/NA	Air	TO-15	
320-39559-2	VSP-802	Total/NA	Air	TO-15	
MB 320-226146/13	Method Blank	Total/NA	Air	TO-15	
LCS 320-226146/4	Lab Control Sample	Total/NA	Air	TO-15	
LCS 320-226146/6	Lab Control Sample	Total/NA	Air	TO-15	
LCSD 320-226146/5	Lab Control Sample Dup	Total/NA	Air	TO-15	
LCSD 320-226146/7	Lab Control Sample Dup	Total/NA	Air	TO-15	

Air - GC VOA

Analysis Batch: 224136

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39559-1	VSP-801	Total/NA	Air	D1946	
320-39559-2	VSP-802	Total/NA	Air	D1946	
MB 320-224136/6	Method Blank	Total/NA	Air	D1946	
LCS 320-224136/3	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-224136/4	Lab Control Sample Dup	Total/NA	Air	D1946	

Analysis Batch: 224915

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-39559-1	VSP-801	Total/NA	Air	D1946	
320-39559-2	VSP-802	Total/NA	Air	D1946	
MB 320-224915/11	Method Blank	Total/NA	Air	D1946	
LCS 320-224915/2	Lab Control Sample	Total/NA	Air	D1946	
LCS 320-224915/5	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-224915/3	Lab Control Sample Dup	Total/NA	Air	D1946	
LCSD 320-224915/6	Lab Control Sample Dup	Total/NA	Air	D1946	

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Client Sample ID: VSP-801

Date Collected: 05/17/18 17:00

Date Received: 05/19/18 09:15

Lab Sample ID: 320-39559-1

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	446 mL	250 mL	226146	05/31/18 01:01	AP1	TAL SAC
Total/NA	Analysis	TO-15	DL	9.92	45 mL	250 mL	226146	05/31/18 08:27	AP1	TAL SAC
Total/NA	Analysis	D1946		1.79	50 mL	50 mL	224136	05/23/18 13:20	NS1	TAL SAC
Total/NA	Analysis	D1946		1.79	50 mL	50 mL	224915	05/23/18 09:53	NS1	TAL SAC

Client Sample ID: VSP-802

Date Collected: 05/17/18 17:05

Date Received: 05/19/18 09:15

Lab Sample ID: 320-39559-2

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	555 mL	250 mL	226146	05/31/18 01:59	AP1	TAL SAC
Total/NA	Analysis	D1946		2.22	50 mL	50 mL	224136	05/23/18 13:33	NS1	TAL SAC
Total/NA	Analysis	D1946		2.22	50 mL	50 mL	224915	05/23/18 10:07	NS1	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Method Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL SAC
D1946	Fixed Gases in Air (GC)	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-39559-1	VSP-801	Air	05/17/18 17:00	05/19/18 09:15
320-39559-2	VSP-802	Air	05/17/18 17:05	05/19/18 09:15

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

TestAmerica Sacramento
880 Riverside Parkway

West Sacramento, CA 95605
phone 916.374.4378 fax 916.372.1059

Client Contact Information
Company Name: Arcadis
Address: 1000 Olive Way, Suite 800
City/State/Zip: Seattle, WA 98101
Phone:
FAX:
Project Name: Edwards Terminal
Site/Location: 11720 Lincoln Rd
P O #

Project Manager: Scott Zorn
Phone:
Email:
Site Contact:
TA Contact:
Analysis Turnaround Time
Standard (Specify): STAT
Rush (Specify):

Sample Identification
Sample Date(s)
Time Start
Time Stop
Canister Vacuum in Field, 'Hg (Start)'
Canister Vacuum in Field, 'Hg (Stop)'
Flow Controller ID
Canister ID

1* VSP-801
5/17/18 1700
5/17/18 1705

2* VSP-802
5/17/18 1705

Temperature (Fahrenheit)
Start Interior
Stop
Start Interior
Stop

Special Instructions/QC Requirements & Comments:
Barcode: 320-39559 Chain of Custody

Samples Shipped by:
Samples Relinquished by:
Relinquished by: B. Hall
Lab Use Only: SEA TM
Shipper Name:

Date / Time:
Date / Time: 5/18/18 @ 1125
Date / Time: 5.18.18 @ 1411
Opened by:

Samples Received by: B. Hall
Received by:
Received by: Sammy James
Condition: SEA TM 5/18/18 1125
TA-SAC
5/19/18 09:15

1x canister ID is 34001953 EA 5/21/18
2* canister ID is 8282

Canister Samples Chain of Custody Record

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

COC No: _____ of _____ COCs

For Lab Use Only:
Walk-in Client:
Lab Sampling:
Job / SDG No.:
(See below for Add'l Items)

Sample Specific Notes:
EPA TO-15 for
BTEX & TPH-G
Other = Fixed Gas
(methane, O2, CO2)

Other (Please specify in notes section)
Landfill Gas
Soil Gas
Ambient Air
Indoor Air
Sample Type

Other (Please specify in notes section)
TO-3
EPA 15/16
ASTM D-1946 / 1945 / 3588
EPA 25C / 25.3
EPA 3C
MA-APH
TO-15 (Med / Std / Low / SIM)

Flow Controller ID
Canister ID
34001853
8202
34002460

Temperature (Fahrenheit)
Start Interior
Stop
Start Interior
Stop

Samples Shipped by:
Samples Relinquished by:
Relinquished by: B. Hall
Lab Use Only: SEA TM
Shipper Name:

Date / Time:
Date / Time: 5/18/18 @ 1125
Date / Time: 5.18.18 @ 1411
Opened by:

Samples Received by: B. Hall
Received by:
Received by: Sammy James
Condition: SEA TM 5/18/18 1125
TA-SAC
5/19/18 09:15

1x canister ID is 34001953 EA 5/21/18
2* canister ID is 8282



Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 320-39559-1

Login Number: 39559

List Source: TestAmerica Sacramento

List Number: 1

Creator: James, Emily M

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	506653
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	IDs on containers do not match the COC. Logged in per COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Date Cleaned/Batch ID D03-23-18 320-37470

Date of QC 4/5/18

Data File Number \\msd\user\i\DATA\1804051



320-37470 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

*	34001642 <i>MS9040508.4</i>
	8282
	34000633
	34001953
	34000641
	34000661
	7566
	34001245

	34001940
	34001632
	34001000
	34000238
	34000909
	34001634
	8522
	34001936

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

[Signature]
1st level Reviewed By:

4/6/18
Date:

[Signature]
2nd level Reviewed By:

4/12/18
Date:



FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37470-1
 SDG No.: _____
 Client Sample ID: 34001642 Lab Sample ID: 320-37470-1
 Matrix: Air Lab File ID: MS9040508.D
 Analysis Method: TO-15 Date Collected: 03/23/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 04/05/2018 19:11
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 216518 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.36	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	ND		0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37470-1
 SDG No.: _____
 Client Sample ID: 34001642 Lab Sample ID: 320-37470-1
 Matrix: Air Lab File ID: MS9040508.D
 Analysis Method: TO-15 Date Collected: 03/23/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 04/05/2018 19:11
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 216518 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37470-1
 SDG No.: _____
 Client Sample ID: 34001642 Lab Sample ID: 320-37470-1
 Matrix: Air Lab File ID: MS9040508.D
 Analysis Method: TO-15 Date Collected: 03/23/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 04/05/2018 19:11
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 216518 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	95		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	101		70-130
2037-26-5	Toluene-d8 (Surr)	100		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D
 Lims ID: 320-37470-A-1
 Client ID: 34001642
 Sample Type: Client
 Inject. Date: 05-Apr-2018 19:11:30 ALS Bottle#: 6 Worklist Smp#: 6
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Sample Info: 320-37470-A-1
 Misc. Info.: 500 mL CAN CERT
 Operator ID: LHS Instrument ID: ATMS9
 Method: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\TO15_ATMS9N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 06-Apr-2018 06:58:33 Calib Date: 05-Apr-2018 16:34:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040505.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK008

First Level Reviewer: phanthasena

Date: 06-Apr-2018 12:39:20

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	12.312	12.312	0.000	96	39813	4.00	
* 2 1,4-Difluorobenzene	114	14.405	14.405	0.000	100	167532	4.00	
* 3 Chlorobenzene-d5 (IS)	117	20.330	20.324	0.006	99	97112	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	13.480	13.480	0.000	97	58673	4.04	
\$ 5 Toluene-d8 (Surr)	100	17.568	17.569	-0.001	98	77488	3.99	
\$ 6 4-Bromofluorobenzene (Surr	174	22.259	22.259	0.000	97	34310	3.81	
31 Acetone	43	7.689	7.695	-0.006	94	9579	0.3625	
47 Methylene Chloride	49	8.893	8.881	0.012	6	671	0.0445	
126 1,2,4-Trichlorobenzene	180	26.694	26.694	0.000	78	493	0.0314	

Reagents:

VAMSIS20_00137 Amount Added: 50.00 Units: mL Run Reagent

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D

Injection Date: 05-Apr-2018 19:11:30

Instrument ID: ATMS9

Operator ID: LHS

Lims ID: 320-37470-A-1

Lab Sample ID: 320-37470-1

Worklist Smp#: 6

Client ID: 34001642

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

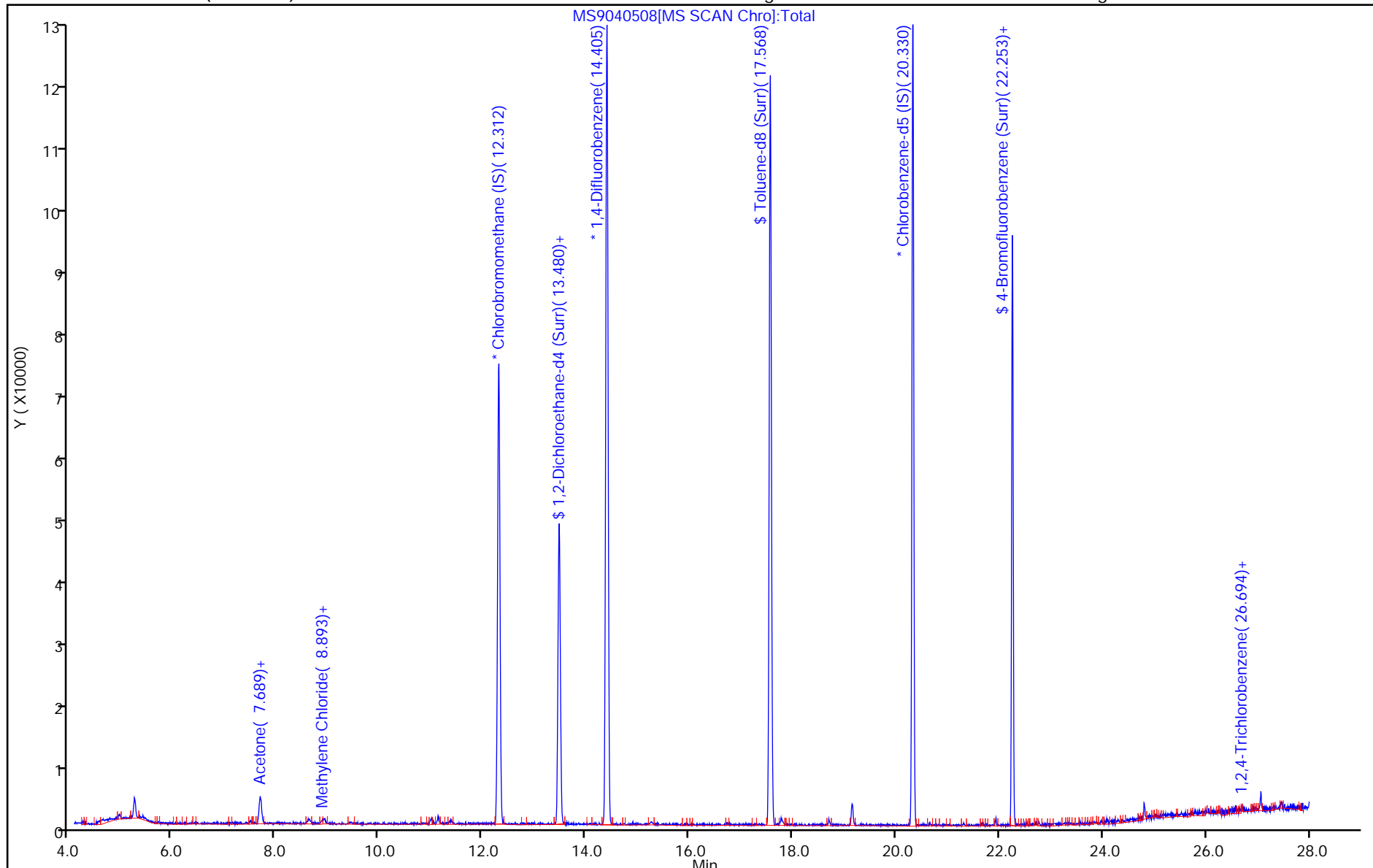
ALS Bottle#: 6

Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Y Scaling: Method Defined: Scale to the Nth Largest Peak: 2



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D

Injection Date: 05-Apr-2018 19:11:30

Instrument ID: ATMS9

Lims ID: 320-37470-A-1

Lab Sample ID: 320-37470-1

Client ID: 34001642

Operator ID: LHS

ALS Bottle#: 6

Worklist Smp#: 6

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

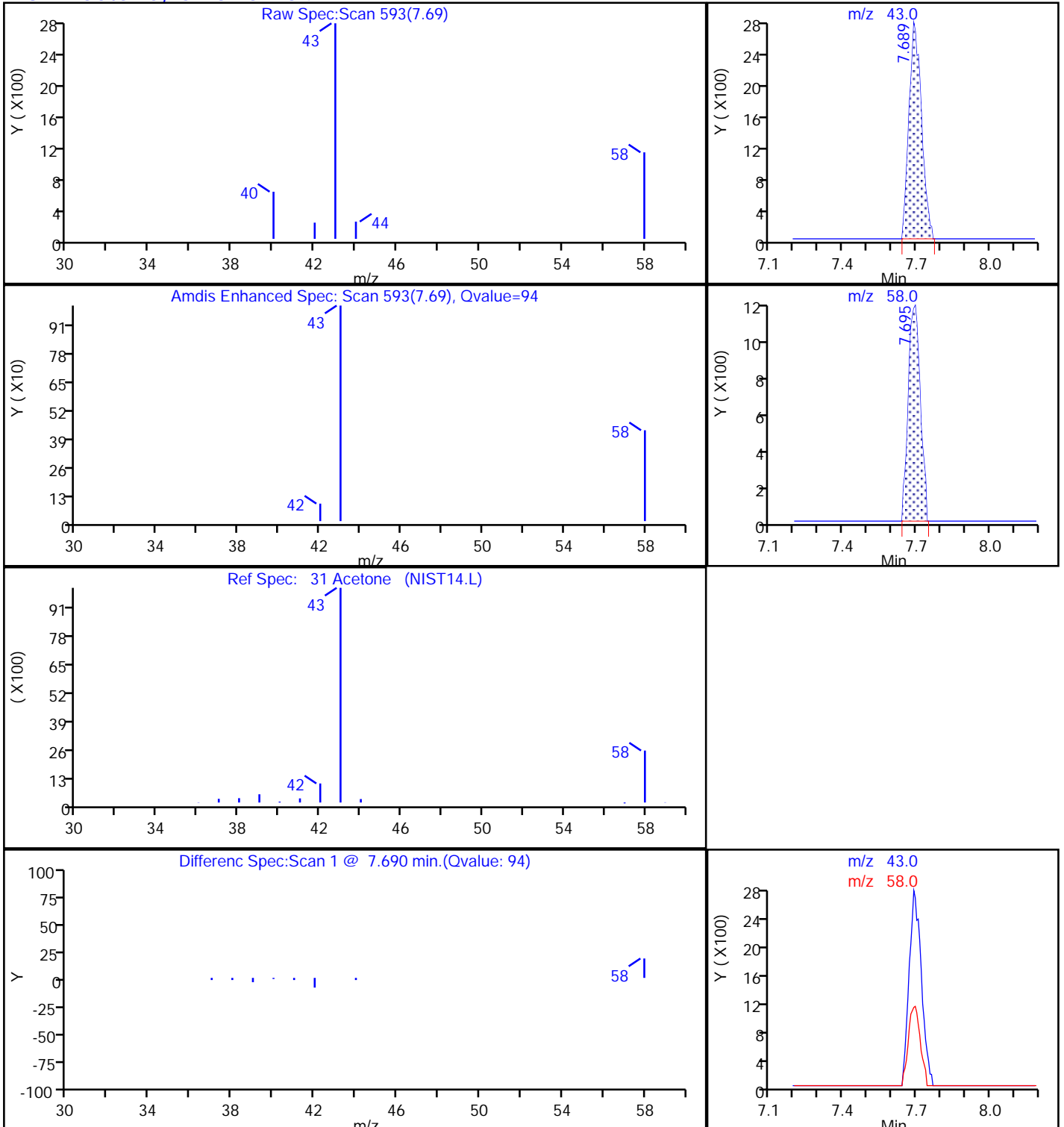
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

31 Acetone, CAS: 67-64-1

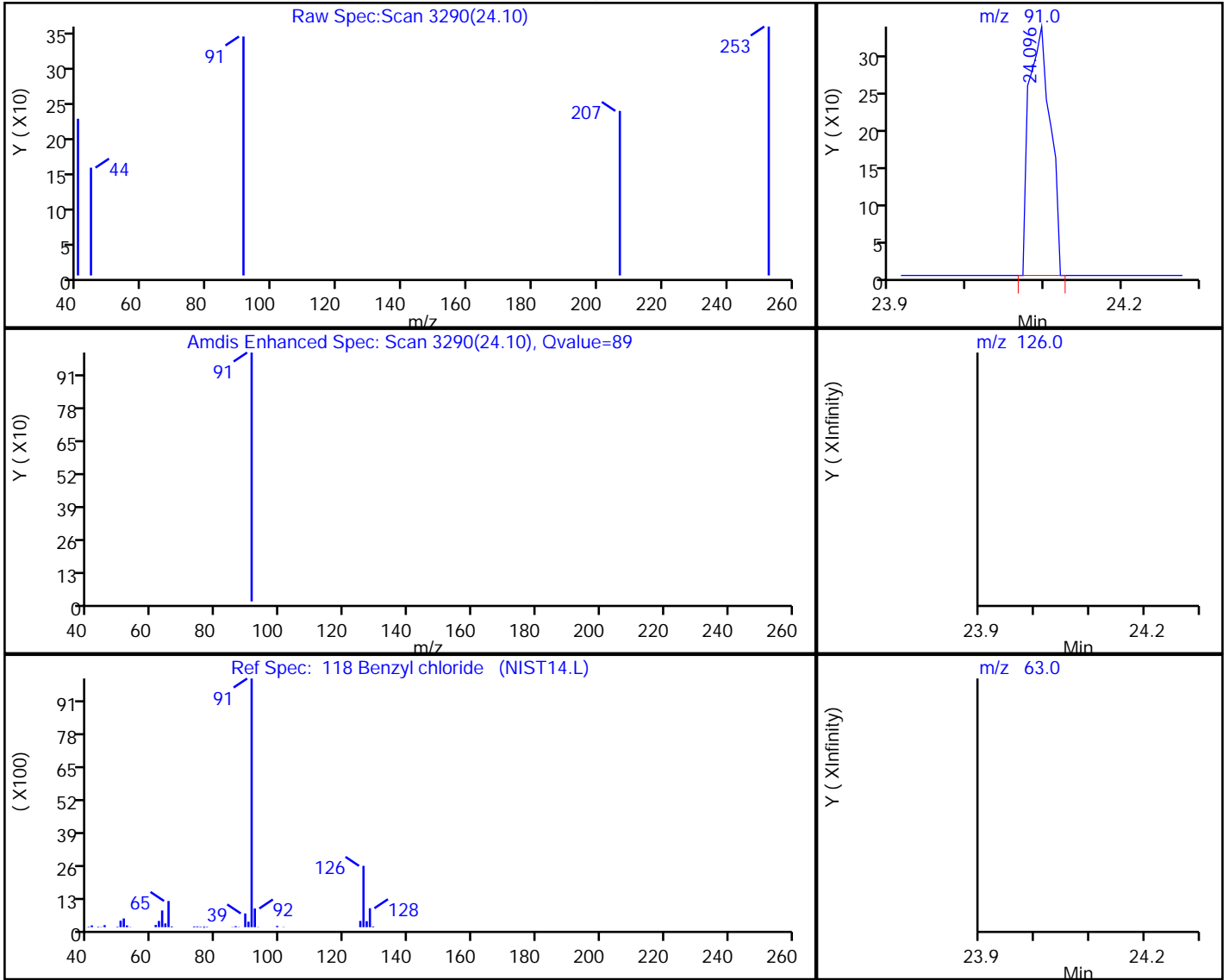


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D
Injection Date: 05-Apr-2018 19:11:30 Instrument ID: ATMS9
Lims ID: 320-37470-A-1 Lab Sample ID: 320-37470-1
Client ID: 34001642
Operator ID: LHS ALS Bottle#: 6 Worklist Smp#: 6
Purge Vol: 5.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector MS SCAN

118 Benzyl chloride, CAS: 100-44-7

Processing Results



RT	Mass	Response	Amount
24.10	91.00	647	0.023121
24.10	126.00	0	
24.10	63.00	0	

Reviewer: phanhasena, 06-Apr-2018 12:39:20

Audit Action: Marked Compound Undetected

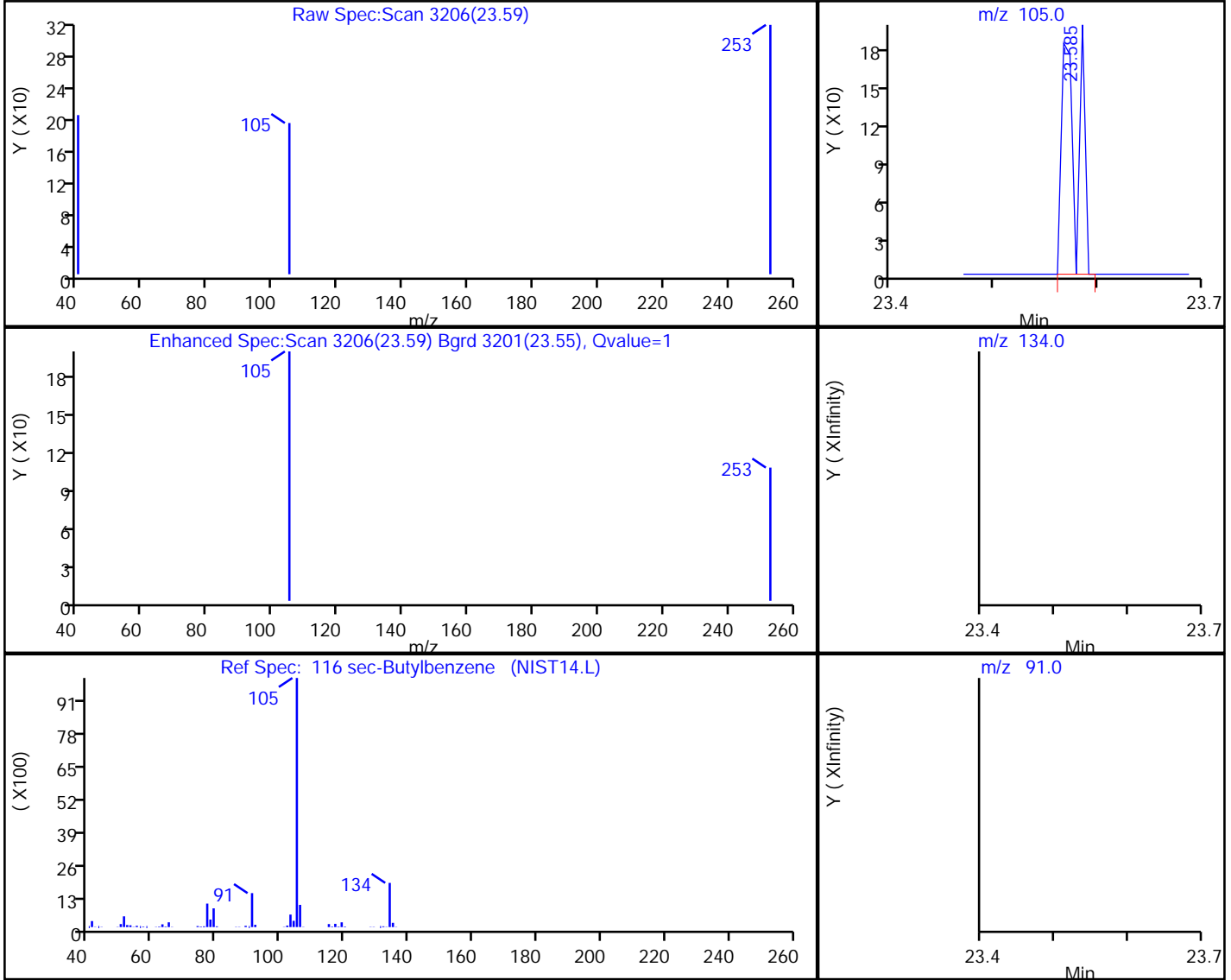
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D
 Injection Date: 05-Apr-2018 19:11:30 Instrument ID: ATMS9
 Lims ID: 320-37470-A-1 Lab Sample ID: 320-37470-1
 Client ID: 34001642
 Operator ID: LHS ALS Bottle#: 6 Worklist Smp#: 6
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

116 sec-Butylbenzene, CAS: 135-98-8

Processing Results



RT	Mass	Response	Amount
23.59	105.00	196	0.003091
23.58	134.00	0	
23.58	91.00	0	

Reviewer: phanhasena, 06-Apr-2018 12:39:20

Audit Action: Marked Compound Undetected

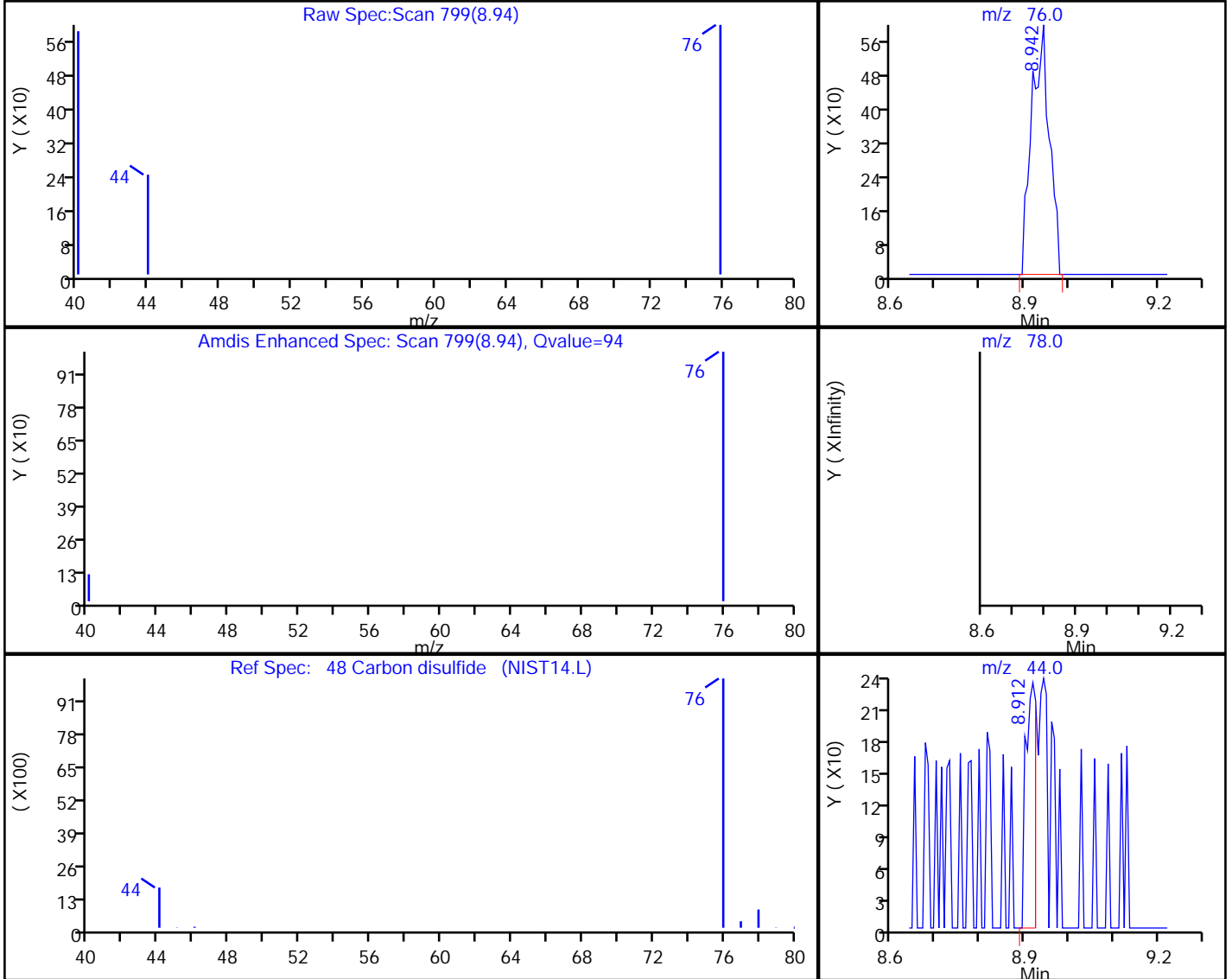
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D
 Injection Date: 05-Apr-2018 19:11:30 Instrument ID: ATMS9
 Lims ID: 320-37470-A-1 Lab Sample ID: 320-37470-1
 Client ID: 34001642
 Operator ID: LHS ALS Bottle#: 6 Worklist Smp#: 6
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

48 Carbon disulfide, CAS: 75-15-0

Processing Results



RT	Mass	Response	Amount
8.94	76.00	1650	0.063366
8.93	78.00	0	
8.91	44.00	372	

Reviewer: phanhasena, 06-Apr-2018 12:39:20

Audit Action: Marked Compound Undetected

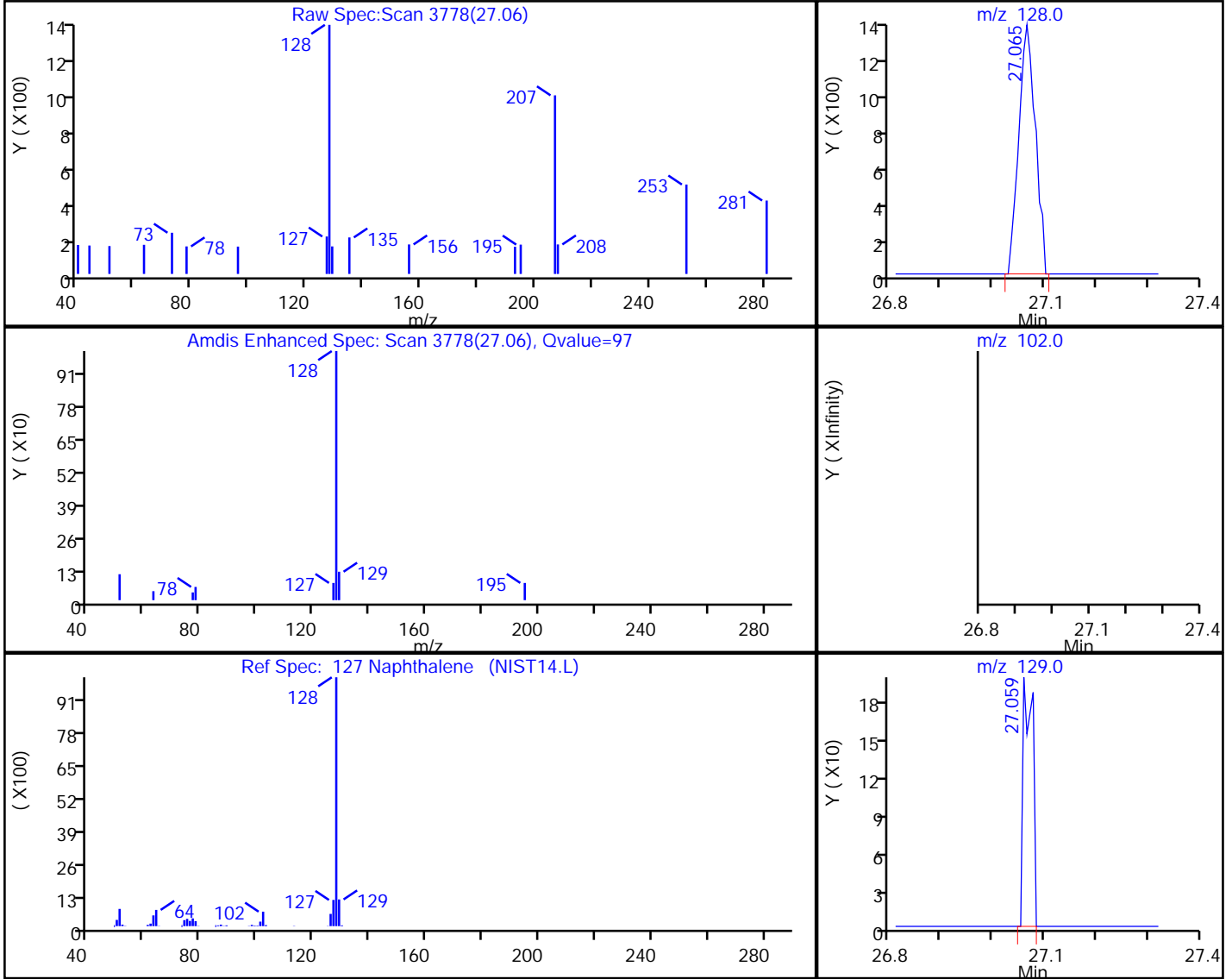
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D
 Injection Date: 05-Apr-2018 19:11:30 Instrument ID: ATMS9
 Lims ID: 320-37470-A-1 Lab Sample ID: 320-37470-1
 Client ID: 34001642
 Operator ID: LHS ALS Bottle#: 6 Worklist Smp#: 6
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

127 Naphthalene, CAS: 91-20-3

Processing Results



RT	Mass	Response	Amount
27.06	128.00	3092	0.067371
27.07	102.00	0	
27.06	129.00	258	

Reviewer: phanhasena, 06-Apr-2018 12:39:20

Audit Action: Marked Compound Undetected

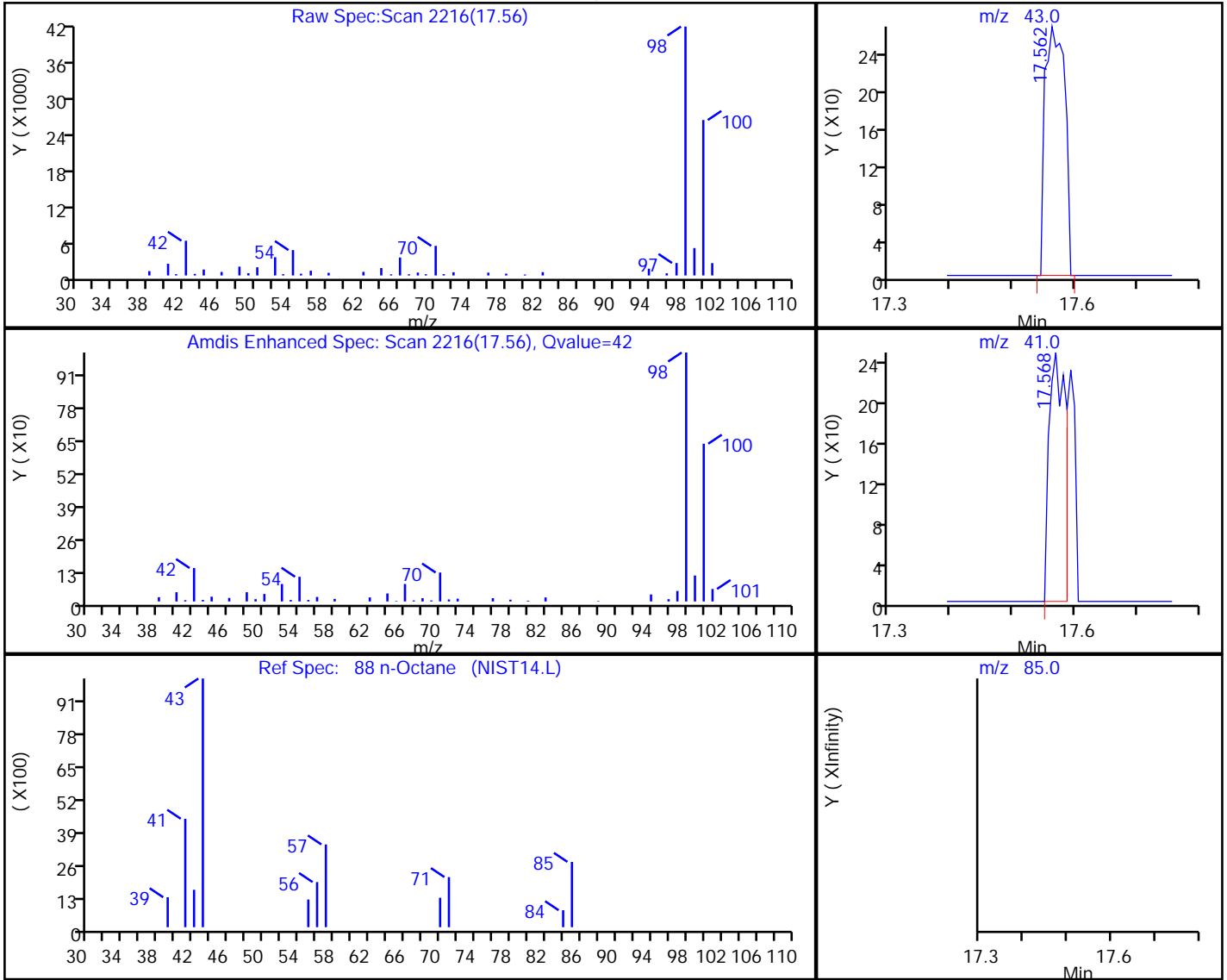
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D
 Injection Date: 05-Apr-2018 19:11:30 Instrument ID: ATMS9
 Lims ID: 320-37470-A-1 Lab Sample ID: 320-37470-1
 Client ID: 34001642
 Operator ID: LHS ALS Bottle#: 6 Worklist Smp#: 6
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

88 n-Octane, CAS: 111-65-9

Processing Results



RT	Mass	Response	Amount
17.56	43.00	590	0.019884
17.57	41.00	441	
17.57	85.00	0	

Reviewer: phanhasena, 06-Apr-2018 12:39:20

Audit Action: Marked Compound Undetected

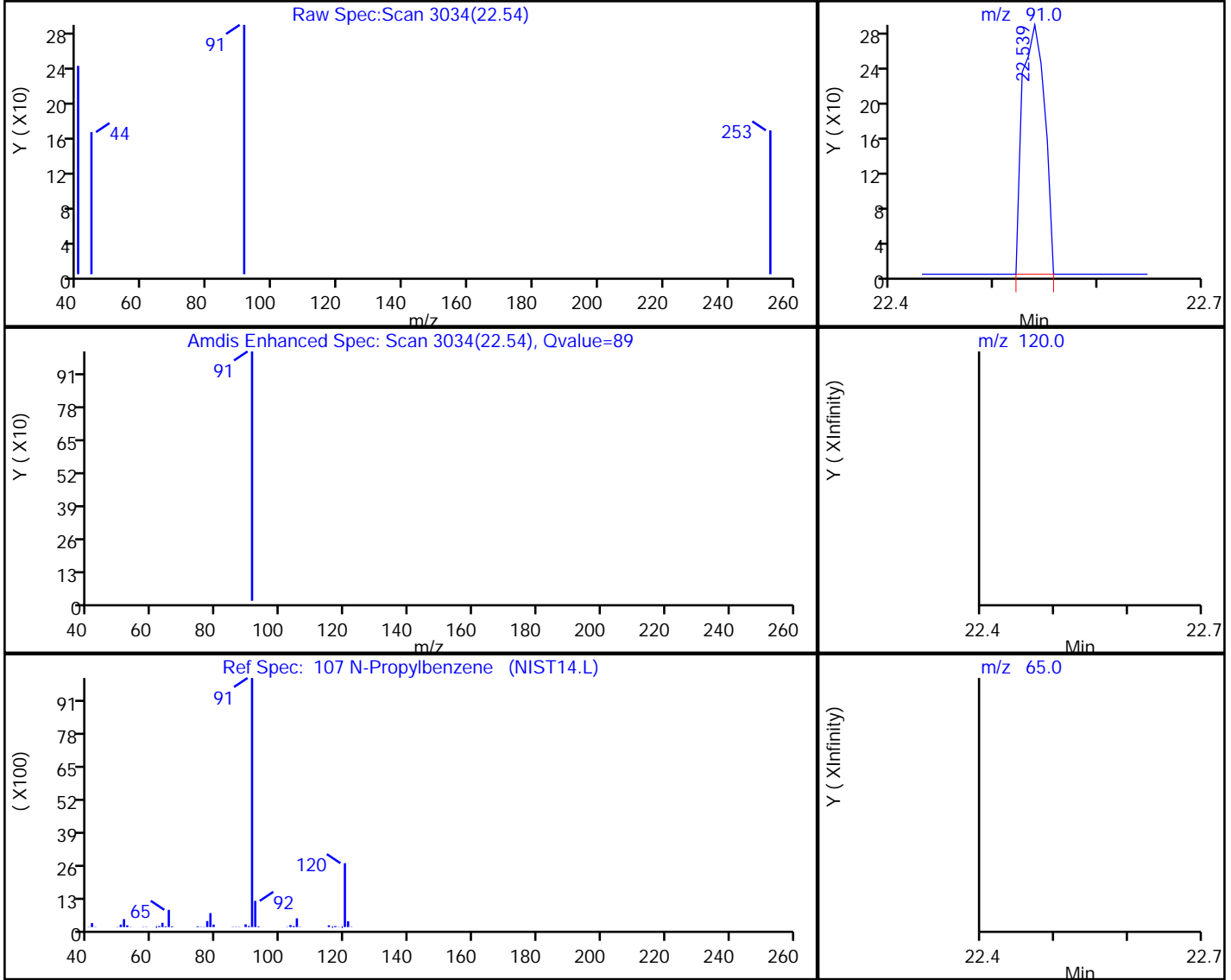
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180405-56291.b\MS9040508.D
 Injection Date: 05-Apr-2018 19:11:30 Instrument ID: ATMS9
 Lims ID: 320-37470-A-1 Lab Sample ID: 320-37470-1
 Client ID: 34001642
 Operator ID: LHS ALS Bottle#: 6 Worklist Smp#: 6
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

107 N-Propylbenzene, CAS: 103-65-1

Processing Results



RT	Mass	Response	Amount
22.54	91.00	425	0.006467
22.54	120.00	0	
22.54	65.00	0	

Reviewer: phanhasena, 06-Apr-2018 12:39:20

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-41619-1
Client Project/Site: Chevron Edmonds Terminal

For:
ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
8/15/2018 5:14:37 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS

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Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Air - GC VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Job ID: 320-41619-1

Laboratory: TestAmerica Sacramento

Narrative

**Job Narrative
320-41619-1**

Receipt

Two samples were received on 7/31/2018 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice.

Air - GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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Detection Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Client Sample ID: VSP-801

Lab Sample ID: 320-41619-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	46		6.3	1.2	ppb v/v	15.7		TO-15	Total/NA
Ethylbenzene	51		6.3	0.99	ppb v/v	15.7		TO-15	Total/NA
m,p-Xylene	170		13	1.6	ppb v/v	15.7		TO-15	Total/NA
o-Xylene	28		6.3	0.85	ppb v/v	15.7		TO-15	Total/NA
TPH (as Gasoline)	17000		1600	630	ppb v/v	15.7		TO-15	Total/NA
Carbon Dioxide (TCD)	0.45	J	0.79	0.017	% v/v	1.57		D1946	Total/NA
Methane (FID)	0.00080		0.00016	0.000031	% v/v	1.57		D1946	Total/NA
Oxygen	18		0.31	0.012	% v/v	1.57		D1946	Total/NA

Client Sample ID: VSP-802

Lab Sample ID: 320-41619-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.21	J	0.40	0.079	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	1.3		0.40	0.063	ppb v/v	1		TO-15	Total/NA
Toluene	1.6		0.40	0.051	ppb v/v	1		TO-15	Total/NA
m,p-Xylene	5.3		0.80	0.10	ppb v/v	1		TO-15	Total/NA
o-Xylene	1.9		0.40	0.054	ppb v/v	1		TO-15	Total/NA
TPH (as Gasoline)	280		100	40	ppb v/v	1		TO-15	Total/NA
Carbon Dioxide (TCD)	0.75	J	0.83	0.018	% v/v	1.66		D1946	Total/NA
Methane (FID)	0.0025		0.00017	0.000033	% v/v	1.66		D1946	Total/NA
Oxygen	17		0.33	0.012	% v/v	1.66		D1946	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Client Sample ID: VSP-801

Lab Sample ID: 320-41619-1

Date Collected: 07/26/18 12:45

Matrix: Air

Date Received: 07/31/18 09:00

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	46		6.3	1.2	ppb v/v			08/15/18 05:44	15.7
Ethylbenzene	51		6.3	0.99	ppb v/v			08/15/18 05:44	15.7
Toluene	ND		6.3	0.80	ppb v/v			08/15/18 05:44	15.7
m,p-Xylene	170		13	1.6	ppb v/v			08/15/18 05:44	15.7
o-Xylene	28		6.3	0.85	ppb v/v			08/15/18 05:44	15.7
TPH (as Gasoline)	17000		1600	630	ppb v/v			08/15/18 05:44	15.7

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		70 - 130		08/15/18 05:44	15.7
1,2-Dichloroethane-d4 (Surr)	93		70 - 130		08/15/18 05:44	15.7
Toluene-d8 (Surr)	98		70 - 130		08/15/18 05:44	15.7

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.45	J	0.79	0.017	% v/v			08/02/18 09:41	1.57
Methane (FID)	0.00080		0.00016	0.000031	% v/v			08/09/18 10:19	1.57
Oxygen	18		0.31	0.012	% v/v			08/02/18 09:41	1.57

Client Sample ID: VSP-802

Lab Sample ID: 320-41619-2

Date Collected: 07/26/18 12:55

Matrix: Air

Date Received: 07/31/18 09:00

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.21	J	0.40	0.079	ppb v/v			08/15/18 06:41	1
Ethylbenzene	1.3		0.40	0.063	ppb v/v			08/15/18 06:41	1
Toluene	1.6		0.40	0.051	ppb v/v			08/15/18 06:41	1
m,p-Xylene	5.3		0.80	0.10	ppb v/v			08/15/18 06:41	1
o-Xylene	1.9		0.40	0.054	ppb v/v			08/15/18 06:41	1
TPH (as Gasoline)	280		100	40	ppb v/v			08/15/18 06:41	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	106		70 - 130		08/15/18 06:41	1
1,2-Dichloroethane-d4 (Surr)	86		70 - 130		08/15/18 06:41	1
Toluene-d8 (Surr)	102		70 - 130		08/15/18 06:41	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.75	J	0.83	0.018	% v/v			08/02/18 09:53	1.66
Methane (FID)	0.0025		0.00017	0.000033	% v/v			08/09/18 10:35	1.66
Oxygen	17		0.33	0.012	% v/v			08/02/18 09:53	1.66

TestAmerica Sacramento

Surrogate Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Matrix: Air

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB (70-130)	DCA (70-130)	TOL (70-130)
320-41619-1	VSP-801	103	93	98
320-41619-2	VSP-802	106	86	102
LCS 320-239788/4	Lab Control Sample	108	129	104
LCS 320-239788/6	Lab Control Sample	114	98	105
LCSD 320-239788/5	Lab Control Sample Dup	107	128	101
LCSD 320-239788/7	Lab Control Sample Dup	114	100	103
MB 320-239788/21	Method Blank	83	90	93

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DCA = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-239788/21

Matrix: Air

Analysis Batch: 239788

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			08/15/18 04:52	1
Ethylbenzene	ND		0.40	0.063	ppb v/v			08/15/18 04:52	1
Toluene	ND		0.40	0.051	ppb v/v			08/15/18 04:52	1
m,p-Xylene	ND		0.80	0.10	ppb v/v			08/15/18 04:52	1
o-Xylene	ND		0.40	0.054	ppb v/v			08/15/18 04:52	1
TPH (as Gasoline)	ND		100	40	ppb v/v			08/15/18 04:52	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	83		70 - 130		08/15/18 04:52	1
1,2-Dichloroethane-d4 (Surr)	90		70 - 130		08/15/18 04:52	1
Toluene-d8 (Surr)	93		70 - 130		08/15/18 04:52	1

Lab Sample ID: LCS 320-239788/4

Matrix: Air

Analysis Batch: 239788

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	5000	4180		ppb v/v		84	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	108		70 - 130
1,2-Dichloroethane-d4 (Surr)	129		70 - 130
Toluene-d8 (Surr)	104		70 - 130

Lab Sample ID: LCS 320-239788/6

Matrix: Air

Analysis Batch: 239788

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	20.8		ppb v/v		104	68 - 128
Ethylbenzene	20.0	21.2		ppb v/v		106	64 - 124
Toluene	20.0	22.3		ppb v/v		111	68 - 128
m,p-Xylene	40.0	43.5		ppb v/v		109	65 - 125
o-Xylene	20.0	21.6		ppb v/v		108	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	114		70 - 130
1,2-Dichloroethane-d4 (Surr)	98		70 - 130
Toluene-d8 (Surr)	105		70 - 130

Lab Sample ID: LCSD 320-239788/5

Matrix: Air

Analysis Batch: 239788

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	5000	3980		ppb v/v		80	70 - 130	5	25

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-239788/5
Matrix: Air
Analysis Batch: 239788

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	107		70 - 130
1,2-Dichloroethane-d4 (Surr)	128		70 - 130
Toluene-d8 (Surr)	101		70 - 130

Lab Sample ID: LCSD 320-239788/7
Matrix: Air
Analysis Batch: 239788

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	22.5		ppb v/v		112	68 - 128	8	25
Ethylbenzene	20.0	22.3		ppb v/v		112	64 - 124	5	25
Toluene	20.0	23.4		ppb v/v		117	68 - 128	5	25
m,p-Xylene	40.0	45.3		ppb v/v		113	65 - 125	4	25
o-Xylene	20.0	22.5		ppb v/v		112	65 - 125	4	25

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	114		70 - 130
1,2-Dichloroethane-d4 (Surr)	100		70 - 130
Toluene-d8 (Surr)	103		70 - 130

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-237521/7
Matrix: Air
Analysis Batch: 237521

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			08/02/18 09:11	1
Methane (TCD)	ND		0.50	0.14	% v/v			08/02/18 09:11	1
Oxygen	ND		0.20	0.0074	% v/v			08/02/18 09:11	1

Lab Sample ID: LCS 320-237521/2
Matrix: Air
Analysis Batch: 237521

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon Dioxide (TCD)	24.0	24.2		% v/v		101	80 - 120
Methane (TCD)	25.6	24.0		% v/v		93	80 - 120

Lab Sample ID: LCS 320-237521/5
Matrix: Air
Analysis Batch: 237521

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oxygen	16.2	14.0		% v/v		87	80 - 120

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: LCSD 320-237521/3
Matrix: Air
Analysis Batch: 237521

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	24.0	24.2		% v/v		101	80 - 120	0	20
Methane (TCD)	25.6	24.1		% v/v		94	80 - 120	1	20

Lab Sample ID: LCSD 320-237521/6
Matrix: Air
Analysis Batch: 237521

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	16.2	13.9		% v/v		86	80 - 120	1	20

Lab Sample ID: MB 320-238928/5
Matrix: Air
Analysis Batch: 238928

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.00010	0.000020	% v/v			08/09/18 10:01	1

Lab Sample ID: LCS 320-238928/2
Matrix: Air
Analysis Batch: 238928

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0251		% v/v		100	80 - 120		

Lab Sample ID: LCSD 320-238928/3
Matrix: Air
Analysis Batch: 238928

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0260		% v/v		104	80 - 120	4	20

QC Association Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Air - GC/MS VOA

Analysis Batch: 239788

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41619-1	VSP-801	Total/NA	Air	TO-15	
320-41619-2	VSP-802	Total/NA	Air	TO-15	
MB 320-239788/21	Method Blank	Total/NA	Air	TO-15	
LCS 320-239788/4	Lab Control Sample	Total/NA	Air	TO-15	
LCS 320-239788/6	Lab Control Sample	Total/NA	Air	TO-15	
LCSD 320-239788/5	Lab Control Sample Dup	Total/NA	Air	TO-15	
LCSD 320-239788/7	Lab Control Sample Dup	Total/NA	Air	TO-15	

Air - GC VOA

Analysis Batch: 237521

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41619-1	VSP-801	Total/NA	Air	D1946	
320-41619-2	VSP-802	Total/NA	Air	D1946	
MB 320-237521/7	Method Blank	Total/NA	Air	D1946	
LCS 320-237521/2	Lab Control Sample	Total/NA	Air	D1946	
LCS 320-237521/5	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-237521/3	Lab Control Sample Dup	Total/NA	Air	D1946	
LCSD 320-237521/6	Lab Control Sample Dup	Total/NA	Air	D1946	

Analysis Batch: 238928

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41619-1	VSP-801	Total/NA	Air	D1946	
320-41619-2	VSP-802	Total/NA	Air	D1946	
MB 320-238928/5	Method Blank	Total/NA	Air	D1946	
LCS 320-238928/2	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-238928/3	Lab Control Sample Dup	Total/NA	Air	D1946	

Lab Chronicle

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Client Sample ID: VSP-801

Date Collected: 07/26/18 12:45

Date Received: 07/31/18 09:00

Lab Sample ID: 320-41619-1

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		15.7	25 mL	250 mL	239788	08/15/18 05:44	AP1	TAL SAC
Total/NA	Analysis	D1946		1.57	50 mL	50 mL	238928	08/09/18 10:19	NS1	TAL SAC
Total/NA	Analysis	D1946		1.57	50 mL	50 mL	237521	08/02/18 09:41	NS1	TAL SAC

Client Sample ID: VSP-802

Date Collected: 07/26/18 12:55

Date Received: 07/31/18 09:00

Lab Sample ID: 320-41619-2

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	415 mL	250 mL	239788	08/15/18 06:41	AP1	TAL SAC
Total/NA	Analysis	D1946		1.66	50 mL	50 mL	238928	08/09/18 10:35	NS1	TAL SAC
Total/NA	Analysis	D1946		1.66	50 mL	50 mL	237521	08/02/18 09:53	NS1	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Method Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL SAC
D1946	Fixed Gases in Air (GC)	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-41619-1	VSP-801	Air	07/26/18 12:45	07/31/18 09:00
320-41619-2	VSP-802	Air	07/26/18 12:55	07/31/18 09:00

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

Chevron Northwest Region Analysis Request/Chain of Custody



Lancaster Laboratories

For Lancaster Laboratories use only
 Acct. # _____ Group # _____ Sample # _____
 Instructions on reverse side correspond with circled numbers.

<p>1 Client Information</p> <p>Facility # <u>WBS</u></p> <p>Site Address <u>Arrows</u> <u>11720 Vanco Rd</u> <u>Chevron Arrows Contract</u> <u>Peter Campbell</u> <u>Arrows/500T</u> Consultant/Office <u>500T 201A</u> Consultant Project Mgr. <u>206-492-7735</u> Consultant Phone # <u>Jason Wittk</u> Samples</p>	<p>4 Matrix</p> <p><input type="checkbox"/> Sediment <input type="checkbox"/> Soil <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Surface <input type="checkbox"/> Ground <input type="checkbox"/> Air <input checked="" type="checkbox"/> Composite</p>	<p>5 Analyses Requested</p> <p>8260 full scan <input type="checkbox"/> Oxygenates <input type="checkbox"/> NWTPH GX <input type="checkbox"/> NWTPH DX <input type="checkbox"/> Silica Gel Cleanup <input type="checkbox"/> Lead Total <input type="checkbox"/> Diss. Method <input type="checkbox"/> WAPVH <input type="checkbox"/> WAEFH</p>	<p>6 Remarks</p> <p>EPA TO-15 for BTEX and TH-9 (Total Number of Containers) BTEX + MTBE 8021 <input type="checkbox"/> 8260 <input type="checkbox"/> Naphth <input type="checkbox"/></p>																								
<p>2 Sample Identification</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Sample</th> <th>Collected Date</th> <th>Time</th> <th>Grab</th> </tr> </thead> <tbody> <tr> <td><u>VSP-801</u></td> <td><u>7/26/18</u></td> <td><u>1245</u></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td><u>VSP-802</u></td> <td><u>7/26/18</u></td> <td><u>1215</u></td> <td><input checked="" type="checkbox"/></td> </tr> </tbody> </table>	Sample	Collected Date	Time	Grab	<u>VSP-801</u>	<u>7/26/18</u>	<u>1245</u>	<input checked="" type="checkbox"/>	<u>VSP-802</u>	<u>7/26/18</u>	<u>1215</u>	<input checked="" type="checkbox"/>	<p>7 Turnaround Time Requested (TAT) (please circle)</p> <p>Standard <u>5 day</u> 72 hour 48 hour 24 hour</p>	<p>8 Data Package Options (please circle if required)</p> <p>Type I - Full Type VI (Raw Data)</p>	<p>9</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>Time</th> <th>Received by</th> </tr> </thead> <tbody> <tr> <td><u>7/28/18</u></td> <td><u>1315</u></td> <td><u>[Signature]</u></td> </tr> <tr> <td><u>7/30/18</u></td> <td><u>1000</u></td> <td><u>[Signature]</u></td> </tr> <tr> <td><u>7/31/18</u></td> <td><u>09:00</u></td> <td><u>Emely James</u></td> </tr> </tbody> </table>	Date	Time	Received by	<u>7/28/18</u>	<u>1315</u>	<u>[Signature]</u>	<u>7/30/18</u>	<u>1000</u>	<u>[Signature]</u>	<u>7/31/18</u>	<u>09:00</u>	<u>Emely James</u>
Sample	Collected Date	Time	Grab																								
<u>VSP-801</u>	<u>7/26/18</u>	<u>1245</u>	<input checked="" type="checkbox"/>																								
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<u>7/31/18</u>	<u>09:00</u>	<u>Emely James</u>																									
<p>3</p> <p>Barcode: 320-41619 Chain of Custody</p>		<p>8</p> <p>Relinquished by <u>[Signature]</u> Relinquished by <u>[Signature]</u> Relinquished by Commercial Carrier: UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Other <input type="checkbox"/></p>																									
<p>10</p> <p>Temperature Upon Receipt _____ °C</p>		<p>11</p> <p>Custody Seals Intact? Yes <input type="checkbox"/> No <input type="checkbox"/></p>																									

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 320-41619-1

Login Number: 41619

List Source: TestAmerica Sacramento

List Number: 1

Creator: Branscum, Cassie

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	528, 351
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Date Cleaned/Batch ID: D 05-29-18

Date of QC: 6/6/18

Data File Number: C:\MSDCHEM\1\DATA\180606



320-39811 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

*	34002441	<i>MS9060615.4</i>		34002428
	34001798			34000601
	34000330			34002433
	34001032			34001089
	34001136			8286
	34002451			34000685
	34000914			34000649
	34002002			34001085

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

***** INDICATES THE CAN OR CANS WHICH WERE SCREENED**

[Signature]
1st Level Reviewed By

6/7/18
Date

2nd Level Reviewed By

Date

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-39811-1
 SDG No.: _____
 Client Sample ID: 34002441 Lab Sample ID: 320-39811-1
 Matrix: Air Lab File ID: MS9060615.D
 Analysis Method: TO-15 Date Collected: 05/29/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 06/07/2018 05:49
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 227669 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.77	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	ND		0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-39811-1
 SDG No.: _____
 Client Sample ID: 34002441 Lab Sample ID: 320-39811-1
 Matrix: Air Lab File ID: MS9060615.D
 Analysis Method: TO-15 Date Collected: 05/29/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 06/07/2018 05:49
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 227669 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	0.094	J	0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-39811-1
 SDG No.: _____
 Client Sample ID: 34002441 Lab Sample ID: 320-39811-1
 Matrix: Air Lab File ID: MS9060615.D
 Analysis Method: TO-15 Date Collected: 05/29/2018 00:00
 Sample wt/vol: 500 (mL) Date Analyzed: 06/07/2018 05:49
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 227669 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	85		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	100		70-130
2037-26-5	Toluene-d8 (Surr)	98		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D
 Lims ID: 320-39811-A-1
 Client ID: 34002441
 Sample Type: Client
 Inject. Date: 07-Jun-2018 05:49:30 ALS Bottle#: 10 Worklist Smp#: 15
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Sample Info: 320-39811-A-1
 Misc. Info.: 500 CAN CERT
 Operator ID: LHS Instrument ID: ATMS9
 Method: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\TO15_ATMS9N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 07-Jun-2018 15:03:00 Calib Date: 06-Jun-2018 18:21:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060603.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK027

First Level Reviewer: vanommens

Date: 07-Jun-2018 09:41:24

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	12.041	12.041	0.000	94	36144	4.00	
* 2 1,4-Difluorobenzene	114	14.194	14.194	0.000	100	140967	4.00	
* 3 Chlorobenzene-d5 (IS)	117	20.229	20.229	0.000	99	83515	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	13.239	13.245	-0.006	97	51704	3.99	
\$ 5 Toluene-d8 (Surr)	100	17.431	17.425	0.006	99	69980	3.93	
\$ 6 4-Bromofluorobenzene (Surr	174	22.176	22.182	-0.006	98	25230	3.41	
31 Acetone	43	7.168	7.156	0.012	94	15629	0.7692	
47 Methylene Chloride	49	8.482	8.476	0.006	94	1657	0.0935	
54 2-Butanone (MEK)	72	11.006	11.006	0.000	99	813	0.1586	

Reagents:

VAMSIS20_00175

Amount Added: 50.00

Units: mL

Run Reagent

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D

Injection Date: 07-Jun-2018 05:49:30

Instrument ID: ATMS9

Operator ID: LHS

Lims ID: 320-39811-A-1

Lab Sample ID: 320-39811-1

Worklist Smp#: 15

Client ID: 34002441

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

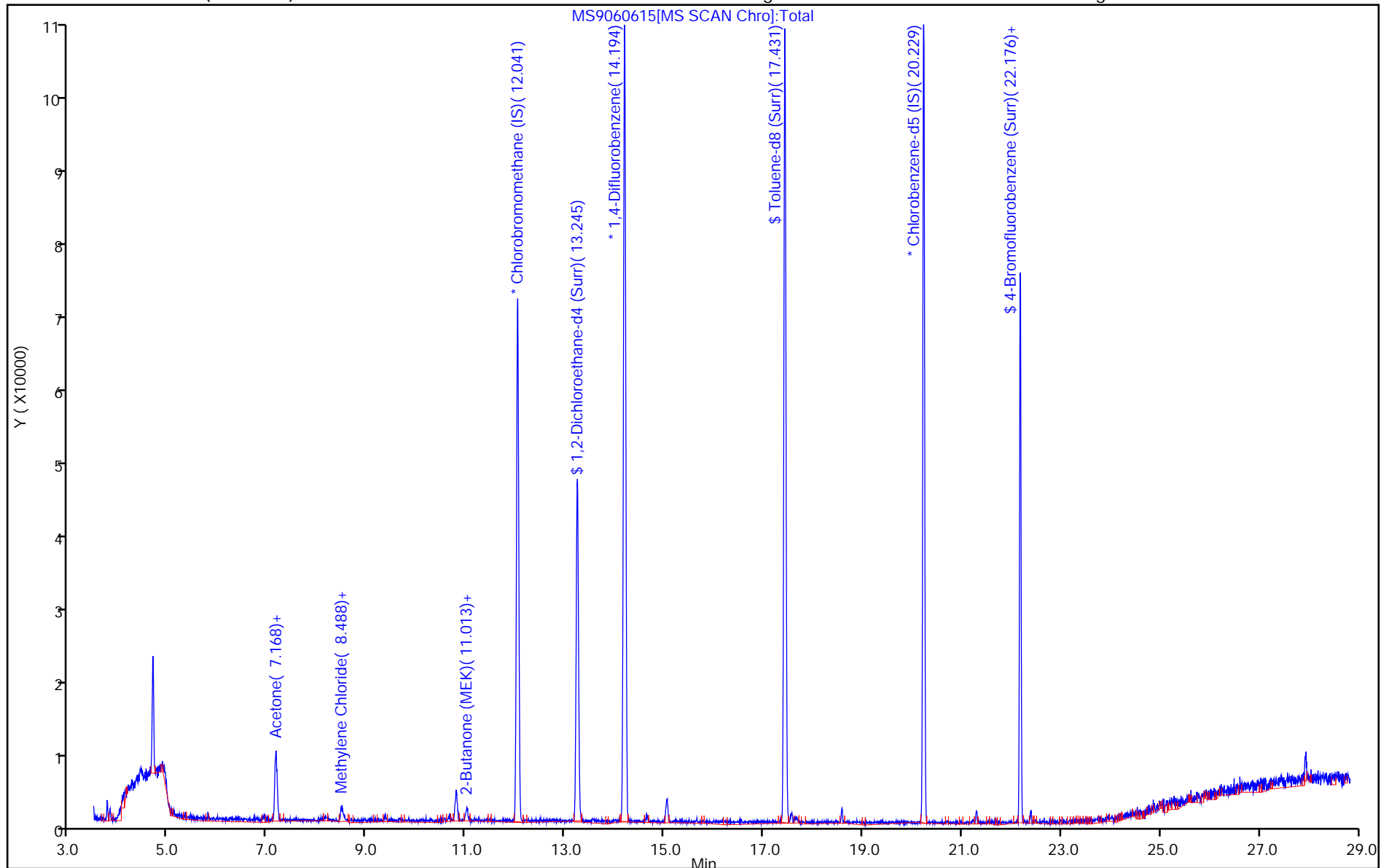
ALS Bottle#: 10

Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Y Scaling: Method Defined: Scale to the Nth Largest Peak: 2



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D

Injection Date: 07-Jun-2018 05:49:30

Instrument ID: ATMS9

Lims ID: 320-39811-A-1

Lab Sample ID: 320-39811-1

Client ID: 34002441

Operator ID: LHS

ALS Bottle#: 10 Worklist Smp#: 15

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

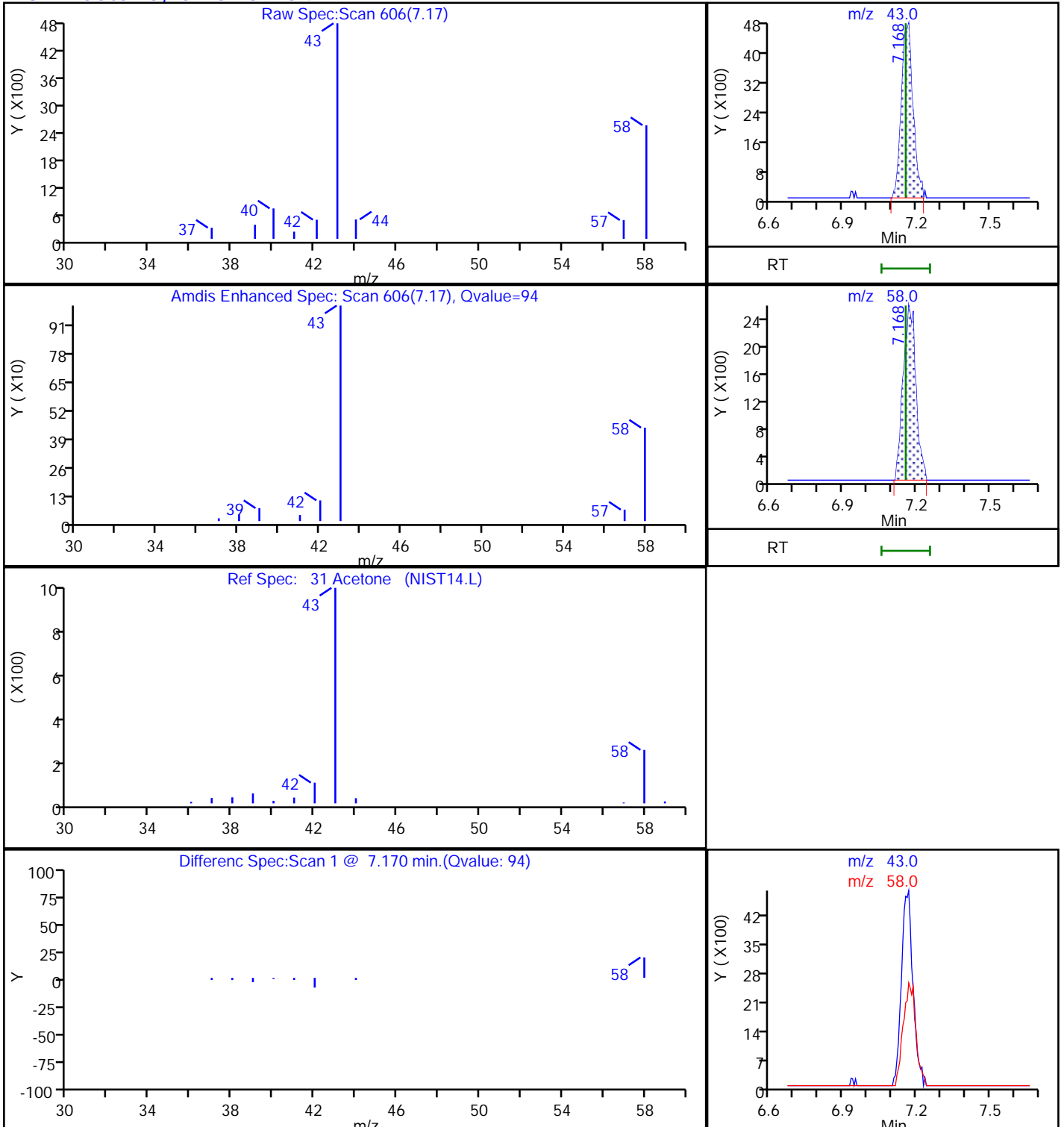
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

31 Acetone, CAS: 67-64-1



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D

Injection Date: 07-Jun-2018 05:49:30

Instrument ID: ATMS9

Lims ID: 320-39811-A-1

Lab Sample ID: 320-39811-1

Client ID: 34002441

Operator ID: LHS

ALS Bottle#: 10 Worklist Smp#: 15

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

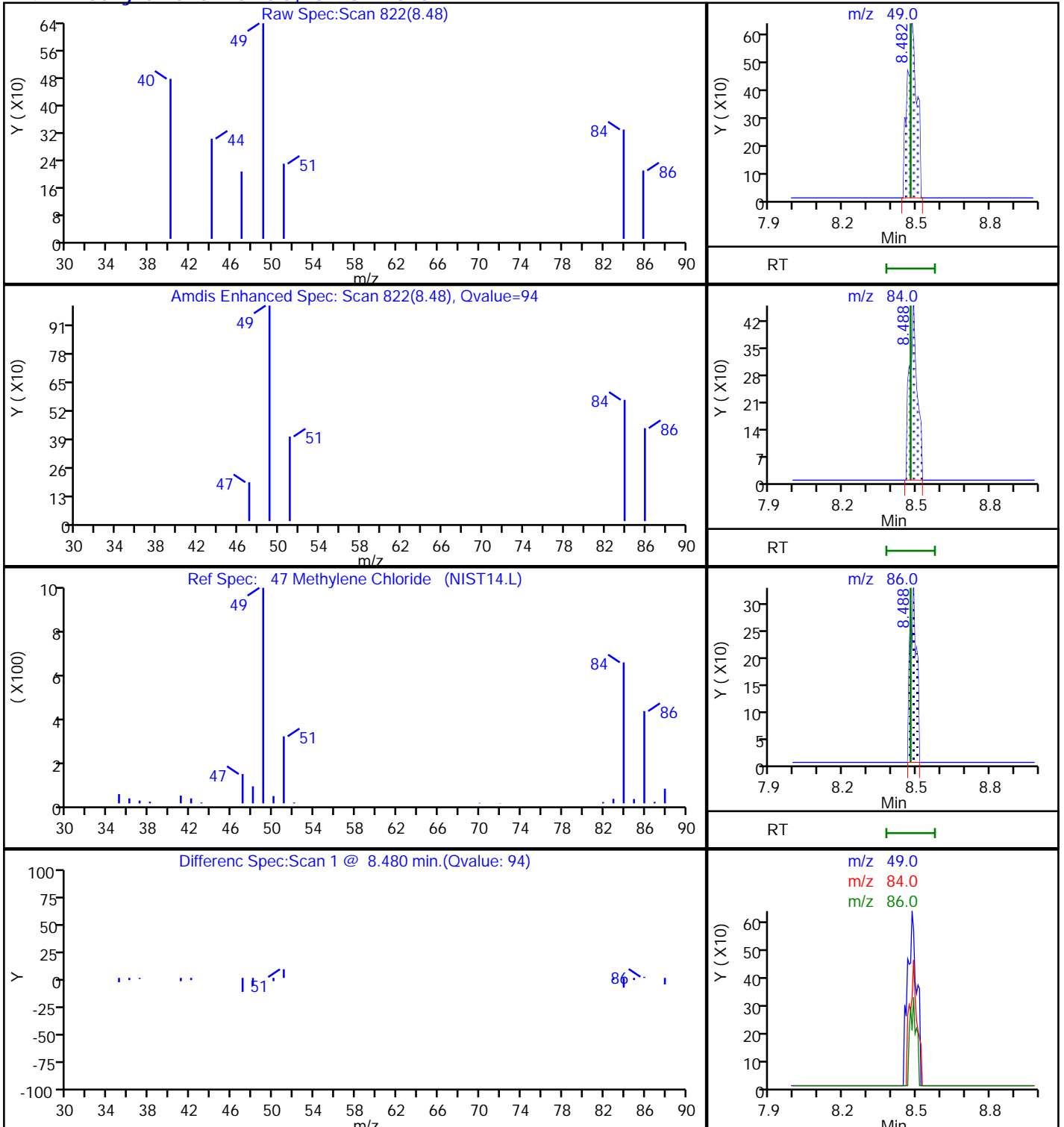
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

47 Methylene Chloride, CAS: 75-09-2

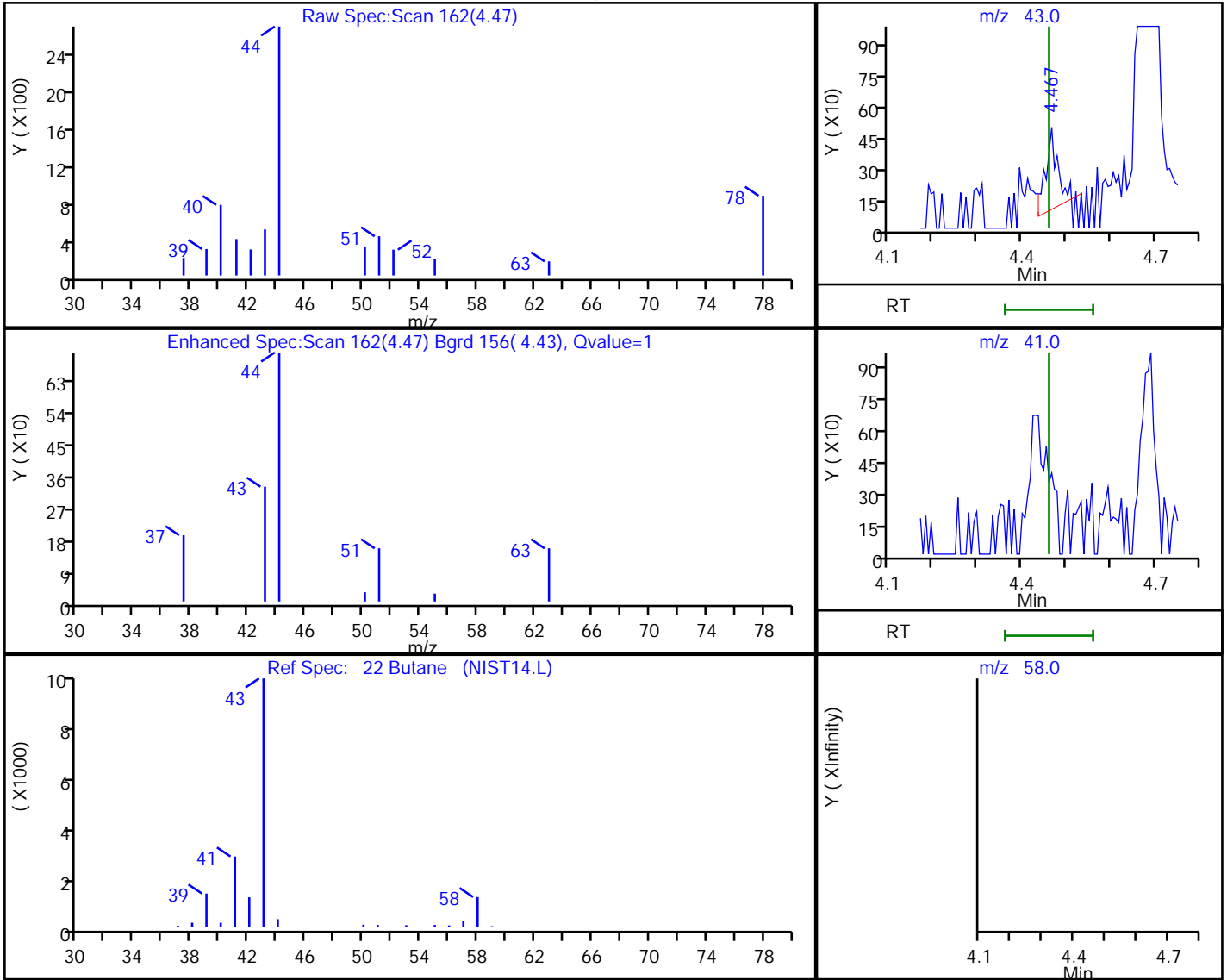


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D
 Injection Date: 07-Jun-2018 05:49:30 Instrument ID: ATMS9
 Lims ID: 320-39811-A-1 Lab Sample ID: 320-39811-1
 Client ID: 34002441
 Operator ID: LHS ALS Bottle#: 10 Worklist Smp#: 15
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

22 Butane, CAS: 106-97-8

Processing Results



RT	Mass	Response	Amount
4.47	43.00	658	0.023779
4.46	41.00	0	
4.46	58.00	0	

Reviewer: vanommens, 07-Jun-2018 09:40:43

Audit Action: Marked Compound Undetected

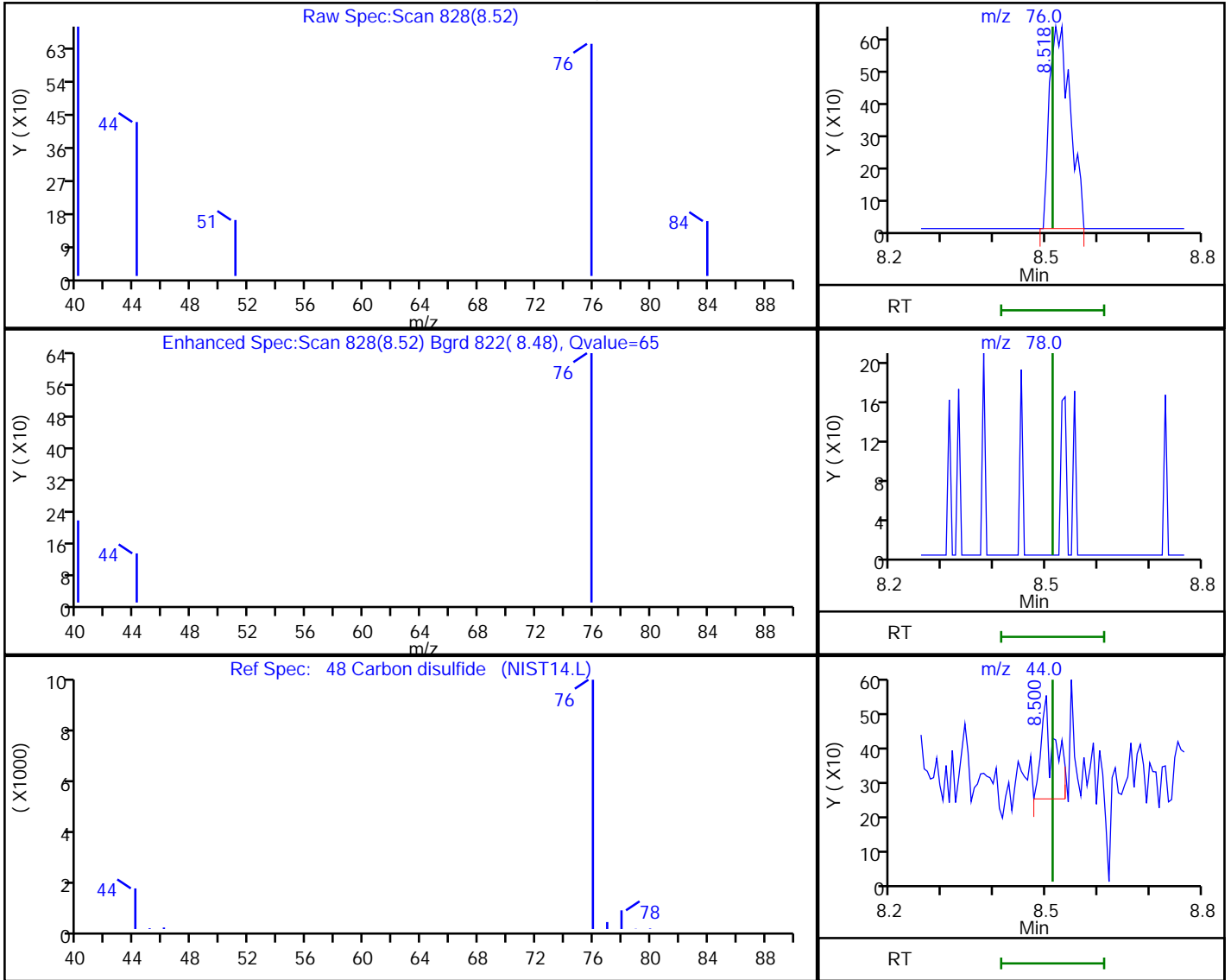
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D
Injection Date: 07-Jun-2018 05:49:30 Instrument ID: ATMS9
Lims ID: 320-39811-A-1 Lab Sample ID: 320-39811-1
Client ID: 34002441
Operator ID: LHS ALS Bottle#: 10 Worklist Smp#: 15
Purge Vol: 5.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector MS SCAN

48 Carbon disulfide, CAS: 75-15-0

Processing Results



RT	Mass	Response	Amount
8.52	76.00	1768	0.047289
8.51	78.00	0	
8.50	44.00	554	

Reviewer: vanommens, 07-Jun-2018 09:40:53

Audit Action: Marked Compound Undetected

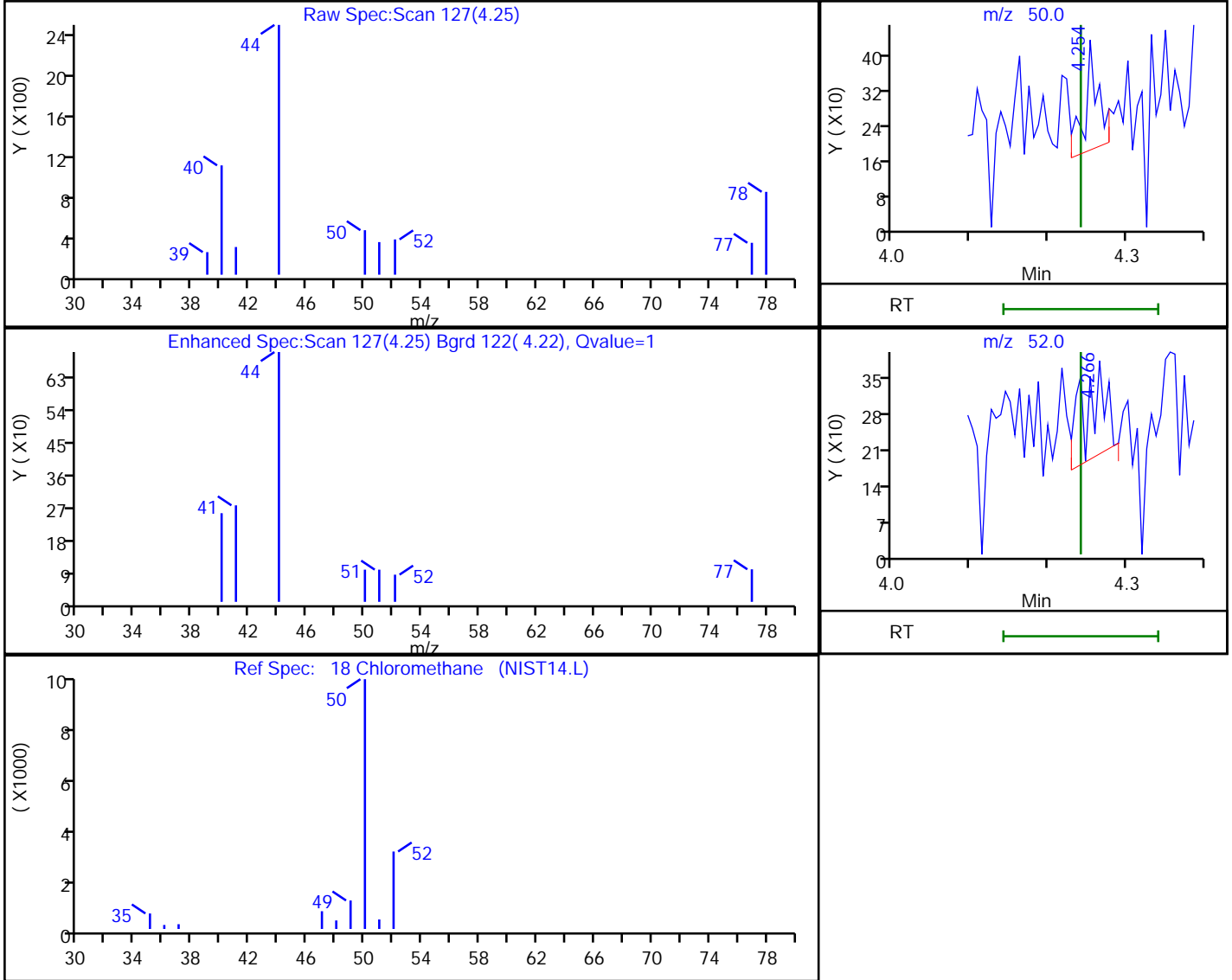
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D
 Injection Date: 07-Jun-2018 05:49:30 Instrument ID: ATMS9
 Lims ID: 320-39811-A-1 Lab Sample ID: 320-39811-1
 Client ID: 34002441
 Operator ID: LHS ALS Bottle#: 10 Worklist Smp#: 15
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

18 Chloromethane, CAS: 74-87-3

Processing Results



RT	Mass	Response	Amount
4.25	50.00	311	0.016150
4.27	52.00	345	

Reviewer: vanommens, 07-Jun-2018 09:40:41

Audit Action: Marked Compound Undetected

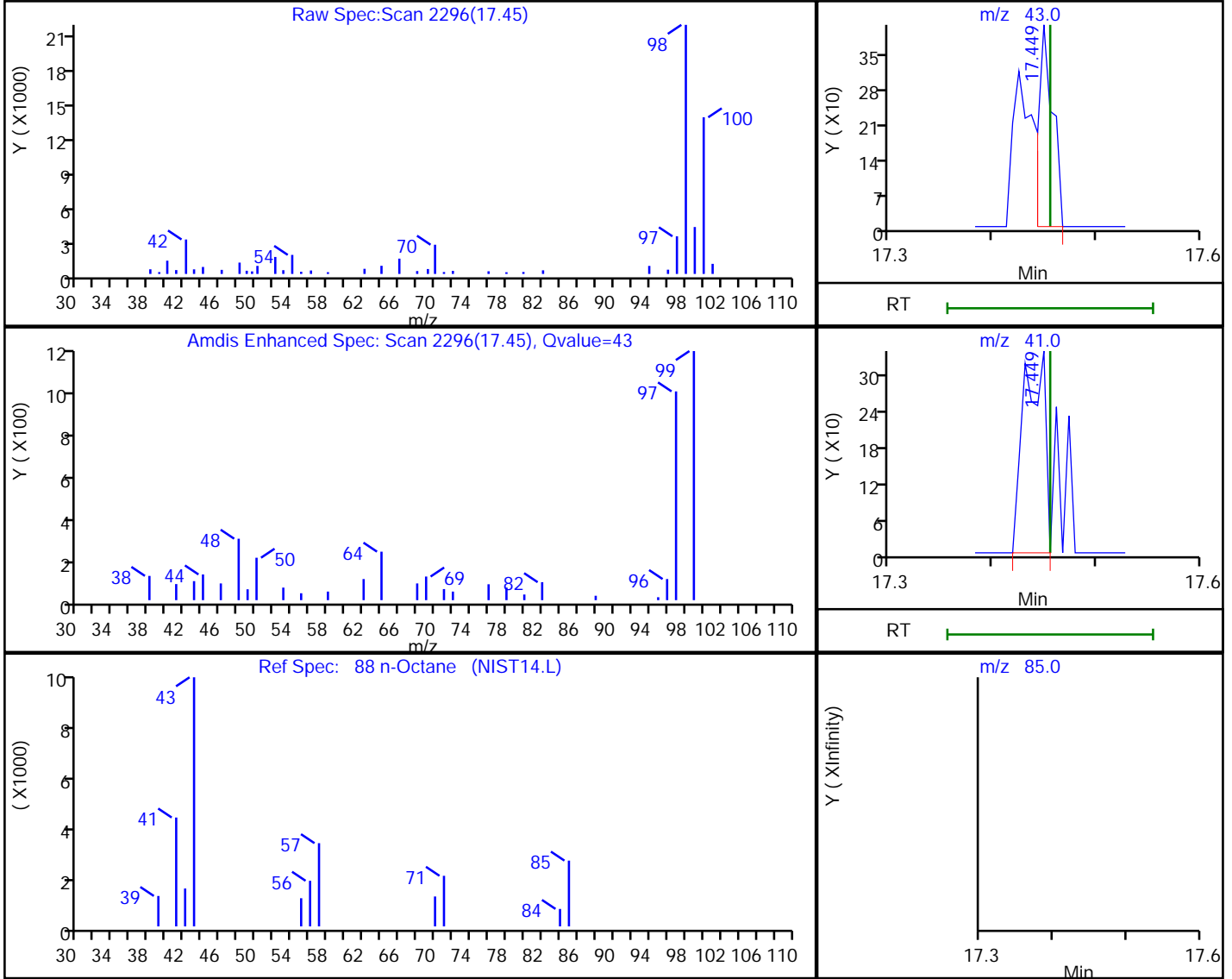
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D
 Injection Date: 07-Jun-2018 05:49:30 Instrument ID: ATMS9
 Lims ID: 320-39811-A-1 Lab Sample ID: 320-39811-1
 Client ID: 34002441
 Operator ID: LHS ALS Bottle#: 10 Worklist Smp#: 15
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

88 n-Octane, CAS: 111-65-9

Processing Results



RT	Mass	Response	Amount
17.45	43.00	381	0.011189
17.45	41.00	480	
17.46	85.00	0	

Reviewer: vanommens, 07-Jun-2018 09:41:09

Audit Action: Marked Compound Undetected

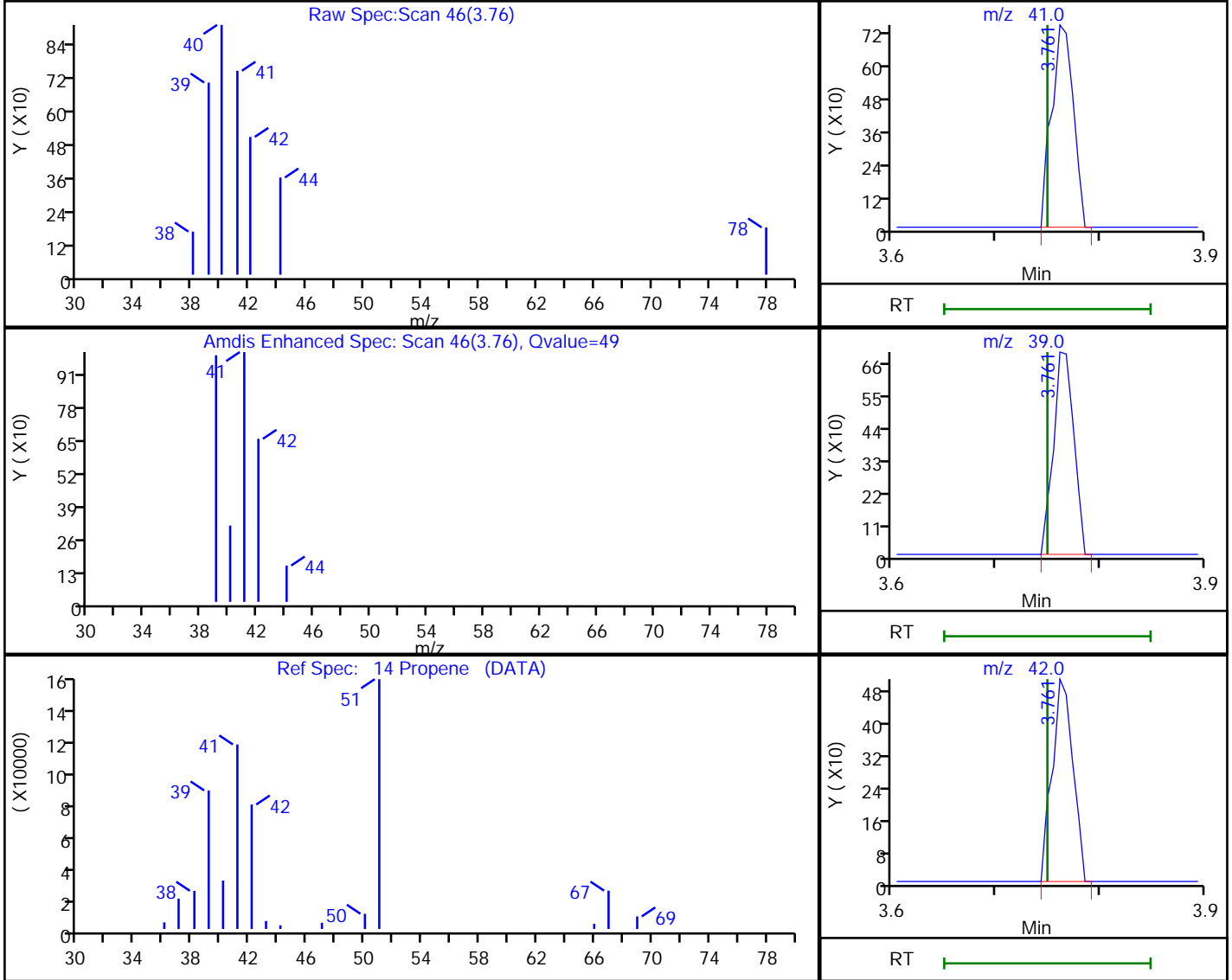
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180606-59321.b\MS9060615.D
 Injection Date: 07-Jun-2018 05:49:30 Instrument ID: ATMS9
 Lims ID: 320-39811-A-1 Lab Sample ID: 320-39811-1
 Client ID: 34002441
 Operator ID: LHS ALS Bottle#: 10 Worklist Smp#: 15
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

14 Propene, CAS: 115-07-1

Processing Results



RT	Mass	Response	Amount
3.76	41.00	1083	0.088258
3.76	39.00	960	
3.76	42.00	699	

Reviewer: vanommens, 07-Jun-2018 09:40:39

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-44380-1
Client Project/Site: Chevron Edmonds Terminal

For:
ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
10/29/2018 1:51:57 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16



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Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Job ID: 320-44380-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-44380-1

Receipt

Two samples were received on 10/20/2018 9:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice.

Receipt Exceptions

The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. Canister IDs and time stop not listed on COC.

Canister ID for sample 1 is 34000801.

Canister ID for sample 2 is 34000536.

Air - GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA

Method(s) TO-15: 1,2-Dichloroethane-d4 (Surrogate) recovery for the following sample was outside control limits: VSP-801 (320-44380-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Client Sample ID: VSP-801

Lab Sample ID: 320-44380-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	640		9.1	1.8	ppb v/v	22.8		TO-15	Total/NA
Ethylbenzene	99	B	9.1	1.4	ppb v/v	22.8		TO-15	Total/NA
Toluene	4.3	J B	9.1	1.2	ppb v/v	22.8		TO-15	Total/NA
m,p-Xylene	110	B	18	2.3	ppb v/v	22.8		TO-15	Total/NA
o-Xylene	12	B	9.1	1.2	ppb v/v	22.8		TO-15	Total/NA
TPH (as Gasoline)	38000		2300	910	ppb v/v	22.8		TO-15	Total/NA
Carbon Dioxide (TCD)	2.2		1.1	0.024	% v/v	2.28		D1946	Total/NA
Methane (FID)	0.0015		0.00023	0.000046	% v/v	2.28		D1946	Total/NA
Oxygen	16		0.46	0.017	% v/v	2.28		D1946	Total/NA

Client Sample ID: VSP-802

Lab Sample ID: 320-44380-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.34	J	0.40	0.079	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	0.33	J B	0.40	0.063	ppb v/v	1		TO-15	Total/NA
Toluene	1.1	B	0.40	0.051	ppb v/v	1		TO-15	Total/NA
m,p-Xylene	0.97	B	0.80	0.10	ppb v/v	1		TO-15	Total/NA
o-Xylene	0.36	J B	0.40	0.054	ppb v/v	1		TO-15	Total/NA
TPH (as Gasoline)	70	J	100	40	ppb v/v	1		TO-15	Total/NA
Carbon Dioxide (TCD)	2.0		0.83	0.018	% v/v	1.66		D1946	Total/NA
Methane (FID)	0.0017		0.00017	0.000033	% v/v	1.66		D1946	Total/NA
Oxygen	16		0.33	0.012	% v/v	1.66		D1946	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Client Sample ID: VSP-801

Lab Sample ID: 320-44380-1

Date Collected: 10/18/18 15:45

Matrix: Air

Date Received: 10/20/18 09:25

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	640		9.1	1.8	ppb v/v			10/26/18 05:08	22.8
Ethylbenzene	99	B	9.1	1.4	ppb v/v			10/26/18 05:08	22.8
Toluene	4.3	J B	9.1	1.2	ppb v/v			10/26/18 05:08	22.8
m,p-Xylene	110	B	18	2.3	ppb v/v			10/26/18 05:08	22.8
o-Xylene	12	B	9.1	1.2	ppb v/v			10/26/18 05:08	22.8
TPH (as Gasoline)	38000		2300	910	ppb v/v			10/26/18 05:08	22.8

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		70 - 130		10/26/18 05:08	22.8
1,2-Dichloroethane-d4 (Surr)	134	X	70 - 130		10/26/18 05:08	22.8
Toluene-d8 (Surr)	101		70 - 130		10/26/18 05:08	22.8

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	2.2		1.1	0.024	% v/v			10/24/18 11:00	2.28
Methane (FID)	0.0015		0.00023	0.000046	% v/v			10/24/18 14:40	2.28
Oxygen	16		0.46	0.017	% v/v			10/24/18 11:00	2.28

Client Sample ID: VSP-802

Lab Sample ID: 320-44380-2

Date Collected: 10/18/18 15:30

Matrix: Air

Date Received: 10/20/18 09:25

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.34	J	0.40	0.079	ppb v/v			10/26/18 06:05	1
Ethylbenzene	0.33	J B	0.40	0.063	ppb v/v			10/26/18 06:05	1
Toluene	1.1	B	0.40	0.051	ppb v/v			10/26/18 06:05	1
m,p-Xylene	0.97	B	0.80	0.10	ppb v/v			10/26/18 06:05	1
o-Xylene	0.36	J B	0.40	0.054	ppb v/v			10/26/18 06:05	1
TPH (as Gasoline)	70	J	100	40	ppb v/v			10/26/18 06:05	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		10/26/18 06:05	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 130		10/26/18 06:05	1
Toluene-d8 (Surr)	97		70 - 130		10/26/18 06:05	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	2.0		0.83	0.018	% v/v			10/24/18 11:10	1.66
Methane (FID)	0.0017		0.00017	0.000033	% v/v			10/24/18 14:27	1.66
Oxygen	16		0.33	0.012	% v/v			10/24/18 11:10	1.66

TestAmerica Sacramento

Surrogate Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Matrix: Air

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB (70-130)	DCA (70-130)	TOL (70-130)
320-44380-1	VSP-801	104	134 X	101
320-44380-2	VSP-802	98	99	97
LCS 320-254908/4	Lab Control Sample	110	115	103
LCS 320-254908/6	Lab Control Sample	116	103	100
LCSD 320-254908/5	Lab Control Sample Dup	108	109	102
LCSD 320-254908/7	Lab Control Sample Dup	114	106	100
MB 320-254908/16	Method Blank	99	101	95

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DCA = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-254908/16

Matrix: Air

Analysis Batch: 254908

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			10/26/18 02:31	1
Ethylbenzene	0.0631	J	0.40	0.063	ppb v/v			10/26/18 02:31	1
Toluene	0.0554	J	0.40	0.051	ppb v/v			10/26/18 02:31	1
m,p-Xylene	0.258	J	0.80	0.10	ppb v/v			10/26/18 02:31	1
o-Xylene	0.132	J	0.40	0.054	ppb v/v			10/26/18 02:31	1
TPH (as Gasoline)	ND		100	40	ppb v/v			10/26/18 02:31	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130		10/26/18 02:31	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		10/26/18 02:31	1
Toluene-d8 (Surr)	95		70 - 130		10/26/18 02:31	1

Lab Sample ID: LCS 320-254908/4

Matrix: Air

Analysis Batch: 254908

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	2000	1640		ppb v/v		82	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	110		70 - 130
1,2-Dichloroethane-d4 (Surr)	115		70 - 130
Toluene-d8 (Surr)	103		70 - 130

Lab Sample ID: LCS 320-254908/6

Matrix: Air

Analysis Batch: 254908

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	21.2		ppb v/v		106	68 - 128
Ethylbenzene	20.0	20.0		ppb v/v		100	64 - 124
Toluene	20.0	21.6		ppb v/v		108	68 - 128
m,p-Xylene	40.0	40.6		ppb v/v		101	65 - 125
o-Xylene	20.0	19.8		ppb v/v		99	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	116		70 - 130
1,2-Dichloroethane-d4 (Surr)	103		70 - 130
Toluene-d8 (Surr)	100		70 - 130

Lab Sample ID: LCSD 320-254908/5

Matrix: Air

Analysis Batch: 254908

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	2000	1690		ppb v/v		84	70 - 130	3	25

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-254908/5
Matrix: Air
Analysis Batch: 254908

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCS D %Recovery	LCS D Qualifier	Limits
4-Bromofluorobenzene (Surr)	108		70 - 130
1,2-Dichloroethane-d4 (Surr)	109		70 - 130
Toluene-d8 (Surr)	102		70 - 130

Lab Sample ID: LCSD 320-254908/7
Matrix: Air
Analysis Batch: 254908

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCS D Result	LCS D Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	21.8		ppb v/v		109	68 - 128	2	25
Ethylbenzene	20.0	21.0		ppb v/v		105	64 - 124	5	25
Toluene	20.0	22.1		ppb v/v		111	68 - 128	2	25
m,p-Xylene	40.0	41.8		ppb v/v		105	65 - 125	3	25
o-Xylene	20.0	20.6		ppb v/v		103	65 - 125	4	25

Surrogate	LCS D %Recovery	LCS D Qualifier	Limits
4-Bromofluorobenzene (Surr)	114		70 - 130
1,2-Dichloroethane-d4 (Surr)	106		70 - 130
Toluene-d8 (Surr)	100		70 - 130

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-254492/11
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			10/24/18 10:08	1
Methane (TCD)	ND		0.50	0.14	% v/v			10/24/18 10:08	1
Oxygen	ND		0.20	0.0074	% v/v			10/24/18 10:08	1

Lab Sample ID: LCS 320-254492/2
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon Dioxide (TCD)	23.9	24.5		% v/v		102	80 - 120
Methane (TCD)	25.6	24.3		% v/v		95	80 - 120

Lab Sample ID: LCS 320-254492/5
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oxygen	16.2	14.1		% v/v		87	80 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: LCSD 320-254492/3
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	23.9	24.5		% v/v		102	80 - 120	0	20
Methane (TCD)	25.6	24.4		% v/v		95	80 - 120	0	20

Lab Sample ID: LCSD 320-254492/6
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	16.2	14.2		% v/v		88	80 - 120	1	20

Lab Sample ID: MB 320-254625/5
Matrix: Air
Analysis Batch: 254625

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.00010	0.000020	% v/v			10/24/18 13:58	1

Lab Sample ID: LCS 320-254625/2
Matrix: Air
Analysis Batch: 254625

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0218		% v/v		87	80 - 120		

Lab Sample ID: LCSD 320-254625/3
Matrix: Air
Analysis Batch: 254625

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0248		% v/v		99	80 - 120	13	20

QC Association Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Air - GC/MS VOA

Analysis Batch: 254908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44380-1	VSP-801	Total/NA	Air	TO-15	
320-44380-2	VSP-802	Total/NA	Air	TO-15	
MB 320-254908/16	Method Blank	Total/NA	Air	TO-15	
LCS 320-254908/4	Lab Control Sample	Total/NA	Air	TO-15	
LCS 320-254908/6	Lab Control Sample	Total/NA	Air	TO-15	
LCSD 320-254908/5	Lab Control Sample Dup	Total/NA	Air	TO-15	
LCSD 320-254908/7	Lab Control Sample Dup	Total/NA	Air	TO-15	

Air - GC VOA

Analysis Batch: 254492

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44380-1	VSP-801	Total/NA	Air	D1946	
320-44380-2	VSP-802	Total/NA	Air	D1946	
MB 320-254492/11	Method Blank	Total/NA	Air	D1946	
LCS 320-254492/2	Lab Control Sample	Total/NA	Air	D1946	
LCS 320-254492/5	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-254492/3	Lab Control Sample Dup	Total/NA	Air	D1946	
LCSD 320-254492/6	Lab Control Sample Dup	Total/NA	Air	D1946	

Analysis Batch: 254625

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44380-1	VSP-801	Total/NA	Air	D1946	
320-44380-2	VSP-802	Total/NA	Air	D1946	
MB 320-254625/5	Method Blank	Total/NA	Air	D1946	
LCS 320-254625/2	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-254625/3	Lab Control Sample Dup	Total/NA	Air	D1946	

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Client Sample ID: VSP-801

Date Collected: 10/18/18 15:45

Date Received: 10/20/18 09:25

Lab Sample ID: 320-44380-1

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		22.8	25 mL	250 mL	254908	10/26/18 05:08	AP1	TAL SAC
Total/NA	Analysis	D1946		2.28	50 mL	50 mL	254625	10/24/18 14:40	NS1	TAL SAC
Total/NA	Analysis	D1946		2.28	50 mL	50 mL	254492	10/24/18 11:00	NS1	TAL SAC

Client Sample ID: VSP-802

Date Collected: 10/18/18 15:30

Date Received: 10/20/18 09:25

Lab Sample ID: 320-44380-2

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	415 mL	250 mL	254908	10/26/18 06:05	AP1	TAL SAC
Total/NA	Analysis	D1946		1.66	50 mL	50 mL	254625	10/24/18 14:27	NS1	TAL SAC
Total/NA	Analysis	D1946		1.66	50 mL	50 mL	254492	10/24/18 11:10	NS1	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18 *
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL SAC
D1946	Fixed Gases in Air (GC)	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-44380-1	VSP-801	Air	10/18/18 15:45	10/20/18 09:25
320-44380-2	VSP-802	Air	10/18/18 15:30	10/20/18 09:25

- 1
- 2
- 3
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- 9
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- 11
- 12
- 13
- 14
- 15
- 16

TestAmerica Sacramento
880 Riverside Parkway

West Sacramento, CA 95605
phone 916.374.4378 fax 916.372.1059

Canister Samples Chain of Custody Record

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact Information Company Name: <u>ArCADIS</u> Address: <u>1100 Olive Way, Suite 800</u> City/State/Zip: <u>Seattle, WA 98101</u> Phone: _____ FAX: _____ Project Name: <u>Edwards Terminal</u> Site/Location: <u>1720 University, Edwards WA</u> P O #: _____		Project Manager: Phone: _____ Email: _____ Site Contact: _____ TA Contact: _____ Analysis Turnaround Time: <u>STAT</u> Standard (Specific): _____ Rush (Specify): _____		Project Collected By: <u>JASON LITKE</u>		COC No: _____ of _____ COCs	
Sample Identification <u>VSP-801</u> <u>VSP-802</u>		Sample Date(s) <u>10/18/18 1545</u> <u>10/18/18 1530</u>		Time Start _____		Time Stop _____	
Canister Vacuum in Field, 'Hg (Start) _____		Canister Vacuum in Field, 'Hg (Stop) _____		Flow Controller ID _____		Canister ID _____	
TO-15 (Med / Std / Low / SIM) _____		MA-APH _____		EPA 3C _____		EPA 25C / 25.3 _____	
ASTM D-1946 / 1945 / 3588 _____		EPA 15/16 BTEX/TPH-6 <input checked="" type="checkbox"/>		TO-3 <input checked="" type="checkbox"/>		Other (Please specify in notes section) _____	
Sample Type _____		Indoor Air _____		Ambient Air _____		Soil Gas _____	
Landfill Gas _____		Other (Please specify in notes section) _____		Sample Specific Notes: <u>EPA TO-15 for BTEX</u> <u>TPH-6</u> <u>Other: Fixed Gas (methane, O2, CO2)</u>			



Special Instructions/QC Requirements & Comments:

Samples Shipped by: Jan L.
Samples Relinquished by: Jason Litke
Relinquished Date/Time: 10/19/18 1545
Lab Use Qty: _____
Shipper Name: _____

Date / Time:
Date / Time: 10/19/18 1245
Date / Time: 10/19/18 1545
Opened by: _____
Received by: _____
Received by: ASAC
Condition: _____

- ① canister ID is 34000801
- ② canister ID is 341000536

NSH 10/20/18 9:25



Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 320-44380-1

Login Number: 44380

List Source: TestAmerica Sacramento

List Number: 1

Creator: Sharifi, Nooshin

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	478967
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Canister IDs not listed on COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Date Cleaned/Batch ID 1-24-18 320-35358
 Date of QC 2/8/18
 Data File Number 18020819



320-35358 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

*	34000801
	8522
	34000238
	34000641
	34001634
	34001203
	34001953
	34000931

	34000909
	7566
	34000974
	34001229
	34001940
	34001000
	34000773
	34001652

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

W for AP
1st level Reviewed By:

2/9/18
Date:

[Signature]
2nd level Reviewed By:

2/9/18
Date:

Date Cleaned/Batch ID 2-13-18 320-36031
 Date of QC 2/23/18
 Data File Number MS9022319



320-36031 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

*	34000536
	34002055
	34000753
	8937
	8967
	34000625
	34000732
	34000731

	34001056
	34001950
	34001190
	34001077
	34000951
	34001093
	8514
	34001946

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

“*” INDICATES THE CAN OR CANS WHICH WERE SCREENED.

RA for AP
1st level Reviewed By:

2nd level Reviewed By:

2/26/18
Date:
3/5/18
Date:

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35358-1
 SDG No.: _____
 Client Sample ID: 34000801 Lab Sample ID: 320-35358-1
 Matrix: Air Lab File ID: 18020819.D
 Analysis Method: TO-15 Date Collected: 01/24/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 01:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	ND		5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	0.27	J	0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35358-1
 SDG No.: _____
 Client Sample ID: 34000801 Lab Sample ID: 320-35358-1
 Matrix: Air Lab File ID: 18020819.D
 Analysis Method: TO-15 Date Collected: 01/24/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 01:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35358-1
 SDG No.: _____
 Client Sample ID: 34000801 Lab Sample ID: 320-35358-1
 Matrix: Air Lab File ID: 18020819.D
 Analysis Method: TO-15 Date Collected: 01/24/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 01:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	97		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	100		70-130
2037-26-5	Toluene-d8 (Surr)	98		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
 Lims ID: 320-35358-A-1
 Client ID: 34000801
 Sample Type: Client
 Inject. Date: 09-Feb-2018 01:50:30 ALS Bottle#: 13 Worklist Smp#: 18
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Sample Info: 320-35385-A-1
 Misc. Info.: 500mL
 Operator ID: SV Instrument ID: ATMS2
 Method: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\TO15_ATMS2N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 09-Feb-2018 17:58:06 Calib Date: 06-Feb-2018 23:01:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS2\20180206-53757.b\18020612.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK008

First Level Reviewer: phanthasena

Date: 09-Feb-2018 17:58:06

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	11.386	11.380	0.006	98	56144	4.00	
* 2 1,4-Difluorobenzene	114	13.472	13.472	0.000	99	242149	4.00	
* 3 Chlorobenzene-d5 (IS)	117	19.532	19.532	0.000	99	227675	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	12.536	12.536	0.000	39	84932	4.00	
\$ 5 Toluene-d8 (Surr)	100	16.697	16.697	0.000	100	151453	3.91	
\$ 6 4-Bromofluorobenzene (Surr	95	21.551	21.551	0.000	99	162330	3.88	
10 Propene	41	3.933	3.927	0.006	90	942	0.0593	
18 Butane	43	4.560	4.560	0.000	85	559	0.0200	
32 Acetone	43	6.957	6.896	0.061	99	10139	-0.3448	
39 Methylene Chloride	49	8.095	8.088	0.007	89	1284	0.0657	
40 Carbon disulfide	76	8.131	8.131	0.000	99	8667	0.2661	
123 1,2,4-Trichlorobenzene	180	25.974	25.974	0.000	82	425	0.0139	

Reagents:

VAMSIS20_00106

Amount Added: 50.00

Units: mL

Run Reagent

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D

Injection Date: 09-Feb-2018 01:50:30

Instrument ID: ATMS2

Operator ID: SV

Lims ID: 320-35358-A-1

Lab Sample ID: 320-35358-1

Worklist Smp#: 18

Client ID: 34000801

Purge Vol: 250.000 mL

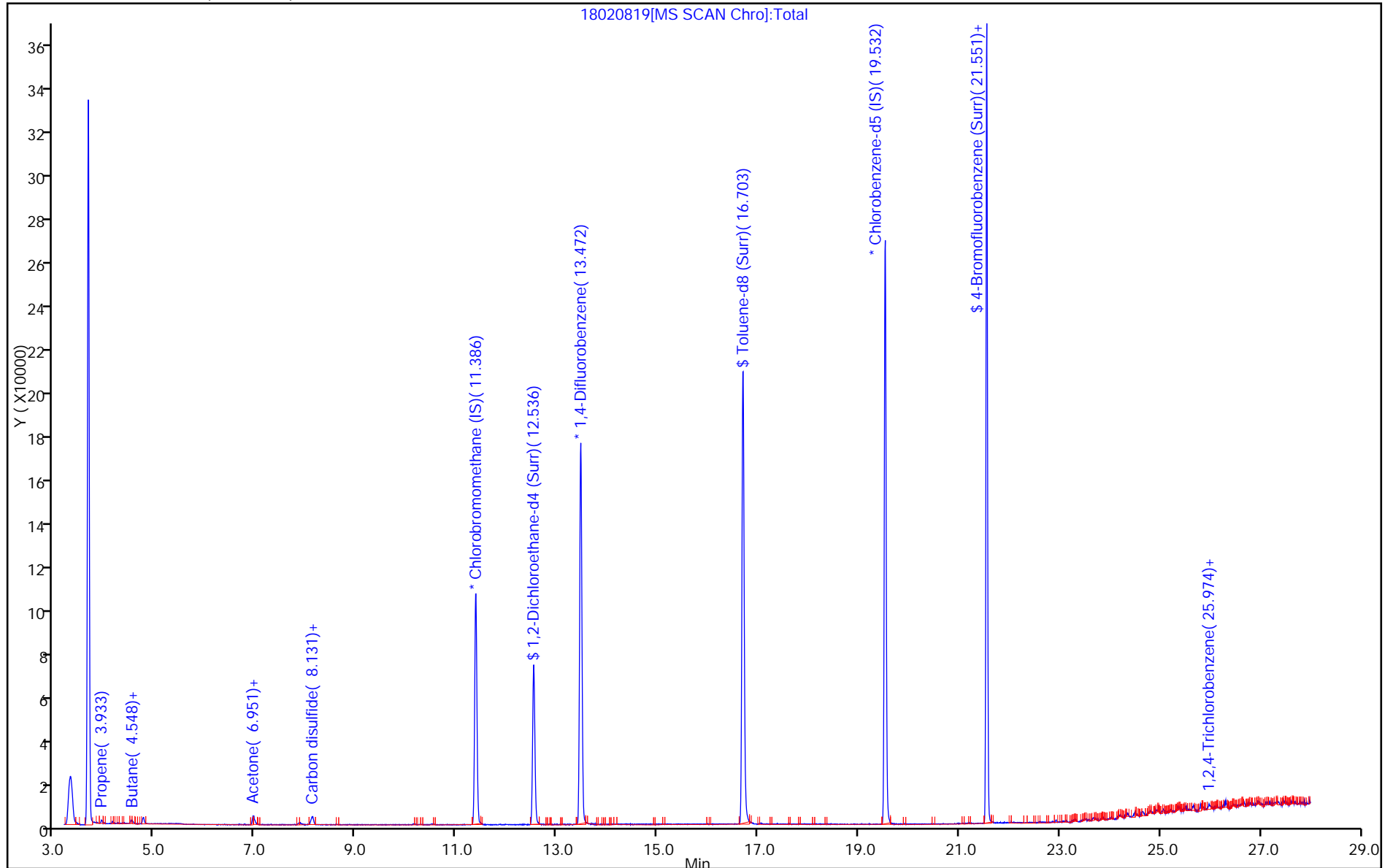
Dil. Factor: 1.0000

ALS Bottle#: 13

Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D

Injection Date: 09-Feb-2018 01:50:30

Instrument ID: ATMS2

Lims ID: 320-35358-A-1

Lab Sample ID: 320-35358-1

Client ID: 34000801

Operator ID: SV

ALS Bottle#: 13 Worklist Smp#: 18

Purge Vol: 250.000 mL

Dil. Factor: 1.0000

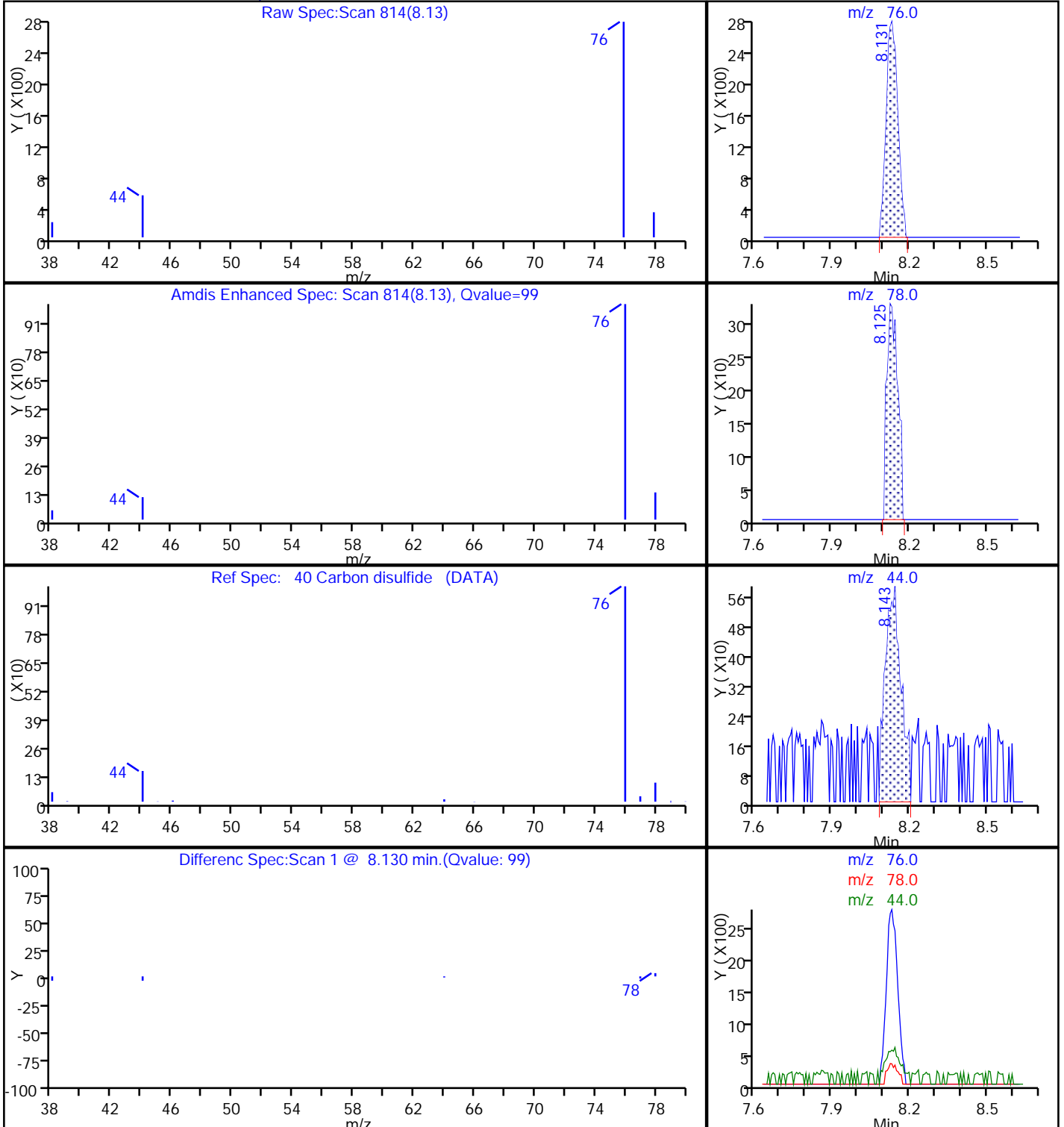
Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

40 Carbon disulfide, CAS: 75-15-0

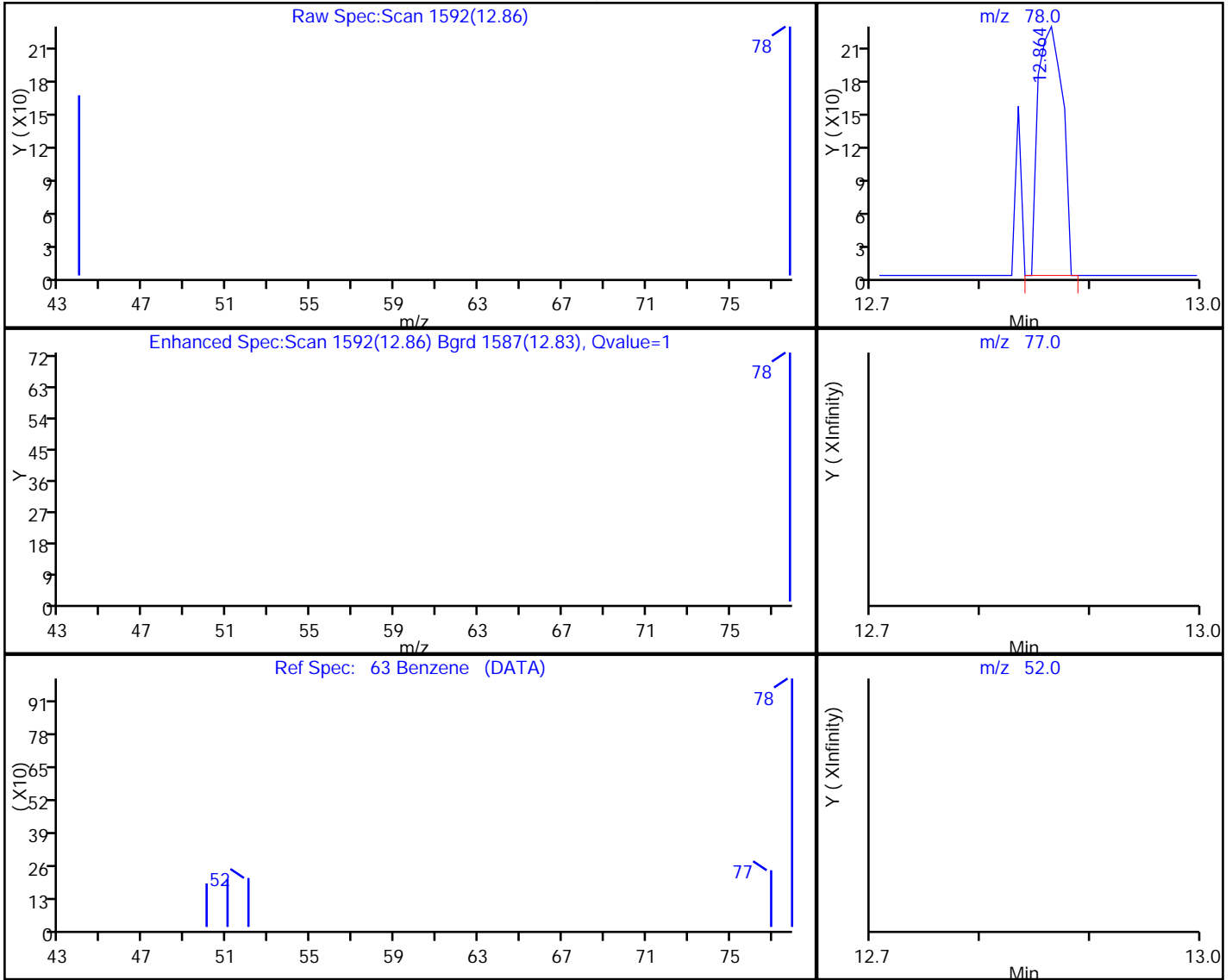


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
Injection Date: 09-Feb-2018 01:50:30 Instrument ID: ATMS2
Lims ID: 320-35358-A-1 Lab Sample ID: 320-35358-1
Client ID: 34000801
Operator ID: SV ALS Bottle#: 13 Worklist Smp#: 18
Purge Vol: 250.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector MS SCAN

63 Benzene, CAS: 71-43-2

Processing Results



RT	Mass	Response	Amount
12.86	78.00	355	0.008029
12.85	77.00	0	
12.85	52.00	0	

Reviewer: phanhasena, 09-Feb-2018 17:58:06

Audit Action: Marked Compound Undetected

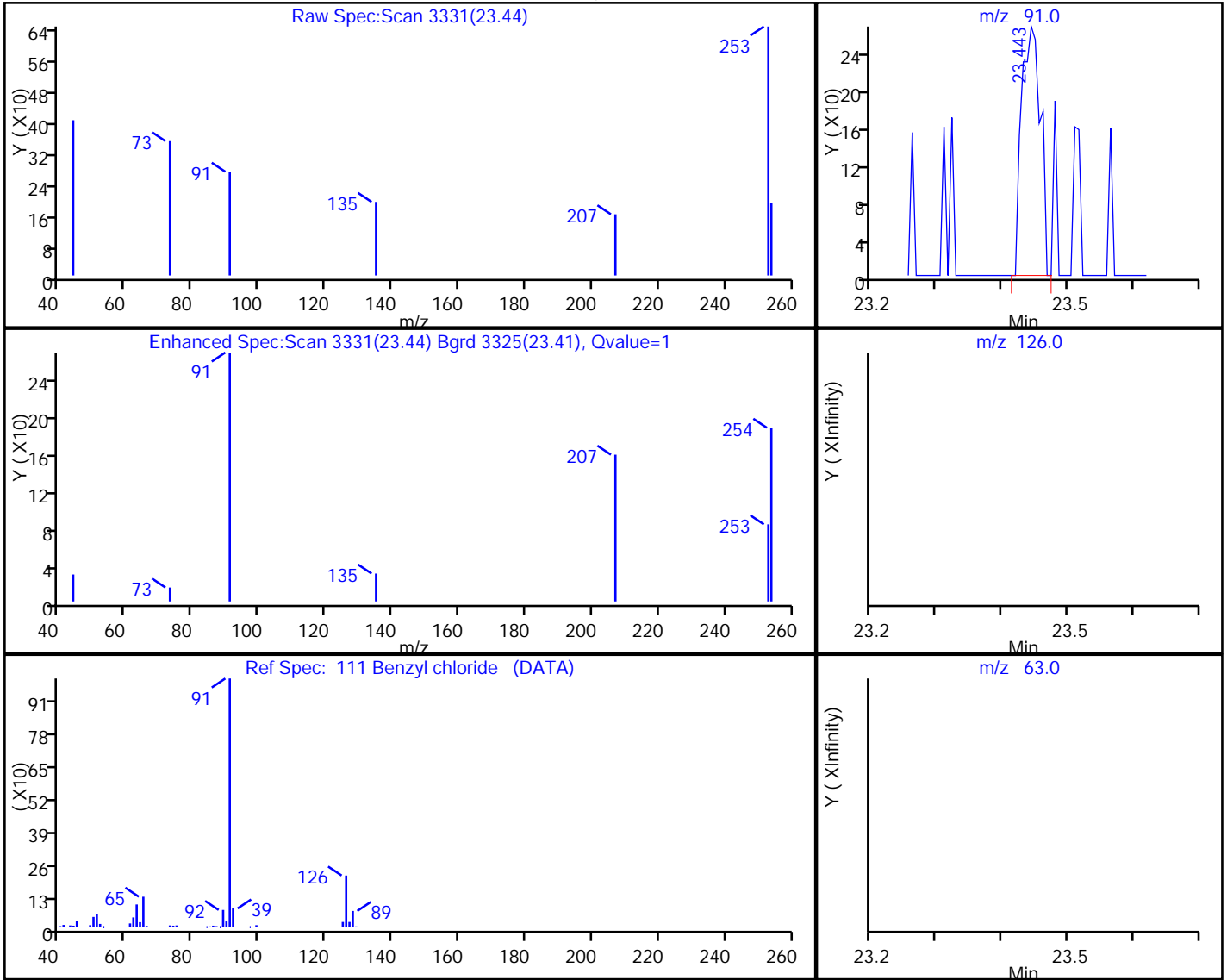
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
 Injection Date: 09-Feb-2018 01:50:30 Instrument ID: ATMS2
 Lims ID: 320-35358-A-1 Lab Sample ID: 320-35358-1
 Client ID: 34000801
 Operator ID: SV ALS Bottle#: 13 Worklist Smp#: 18
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

111 Benzyl chloride, CAS: 100-44-7

Processing Results



RT	Mass	Response	Amount
23.44	91.00	538	0.008091
23.44	126.00	0	
23.44	63.00	0	

Reviewer: phanhasena, 09-Feb-2018 17:58:06

Audit Action: Marked Compound Undetected

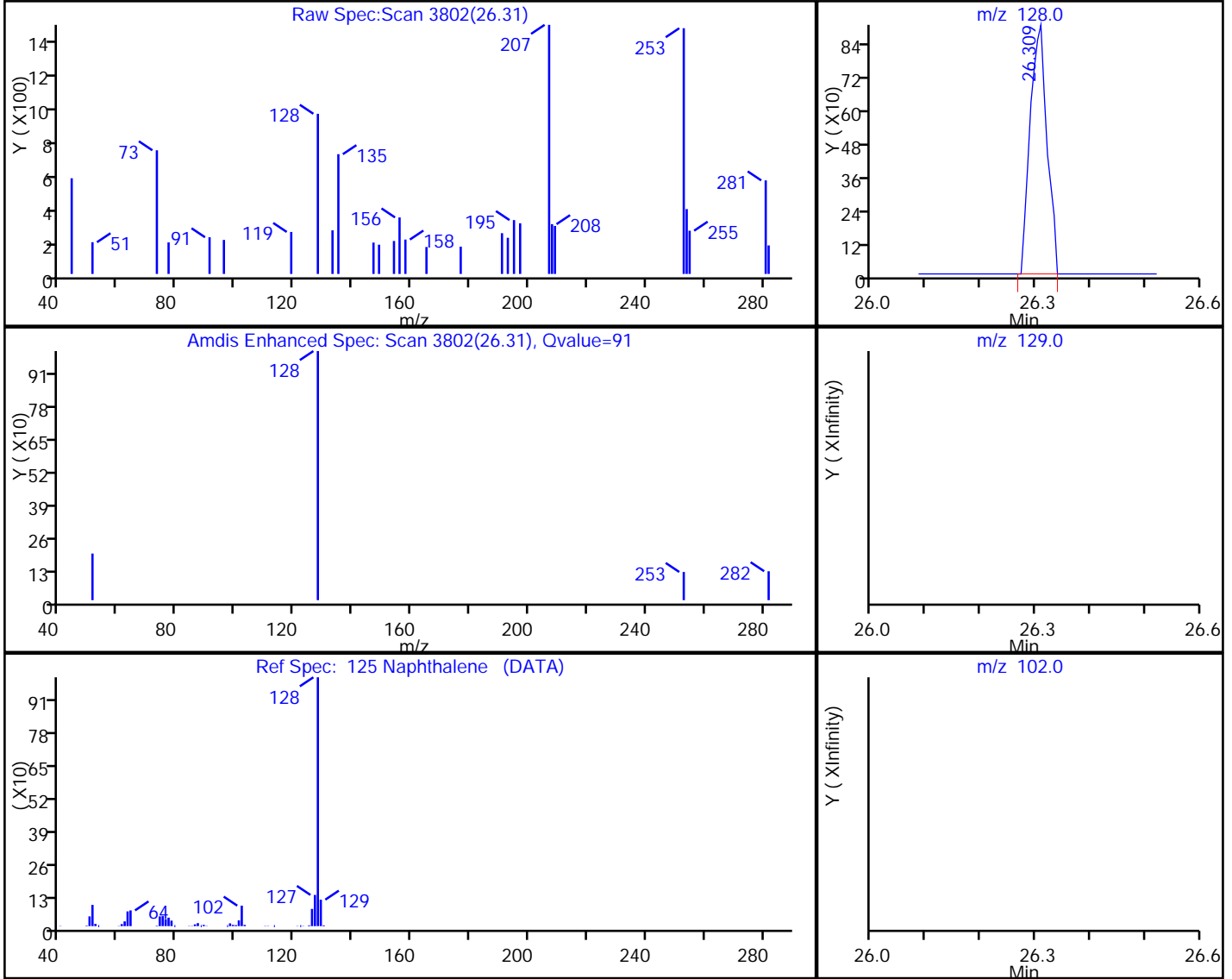
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
 Injection Date: 09-Feb-2018 01:50:30 Instrument ID: ATMS2
 Lims ID: 320-35358-A-1 Lab Sample ID: 320-35358-1
 Client ID: 34000801
 Operator ID: SV ALS Bottle#: 13 Worklist Smp#: 18
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

125 Naphthalene, CAS: 91-20-3

Processing Results



RT	Mass	Response	Amount
26.31	128.00	1941	0.026443
26.30	129.00	0	
26.30	102.00	0	

Reviewer: phanhasena, 09-Feb-2018 17:58:06

Audit Action: Marked Compound Undetected

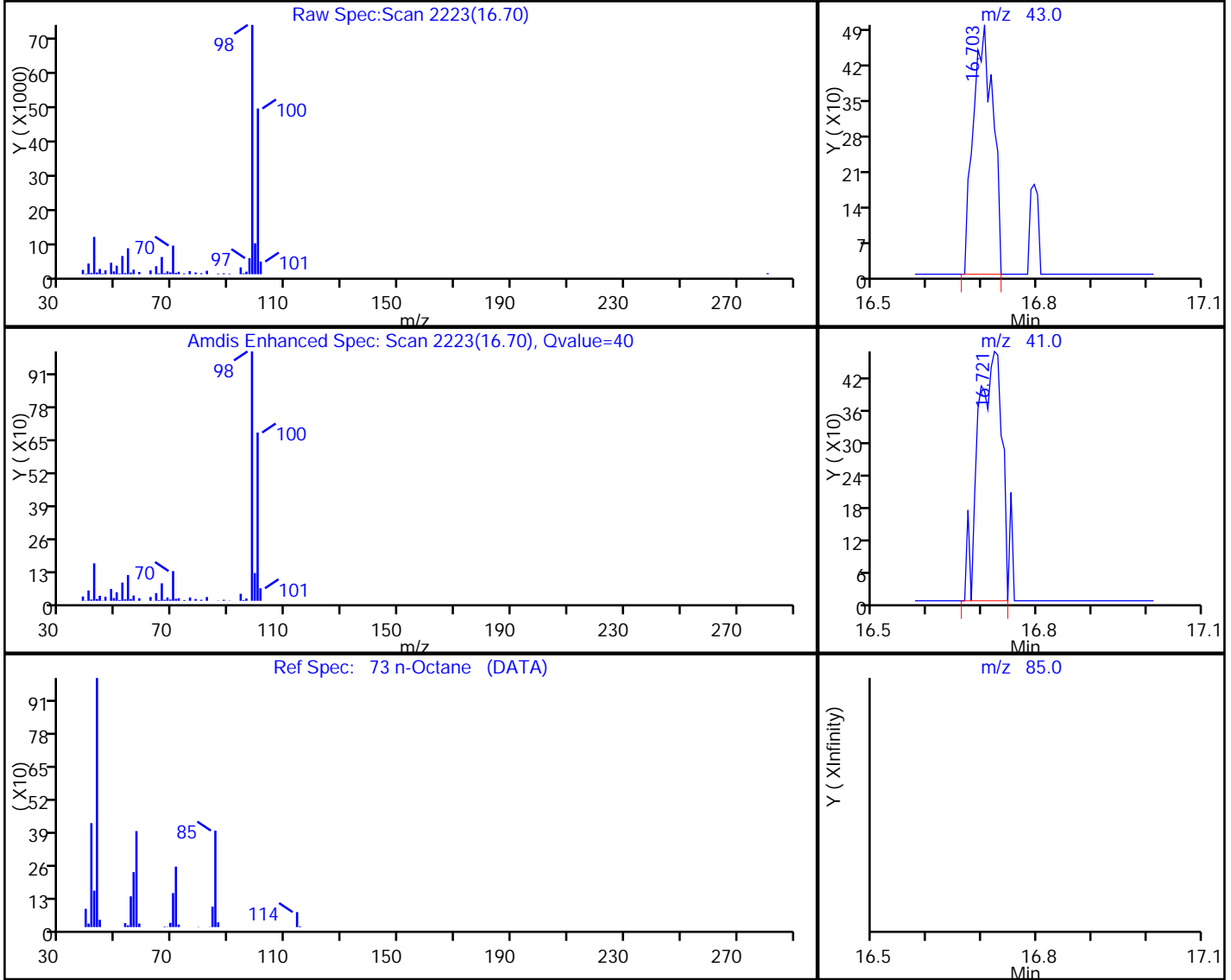
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
 Injection Date: 09-Feb-2018 01:50:30 Instrument ID: ATMS2
 Lims ID: 320-35358-A-1 Lab Sample ID: 320-35358-1
 Client ID: 34000801
 Operator ID: SV ALS Bottle#: 13 Worklist Smp#: 18
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

73 n-Octane, CAS: 111-65-9

Processing Results



RT	Mass	Response	Amount
16.70	43.00	1244	0.027068
16.72	41.00	1409	
16.79	85.00	0	

Reviewer: phanhasena, 09-Feb-2018 17:58:06

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID



FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-36031-1
 SDG No.: _____
 Client Sample ID: 34000536 Lab Sample ID: 320-36031-1
 Matrix: Air Lab File ID: MS9022319.D
 Analysis Method: TO-15 Date Collected: 02/13/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/24/2018 03:41
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 209817 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.43	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	0.12	J	0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-36031-1
 SDG No.: _____
 Client Sample ID: 34000536 Lab Sample ID: 320-36031-1
 Matrix: Air Lab File ID: MS9022319.D
 Analysis Method: TO-15 Date Collected: 02/13/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/24/2018 03:41
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 209817 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-36031-1
 SDG No.: _____
 Client Sample ID: 34000536 Lab Sample ID: 320-36031-1
 Matrix: Air Lab File ID: MS9022319.D
 Analysis Method: TO-15 Date Collected: 02/13/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/24/2018 03:41
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 209817 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	88		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	101		70-130
2037-26-5	Toluene-d8 (Surr)	95		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Lims ID: 320-36031-A-1
 Client ID: 34000536
 Sample Type: Client
 Inject. Date: 24-Feb-2018 03:41:30 ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Sample Info: 320-36031-A-1
 Misc. Info.: 500
 Operator ID: RG Instrument ID: ATMS9
 Method: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\TO15_ATMS9N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 26-Feb-2018 11:17:19 Calib Date: 09-Feb-2018 00:05:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS9\20180208-53859.b\MS9020812.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK007

First Level Reviewer: phanthasena

Date: 26-Feb-2018 11:17:19

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	12.312	12.312	0.000	94	73992	4.00	
* 2 1,4-Difluorobenzene	114	14.405	14.405	0.000	99	305569	4.00	
* 3 Chlorobenzene-d5 (IS)	117	20.324	20.324	0.000	98	192153	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	13.480	13.480	0.000	97	119516	4.02	
\$ 5 Toluene-d8 (Surr)	100	17.562	17.569	-0.007	98	146869	3.78	
\$ 6 4-Bromofluorobenzene (Surr	174	22.253	22.259	-0.006	98	89197	3.53	
18 Chloromethane	50	4.793	4.763	0.030	36	1256	0.0621	
31 Acetone	43	7.689	7.634	0.055	95	13246	0.4284	
47 Methylene Chloride	49	8.881	8.899	-0.018	78	1106	0.0426	
48 Carbon disulfide	76	8.936	8.942	-0.006	99	5311	0.1177	
62 Tetrahydrofuran	42	12.586	12.513	0.073	25	804	0.0324	
85 Toluene	91	17.708	17.726	-0.019	75	1747	0.0199	
87 2-Hexanone	58	18.402	18.371	0.037	68	607	0.0176	
93 Tetrachloroethene	166	18.992	19.010	-0.018	85	1287	0.0332	
98 m-Xylene & p-Xylene	91	20.659	20.665	-0.006	0	5783	0.0667	
101 o-Xylene	91	21.359	21.365	-0.007	94	2695	0.0308	
107 N-Propylbenzene	91	22.533	22.539	-0.006	95	1753	0.0115	
110 4-Ethyltoluene	120	22.709	22.697	0.006	90	386	0.0103	
111 1,3,5-Trimethylbenzene	120	22.770	22.770	0.000	86	639	0.0122	
114 tert-Butylbenzene	91	23.269	23.281	-0.012	22	1007	0.0133	
115 1,2,4-Trimethylbenzene	120	23.324	23.323	0.000	90	915	0.0178	
116 sec-Butylbenzene	105	23.579	23.579	0.000	88	1182	0.007750	
121 4-Isopropyltoluene	119	23.755	23.755	0.000	92	1223	0.009246	
117 1,3-Dichlorobenzene	146	23.853	23.853	0.000	66	733	0.0106	
120 1,4-Dichlorobenzene	146	23.981	23.987	-0.006	84	1046	0.0150	
123 n-Butylbenzene	92	24.291	24.297	-0.006	87	354	0.004893	
122 1,2-Dichlorobenzene	146	24.467	24.473	-0.006	85	568	0.008525	
126 1,2,4-Trichlorobenzene	180	26.694	26.700	-0.006	37	930	0.0460	
127 Naphthalene	128	27.065	27.065	0.000	97	5089	0.0289	
S 155 Xylenes, Total	91				0		0.0975	

Reagents:

VAMSIS20_00109

Amount Added: 50.00

Units: mL

Run Reagent

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D

Injection Date: 24-Feb-2018 03:41:30

Instrument ID: ATMS9

Operator ID: RG

Lims ID: 320-36031-A-1

Lab Sample ID: 320-36031-1

Worklist Smp#: 34

Client ID: 34000536

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

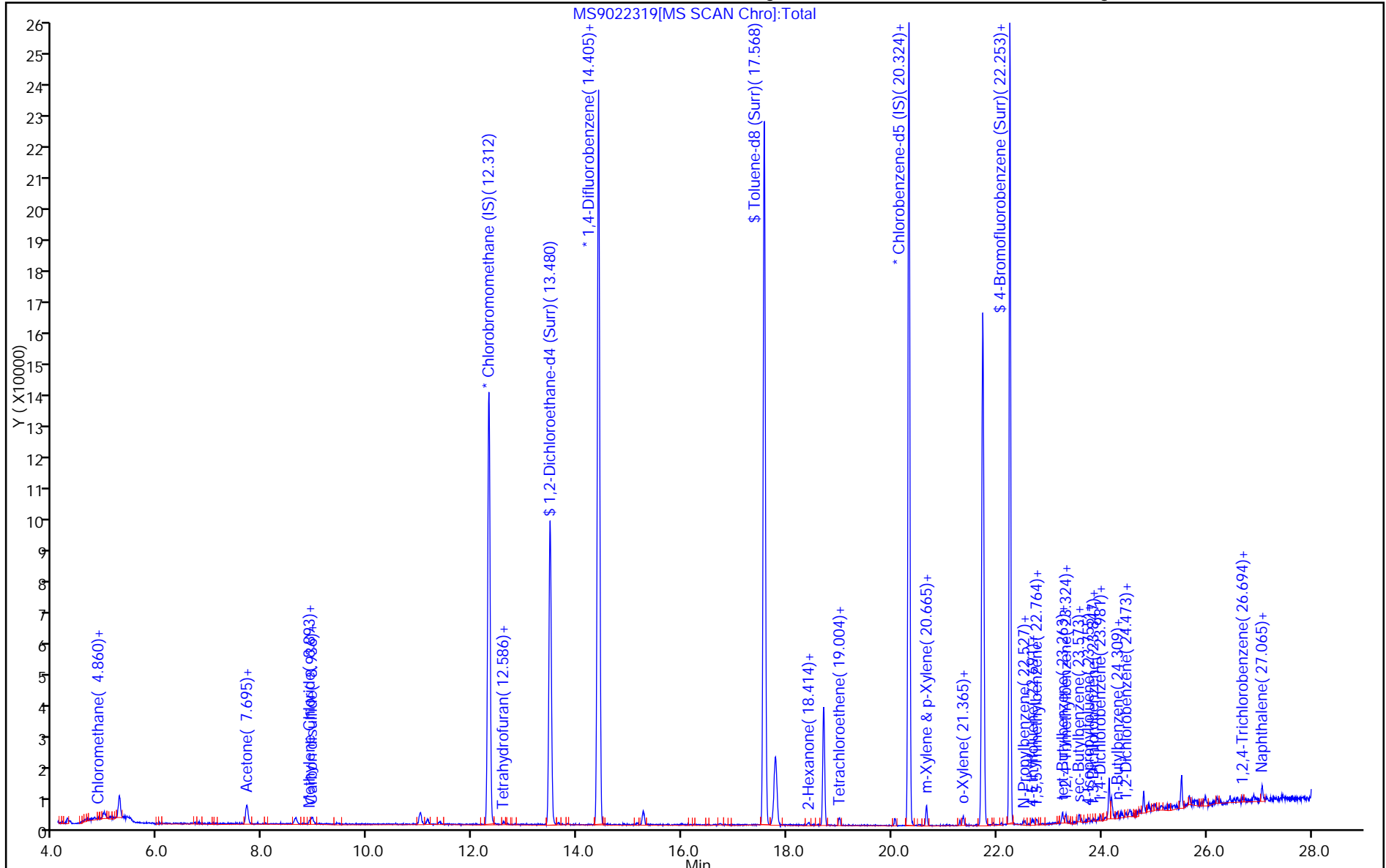
ALS Bottle#: 14

Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Y Scaling: Method Defined: Scale to the Nth Largest Peak: 2



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D

Injection Date: 24-Feb-2018 03:41:30

Instrument ID: ATMS9

Lims ID: 320-36031-A-1

Lab Sample ID: 320-36031-1

Client ID: 34000536

Operator ID: RG

ALS Bottle#: 14

Worklist Smp#: 34

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

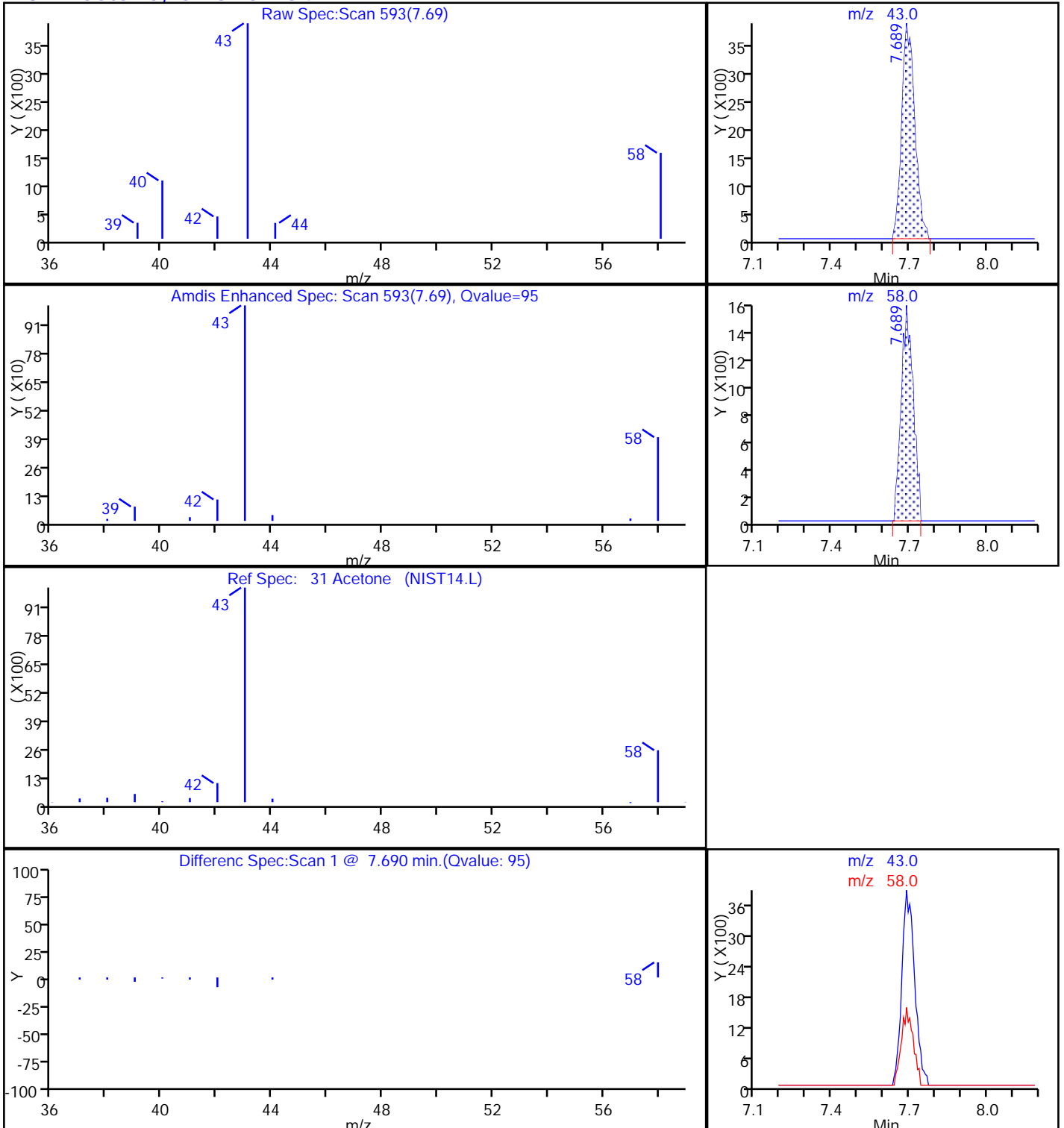
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

31 Acetone, CAS: 67-64-1



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D

Injection Date: 24-Feb-2018 03:41:30

Instrument ID: ATMS9

Lims ID: 320-36031-A-1

Lab Sample ID: 320-36031-1

Client ID: 34000536

Operator ID: RG

ALS Bottle#: 14 Worklist Smp#: 34

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

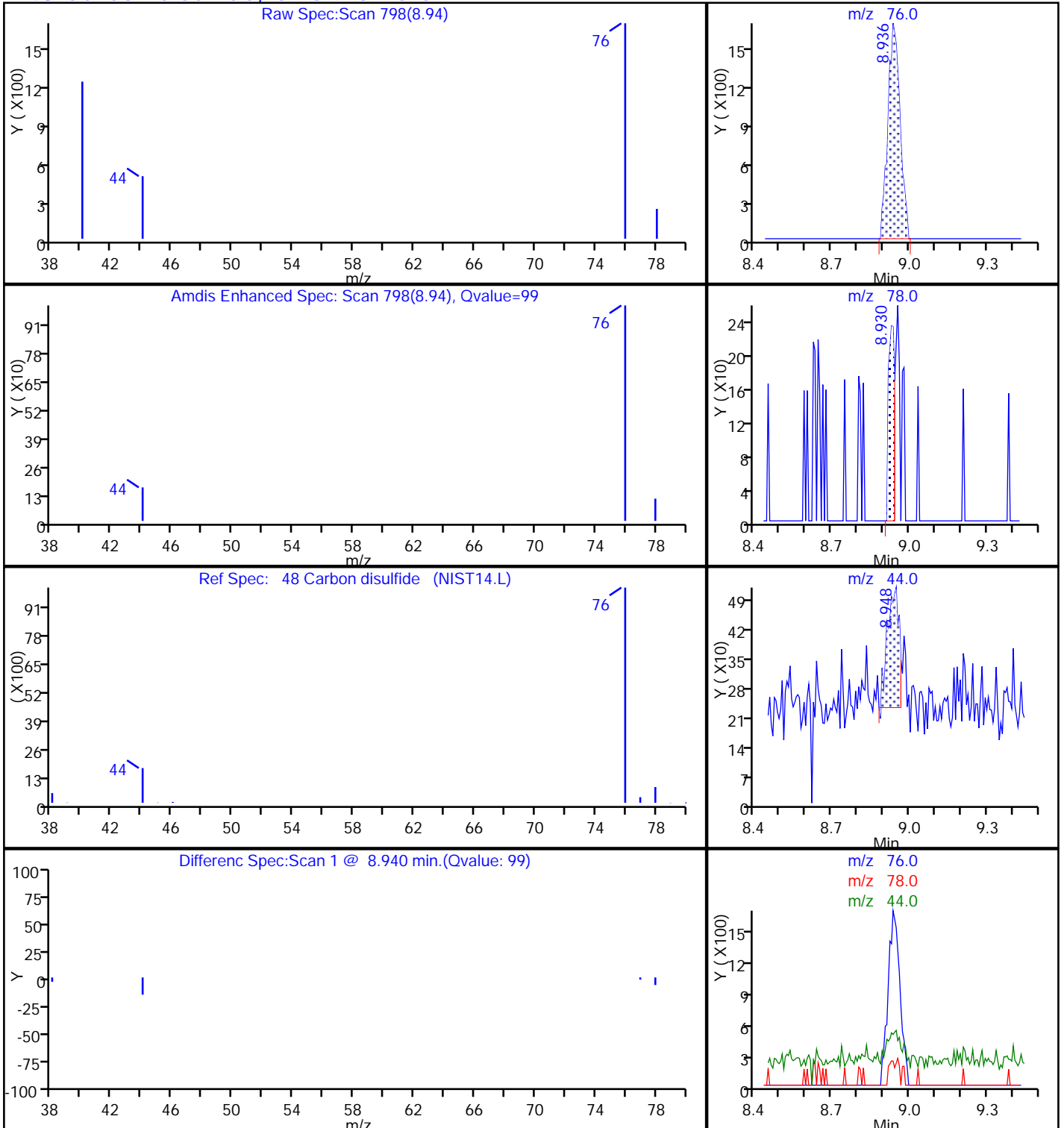
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

48 Carbon disulfide, CAS: 75-15-0

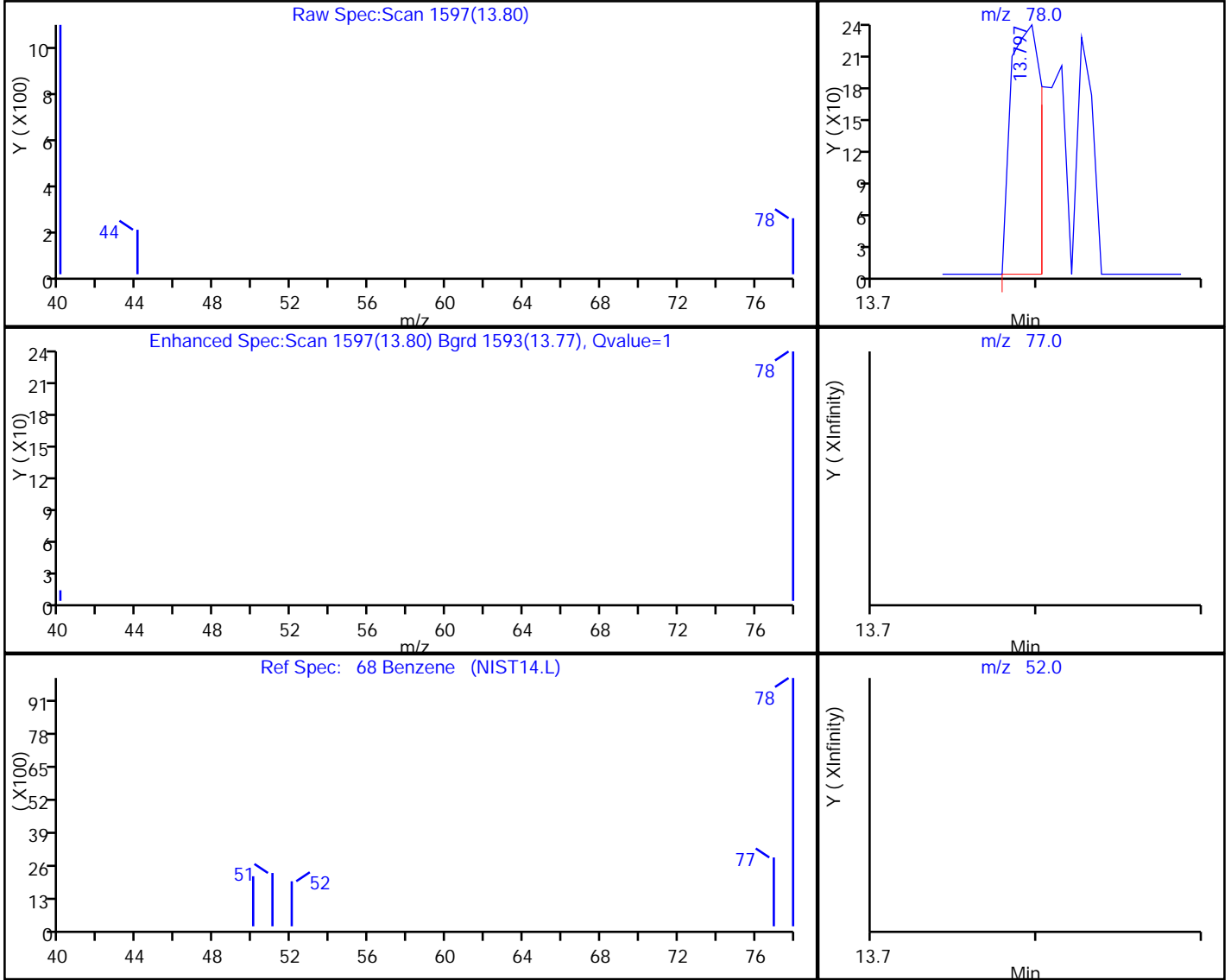


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

68 Benzene, CAS: 71-43-2

Processing Results



RT	Mass	Response	Amount
13.80	78.00	310	0.004506
13.81	77.00	0	
13.81	52.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

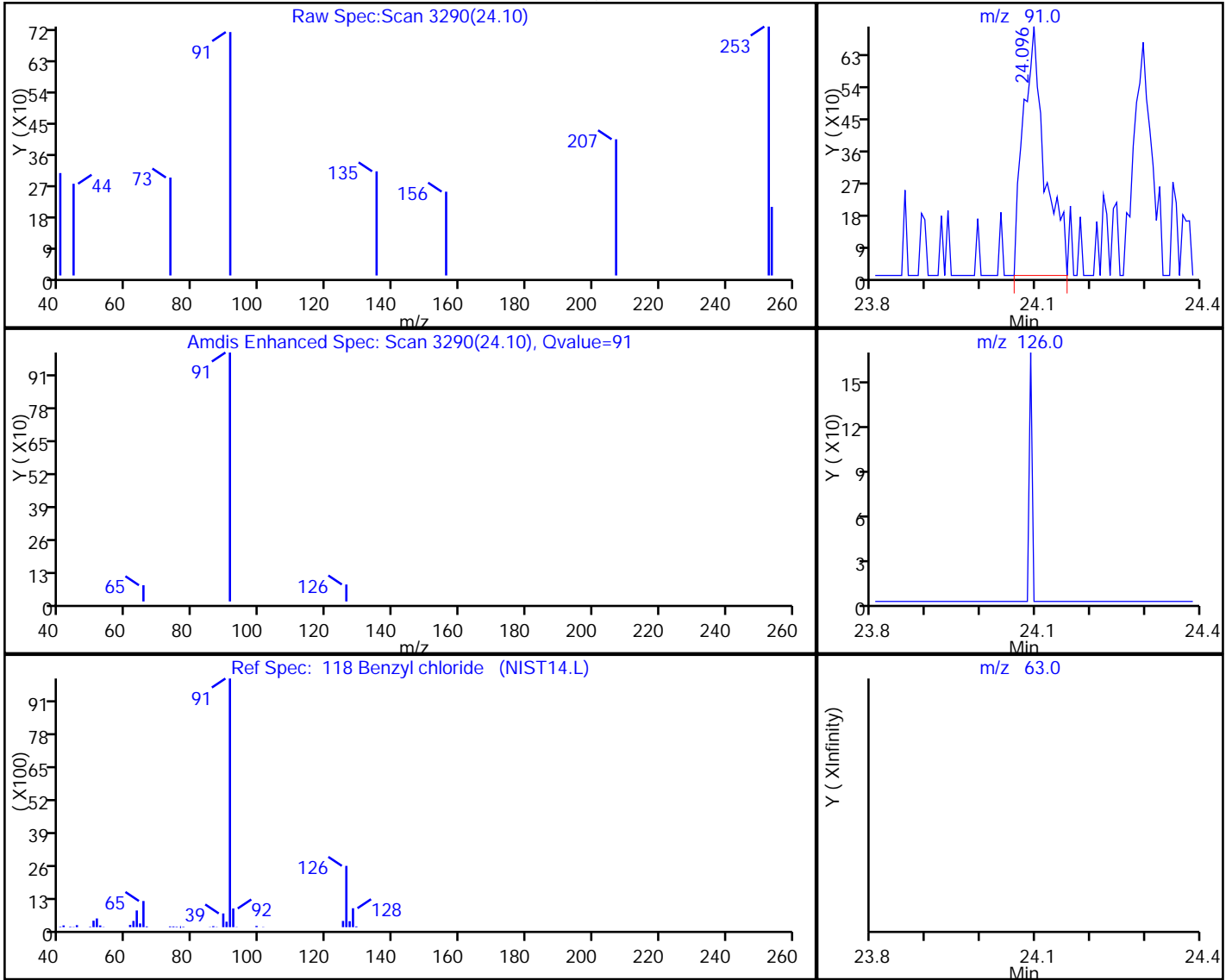
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

118 Benzyl chloride, CAS: 100-44-7

Processing Results



RT	Mass	Response	Amount
24.10	91.00	1956	0.014991
24.10	126.00	0	
24.10	63.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

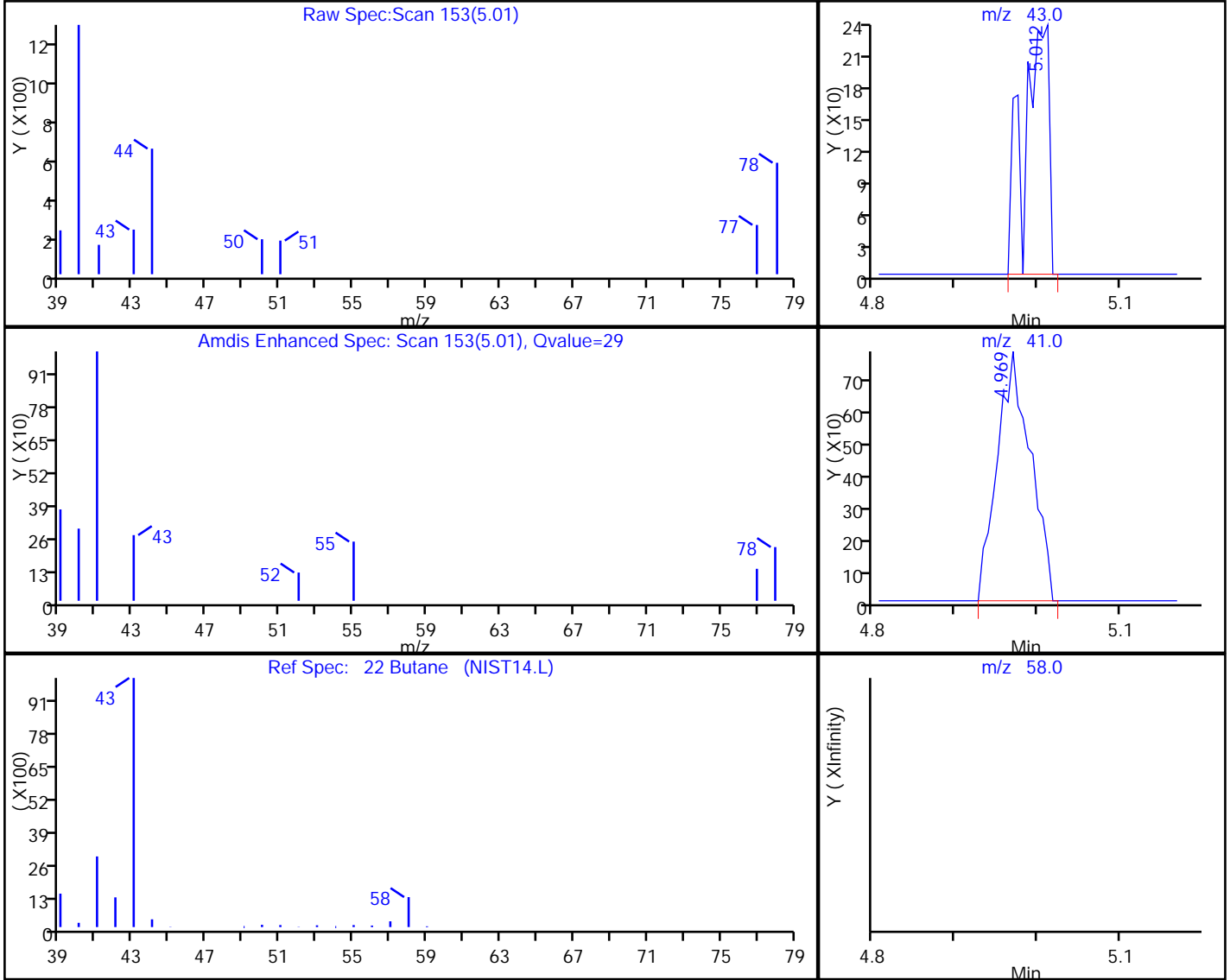
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
Client ID: 34000536
Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
Purge Vol: 5.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

22 Butane, CAS: 106-97-8

Processing Results



RT	Mass	Response	Amount
5.01	43.00	495	0.013432
4.97	41.00	2209	
4.99	58.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

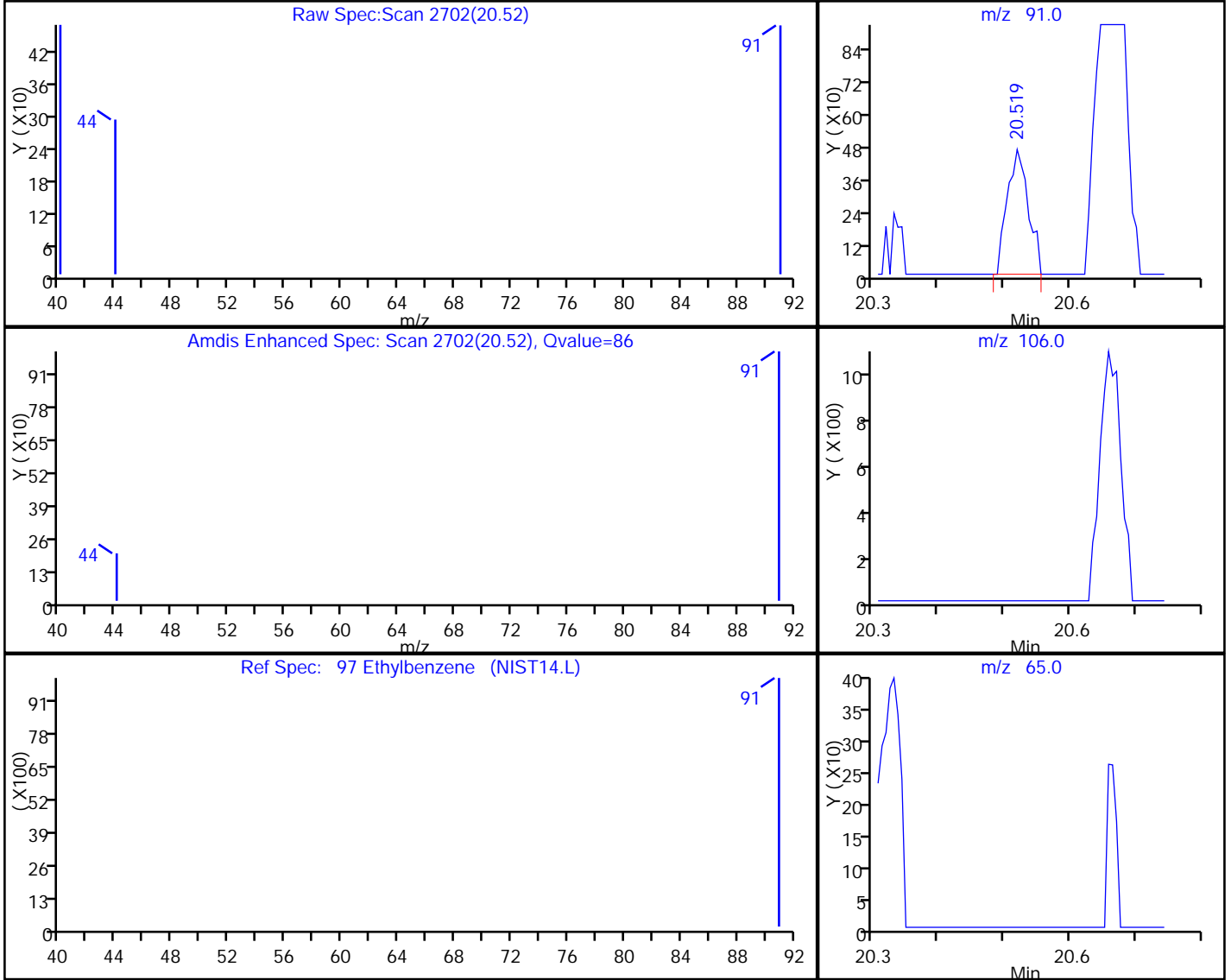
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
Client ID: 34000536
Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
Purge Vol: 5.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector MS SCAN

97 Ethylbenzene, CAS: 100-41-4

Processing Results



RT	Mass	Response	Amount
20.52	91.00	1041	0.009498
20.53	106.00	0	
20.53	65.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

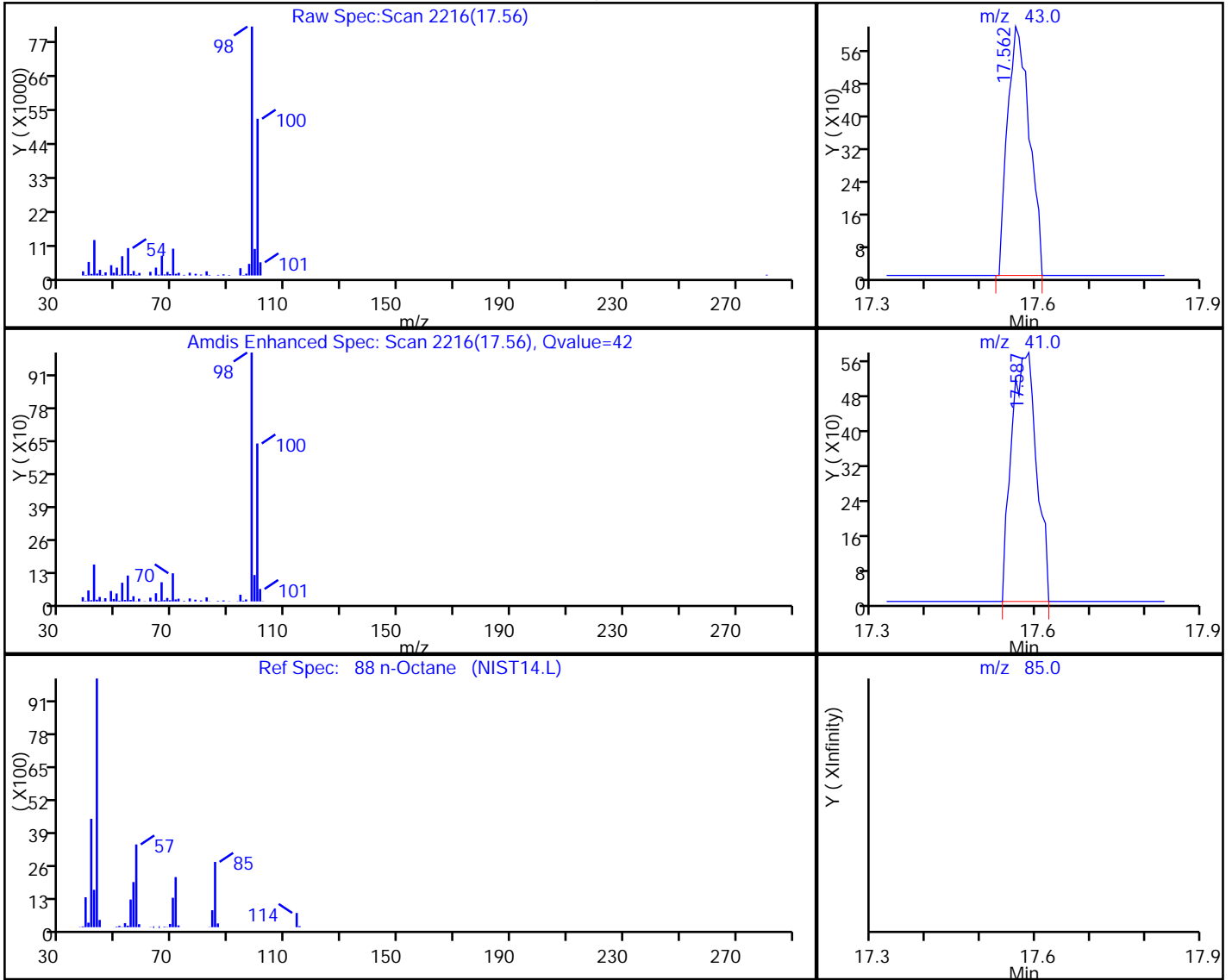
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

88 n-Octane, CAS: 111-65-9

Processing Results



RT	Mass	Response	Amount
17.56	43.00	1719	0.031107
17.59	41.00	1808	
17.58	85.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

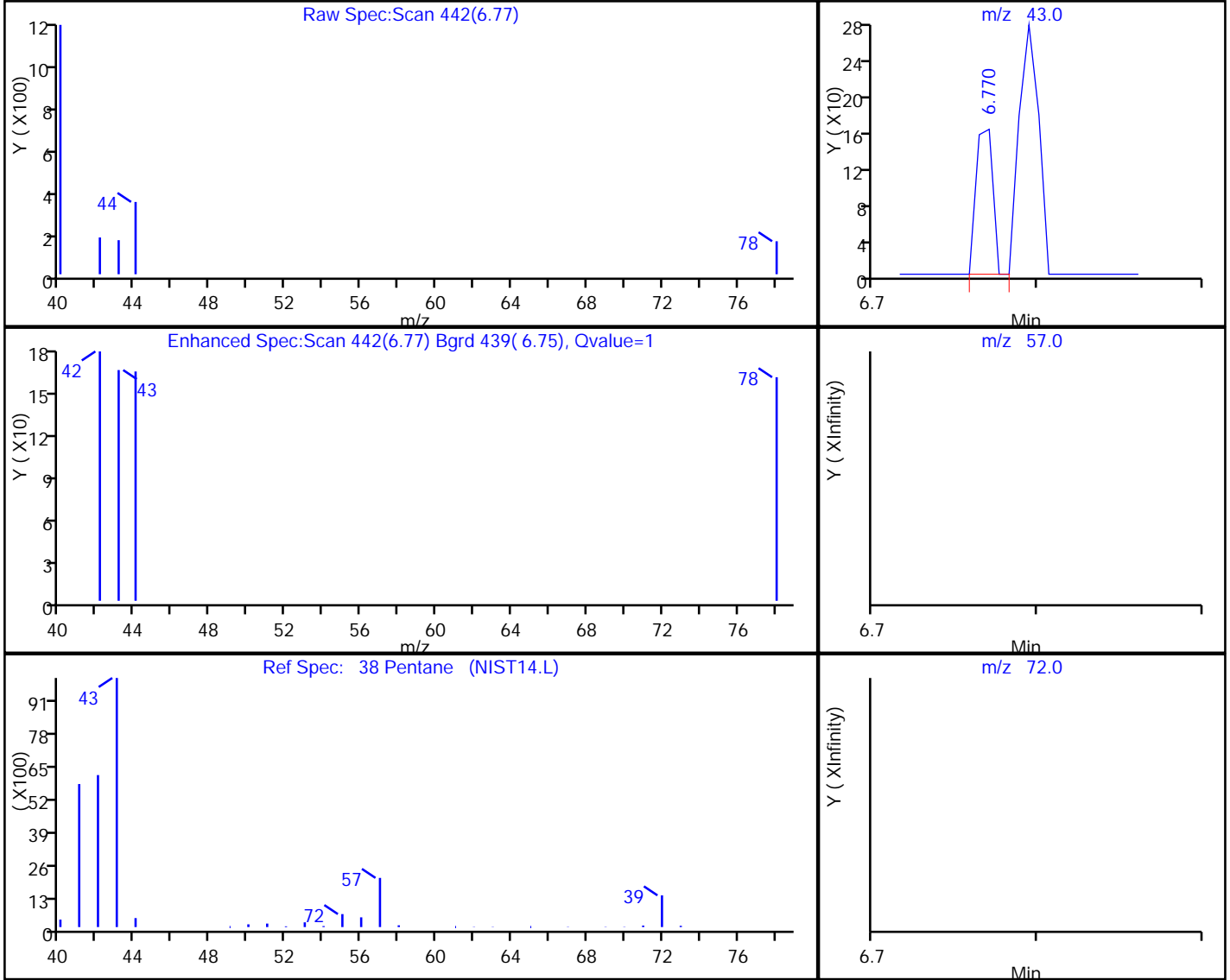


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

38 Pentane, CAS: 109-66-0

Processing Results



RT	Mass	Response	Amount
6.77	43.00	115	0.003164
6.79	57.00	0	
6.79	72.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-44380-1
Client Project/Site: Chevron Edmonds Terminal

For:
ARCADIS U.S. Inc
1100 Olive Way
Suite 800
Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by:
10/29/2018 1:51:57 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

LINKS

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www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
X	Surrogate is outside control limits
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Job ID: 320-44380-1

Laboratory: TestAmerica Sacramento

Narrative

Job Narrative 320-44380-1

Receipt

Two samples were received on 10/20/2018 9:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice.

Receipt Exceptions

The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. Canister IDs and time stop not listed on COC.

Canister ID for sample 1 is 34000801.

Canister ID for sample 2 is 34000536.

Air - GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA

Method(s) TO-15: 1,2-Dichloroethane-d4 (Surrogate) recovery for the following sample was outside control limits: VSP-801 (320-44380-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Client Sample ID: VSP-801

Lab Sample ID: 320-44380-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	640		9.1	1.8	ppb v/v	22.8		TO-15	Total/NA
Ethylbenzene	99	B	9.1	1.4	ppb v/v	22.8		TO-15	Total/NA
Toluene	4.3	J B	9.1	1.2	ppb v/v	22.8		TO-15	Total/NA
m,p-Xylene	110	B	18	2.3	ppb v/v	22.8		TO-15	Total/NA
o-Xylene	12	B	9.1	1.2	ppb v/v	22.8		TO-15	Total/NA
TPH (as Gasoline)	38000		2300	910	ppb v/v	22.8		TO-15	Total/NA
Carbon Dioxide (TCD)	2.2		1.1	0.024	% v/v	2.28		D1946	Total/NA
Methane (FID)	0.0015		0.00023	0.000046	% v/v	2.28		D1946	Total/NA
Oxygen	16		0.46	0.017	% v/v	2.28		D1946	Total/NA

Client Sample ID: VSP-802

Lab Sample ID: 320-44380-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.34	J	0.40	0.079	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	0.33	J B	0.40	0.063	ppb v/v	1		TO-15	Total/NA
Toluene	1.1	B	0.40	0.051	ppb v/v	1		TO-15	Total/NA
m,p-Xylene	0.97	B	0.80	0.10	ppb v/v	1		TO-15	Total/NA
o-Xylene	0.36	J B	0.40	0.054	ppb v/v	1		TO-15	Total/NA
TPH (as Gasoline)	70	J	100	40	ppb v/v	1		TO-15	Total/NA
Carbon Dioxide (TCD)	2.0		0.83	0.018	% v/v	1.66		D1946	Total/NA
Methane (FID)	0.0017		0.00017	0.000033	% v/v	1.66		D1946	Total/NA
Oxygen	16		0.33	0.012	% v/v	1.66		D1946	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Client Sample ID: VSP-801

Lab Sample ID: 320-44380-1

Date Collected: 10/18/18 15:45

Matrix: Air

Date Received: 10/20/18 09:25

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	640		9.1	1.8	ppb v/v			10/26/18 05:08	22.8
Ethylbenzene	99	B	9.1	1.4	ppb v/v			10/26/18 05:08	22.8
Toluene	4.3	J B	9.1	1.2	ppb v/v			10/26/18 05:08	22.8
m,p-Xylene	110	B	18	2.3	ppb v/v			10/26/18 05:08	22.8
o-Xylene	12	B	9.1	1.2	ppb v/v			10/26/18 05:08	22.8
TPH (as Gasoline)	38000		2300	910	ppb v/v			10/26/18 05:08	22.8

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		70 - 130		10/26/18 05:08	22.8
1,2-Dichloroethane-d4 (Surr)	134	X	70 - 130		10/26/18 05:08	22.8
Toluene-d8 (Surr)	101		70 - 130		10/26/18 05:08	22.8

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	2.2		1.1	0.024	% v/v			10/24/18 11:00	2.28
Methane (FID)	0.0015		0.00023	0.000046	% v/v			10/24/18 14:40	2.28
Oxygen	16		0.46	0.017	% v/v			10/24/18 11:00	2.28

Client Sample ID: VSP-802

Lab Sample ID: 320-44380-2

Date Collected: 10/18/18 15:30

Matrix: Air

Date Received: 10/20/18 09:25

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.34	J	0.40	0.079	ppb v/v			10/26/18 06:05	1
Ethylbenzene	0.33	J B	0.40	0.063	ppb v/v			10/26/18 06:05	1
Toluene	1.1	B	0.40	0.051	ppb v/v			10/26/18 06:05	1
m,p-Xylene	0.97	B	0.80	0.10	ppb v/v			10/26/18 06:05	1
o-Xylene	0.36	J B	0.40	0.054	ppb v/v			10/26/18 06:05	1
TPH (as Gasoline)	70	J	100	40	ppb v/v			10/26/18 06:05	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		10/26/18 06:05	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 130		10/26/18 06:05	1
Toluene-d8 (Surr)	97		70 - 130		10/26/18 06:05	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	2.0		0.83	0.018	% v/v			10/24/18 11:10	1.66
Methane (FID)	0.0017		0.00017	0.000033	% v/v			10/24/18 14:27	1.66
Oxygen	16		0.33	0.012	% v/v			10/24/18 11:10	1.66

TestAmerica Sacramento

Surrogate Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Matrix: Air

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB (70-130)	DCA (70-130)	TOL (70-130)
320-44380-1	VSP-801	104	134 X	101
320-44380-2	VSP-802	98	99	97
LCS 320-254908/4	Lab Control Sample	110	115	103
LCS 320-254908/6	Lab Control Sample	116	103	100
LCSD 320-254908/5	Lab Control Sample Dup	108	109	102
LCSD 320-254908/7	Lab Control Sample Dup	114	106	100
MB 320-254908/16	Method Blank	99	101	95

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

DCA = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 320-254908/16

Matrix: Air

Analysis Batch: 254908

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40	0.079	ppb v/v			10/26/18 02:31	1
Ethylbenzene	0.0631	J	0.40	0.063	ppb v/v			10/26/18 02:31	1
Toluene	0.0554	J	0.40	0.051	ppb v/v			10/26/18 02:31	1
m,p-Xylene	0.258	J	0.80	0.10	ppb v/v			10/26/18 02:31	1
o-Xylene	0.132	J	0.40	0.054	ppb v/v			10/26/18 02:31	1
TPH (as Gasoline)	ND		100	40	ppb v/v			10/26/18 02:31	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		70 - 130		10/26/18 02:31	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		10/26/18 02:31	1
Toluene-d8 (Surr)	95		70 - 130		10/26/18 02:31	1

Lab Sample ID: LCS 320-254908/4

Matrix: Air

Analysis Batch: 254908

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
TPH (as Gasoline)	2000	1640		ppb v/v		82	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	110		70 - 130
1,2-Dichloroethane-d4 (Surr)	115		70 - 130
Toluene-d8 (Surr)	103		70 - 130

Lab Sample ID: LCS 320-254908/6

Matrix: Air

Analysis Batch: 254908

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	21.2		ppb v/v		106	68 - 128
Ethylbenzene	20.0	20.0		ppb v/v		100	64 - 124
Toluene	20.0	21.6		ppb v/v		108	68 - 128
m,p-Xylene	40.0	40.6		ppb v/v		101	65 - 125
o-Xylene	20.0	19.8		ppb v/v		99	65 - 125

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	116		70 - 130
1,2-Dichloroethane-d4 (Surr)	103		70 - 130
Toluene-d8 (Surr)	100		70 - 130

Lab Sample ID: LCSD 320-254908/5

Matrix: Air

Analysis Batch: 254908

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
TPH (as Gasoline)	2000	1690		ppb v/v		84	70 - 130	3	25

TestAmerica Sacramento

QC Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCSD 320-254908/5
Matrix: Air
Analysis Batch: 254908

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCS D %Recovery	LCS D Qualifier	Limits
4-Bromofluorobenzene (Surr)	108		70 - 130
1,2-Dichloroethane-d4 (Surr)	109		70 - 130
Toluene-d8 (Surr)	102		70 - 130

Lab Sample ID: LCSD 320-254908/7
Matrix: Air
Analysis Batch: 254908

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCS D Result	LCS D Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	21.8		ppb v/v		109	68 - 128	2	25
Ethylbenzene	20.0	21.0		ppb v/v		105	64 - 124	5	25
Toluene	20.0	22.1		ppb v/v		111	68 - 128	2	25
m,p-Xylene	40.0	41.8		ppb v/v		105	65 - 125	3	25
o-Xylene	20.0	20.6		ppb v/v		103	65 - 125	4	25

Surrogate	LCS D %Recovery	LCS D Qualifier	Limits
4-Bromofluorobenzene (Surr)	114		70 - 130
1,2-Dichloroethane-d4 (Surr)	106		70 - 130
Toluene-d8 (Surr)	100		70 - 130

Method: D1946 - Fixed Gases in Air (GC)

Lab Sample ID: MB 320-254492/11
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		0.50	0.011	% v/v			10/24/18 10:08	1
Methane (TCD)	ND		0.50	0.14	% v/v			10/24/18 10:08	1
Oxygen	ND		0.20	0.0074	% v/v			10/24/18 10:08	1

Lab Sample ID: LCS 320-254492/2
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon Dioxide (TCD)	23.9	24.5		% v/v		102	80 - 120
Methane (TCD)	25.6	24.3		% v/v		95	80 - 120

Lab Sample ID: LCS 320-254492/5
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Oxygen	16.2	14.1		% v/v		87	80 - 120

QC Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method: D1946 - Fixed Gases in Air (GC) (Continued)

Lab Sample ID: LCSD 320-254492/3
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon Dioxide (TCD)	23.9	24.5		% v/v		102	80 - 120	0	20
Methane (TCD)	25.6	24.4		% v/v		95	80 - 120	0	20

Lab Sample ID: LCSD 320-254492/6
Matrix: Air
Analysis Batch: 254492

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Oxygen	16.2	14.2		% v/v		88	80 - 120	1	20

Lab Sample ID: MB 320-254625/5
Matrix: Air
Analysis Batch: 254625

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.00010	0.000020	% v/v			10/24/18 13:58	1

Lab Sample ID: LCS 320-254625/2
Matrix: Air
Analysis Batch: 254625

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0218		% v/v		87	80 - 120		

Lab Sample ID: LCSD 320-254625/3
Matrix: Air
Analysis Batch: 254625

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	0.0250	0.0248		% v/v		99	80 - 120	13	20

QC Association Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Air - GC/MS VOA

Analysis Batch: 254908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44380-1	VSP-801	Total/NA	Air	TO-15	
320-44380-2	VSP-802	Total/NA	Air	TO-15	
MB 320-254908/16	Method Blank	Total/NA	Air	TO-15	
LCS 320-254908/4	Lab Control Sample	Total/NA	Air	TO-15	
LCS 320-254908/6	Lab Control Sample	Total/NA	Air	TO-15	
LCSD 320-254908/5	Lab Control Sample Dup	Total/NA	Air	TO-15	
LCSD 320-254908/7	Lab Control Sample Dup	Total/NA	Air	TO-15	

Air - GC VOA

Analysis Batch: 254492

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44380-1	VSP-801	Total/NA	Air	D1946	
320-44380-2	VSP-802	Total/NA	Air	D1946	
MB 320-254492/11	Method Blank	Total/NA	Air	D1946	
LCS 320-254492/2	Lab Control Sample	Total/NA	Air	D1946	
LCS 320-254492/5	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-254492/3	Lab Control Sample Dup	Total/NA	Air	D1946	
LCSD 320-254492/6	Lab Control Sample Dup	Total/NA	Air	D1946	

Analysis Batch: 254625

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-44380-1	VSP-801	Total/NA	Air	D1946	
320-44380-2	VSP-802	Total/NA	Air	D1946	
MB 320-254625/5	Method Blank	Total/NA	Air	D1946	
LCS 320-254625/2	Lab Control Sample	Total/NA	Air	D1946	
LCSD 320-254625/3	Lab Control Sample Dup	Total/NA	Air	D1946	

Lab Chronicle

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Client Sample ID: VSP-801

Date Collected: 10/18/18 15:45

Date Received: 10/20/18 09:25

Lab Sample ID: 320-44380-1

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		22.8	25 mL	250 mL	254908	10/26/18 05:08	AP1	TAL SAC
Total/NA	Analysis	D1946		2.28	50 mL	50 mL	254625	10/24/18 14:40	NS1	TAL SAC
Total/NA	Analysis	D1946		2.28	50 mL	50 mL	254492	10/24/18 11:00	NS1	TAL SAC

Client Sample ID: VSP-802

Date Collected: 10/18/18 15:30

Date Received: 10/20/18 09:25

Lab Sample ID: 320-44380-2

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	415 mL	250 mL	254908	10/26/18 06:05	AP1	TAL SAC
Total/NA	Analysis	D1946		1.66	50 mL	50 mL	254625	10/24/18 14:27	NS1	TAL SAC
Total/NA	Analysis	D1946		1.66	50 mL	50 mL	254492	10/24/18 11:10	NS1	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18 *
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL SAC
D1946	Fixed Gases in Air (GC)	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600



Sample Summary

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-44380-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-44380-1	VSP-801	Air	10/18/18 15:45	10/20/18 09:25
320-44380-2	VSP-802	Air	10/18/18 15:30	10/20/18 09:25

- 1
- 2
- 3
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- 9
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- 13
- 14
- 15
- 16

TestAmerica Sacramento
880 Riverside Parkway

West Sacramento, CA 95605
phone 916.374.4378 fax 916.372.1059


Canister Samples Chain of Custody Record

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact Information		Project Manager:		Samples Collected By:		COC No.:																
Company Name: <u>ARCADUS</u>		Phone: _____		Jason Little		_____ of _____ COCs																
Address: <u>1100 OLINGWAY, SUITE 800</u>		Email: _____																				
City/State/Zip: <u>SCAGLE, WA 98101</u>		Site Contact: _____																				
Phone: _____		TA Contact: _____																				
FAX: _____		Analysis Turnaround Time																				
Project Name: <u>EDWARDS TERMINAL</u>		Standard (Specific): <u>STAT</u>																				
Site/Location: <u>1720 UNIVERSITY, EDWARDS WA</u>		Rush (Specify): _____																				
P O # _____																						
Sample Identification	Sample Date(s)	Time Start	Time Stop	Canister Vacuum in Field, 'Hg (Start)	Canister in Vacuum in Field, 'Hg (Stop)	Flow Controller ID	Canister ID	TO-15 (Med / Sid / Low / SIM)	MA-APH	EPA 3C	EPA 25C / 25.3	ASTM D-1946 / 1945 / 3588	EPA 15/16 BTEX, TRH-6	TO-3	Other (Please specify in notes section)					Sample Specific Notes:		
															Landfill Gas	Soil Gas	Ambient Air	Indoor Air	Sample Type			
<u>VSP-801</u>	<u>10/18/18</u>	<u>1545</u>											<u>XXX</u>	<u>XXX</u>							<u>EPA TO-15 for BTEX</u>	
<u>VSP-802</u>	<u>10/18/18</u>	<u>1530</u>											<u>XXX</u>									<u>TPH-6</u>
																						<u>Other: Fixed Gas (methane, O2, CO2)</u>



320-44380 Chain of Custody

Special Instructions/QC Requirements & Comments:	

Samples Shipped by: <u>Jason Little</u> Samples Relinquished by: <u>Jason Little</u> Relinquished by: <u>Jason Little</u> Lab Use Only: _____	Date / Time: Date / Time: <u>10/19/18 11:25</u> Date / Time: <u>10/19/18 1545</u> Opened by: _____ Shipper Name: _____	Samples Received by: Received by: _____ Received by: <u>Jason Little</u> Condition: _____
--	--	--

Form No. CA-C-WI-003, Rev. 1, dated 05/10/2013

NSH 10/20/18 9:25

① canister ID is 34000801

② canister ID is 34000536



Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 320-44380-1

Login Number: 44380

List Source: TestAmerica Sacramento

List Number: 1

Creator: Sharifi, Nooshin

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	478967
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Canister IDs not listed on COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Date Cleaned/Batch ID 1-24-18 320-35358
Date of QC 2/8/18
Data File Number 18020819



320-35358 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

*	34000801
	8522
	34000238
	34000641
	34001634
	34001203
	34001953
	34000931

	34000909
	7566
	34000974
	34001229
	34001940
	34001000
	34000773
	34001652

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

W for AP
1st level Reviewed By:

2/9/18
Date:

[Signature]
2nd level Reviewed By:

2/9/18
Date:

Date Cleaned/Batch ID 2-13-18 320-36031
 Date of QC 2/23/18
 Data File Number MS9022319



320-36031 Chain of Custody

(File ID for certification analysis of canister designated below)

CANISTER ID NUMBERS

*	34000536
	34002055
	34000753
	8937
	8967
	34000625
	34000732
	34000731

	34001056
	34001950
	34001190
	34001077
	34000951
	34001093
	8514
	34001946

The above canisters were cleaned as a batch. This certifies this batch contains no target analyte concentration greater than or equal to the method criteria for the "Certification Type" indicated above.

"*" INDICATES THE CAN OR CANS WHICH WERE SCREENED.

RA for AP
1st level Reviewed By:

2nd level Reviewed By:

2/26/18
Date:
3/5/18
Date:

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35358-1
 SDG No.: _____
 Client Sample ID: 34000801 Lab Sample ID: 320-35358-1
 Matrix: Air Lab File ID: 18020819.D
 Analysis Method: TO-15 Date Collected: 01/24/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 01:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	ND		5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	0.27	J	0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35358-1
 SDG No.: _____
 Client Sample ID: 34000801 Lab Sample ID: 320-35358-1
 Matrix: Air Lab File ID: 18020819.D
 Analysis Method: TO-15 Date Collected: 01/24/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 01:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35358-1
 SDG No.: _____
 Client Sample ID: 34000801 Lab Sample ID: 320-35358-1
 Matrix: Air Lab File ID: 18020819.D
 Analysis Method: TO-15 Date Collected: 01/24/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/09/2018 01:50
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 207546 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	97		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	100		70-130
2037-26-5	Toluene-d8 (Surr)	98		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
 Lims ID: 320-35358-A-1
 Client ID: 34000801
 Sample Type: Client
 Inject. Date: 09-Feb-2018 01:50:30 ALS Bottle#: 13 Worklist Smp#: 18
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Sample Info: 320-35385-A-1
 Misc. Info.: 500mL
 Operator ID: SV Instrument ID: ATMS2
 Method: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\TO15_ATMS2N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 09-Feb-2018 17:58:06 Calib Date: 06-Feb-2018 23:01:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS2\20180206-53757.b\18020612.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK008

First Level Reviewer: phanthasena

Date: 09-Feb-2018 17:58:06

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	11.386	11.380	0.006	98	56144	4.00	
* 2 1,4-Difluorobenzene	114	13.472	13.472	0.000	99	242149	4.00	
* 3 Chlorobenzene-d5 (IS)	117	19.532	19.532	0.000	99	227675	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	12.536	12.536	0.000	39	84932	4.00	
\$ 5 Toluene-d8 (Surr)	100	16.697	16.697	0.000	100	151453	3.91	
\$ 6 4-Bromofluorobenzene (Surr	95	21.551	21.551	0.000	99	162330	3.88	
10 Propene	41	3.933	3.927	0.006	90	942	0.0593	
18 Butane	43	4.560	4.560	0.000	85	559	0.0200	
32 Acetone	43	6.957	6.896	0.061	99	10139	-0.3448	
39 Methylene Chloride	49	8.095	8.088	0.007	89	1284	0.0657	
40 Carbon disulfide	76	8.131	8.131	0.000	99	8667	0.2661	
123 1,2,4-Trichlorobenzene	180	25.974	25.974	0.000	82	425	0.0139	

Reagents:

VAMSIS20_00106

Amount Added: 50.00

Units: mL

Run Reagent

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D

Injection Date: 09-Feb-2018 01:50:30

Instrument ID: ATMS2

Operator ID: SV

Lims ID: 320-35358-A-1

Lab Sample ID: 320-35358-1

Worklist Smp#: 18

Client ID: 34000801

Purge Vol: 250.000 mL

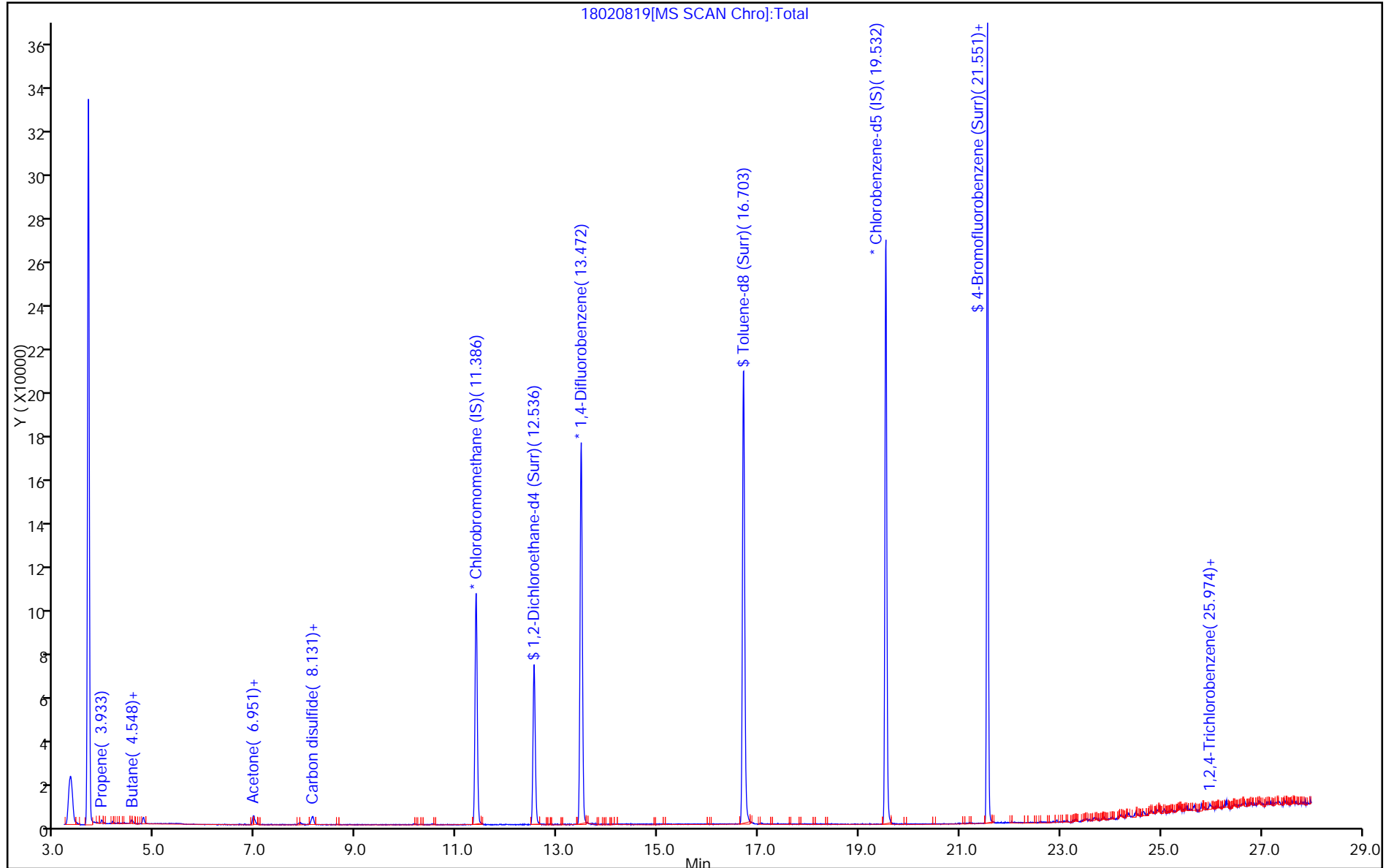
Dil. Factor: 1.0000

ALS Bottle#: 13

Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D

Injection Date: 09-Feb-2018 01:50:30

Instrument ID: ATMS2

Lims ID: 320-35358-A-1

Lab Sample ID: 320-35358-1

Client ID: 34000801

Operator ID: SV

ALS Bottle#: 13

Worklist Smp#: 18

Purge Vol: 250.000 mL

Dil. Factor: 1.0000

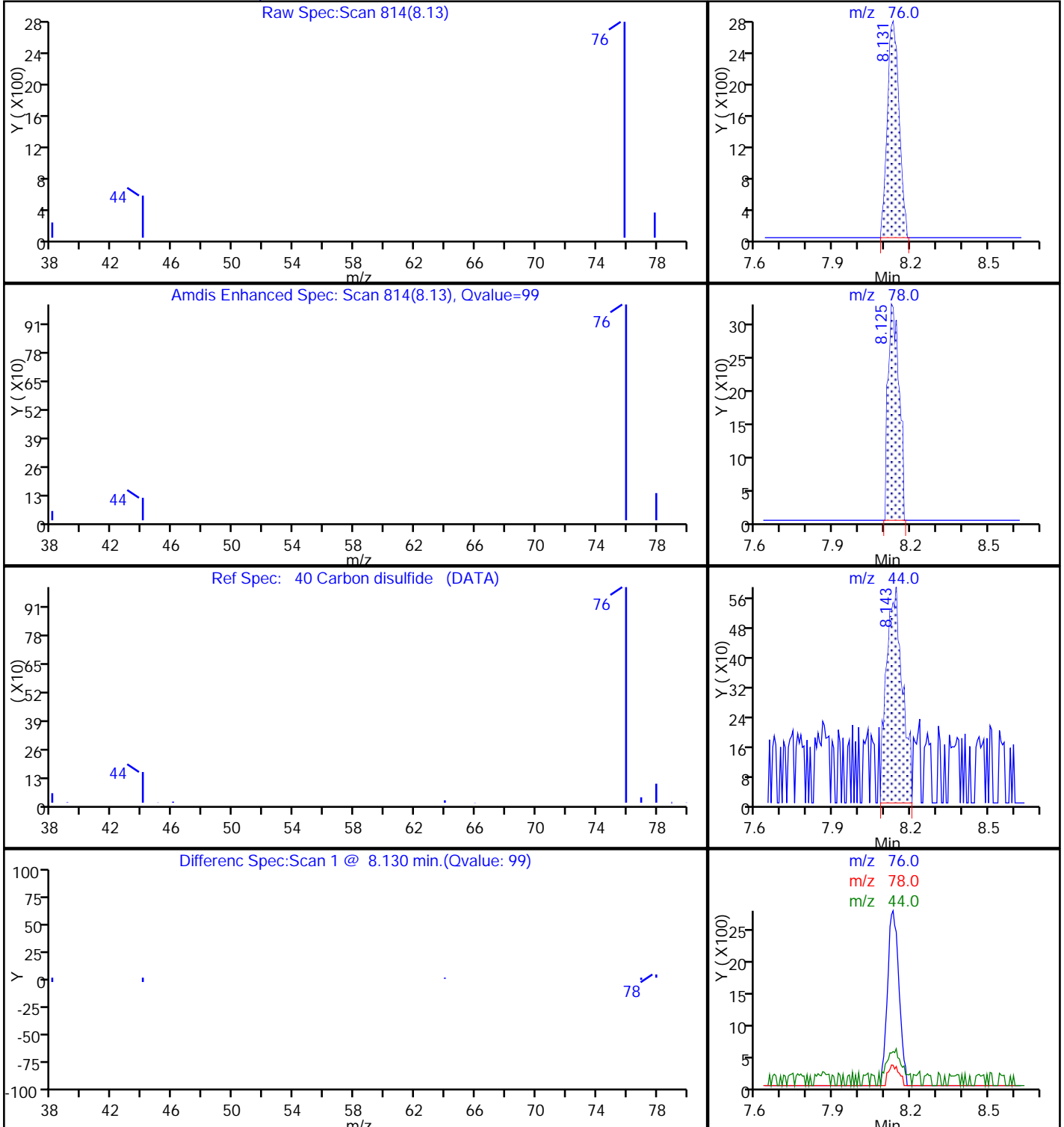
Method: TO15_ATMS2N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

40 Carbon disulfide, CAS: 75-15-0

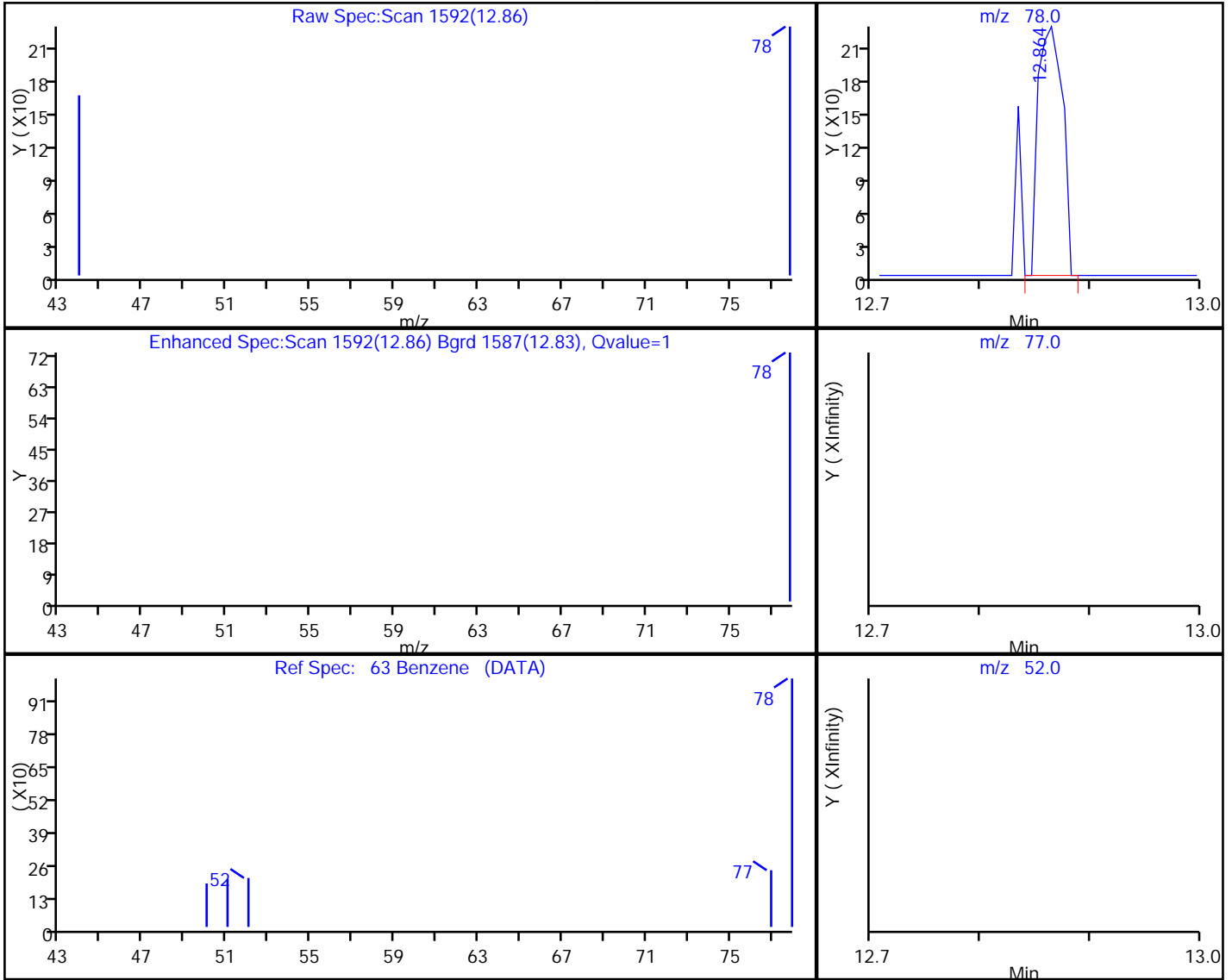


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
Injection Date: 09-Feb-2018 01:50:30 Instrument ID: ATMS2
Lims ID: 320-35358-A-1 Lab Sample ID: 320-35358-1
Client ID: 34000801
Operator ID: SV ALS Bottle#: 13 Worklist Smp#: 18
Purge Vol: 250.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

63 Benzene, CAS: 71-43-2

Processing Results



RT	Mass	Response	Amount
12.86	78.00	355	0.008029
12.85	77.00	0	
12.85	52.00	0	

Reviewer: phanhasena, 09-Feb-2018 17:58:06

Audit Action: Marked Compound Undetected

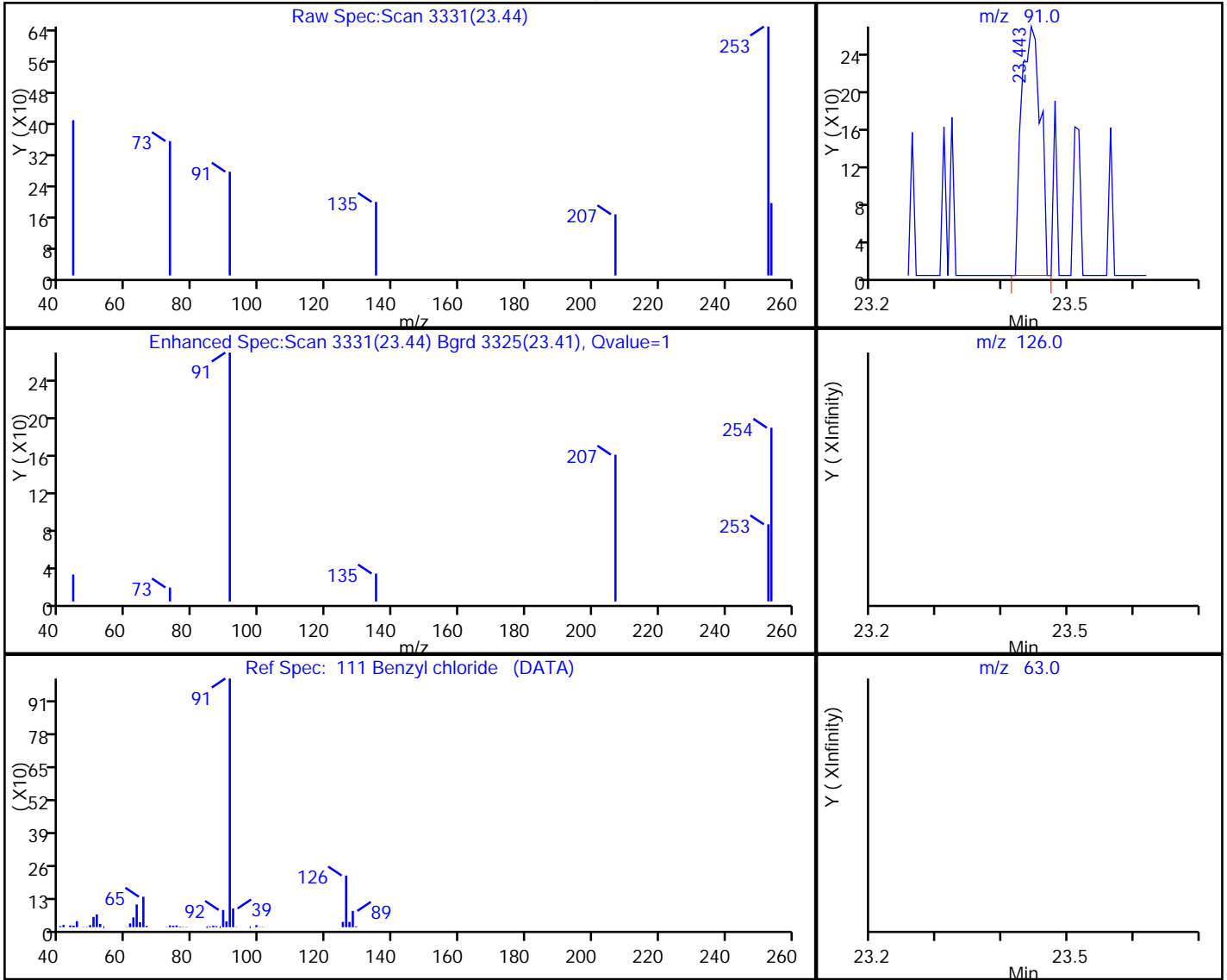
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
 Injection Date: 09-Feb-2018 01:50:30 Instrument ID: ATMS2
 Lims ID: 320-35358-A-1 Lab Sample ID: 320-35358-1
 Client ID: 34000801
 Operator ID: SV ALS Bottle#: 13 Worklist Smp#: 18
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

111 Benzyl chloride, CAS: 100-44-7

Processing Results



RT	Mass	Response	Amount
23.44	91.00	538	0.008091
23.44	126.00	0	
23.44	63.00	0	

Reviewer: phanhasena, 09-Feb-2018 17:58:06

Audit Action: Marked Compound Undetected

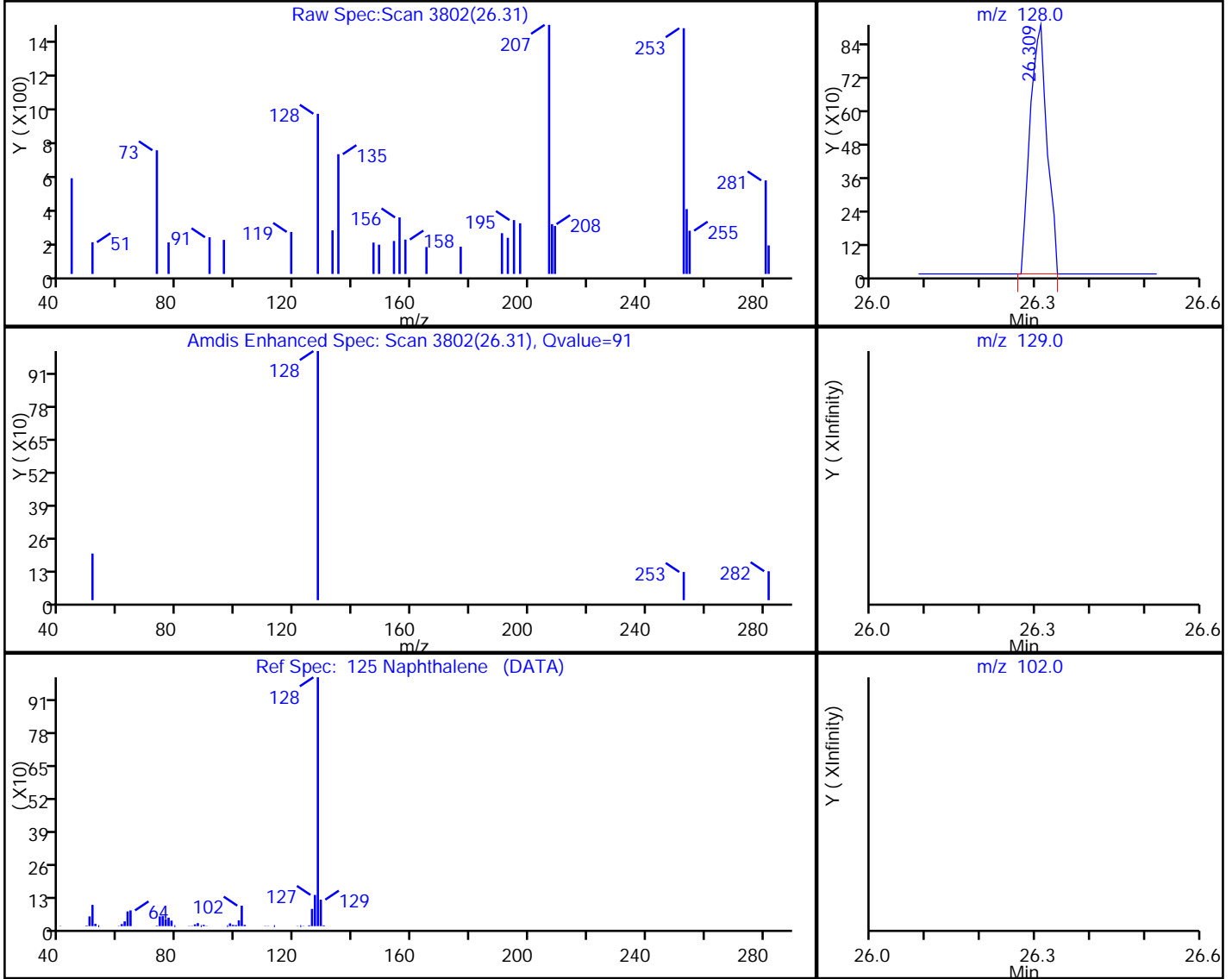
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
 Injection Date: 09-Feb-2018 01:50:30 Instrument ID: ATMS2
 Lims ID: 320-35358-A-1 Lab Sample ID: 320-35358-1
 Client ID: 34000801
 Operator ID: SV ALS Bottle#: 13 Worklist Smp#: 18
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

125 Naphthalene, CAS: 91-20-3

Processing Results



RT	Mass	Response	Amount
26.31	128.00	1941	0.026443
26.30	129.00	0	
26.30	102.00	0	

Reviewer: phanhasena, 09-Feb-2018 17:58:06

Audit Action: Marked Compound Undetected

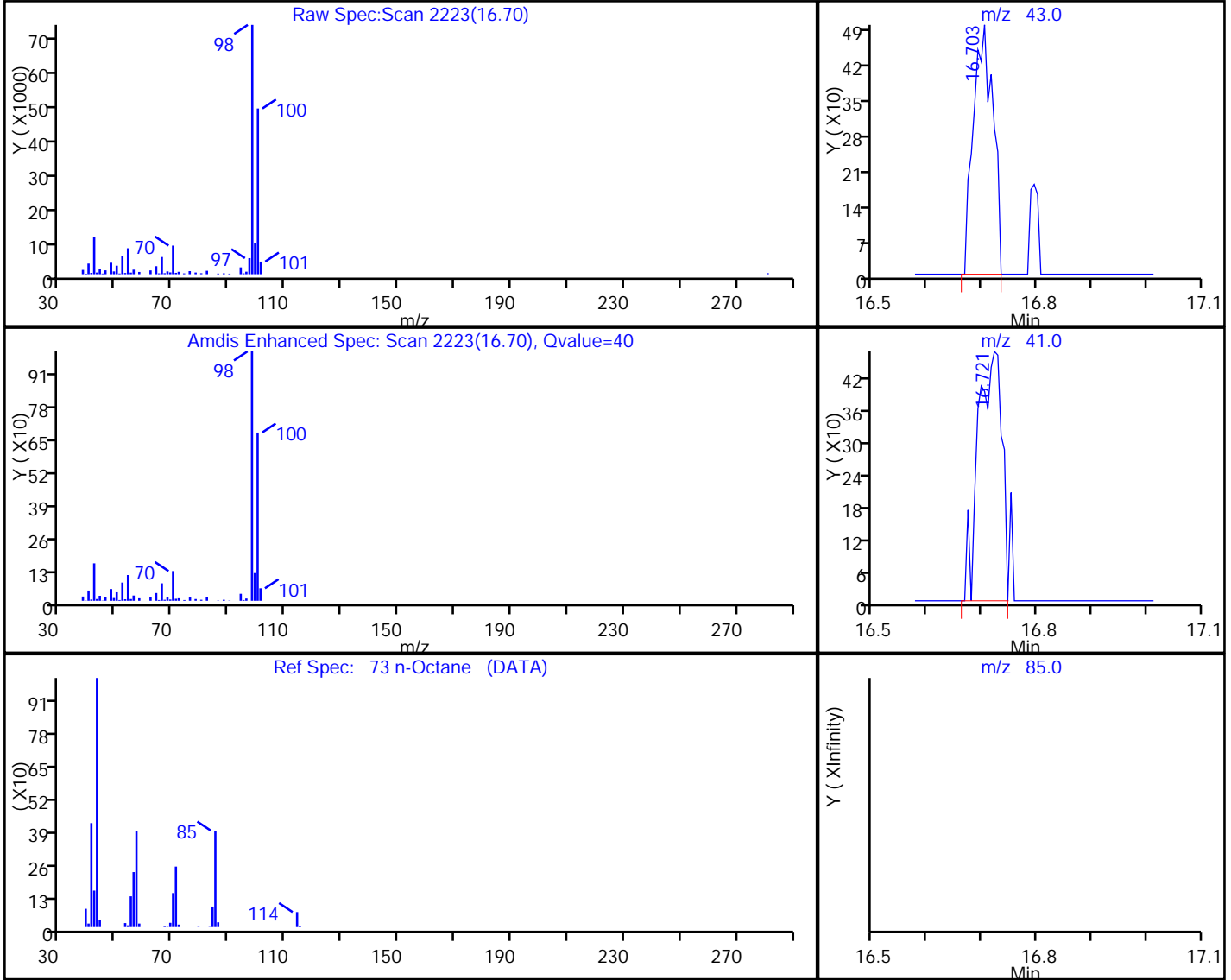
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS2\20180208-53836.b\18020819.D
 Injection Date: 09-Feb-2018 01:50:30 Instrument ID: ATMS2
 Lims ID: 320-35358-A-1 Lab Sample ID: 320-35358-1
 Client ID: 34000801
 Operator ID: SV ALS Bottle#: 13 Worklist Smp#: 18
 Purge Vol: 250.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS2N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

73 n-Octane, CAS: 111-65-9

Processing Results



RT	Mass	Response	Amount
16.70	43.00	1244	0.027068
16.72	41.00	1409	
16.79	85.00	0	

Reviewer: phanhasena, 09-Feb-2018 17:58:06

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID



FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-36031-1
 SDG No.: _____
 Client Sample ID: 34000536 Lab Sample ID: 320-36031-1
 Matrix: Air Lab File ID: MS9022319.D
 Analysis Method: TO-15 Date Collected: 02/13/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/24/2018 03:41
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 209817 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
67-64-1	Acetone	0.43	J	5.0	0.18
107-02-8	Acrolein	ND		2.0	0.22
107-13-1	Acrylonitrile	ND		2.0	0.19
107-05-1	Allyl chloride	ND		0.80	0.11
71-43-2	Benzene	ND		0.40	0.079
100-44-7	Benzyl chloride	ND		0.80	0.16
75-27-4	Bromodichloromethane	ND		0.30	0.066
75-25-2	Bromoform	ND		0.40	0.070
74-83-9	Bromomethane	ND		0.80	0.34
106-99-0	1,3-Butadiene	ND		0.80	0.15
106-97-8	n-Butane	ND		0.40	0.15
78-93-3	2-Butanone (MEK)	ND		0.80	0.20
75-65-0	tert-Butyl alcohol (TBA)	ND		2.0	0.11
104-51-8	n-Butylbenzene	ND		0.40	0.18
135-98-8	sec-Butylbenzene	ND		0.40	0.070
98-06-6	tert-Butylbenzene	ND		0.80	0.068
75-15-0	Carbon disulfide	0.12	J	0.80	0.078
56-23-5	Carbon tetrachloride	ND		0.80	0.064
108-90-7	Chlorobenzene	ND		0.30	0.064
75-45-6	Chlorodifluoromethane	ND		0.80	0.27
75-00-3	Chloroethane	ND		0.80	0.31
67-66-3	Chloroform	ND		0.30	0.095
74-87-3	Chloromethane	ND		0.80	0.20
95-49-8	2-Chlorotoluene	ND		0.40	0.080
110-82-7	Cyclohexane	ND		0.40	0.084
124-48-1	Dibromochloromethane	ND		0.40	0.079
106-93-4	1,2-Dibromoethane (EDB)	ND		0.80	0.075
74-95-3	Dibromomethane	ND		0.40	0.057
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.40	0.16
95-50-1	1,2-Dichlorobenzene	ND		0.40	0.13
541-73-1	1,3-Dichlorobenzene	ND		0.40	0.11
106-46-7	1,4-Dichlorobenzene	ND		0.40	0.15
75-71-8	Dichlorodifluoromethane	ND		0.40	0.15
75-34-3	1,1-Dichloroethane	ND		0.30	0.072
107-06-2	1,2-Dichloroethane	ND		0.80	0.088

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-36031-1
 SDG No.: _____
 Client Sample ID: 34000536 Lab Sample ID: 320-36031-1
 Matrix: Air Lab File ID: MS9022319.D
 Analysis Method: TO-15 Date Collected: 02/13/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/24/2018 03:41
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 209817 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
75-35-4	1,1-Dichloroethene	ND		0.80	0.13
156-59-2	cis-1,2-Dichloroethene	ND		0.40	0.089
156-60-5	trans-1,2-Dichloroethene	ND		0.40	0.10
78-87-5	1,2-Dichloropropane	ND		0.40	0.24
10061-01-5	cis-1,3-Dichloropropene	ND		0.40	0.10
10061-02-6	trans-1,3-Dichloropropene	ND		0.40	0.088
123-91-1	1,4-Dioxane	ND		0.80	0.10
141-78-6	Ethyl acetate	ND		0.30	0.18
100-41-4	Ethylbenzene	ND		0.40	0.063
622-96-8	4-Ethyltoluene	ND		0.40	0.19
142-82-5	n-Heptane	ND		0.80	0.063
87-68-3	Hexachlorobutadiene	ND		2.0	0.43
110-54-3	n-Hexane	ND		0.80	0.075
591-78-6	2-Hexanone	ND		0.40	0.087
98-82-8	Isopropylbenzene	ND		0.80	0.10
99-87-6	4-Isopropyltoluene	ND		0.80	0.12
1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND		0.80	0.12
80-62-6	Methyl methacrylate	ND		0.80	0.16
108-10-1	4-Methyl-2-pentanone (MIBK)	ND		0.40	0.14
75-09-2	Methylene Chloride	ND		0.40	0.072
98-83-9	alpha-Methylstyrene	ND		0.40	0.065
91-20-3	Naphthalene	ND		0.80	0.56
111-65-9	n-Octane	ND		0.40	0.055
109-66-0	n-Pentane	ND		0.80	0.26
115-07-1	Propylene	ND		0.40	0.099
103-65-1	N-Propylbenzene	ND		0.40	0.059
100-42-5	Styrene	ND		0.40	0.059
79-34-5	1,1,2,2-Tetrachloroethane	ND		0.40	0.069
127-18-4	Tetrachloroethene	ND		0.40	0.051
109-99-9	Tetrahydrofuran	ND		0.80	0.21
108-88-3	Toluene	ND		0.40	0.051
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.40	0.16
120-82-1	1,2,4-Trichlorobenzene	ND		2.0	0.43
71-55-6	1,1,1-Trichloroethane	ND		0.30	0.065
79-00-5	1,1,2-Trichloroethane	ND		0.40	0.067

FORM I
AIR - GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-36031-1
 SDG No.: _____
 Client Sample ID: 34000536 Lab Sample ID: 320-36031-1
 Matrix: Air Lab File ID: MS9022319.D
 Analysis Method: TO-15 Date Collected: 02/13/2018 00:00
 Sample wt/vol: 250 (mL) Date Analyzed: 02/24/2018 03:41
 Soil Aliquot Vol: _____ Dilution Factor: 1
 Soil Extract Vol.: _____ GC Column: RTX-Volatiles ID: 0.32 (mm)
 % Moisture: _____ Level: (low/med) Low
 Analysis Batch No.: 209817 Units: ppb v/v

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
79-01-6	Trichloroethene	ND		0.40	0.11
75-69-4	Trichlorofluoromethane	ND		0.40	0.20
96-18-4	1,2,3-Trichloropropane	ND		0.40	0.17
95-63-6	1,2,4-Trimethylbenzene	ND		0.80	0.16
108-67-8	1,3,5-Trimethylbenzene	ND		0.40	0.13
540-84-1	2,2,4-Trimethylpentane	ND		0.40	0.071
108-05-4	Vinyl acetate	ND		0.80	0.15
593-60-2	Vinyl bromide	ND		0.80	0.26
75-01-4	Vinyl chloride	ND		0.40	0.12
179601-23-1	m,p-Xylene	ND		0.80	0.10
95-47-6	o-Xylene	ND		0.40	0.054
1330-20-7	Xylenes, Total	ND		1.2	0.074

CAS NO.	SURROGATE	%REC	Q	LIMITS
460-00-4	4-Bromofluorobenzene (Surr)	88		70-130
17060-07-0	1,2-Dichloroethane-d4 (Surr)	101		70-130
2037-26-5	Toluene-d8 (Surr)	95		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Lims ID: 320-36031-A-1
 Client ID: 34000536
 Sample Type: Client
 Inject. Date: 24-Feb-2018 03:41:30 ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Sample Info: 320-36031-A-1
 Misc. Info.: 500
 Operator ID: RG Instrument ID: ATMS9
 Method: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\TO15_ATMS9N.m
 Limit Group: MSA - TO15 - ICAL
 Last Update: 26-Feb-2018 11:17:19 Calib Date: 09-Feb-2018 00:05:30
 Integrator: RTE ID Type: Deconvolution ID
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\ATMS9\20180208-53859.b\MS9020812.D
 Column 1 : RTX Volatiles (0.32 mm) Det: MS SCAN
 Process Host: XAWRK007

First Level Reviewer: phanthasena

Date: 26-Feb-2018 11:17:19

Compound	Sig	RT (min.)	Adj RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ppb v/v	Flags
* 1 Chlorobromomethane (IS)	130	12.312	12.312	0.000	94	73992	4.00	
* 2 1,4-Difluorobenzene	114	14.405	14.405	0.000	99	305569	4.00	
* 3 Chlorobenzene-d5 (IS)	117	20.324	20.324	0.000	98	192153	4.00	
\$ 4 1,2-Dichloroethane-d4 (Sur	65	13.480	13.480	0.000	97	119516	4.02	
\$ 5 Toluene-d8 (Surr)	100	17.562	17.569	-0.007	98	146869	3.78	
\$ 6 4-Bromofluorobenzene (Surr	174	22.253	22.259	-0.006	98	89197	3.53	
18 Chloromethane	50	4.793	4.763	0.030	36	1256	0.0621	
31 Acetone	43	7.689	7.634	0.055	95	13246	0.4284	
47 Methylene Chloride	49	8.881	8.899	-0.018	78	1106	0.0426	
48 Carbon disulfide	76	8.936	8.942	-0.006	99	5311	0.1177	
62 Tetrahydrofuran	42	12.586	12.513	0.073	25	804	0.0324	
85 Toluene	91	17.708	17.726	-0.019	75	1747	0.0199	
87 2-Hexanone	58	18.402	18.371	0.037	68	607	0.0176	
93 Tetrachloroethene	166	18.992	19.010	-0.018	85	1287	0.0332	
98 m-Xylene & p-Xylene	91	20.659	20.665	-0.006	0	5783	0.0667	
101 o-Xylene	91	21.359	21.365	-0.007	94	2695	0.0308	
107 N-Propylbenzene	91	22.533	22.539	-0.006	95	1753	0.0115	
110 4-Ethyltoluene	120	22.709	22.697	0.006	90	386	0.0103	
111 1,3,5-Trimethylbenzene	120	22.770	22.770	0.000	86	639	0.0122	
114 tert-Butylbenzene	91	23.269	23.281	-0.012	22	1007	0.0133	
115 1,2,4-Trimethylbenzene	120	23.324	23.323	0.000	90	915	0.0178	
116 sec-Butylbenzene	105	23.579	23.579	0.000	88	1182	0.007750	
121 4-Isopropyltoluene	119	23.755	23.755	0.000	92	1223	0.009246	
117 1,3-Dichlorobenzene	146	23.853	23.853	0.000	66	733	0.0106	
120 1,4-Dichlorobenzene	146	23.981	23.987	-0.006	84	1046	0.0150	
123 n-Butylbenzene	92	24.291	24.297	-0.006	87	354	0.004893	
122 1,2-Dichlorobenzene	146	24.467	24.473	-0.006	85	568	0.008525	
126 1,2,4-Trichlorobenzene	180	26.694	26.700	-0.006	37	930	0.0460	
127 Naphthalene	128	27.065	27.065	0.000	97	5089	0.0289	
S 155 Xylenes, Total	91				0		0.0975	

Reagents:

VAMSIS20_00109

Amount Added: 50.00

Units: mL

Run Reagent

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D

Injection Date: 24-Feb-2018 03:41:30

Instrument ID: ATMS9

Operator ID: RG

Lims ID: 320-36031-A-1

Lab Sample ID: 320-36031-1

Worklist Smp#: 34

Client ID: 34000536

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

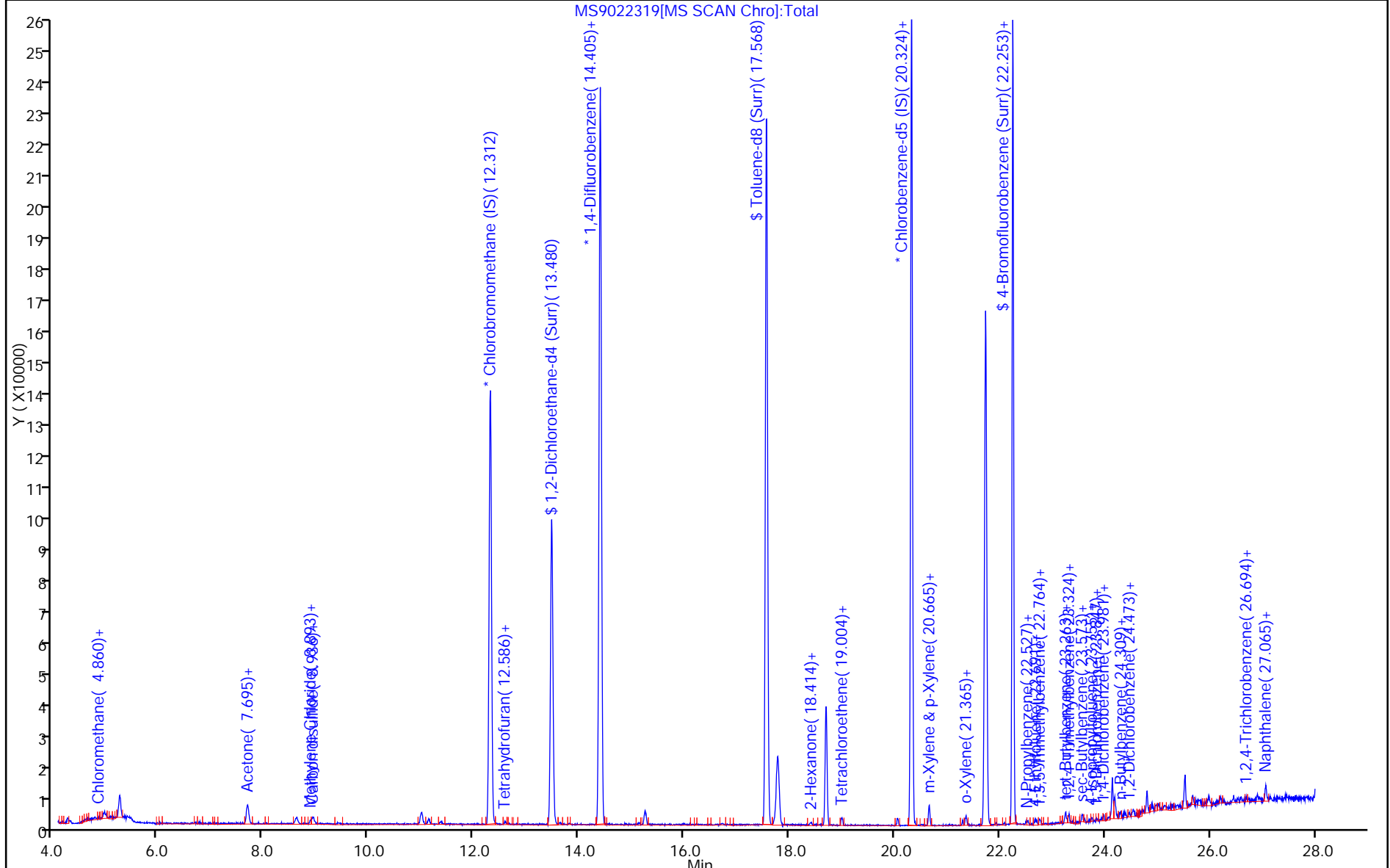
ALS Bottle#: 14

Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Y Scaling: Method Defined: Scale to the Nth Largest Peak: 2



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D

Injection Date: 24-Feb-2018 03:41:30

Instrument ID: ATMS9

Lims ID: 320-36031-A-1

Lab Sample ID: 320-36031-1

Client ID: 34000536

Operator ID: RG

ALS Bottle#: 14

Worklist Smp#: 34

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

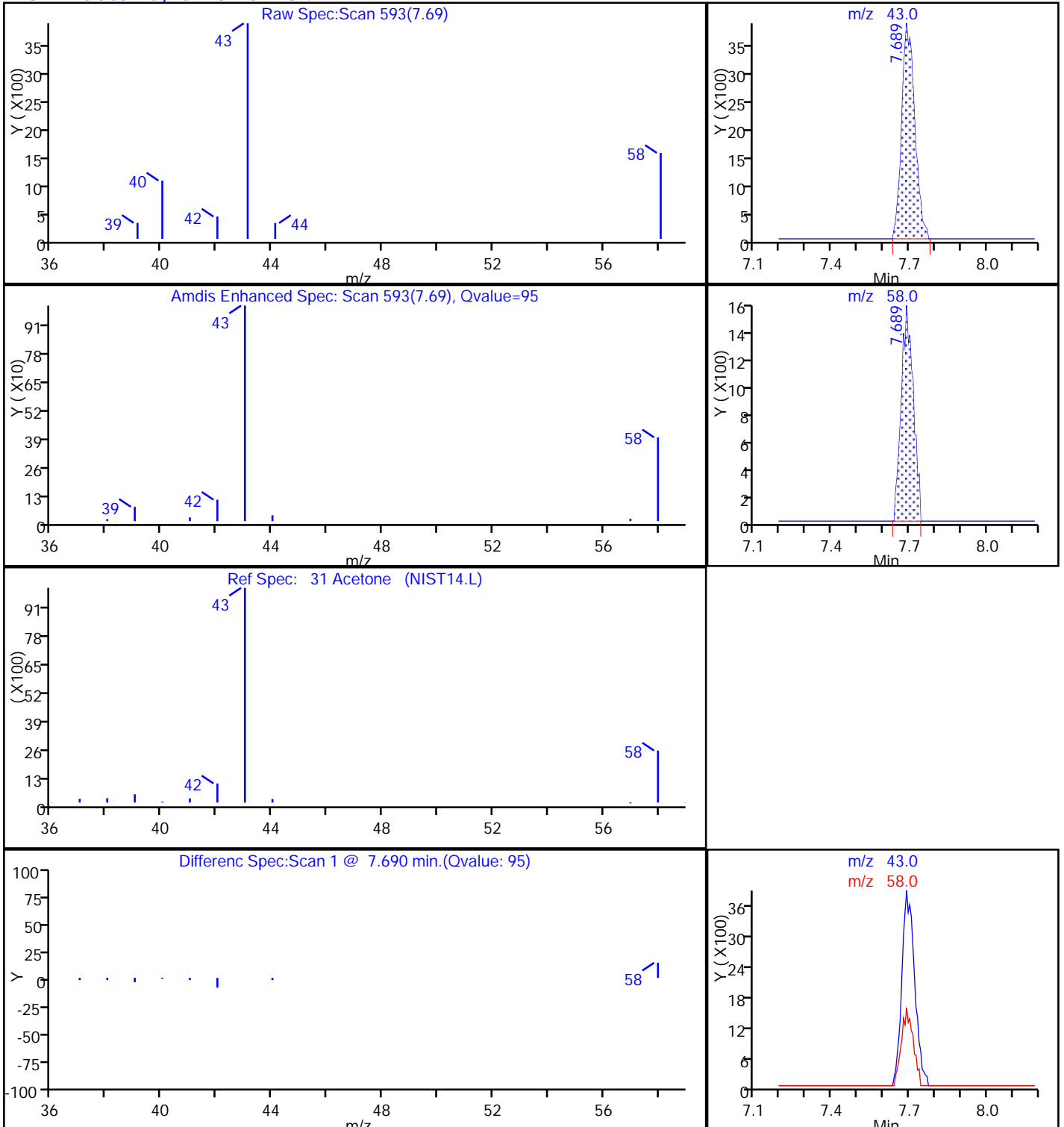
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

31 Acetone, CAS: 67-64-1



TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D

Injection Date: 24-Feb-2018 03:41:30

Instrument ID: ATMS9

Lims ID: 320-36031-A-1

Lab Sample ID: 320-36031-1

Client ID: 34000536

Operator ID: RG

ALS Bottle#: 14 Worklist Smp#: 34

Purge Vol: 5.000 mL

Dil. Factor: 1.0000

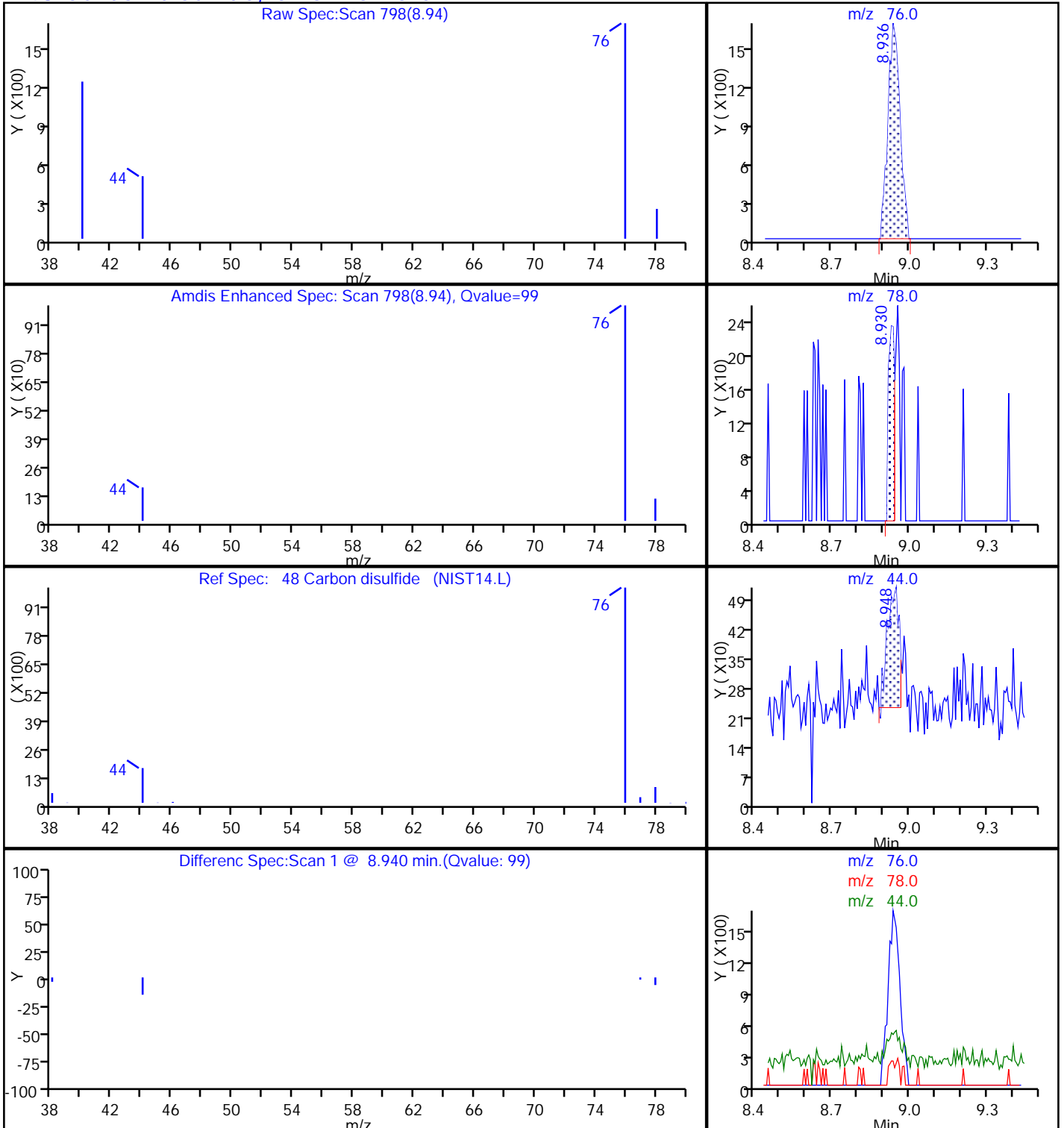
Method: TO15_ATMS9N

Limit Group: MSA - TO15 - ICAL

Column: RTX Volatiles (0.32 mm)

Detector: MS SCAN

48 Carbon disulfide, CAS: 75-15-0

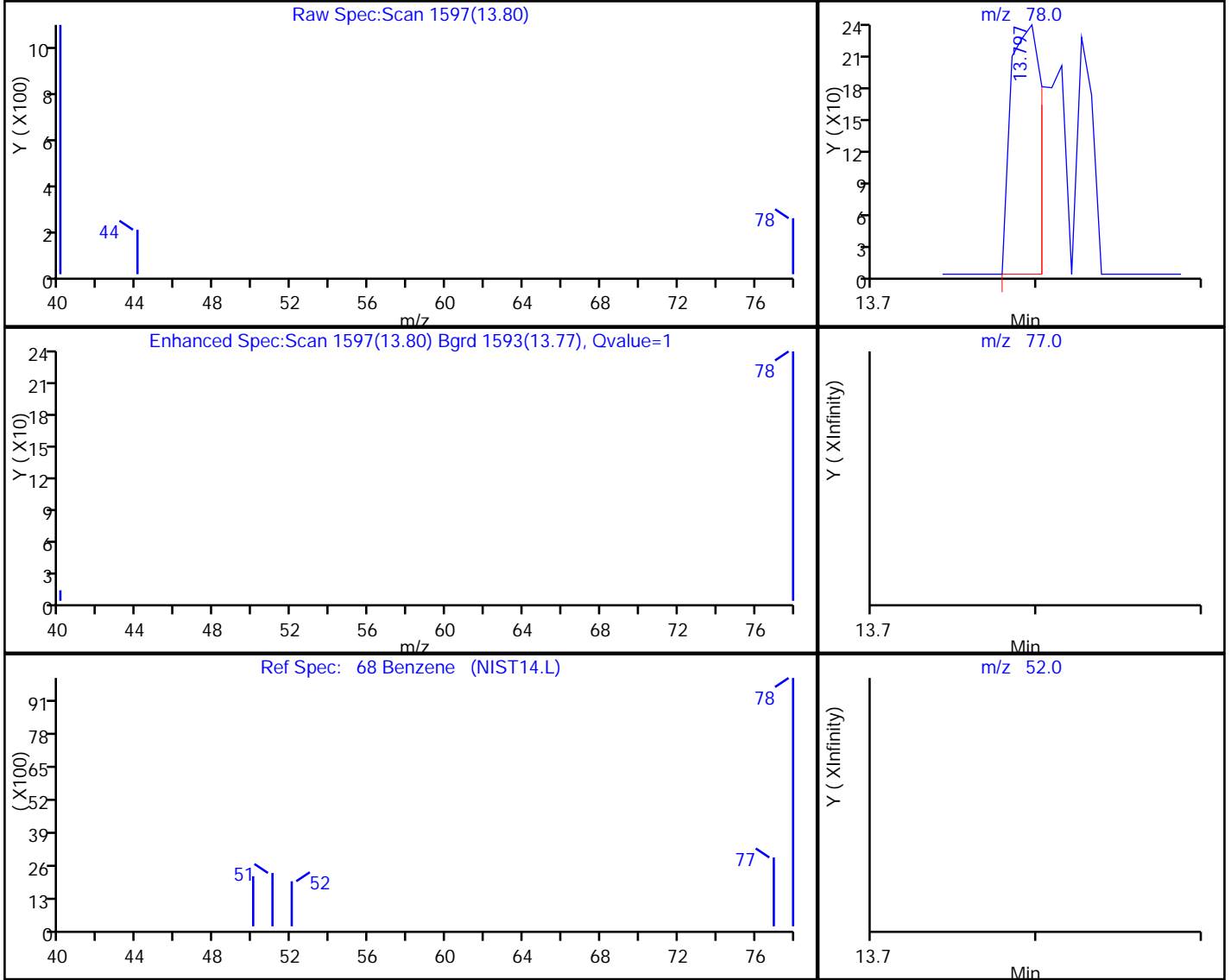


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

68 Benzene, CAS: 71-43-2

Processing Results



RT	Mass	Response	Amount
13.80	78.00	310	0.004506
13.81	77.00	0	
13.81	52.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

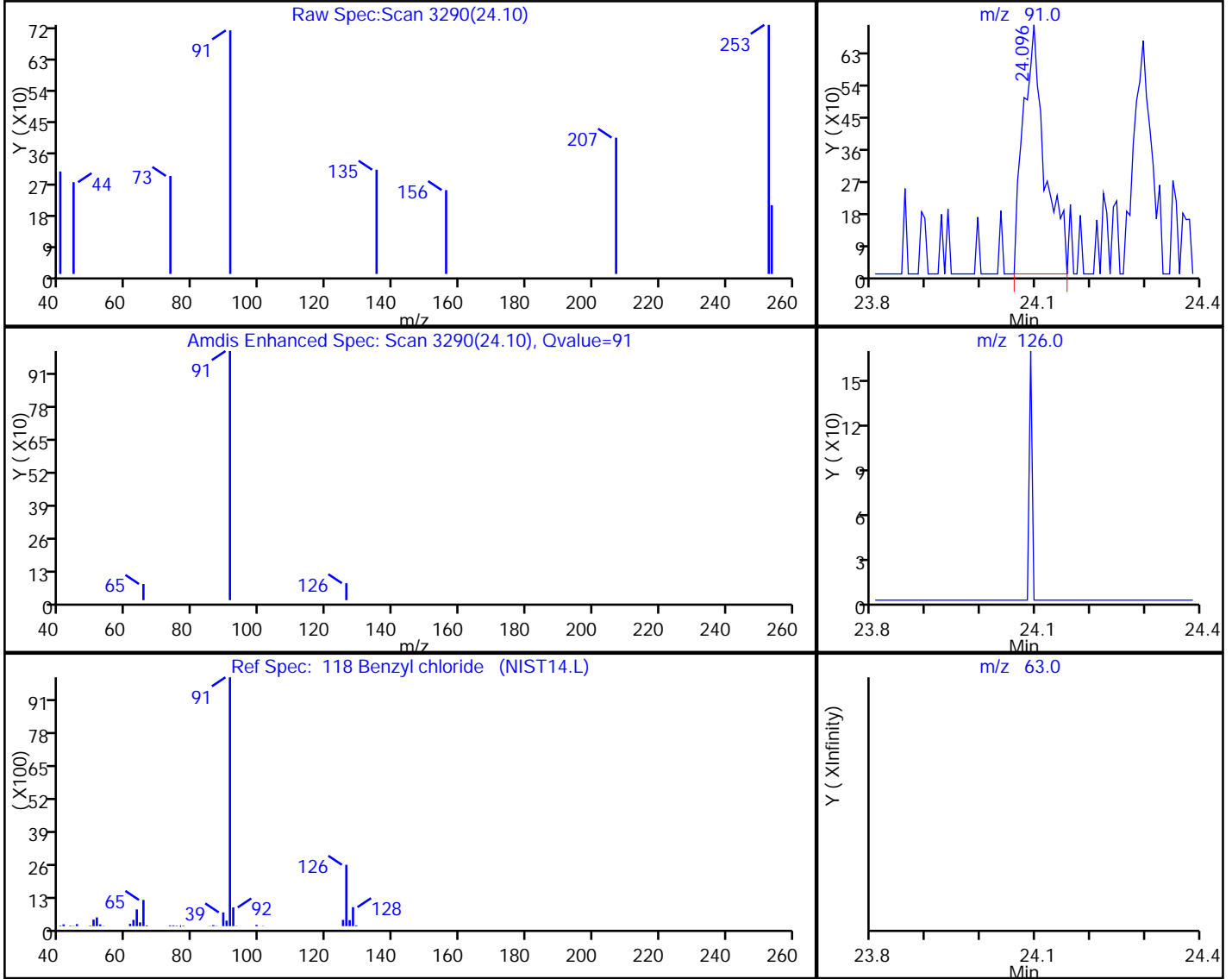
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

118 Benzyl chloride, CAS: 100-44-7

Processing Results



RT	Mass	Response	Amount
24.10	91.00	1956	0.014991
24.10	126.00	0	
24.10	63.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

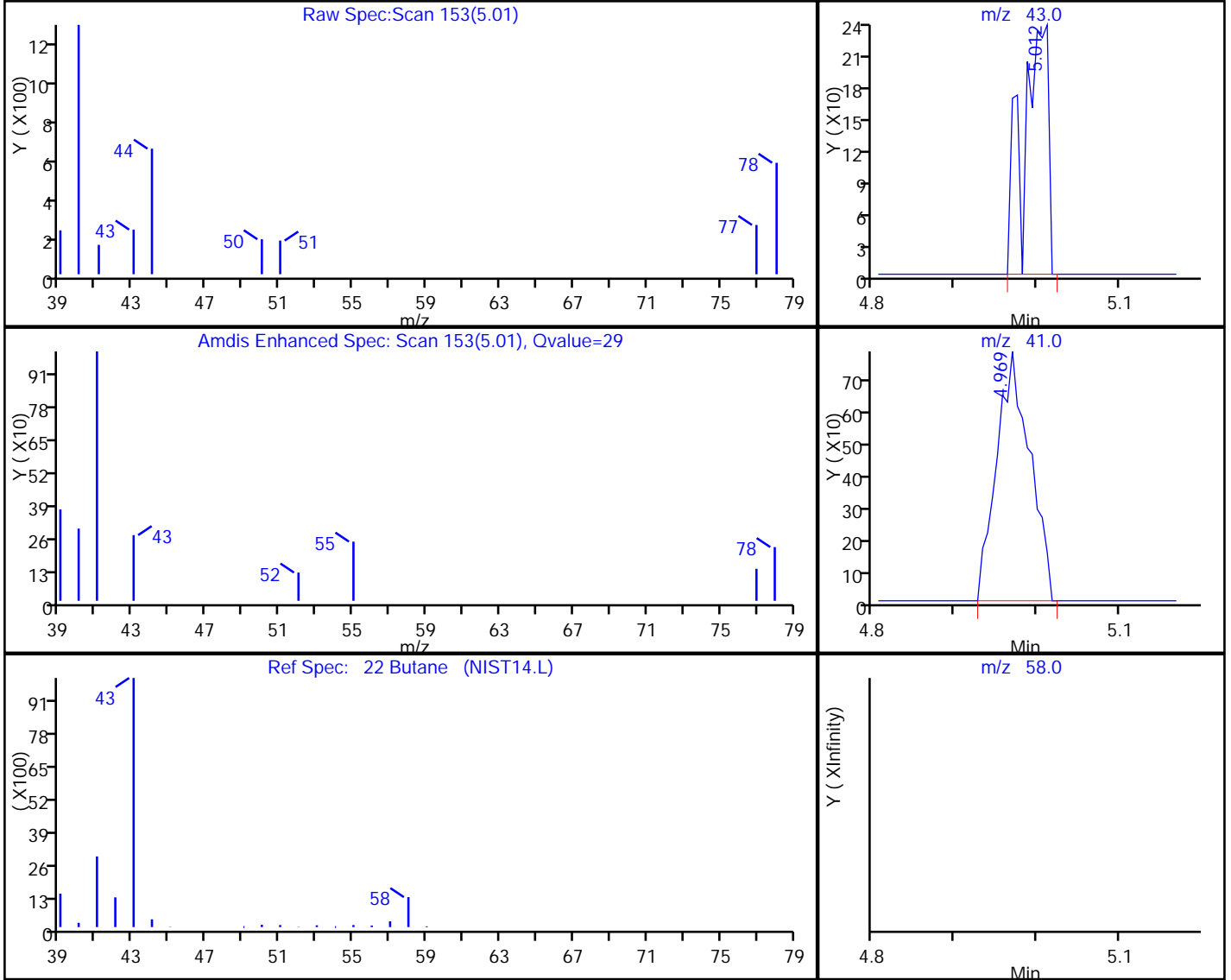
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
Client ID: 34000536
Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
Purge Vol: 5.000 mL Dil. Factor: 1.0000
Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

22 Butane, CAS: 106-97-8

Processing Results



RT	Mass	Response	Amount
5.01	43.00	495	0.013432
4.97	41.00	2209	
4.99	58.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

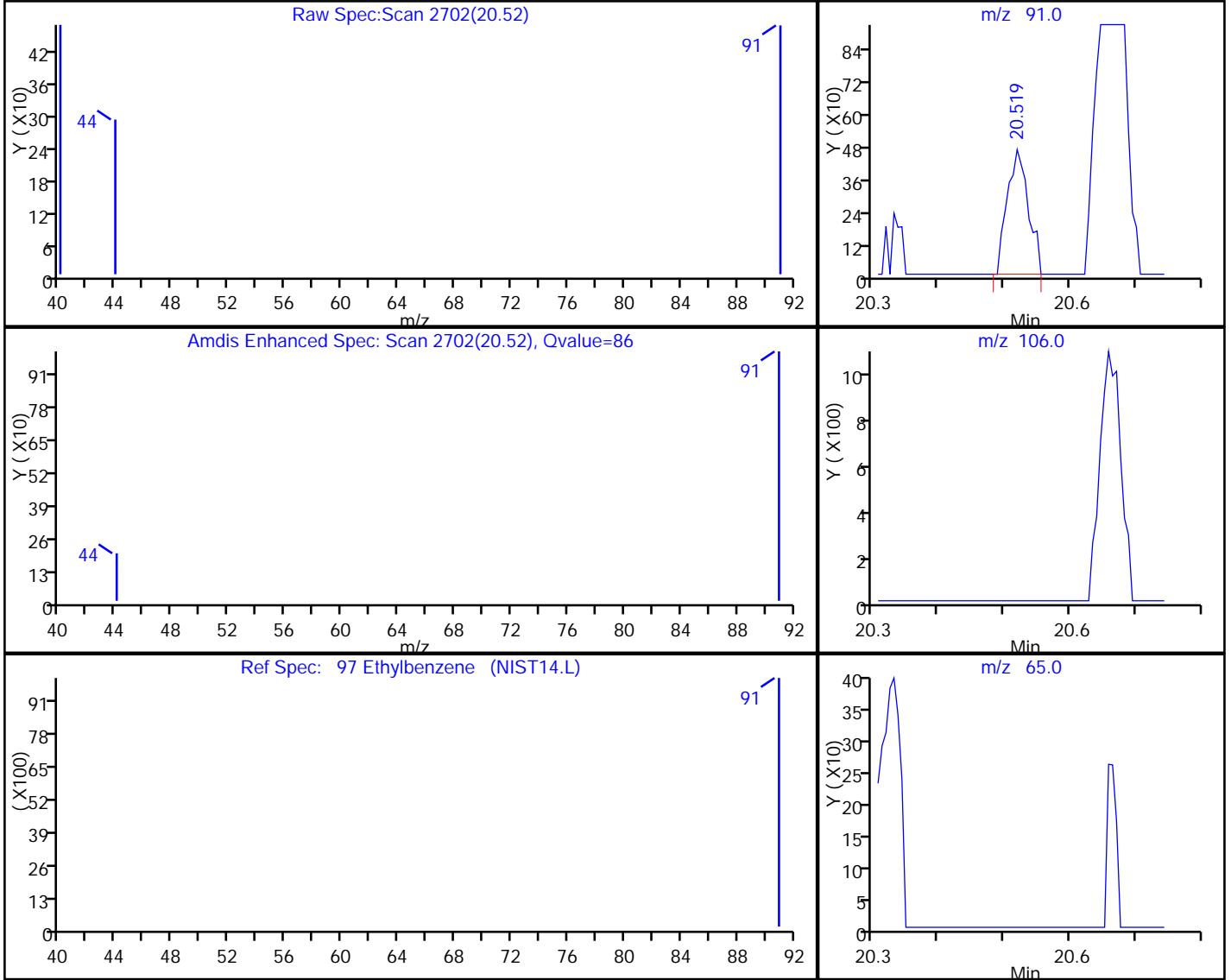
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

97 Ethylbenzene, CAS: 100-41-4

Processing Results



RT	Mass	Response	Amount
20.52	91.00	1041	0.009498
20.53	106.00	0	
20.53	65.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

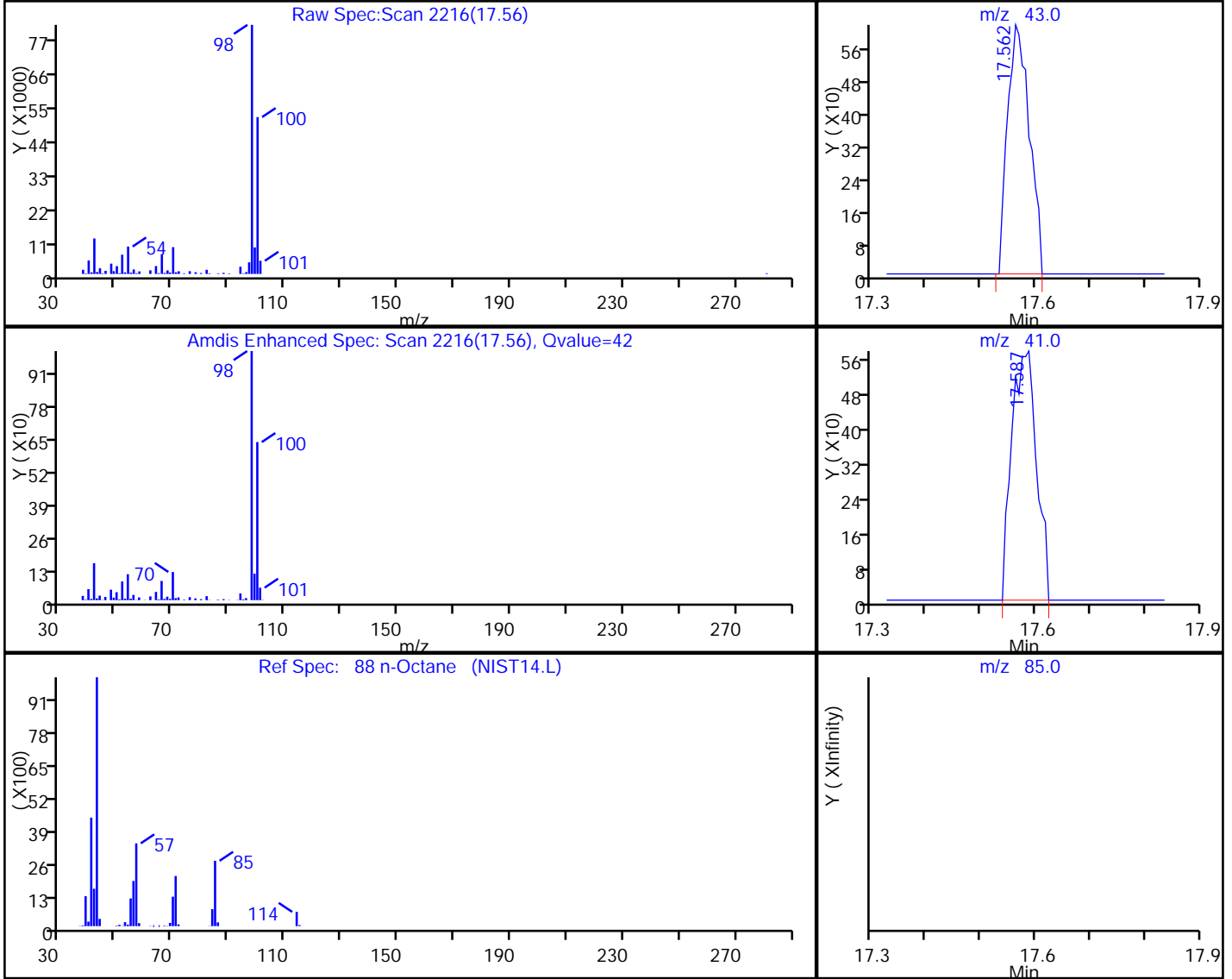
Audit Reason: Invalid Compound ID

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector MS SCAN

88 n-Octane, CAS: 111-65-9

Processing Results



RT	Mass	Response	Amount
17.56	43.00	1719	0.031107
17.59	41.00	1808	
17.58	85.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

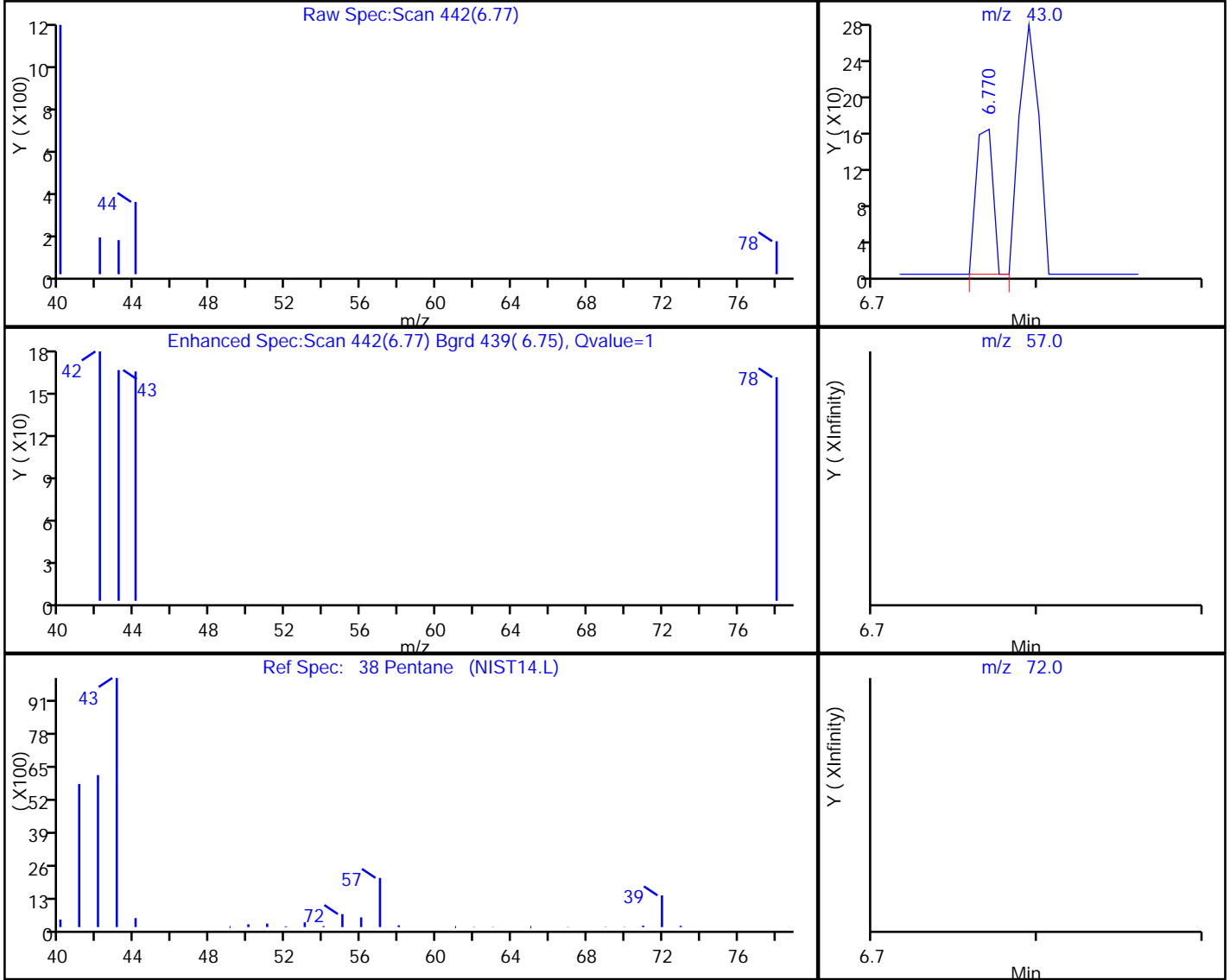


TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\ATMS9\20180223-54469.b\MS9022319.D
 Injection Date: 24-Feb-2018 03:41:30 Instrument ID: ATMS9
 Lims ID: 320-36031-A-1 Lab Sample ID: 320-36031-1
 Client ID: 34000536
 Operator ID: RG ALS Bottle#: 14 Worklist Smp#: 34
 Purge Vol: 5.000 mL Dil. Factor: 1.0000
 Method: TO15_ATMS9N Limit Group: MSA - TO15 - ICAL
 Column: RTX Volatiles (0.32 mm) Detector: MS SCAN

38 Pentane, CAS: 109-66-0

Processing Results



RT	Mass	Response	Amount
6.77	43.00	115	0.003164
6.79	57.00	0	
6.79	72.00	0	

Reviewer: phanhasena, 26-Feb-2018 11:17:19

Audit Action: Marked Compound Undetected

Audit Reason: Invalid Compound ID

APPENDIX K

DPE System Data Validation Memorandums



Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	320-36324-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 28, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 320-36324-1 for 2 air samples collected on February 20, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the requirement of the Compliance Monitoring Plan (CMP), which is provided as Appendix B of the Draft Cleanup Action Plan (CAP) submitted to Ecology on July 31, 2017 (Arcadis 2017). Air samples are collected monthly from the pre-treatment and post-treatment effluent stack and samples are analyzed for the following compounds:

- Benzene, toluene, ethylbenzene, xylenes, (BTEX collectively)
- Gasoline range organics (GRO)
- Fixed Gases (carbon dioxide, oxygen and methane)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)

- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Air samples were analyzed for BTEX and GRO (USEPA method TO-15) and Fixed Gases in air (ASTM method D1946).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Air sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested air sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks are prepared to identify any contamination which may have been introduced into the samples.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for USEPA method TO-15 analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample VSP-801, the surrogate recovery for TO-15 analysis was above the upper control limit (2%) and all associated detected sample results were qualified as estimated "J".

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
VSP-801	1,2-Dichloroethane-d4	132	70-130

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 320-36324-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 320-36324-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 320-36324-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample results were qualified as estimated for high surrogate recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.



REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
VSP-801	320-36324-1	02/20/2018	15:30	Regular
VSP-802	320-36324-2	02/20/2018	15:45	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
320-36324-1	VSP-801	REG	320-36324-1	TO-15	Benzene	280	ppb v/v		J	SURH	Y
320-36324-1	VSP-801	REG	320-36324-1	TO-15	Ethylbenzene	26	ppb v/v		J	SURH	Y
320-36324-1	VSP-801	REG	320-36324-1	TO-15	Toluene	1.2	ppb v/v	J	J	SURH	Y
320-36324-1	VSP-801	REG	320-36324-1	TO-15	m, p-Xylene	25	ppb v/v		J	SURH	Y
320-36324-1	VSP-801	REG	320-36324-1	TO-15	o-Xylene	3.0	ppb v/v		J	SURH	Y
320-36324-1	VSP-801	REG	320-36324-1	TO-15	GRO	18,000	ppb v/v		J	SURH	Y

Notes:

REG: regular

SDG: sample delivery group

GRO: gasoline range organics reported as TPH (as Gasoline)

ppb v/v: parts per billion volume/volume

J: the concentration is an approximate value

SURH: surrogate recovery above upper acceptance limit

Y: analyte detected

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-36324-1

Client Sample ID: VSP - 801

Lab Sample ID: 320-36324-1

Date Collected: 02/20/18 15:30

Matrix: Air

Date Received: 02/22/18 09:00

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	280	J	2.6	0.51	ppb v/v			03/01/18 22:22	6.45
Ethylbenzene	26	J	2.6	0.41	ppb v/v			03/01/18 22:22	6.45
Toluene	1.2	J	2.6	0.33	ppb v/v			03/01/18 22:22	6.45
m,p-Xylene	25	J	5.2	0.65	ppb v/v			03/01/18 22:22	6.45
o-Xylene	3.0	J	2.6	0.35	ppb v/v			03/01/18 22:22	6.45
TPH (as Gasoline)	18000	J	650	260	ppb v/v			03/01/18 22:22	6.45

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		03/01/18 22:22	6.45
1,2-Dichloroethane-d4 (Surr)	132	X	70 - 130		03/01/18 22:22	6.45
Toluene-d8 (Surr)	101		70 - 130		03/01/18 22:22	6.45

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.50	J	0.84	0.018	% v/v			02/26/18 13:22	1.68
Methane (FID)	0.016		0.00017	0.000034	% v/v			02/26/18 14:47	1.68
Methane (TCD)	ND		0.84	0.23	% v/v			02/26/18 13:22	1.68
Oxygen	18		0.34	0.012	% v/v			02/26/18 13:22	1.68

Client Sample ID: VSP - 802

Lab Sample ID: 320-36324-2

Date Collected: 02/20/18 15:45

Matrix: Air

Date Received: 02/22/18 09:00

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.17	J	0.40	0.079	ppb v/v			03/01/18 23:14	1
Ethylbenzene	0.83		0.40	0.063	ppb v/v			03/01/18 23:14	1
Toluene	0.66		0.40	0.051	ppb v/v			03/01/18 23:14	1
m,p-Xylene	1.9		0.80	0.10	ppb v/v			03/01/18 23:14	1
o-Xylene	0.49		0.40	0.054	ppb v/v			03/01/18 23:14	1
TPH (as Gasoline)	320		100	40	ppb v/v			03/01/18 23:14	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		70 - 130		03/01/18 23:14	1
1,2-Dichloroethane-d4 (Surr)	88		70 - 130		03/01/18 23:14	1
Toluene-d8 (Surr)	96		70 - 130		03/01/18 23:14	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.35	J	1.0	0.022	% v/v			02/26/18 13:32	2.08
Methane (FID)	0.0030		0.00021	0.000042	% v/v			02/26/18 15:07	2.08
Methane (TCD)	ND		1.0	0.28	% v/v			02/26/18 13:32	2.08
Oxygen	18		0.42	0.015	% v/v			02/26/18 13:32	2.08

TestAmerica Sacramento

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	320-37147-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	April 10, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 320-37147-1 for 2 air samples collected on March 14, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the requirement of the Compliance Monitoring Plan (CMP), which is provided as Appendix B of the Draft Cleanup Action Plan (CAP) submitted to Ecology on July 31, 2017 (Arcadis 2017). Air samples are collected monthly from the pre-treatment and post-treatment effluent stack and samples are analyzed for the following compounds:

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- Gasoline Range Organics (GRO)
- Fixed Gases (carbon dioxide, oxygen and methane)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

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- Matrix Spike/Matrix Spike Duplicates (MS/MSD)

- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Air samples were analyzed for BTEX and GRO (USEPA method TO-15) and Fixed Gases in air (ASTM method D1946).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

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Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks are prepared to identify any contamination which may have been introduced into the samples.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for USEPA method TO-15 analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample VSP-801, the surrogate recovery for TO-15 analysis was above the upper control limit (5%) and all associated detected sample results were qualified as estimated "J".

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
VSP-801	1,2-Dichloroethane-d4	135	70-130

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 320-37147-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 320-37147-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 320-37147-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Sample results of VSP-801 were qualified as estimated for high surrogate recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.



REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
VSP-801	320-37147-1	03/14/2018	10:10	Regular
VSP-802	320-37147-2	03/14/2018	10:20	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
320-37147-1	VSP-801	REG	320-37147-1	TO-15	Benzene	170	ppb v/v		J	SURH	Y
320-37147-1	VSP-801	REG	320-37147-1	TO-15	Ethylbenzene	260	ppb v/v		J	SURH	Y
320-37147-1	VSP-801	REG	320-37147-1	TO-15	Toluene	17	ppb v/v		J	SURH	Y
320-37147-1	VSP-801	REG	320-37147-1	TO-15	m, p-Xylene	440	ppb v/v		J	SURH	Y
320-37147-1	VSP-801	REG	320-37147-1	TO-15	o-Xylene	60	ppb v/v		J	SURH	Y
320-37147-1	VSP-801	REG	320-37147-1	TO-15	GRO	20,000	ppb v/v		J	SURH	Y

Notes:

REG: regular

SDG: sample delivery group


GRO: gasoline range organics reported as TPH (as Gasoline)

ppb v/v: parts per billion volume/volume

J: the concentration is an approximate value

SURH: surrogate recovery above upper acceptance limit

Y: analyte detected

Client Contact Information		Project Manager: SCOTT ZORN		Samples Collected By: JASON LITTLE		COC No: 1 of 1 COCs							
Company Name: Arcadis		Phone:		Other (Please specify in notes section)		For Lab Use Only:							
Address: 100 Olive Way, Suite 800		Email: SCOTT.ZORN@arcadis.com		Landfill Gas		Walk-in Client:							
City/State/Zip: Seattle WA 98101		Site Contact: Peter Campioelli		Soil Gas		Lab Sampling:							
Phone:		TA Contact: Elaine Walker		Ambient Air		Job / SDG No.:							
FAX:		Analyst's Turnaround Time		Indoor Air		(See below for Add'l Items)							
Project Name: Edmunds Terminal		Standard (Specific): STAT		Sample Type		Sample Specific Notes:							
Site/Location: 1720 Woodward		Rush (Specify):		Other (Please specify in notes section)		Fixed Gas: Methane							
PO #		Sample Date(s)		TO-15 (Med / Sid / Low / SIM)		O ₂ & CO ₂							
VSP-801	3/14/18	1010	Canister Vacuum in Field, 'Hg (Start)	Canister Field, 'Hg (Stop)	Canister ID	Flow Controller ID							
VSP-802	3/14/18	1020			320-34158	320-35825							
 320-37147 Chain of Custody													
Temperature (Fahrenheit) <table border="1" style="width: 100%;"> <tr> <td>Start</td> <td>Interior</td> <td>Ambient</td> </tr> <tr> <td>Stop</td> <td></td> <td></td> </tr> </table>								Start	Interior	Ambient	Stop		
Start	Interior	Ambient											
Stop													
Temperature (Fahrenheit) <table border="1" style="width: 100%;"> <tr> <td>Start</td> <td>Interior</td> <td>Ambient</td> </tr> <tr> <td>Stop</td> <td></td> <td></td> </tr> </table>								Start	Interior	Ambient	Stop		
Start	Interior	Ambient											
Stop													
Special Instructions/QC Requirements & Comments: Any questions call 303-514-7192													
Samples Shipped by:		Date / Time:		Samples Received by:		Date / Time:							
Samples Relinquished by: [Signature]		Date / Time: 3/14/18 / 1345		Received by: [Signature]		Date / Time: 3/15/18 0845							
Relinquished by: [Signature]		Date / Time: 3/15/18 0845		Received by: [Signature]		Date / Time: 3/15/18 0845							
Lab Use Only:		Shipper Name:		Condition:		TA-SAC							

1 - no end times ID 3400684
2 - ID 3400068



Detection Summary

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Client Sample ID: VSP-801

Lab Sample ID: 320-37147-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	170		2.0	0.39	ppb v/v	4.93		TO-15	Total/NA
Ethylbenzene	260		2.0	0.31	ppb v/v	4.93		TO-15	Total/NA
Toluene	17		2.0	0.25	ppb v/v	4.93		TO-15	Total/NA
m,p-Xylene	440		3.9	0.49	ppb v/v	4.93		TO-15	Total/NA
o-Xylene	60		2.0	0.27	ppb v/v	4.93		TO-15	Total/NA
TPH (as Gasoline)	20000		490	200	ppb v/v	4.93		TO-15	Total/NA
Methane (FID)	0.0044		0.00064	0.00013	% v/v	6.38		D1946	Total/NA
Oxygen	17		1.3	0.047	% v/v	6.38		D1946	Total/NA

Client Sample ID: VSP-802

Lab Sample ID: 320-37147-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.11	J	0.40	0.079	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	0.47		0.40	0.063	ppb v/v	1		TO-15	Total/NA
Toluene	0.99		0.40	0.051	ppb v/v	1		TO-15	Total/NA
m,p-Xylene	1.8		0.80	0.10	ppb v/v	1		TO-15	Total/NA
o-Xylene	0.60		0.40	0.054	ppb v/v	1		TO-15	Total/NA
TPH (as Gasoline)	220		100	40	ppb v/v	1		TO-15	Total/NA
Methane (FID)	0.0041		0.0014	0.00029	% v/v	14.33		D1946	Total/NA
Oxygen	20		2.9	0.11	% v/v	14.33		D1946	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-37147-1

Client Sample ID: VSP-801

Lab Sample ID: 320-37147-1

Date Collected: 03/14/18 10:10

Matrix: Air

Date Received: 03/16/18 09:05

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	170	J	2.0	0.39	ppb v/v			03/27/18 23:26	4.93
Ethylbenzene	260	J	2.0	0.31	ppb v/v			03/27/18 23:26	4.93
Toluene	17	J	2.0	0.25	ppb v/v			03/27/18 23:26	4.93
m,p-Xylene	440	J	3.9	0.49	ppb v/v			03/27/18 23:26	4.93
o-Xylene	60	J	2.0	0.27	ppb v/v			03/27/18 23:26	4.93
TPH (as Gasoline)	20000	J	490	200	ppb v/v			03/27/18 23:26	4.93

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	110		70 - 130		03/27/18 23:26	4.93
1,2-Dichloroethane-d4 (Surr)	135	X	70 - 130		03/27/18 23:26	4.93
Toluene-d8 (Surr)	108		70 - 130		03/27/18 23:26	4.93

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		3.2	0.068	% v/v			03/28/18 16:11	6.38
Methane (FID)	0.0044		0.00064	0.00013	% v/v			03/29/18 11:21	6.38
Oxygen	17		1.3	0.047	% v/v			03/28/18 16:11	6.38

Client Sample ID: VSP-802

Lab Sample ID: 320-37147-2

Date Collected: 03/14/18 10:20

Matrix: Air

Date Received: 03/16/18 09:05

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.11	J	0.40	0.079	ppb v/v			03/28/18 00:29	1
Ethylbenzene	0.47		0.40	0.063	ppb v/v			03/28/18 00:29	1
Toluene	0.99		0.40	0.051	ppb v/v			03/28/18 00:29	1
m,p-Xylene	1.8		0.80	0.10	ppb v/v			03/28/18 00:29	1
o-Xylene	0.60		0.40	0.054	ppb v/v			03/28/18 00:29	1
TPH (as Gasoline)	220		100	40	ppb v/v			03/28/18 00:29	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		70 - 130		03/28/18 00:29	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 130		03/28/18 00:29	1
Toluene-d8 (Surr)	102		70 - 130		03/28/18 00:29	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	ND		7.2	0.15	% v/v			03/28/18 16:21	14.33
Methane (FID)	0.0041		0.0014	0.00029	% v/v			03/29/18 11:36	14.33
Oxygen	20		2.9	0.11	% v/v			03/28/18 16:21	14.33

TestAmerica Sacramento

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	320-39559-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	June 19, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 320-39559-1 for 2 air samples collected on May 17, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the requirement of the Compliance Monitoring Plan (CMP), which is provided as Appendix B of the Draft Cleanup Action Plan (CAP) submitted to Ecology on July 31, 2017 (Arcadis 2017). Air samples are collected monthly from the pre-treatment and post-treatment effluent stack and samples are analyzed for the following compounds:

- Benzene, toluene, ethylbenzene, xylenes (BTEX collectively)
- Gasoline Range Organics (GRO)
- Fixed Gases (carbon dioxide, oxygen and methane)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)

- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Air samples were analyzed for BTEX and GRO (USEPA method TO-15) and Fixed Gases in air (ASTM method D1946).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Air sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested air sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks are prepared to identify any contamination which may have been introduced into the samples.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for USEPA method TO-15 analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample VSP-801, the surrogate recovery for TO-15 analysis was above the upper control limit (96%-121%) and all associated detected sample results were qualified as estimated "J".

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
VSP-801	4-Bromofluorobenzene	251	70-130
VSP-801	1,2-Dichloroethane-d4	226	70-130

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 320-39559-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 320-39559-1.


Laboratory Duplicates

Laboratory duplicate was not performed for SDG 320-39559-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample results were qualified as estimated for high surrogate recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable



measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
VSP-801	320-39559-1	05/17/2018	17:00	Regular
VSP-802	320-39559-2	05/17/2018	17:05	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
320-39559-1	VSP-801	REG	320-39559-1	TO-15	Benzene	1.1	ppb v/v		J	SURH	Y
320-39559-1	VSP-801	REG	320-39559-1	TO-15	Ethylbenzene	1.9	ppb v/v		J	SURH	Y
320-39559-1	VSP-801	REG	320-39559-1	TO-15	Toluene	1.1	ppb v/v		J	SURH	Y
320-39559-1	VSP-801	REG	320-39559-1	TO-15	m, p-Xylene	8.3	ppb v/v		J	SURH	Y
320-39559-1	VSP-801	REG	320-39559-1	TO-15	o-Xylene	2.1	ppb v/v		J	SURH	Y

Notes:

REG: regular

SDG: sample delivery group

ppb v/v: parts per billion volume/volume

J: the concentration is an approximate value

SURH: surrogate recovery above upper acceptance limit

Y: analyte detected

TestAmerica Sacramento
880 Riverside Parkway

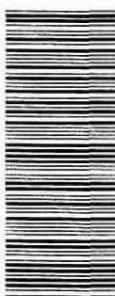
West Sacramento, CA 95605
phone 916.374.4378 fax 916.372.1059

Canister Samples Chain of Custody Record

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact Information Company Name: <u>Arcadis</u> Address: <u>1000 Olive Way, Suite 800</u> City/State/Zip: <u>Seattle, WA 98101</u> Phone: _____ FAX: _____ Project Name: <u>Edwards Terminal</u> Site/Location: <u>11720 Lincoln Rd</u> P O #: _____		Project Manager: <u>Scott Zorn</u> Phone: _____ Email: _____ Site Contact: _____ TA Contact: _____ Analysis Turnaround Time: _____ Standard (Specify): <u>STAT</u> Rush (Specify): _____		Samples Collected By: <u>Jason Little</u> COC No: _____ of _____ COCs For Lab Use Only: Walk-in Client: _____ Lab Sampling: _____ Job / SDG No.: _____ (See below for Add'l Items)																	
Sample Identification	Sample Date(s)	Time Start	Time Stop	Canister Vacuum in Field, 'Hg (Start)	Canister Vacuum in Field, 'Hg (Stop)	Flow Controller ID	Canister ID	Sample Specific Notes:													
								TO-15 (Med / Std / Low / SIM)	MA-APH	EPA 3C	EPA 25C / 25.3	ASTM D-1946 / 1945 / 3588	EPA 15/16	TO-3	Other (Please specify in notes section)	Sample Type	Indoor Air	Ambient Air	Soil Gas	Landfill Gas	Other (Please specify in notes section)
<u>VSP-801</u>	<u>5/17/18 1700</u>						<u>34001853</u>	<u>X</u>												<u>EPA TO-15 for BTEX & TPH-G</u>	
<u>VSP-802</u>	<u>5/17/18 1705</u>						<u>8202</u>	<u>X</u>												<u>Other = Fixed Gas (Methane, O2, CO2)</u>	
Special Instructions/QC Requirements & Comments: <div style="text-align: center;">  320-39559 Chain of Custody </div>																					
Samples Shipped by: <u>[Signature]</u>		Date / Time: <u>5/18/18 @ 1125</u>		Samples Received by: <u>B. Hall</u>		Date / Time: <u>5/18/18</u>		Received by: <u>[Signature]</u>		Date / Time: <u>5/19/18 @ 09:15</u>		Received by: <u>[Signature]</u>		Date / Time: <u>5/19/18 @ 09:15</u>		Condition: _____		Shipper Name: _____		Lab Use Only: _____	

1x canister ID is 34001953 EA 5/21/18
 2* canister ID is 8282



Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-39559-1

Client Sample ID: VSP-801

Lab Sample ID: 320-39559-1

Date Collected: 05/17/18 17:00

Matrix: Air

Date Received: 05/19/18 09:15

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.1	J	0.40	0.079	ppb v/v			05/31/18 01:01	1
Ethylbenzene	1.9	J	0.40	0.063	ppb v/v			05/31/18 01:01	1
Toluene	1.1	J	0.40	0.051	ppb v/v			05/31/18 01:01	1
m,p-Xylene	8.3	J	0.80	0.10	ppb v/v			05/31/18 01:01	1
o-Xylene	2.1	J	0.40	0.054	ppb v/v			05/31/18 01:01	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	251	X	70 - 130		05/31/18 01:01	1
1,2-Dichloroethane-d4 (Surr)	226	X	70 - 130		05/31/18 01:01	1
Toluene-d8 (Surr)	106		70 - 130		05/31/18 01:01	1

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
TPH (as Gasoline)	34000		990	400	ppb v/v			05/31/18 08:27	9.92

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	115		70 - 130		05/31/18 08:27	9.92
1,2-Dichloroethane-d4 (Surr)	107		70 - 130		05/31/18 08:27	9.92
Toluene-d8 (Surr)	98		70 - 130		05/31/18 08:27	9.92

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.35	J	0.90	0.019	% v/v			05/23/18 09:53	1.79
Methane (FID)	0.0011		0.00018	0.000036	% v/v			05/23/18 13:20	1.79
Oxygen	18		0.36	0.013	% v/v			05/23/18 09:53	1.79

Client Sample ID: VSP-802

Lab Sample ID: 320-39559-2

Date Collected: 05/17/18 17:05

Matrix: Air

Date Received: 05/19/18 09:15

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.087	J	0.40	0.079	ppb v/v			05/31/18 01:59	1
Ethylbenzene	0.12	J	0.40	0.063	ppb v/v			05/31/18 01:59	1
Toluene	0.14	J	0.40	0.051	ppb v/v			05/31/18 01:59	1
m,p-Xylene	0.23	J	0.80	0.10	ppb v/v			05/31/18 01:59	1
o-Xylene	0.069	J	0.40	0.054	ppb v/v			05/31/18 01:59	1
TPH (as Gasoline)	280		100	40	ppb v/v			05/31/18 01:59	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		70 - 130		05/31/18 01:59	1
1,2-Dichloroethane-d4 (Surr)	101		70 - 130		05/31/18 01:59	1
Toluene-d8 (Surr)	101		70 - 130		05/31/18 01:59	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.39	J	1.1	0.024	% v/v			05/23/18 10:07	2.22
Methane (FID)	0.0010		0.00022	0.000044	% v/v			05/23/18 13:33	2.22
Oxygen	18		0.44	0.016	% v/v			05/23/18 10:07	2.22

TestAmerica Sacramento

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	320-41619-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	September 05, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 320-41619-1 for 2 air samples collected on July 26, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the requirement of the Compliance Monitoring Plan (CMP), which is provided as Appendix B of the Draft Cleanup Action Plan (CAP) submitted to Ecology on July 31, 2017 (Arcadis 2017). Air samples are collected monthly from the pre-treatment and post-treatment effluent stack and samples are analyzed for the following compounds:

- Benzene, toluene, ethylbenzene, xylenes (BTEX collectively)
- Gasoline Range Organics (GRO)
- Fixed Gases (carbon dioxide, oxygen and methane)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)

- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Air samples were analyzed for BTEX and GRO (USEPA method TO-15) and Fixed Gases in air (ASTM method D1946).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Air sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested air sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks are prepared to identify any contamination which may have been introduced into the samples.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for USEPA method TO-15 analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 320-41619-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 320-41619-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 320-41619-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.



REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
VSP-801	320-41619-1	07/26/2018	12:45	Regular
VSP-802	320-41619-2	07/26/2018	12:55	Regular



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

Chevron Northwest Region Analysis Request/Chain of Custody



Lancaster Laboratories

For Lancaster Laboratories use only
 Acct. # _____ Group # _____ Sample # _____
 Instructions on reverse side correspond with circled numbers.

<p>1 Client Information</p> <p>Facility # <u>WBS</u></p> <p>Site Address <u>Arrows</u> <u>11720 Vanco Rd</u> <u>Chevron Arrows Contract</u> <u>Peter Campbell</u> <u>Arrows/500T</u> Consultant/Office Consultant Project Mgr. <u>SIOFF 201A</u> Consultant Phone # <u>206-492-7735</u> Samples <u>Jason Wittk</u></p>	<p>4 Matrix</p> <p><input type="checkbox"/> Sediment <input type="checkbox"/> Soil <input type="checkbox"/> Potable <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> NPDES <input checked="" type="checkbox"/> Air <input type="checkbox"/> Oil</p>	<p>5 Analyses Requested</p> <p><input type="checkbox"/> BTEX + MTBE <input type="checkbox"/> 8021 <input type="checkbox"/> 8260 <input type="checkbox"/> Naphth</p> <p><input type="checkbox"/> 8260 full scan</p> <p><input type="checkbox"/> Oxygenates</p> <p><input type="checkbox"/> NWTPH GX <input type="checkbox"/> NWTPH DX <input type="checkbox"/> Silica Gel Cleanup <input type="checkbox"/> Lead Total <input type="checkbox"/> Diss. <input type="checkbox"/> Method <input type="checkbox"/> WAPVPH <input type="checkbox"/> WAEPPH</p>	<p>6 Remarks</p> <p>EPA TO-15 for BTEX and TH-9 10/11/18: f17-18 985C (Metrol 2)</p>																								
<p>2 Sample Identification</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Sample</th> <th>Collected Date</th> <th>Time</th> <th>Grab</th> <th>Composite</th> </tr> </thead> <tbody> <tr> <td><u>VSP-801</u></td> <td><u>7/26/18</u></td> <td><u>1245</u></td> <td><u>X</u></td> <td></td> </tr> <tr> <td><u>VSP-802</u></td> <td><u>7/26/18</u></td> <td><u>1215</u></td> <td><u>X</u></td> <td></td> </tr> </tbody> </table>	Sample	Collected Date	Time	Grab	Composite	<u>VSP-801</u>	<u>7/26/18</u>	<u>1245</u>	<u>X</u>		<u>VSP-802</u>	<u>7/26/18</u>	<u>1215</u>	<u>X</u>		<p>7 Turnaround Time Requested (TAT) (please circle)</p> <p>Standard <u>72</u> hour 5 day 48 hour 24 hour</p>	<p>8 Data Package Options (please circle if required)</p> <p>Type I - Full Type VI (Raw Data)</p>	<p>9</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>Time</th> <th>Received by</th> </tr> </thead> <tbody> <tr> <td><u>7/28/18</u></td> <td><u>1315</u></td> <td><u>[Signature]</u></td> </tr> <tr> <td><u>7/30/18</u></td> <td><u>1000</u></td> <td><u>Emely James</u></td> </tr> </tbody> </table>	Date	Time	Received by	<u>7/28/18</u>	<u>1315</u>	<u>[Signature]</u>	<u>7/30/18</u>	<u>1000</u>	<u>Emely James</u>
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<p>3</p> <p>Barcode: 320-41619 Chain of Custody</p>		<p>Temperature Upon Receipt _____ °C</p> <p>UPS _____ FedEx _____ Other _____</p> <p>Relinquished by <u>Tom Blatz</u></p> <p>Relinquished by Commercial Carrier: _____</p>																									
<p>SCR #: _____</p> <p><input type="checkbox"/> Results in Dry Weight <input type="checkbox"/> J value reporting needed <input type="checkbox"/> Must meet lowest detection limits possible for 8260 compounds <input type="checkbox"/> 8021 MTBE Confirmation <input type="checkbox"/> Confirm MTBE + Naphthalene <input type="checkbox"/> Confirm highest hit by 8260 <input type="checkbox"/> Confirm all hits by 8260 <input type="checkbox"/> Run _____ oxy's on highest hit <input type="checkbox"/> Run _____ oxy's on all hits</p>		<p>Custody Seals Intact? Yes No</p>																									

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 320-41619-1

Client Sample ID: VSP-801

Lab Sample ID: 320-41619-1

Date Collected: 07/26/18 12:45

Matrix: Air

Date Received: 07/31/18 09:00

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	46		6.3	1.2	ppb v/v			08/15/18 05:44	15.7
Ethylbenzene	51		6.3	0.99	ppb v/v			08/15/18 05:44	15.7
Toluene	ND		6.3	0.80	ppb v/v			08/15/18 05:44	15.7
m,p-Xylene	170		13	1.6	ppb v/v			08/15/18 05:44	15.7
o-Xylene	28		6.3	0.85	ppb v/v			08/15/18 05:44	15.7
TPH (as Gasoline)	17000		1600	630	ppb v/v			08/15/18 05:44	15.7

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	103		70 - 130		08/15/18 05:44	15.7
1,2-Dichloroethane-d4 (Surr)	93		70 - 130		08/15/18 05:44	15.7
Toluene-d8 (Surr)	98		70 - 130		08/15/18 05:44	15.7

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.45	J	0.79	0.017	% v/v			08/02/18 09:41	1.57
Methane (FID)	0.00080		0.00016	0.000031	% v/v			08/09/18 10:19	1.57
Oxygen	18		0.31	0.012	% v/v			08/02/18 09:41	1.57

Client Sample ID: VSP-802

Lab Sample ID: 320-41619-2

Date Collected: 07/26/18 12:55

Matrix: Air

Date Received: 07/31/18 09:00

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.21	J	0.40	0.079	ppb v/v			08/15/18 06:41	1
Ethylbenzene	1.3		0.40	0.063	ppb v/v			08/15/18 06:41	1
Toluene	1.6		0.40	0.051	ppb v/v			08/15/18 06:41	1
m,p-Xylene	5.3		0.80	0.10	ppb v/v			08/15/18 06:41	1
o-Xylene	1.9		0.40	0.054	ppb v/v			08/15/18 06:41	1
TPH (as Gasoline)	280		100	40	ppb v/v			08/15/18 06:41	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	106		70 - 130		08/15/18 06:41	1
1,2-Dichloroethane-d4 (Surr)	86		70 - 130		08/15/18 06:41	1
Toluene-d8 (Surr)	102		70 - 130		08/15/18 06:41	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.75	J	0.83	0.018	% v/v			08/02/18 09:53	1.66
Methane (FID)	0.0025		0.00017	0.000033	% v/v			08/09/18 10:35	1.66
Oxygen	17		0.33	0.012	% v/v			08/02/18 09:53	1.66

TestAmerica Sacramento

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	320-44380-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	January 31, 2019		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 320-44380-1 for 2 air samples collected on October 18, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the requirement of the Compliance Monitoring Plan (CMP), which is provided as Appendix B of the Draft Cleanup Action Plan (CAP) submitted to Ecology on July 31, 2017 (Arcadis 2017). Air samples are collected monthly from the pre-treatment and post-treatment effluent stack and samples are analyzed for the following compounds:

- Benzene, toluene, ethylbenzene, xylenes (BTEX collectively)
- Gasoline Range Organics (GRO)
- Fixed Gases (carbon dioxide, oxygen and methane)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)

- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Air samples were analyzed for BTEX and GRO (USEPA method TO-15) and Fixed Gases in air (ASTM method D1946).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Air sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested air sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks are prepared to identify any contamination which may have been introduced into the samples.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Four BTEX compounds, ethylbenzene, toluene, m,p-xylene and o-xylene were detected at concentration greater than the MDL in method blank MB 320-254908/16 associated with samples VSP-801 and VSP-802.

- The VSP-801 sample results for ethylbenzene and m, p-xylene were greater than five times the blank action level, therefore not qualified.
- The VSP-801 sample results for toluene and o-xylene were less than five times the blank value (taking in consideration the dilution factor of 22.8), therefore associated sample results were qualified as non-detect (U). Sample VSP-801 was already qualified as estimated "J" for high surrogate recoveries, therefore validation qualifier updated as "UJ" instead of "U" for blank contamination.
- The VSP-802 sample results for ethylbenzene and toluene were greater than five times the blank action level, therefore not qualified.

- The VSP-802 sample results for m, p-xylene and o-xylene were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
VSP-801	MB	TO-15	Toluene	ug/L	0.0554	4.3*	UJ
VSP-801	MB	TO-15	o-xylene	ug/L	0.132	12*	UJ
VSP-802	MB	TO-15	m,p-xylene	ug/L	0.258	0.97	U
VSP-802	MB	TO-15	o-xylene	ug/L	0.132	0.36	U

Notes:

MB: method blank

U: non-detect

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

ug/L: micrograms per liter

*: Sample VSP-801 was diluted with a dilution factor of 22.8.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for USEPA method TO-15 analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample VSP-801, the surrogate recovery for TO-15 analysis was above the upper control limit (4%) and compounds benzene, ethylbenzene, toluene, m, p-Xylene, o-Xylene and GRO, reported as TPH (as Gasoline), results were qualified as estimated "J".

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
VSP-801	1,2-Dichloroethane-d4	134	70-130

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 320-44380-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 320-44380-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 320-44380-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample results were qualified as estimated for high surrogate recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. Toluene and o-xylene in sample VSP-801, m, p-xylene and o-xylene in sample VSP-802 were detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
VSP-801	320-44380-1	10/18/2018	15:45	Regular
VSP-802	320-44380-2	10/18/2018	15:30	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
320-44380-1	VSP-801	REG	320-44380-1	TO-15	Benzene	640	ppb v/v		J	SURH	Y
320-44380-1	VSP-801	REG	320-44380-1	TO-15	Ethylbenzene	99	ppb v/v	B	J	SURH	Y
320-44380-1	VSP-801	REG	320-44380-1	TO-15	Toluene	4.3	ppb v/v	J B	UJ	SURH, BL1	N
320-44380-1	VSP-801	REG	320-44380-1	TO-15	m, p-Xylene	110	ppb v/v	B	J	SURH	Y
320-44380-1	VSP-801	REG	320-44380-1	TO-15	o-Xylene	12	ppb v/v	B	UJ	SURH, BL1	N
320-44380-1	VSP-801	REG	320-44380-1	TO-15	GRO	38000	ppb v/v		J	SURH	Y
320-44380-2	VSP-802	REG	320-44380-1	TO-15	m, p-Xylene	0.97	ppb v/v	B	U	BL1	N
320-44380-2	VSP-802	REG	320-44380-1	TO-15	o-Xylene	0.36	ppb v/v	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

GRO: gasoline range organics reported as TPH (as Gasoline)

ppb v/v: parts per billion volume/volume

J: the concentration is an approximate value

SURH: surrogate recovery above upper acceptance limit

B: compound was found in the laboratory method blank and sample

U: non-detect

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

BL1: result less than some multiple of that found in laboratory method blank

Y: analyte detected

N: analyte not detected

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-73288-2
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 30, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-73288-2 for 1 water sample, 1 field duplicate and 1 trip blank collected on December 01, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

The SDG 580-73288-2 contains results for the discharged water sample Outfall 002 and quality control samples (Dup-1 and Trip Blank) recorded in the chain-of-custody documentations (COC). The intermediate treatment water samples results (GWSP series) recorded in the COC are for DPE system operation, monitoring and maintenance purposes and reported under separate cover. Analyses were performed as requested on the COC. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

One of the cPAHs, reported as benzo(a)anthracene was detected at concentration greater than the MDL in method blank MB 580-262722/1-A. The associated sample result was less than five times the blank value, therefore associated sample result was qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall 002	MB	8270C SIM	benzo(a)anthracene	ug/L	0.00551	0.0067	U
DUP-1	MB	8270C SIM	benzo(a)anthracene	ug/L	0.00551	0.0086	U

Notes:

MB: method blank

SIM: selective ion monitoring

U: non-detect

ug/L: micrograms per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

Matrix spikes were prepared in duplicate and analyzed. MS and MSD analysis must exhibit a percent recoveries and relative percent differences within the laboratory's acceptance criteria.

The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where compound concentration detected in the parent sample exceeds the MS/MSD concentration by factor four.

A MS/MSD was performed using sample Outfall 002 and the results were observed within the acceptance criteria besides for two cPAHs, benzo[a]anthracene and benzo[a]pyrene. The MSD recovery results for cPAHs were observed with a range of 3%-4% recovery low bias compared to the acceptance criteria. The associated non-detected parent sample and duplicate sample results for benzo[a]pyrene were qualified as "UJ" and "J" respectively. Benzo[a]anthracene parent sample and duplicate sample results were qualified for blank contamination as "U"; therefore, not changed as UJ.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	MS Recovery	MSD Recovery	RPD	Validation Qualifier	Laboratory Limit
Outfall 002	Benzo[a]anthracene	73	68	7	U	71-120
Outfall 002	Benzo[a]pyrene	80	72	11	UJ	76-120

Notes:

U: non-detect

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

Field Duplicates

Field duplicates were collected for SDG 580-73288-2 and all precision criteria were met.

Duplicate sample ID and Parent field sample ID were updated in the following table:

Duplicate Sample ID	Field Sample ID
DUP-1	Outfall 002

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-73288-2.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable. Two MSD exhibited low recoveries by the range of 3%-4% therefore results were qualified as estimated and the data is considered as valid. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. One of the cPAHs, reported as benzo(a)anthracene was detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detects. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.

- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall 002	580-73288-7	12/01/2017	12:00	Regular
DUP-1	580-73288-8	12/01/2017	NA	Field Duplicate
Trip Blank	580-73288-9	12/01/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-73288-7	Outfall 002	REG	580-73288-2	8270C SIM	benzo[a]anthracene	0.0067	ug/L	J B F1	U	BL1, MSDL	N
580-73288-8	DUP-1	FD	580-73288-2	8270C SIM	benzo[a]anthracene	0.0086	ug/L	J B	U	BL1, MSDL	N
580-73288-7	Outfall 002	REG	580-73288-2	8270C SIM	benzo[a]pyrene	0.020 U	ug/L	F1	UJ	MSDL	N
580-73288-8	DUP-1	FD	580-73288-2	8270C SIM	benzo[a]pyrene	0.0058	ug/L	J	J	MSDL	Y

Notes:

REG: regular

SDG: sample delivery group

SIM: selective ion monitoring

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

F1: MS and/or MSD Recovery is outside acceptance limits

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

BL1: result less than some multiple of that found in laboratory method blank

MSDL: MSD recovery was below the lower control limit

ug/L: micrograms per liter

N: analyte not detected

Y: analyte detected

Client Arcadis Client Contact Peter Campbell Date 12/1/17 Chain of Custody Number 31171
 Address 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number 206.910.0217 Lab Number 73288 Page 1 of 1

City Seattle State WA Zip Code 98101 Sampler Eric Krueger Lab Contact Elaine Wanker
 Project Name and Location (State) Edmonds Terminal, 11720 Unoco Rd, Edmonds WA Billing Contact
 Analysis (Attach list if more space is needed)

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt				
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		NWTPH-GIX	NWTPH-DX	6,24 Benzene	C PAHS by 82700
-1 GWSP-101	12/1/17	0830		X													Therm. ID <u>A2</u> Cor <u>1.9</u> Unc <u>2.6</u> Cooler Dsc <u>By Blue</u> @Lab <u>1620</u> Wet/Packs Packing <u>Bub</u> Lab Cou Custody Seal: Yes ___ No <input checked="" type="checkbox"/>
GWSP-102A		0900															
-3 GWSP-102B		0930															
GWSP-103A		1000															
-5 GWSP-103B		1025															
GWSP-104		1045															
-7 * Outfall 002		<u>1200</u>															
-7 Outfall 002 MS/MSD		1210															
DUP-1																	
-9 Trip blank																	24 hr TAT

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Archive For _____ Sample Disposal Disposal By Lab Wet/Packs Packing Bub Custody Seal: Yes ___ No

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify)

1. Relinquished By Sign/Print <u>Eric Krueger</u>	Date <u>12/1/17</u>	Time <u>1300</u>	1. Received By Sign/Print <u>Blankenship</u>	Date <u>12/1/17</u>	Time <u>1300</u>
2. Relinquished By Sign/Print	Date	Time	2. Received By Sign/Print	Date	Time
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments * outfall 002: 24 hr TAT

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Client Sample ID: Outfall 002

Lab Sample ID: 580-73288-7

Date Collected: 12/01/17 12:00

Matrix: Water

Date Received: 12/01/17 13:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L	-		12/04/17 20:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					12/04/17 20:03	1
Toluene-d8 (Surr)	97		79 - 122					12/04/17 20:03	1
4-Bromofluorobenzene (Surr)	91		78 - 119					12/04/17 20:03	1
Dibromofluoromethane (Surr)	104		70 - 120					12/04/17 20:03	1
1,2-Dichloroethane-d4 (Surr)	114		70 - 120					12/04/17 20:03	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0067	J B F1 U	0.020	0.0020	ug/L	-	12/04/17 09:07	12/07/17 03:23	1
Chrysene	ND		0.020	0.0060	ug/L	-	12/04/17 09:07	12/07/17 03:23	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L	-	12/04/17 09:07	12/07/17 03:23	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L	-	12/04/17 09:07	12/07/17 03:23	1
Benzo[a]pyrene	ND	F1 UJ	0.020	0.0030	ug/L	-	12/04/17 09:07	12/07/17 03:23	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L	-	12/04/17 09:07	12/07/17 03:23	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L	-	12/04/17 09:07	12/07/17 03:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	70		53 - 112				12/04/17 09:07	12/07/17 03:23	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L	-		12/05/17 19:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/05/17 19:52	1
Trifluorotoluene (Surr)	108		77 - 128					12/05/17 19:52	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.024	J	0.10	0.019	mg/L	-	12/04/17 14:02	12/05/17 18:44	1
Motor Oil (>C24-C36)	ND	E2	0.25	0.078	mg/L	-	12/04/17 14:02	12/05/17 18:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	63		50 - 150				12/04/17 14:02	12/05/17 18:44	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Client Sample ID: DUP-1
Date Collected: 12/01/17 00:01
Date Received: 12/01/17 13:00

Lab Sample ID: 580-73288-8
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/04/17 21:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123					12/04/17 21:17	1
Toluene-d8 (Surr)	98		79 - 122					12/04/17 21:17	1
4-Bromofluorobenzene (Surr)	83		78 - 119					12/04/17 21:17	1
Dibromofluoromethane (Surr)	104		70 - 120					12/04/17 21:17	1
1,2-Dichloroethane-d4 (Surr)	114		70 - 120					12/04/17 21:17	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0086	JB U	0.020	0.0020	ug/L		12/04/17 09:07	12/07/17 04:29	1
Chrysene	ND		0.020	0.0061	ug/L		12/04/17 09:07	12/07/17 04:29	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		12/04/17 09:07	12/07/17 04:29	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		12/04/17 09:07	12/07/17 04:29	1
Benzo[a]pyrene	0.0058	J J	0.020	0.0030	ug/L		12/04/17 09:07	12/07/17 04:29	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		12/04/17 09:07	12/07/17 04:29	1
Dibenz(a,h)anthracene	0.0055	J	0.020	0.0020	ug/L		12/04/17 09:07	12/07/17 04:29	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	61		53 - 112				12/04/17 09:07	12/07/17 04:29	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/05/17 22:31	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/05/17 22:31	1
Trifluorotoluene (Surr)	106		77 - 128					12/05/17 22:31	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.027	J	0.10	0.019	mg/L		12/04/17 14:02	12/05/17 20:12	1
Motor Oil (>C24-C36)	ND		0.25	0.078	mg/L		12/04/17 14:02	12/05/17 20:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	72		50 - 150				12/04/17 14:02	12/05/17 20:12	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73288-2

Client Sample ID: Trip Blank

Lab Sample ID: 580-73288-9

Date Collected: 12/01/17 00:01

Matrix: Water

Date Received: 12/01/17 13:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/04/17 16:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	99		74 - 123					12/04/17 16:19	1
<i>Toluene-d8 (Surr)</i>	98		79 - 122					12/04/17 16:19	1
<i>4-Bromofluorobenzene (Surr)</i>	89		78 - 119					12/04/17 16:19	1
<i>Dibromofluoromethane (Surr)</i>	104		70 - 120					12/04/17 16:19	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	112		70 - 120					12/04/17 16:19	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/05/17 16:40	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	93		58 - 133					12/05/17 16:40	1
<i>Trifluorotoluene (Surr)</i>	107		77 - 128					12/05/17 16:40	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-73407-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 16, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-73407-1 for 1 water sample and 1 trip blank collected on December 05, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on COC. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

One of the cPAHs, reported as benzo(k)fluoranthene, was detected at concentration greater than the MDL in method blank MB 580-263163/1-A. The associated sample result was non-detect, therefore not qualified.

Five of the cPAHs, reported as benzo[a]anthracene, chrysene, benzo[a]pyrene, indeno[1,2,3-cd]pyrene and dibenz(a,h)anthracene were detected at concentration greater than the MDL in method blank MB 580-

263163/1-A. The associated sample results were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270C SIM	Benzo[a]anthracene	ug/L	0.00660	0.0090	U
Outfall #002	MB	8270C SIM	Chrysene	ug/L	0.00715	0.0079	U
Outfall #002	MB	8270C SIM	Benzo[a]pyrene	ug/L	0.00606	0.0089	U
Outfall #002	MB	8270C SIM	Indeno[1,2,3-cd]pyrene	ug/L	0.00833	0.0078	U
Outfall #002	MB	8270C SIM	Dibenz(a,h)anthracene	ug/L	0.00783	0.0083	U

Notes:

MB: method blank

SIM: Selective Ion Monitoring

ug/L: microgram per liter

U: non-detect

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria except one of the cPAHs, reported as benzo[a]pyrene exhibit LCSD recovery 3% greater than upper control limit; however, benzo[a]pyrene was qualified for laboratory blank detect as U., So no qualification is required.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
Outfall-120517	Benzo[a]pyrene	116	123	6	U

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-73407-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-73407-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-73407-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. cPAHs, reported as benzo[a]anthracene, chrysene, benzo[a]pyrene, indeno[1,2,3-cd]pyrene and dibenz(a,h)anthracene were detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.



ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall-120517	580-73407-1	12/05/2017	15:30	Regular
Trip Blank	580-73407-2	12/05/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-73407-1	Outfall-120517	REG	580-73407-1	8270C SIM	Benzo[a]anthracene	0.0090	ug/L	J B	U	BL1	N
580-73407-1	Outfall-120517	REG	580-73407-1	8270C SIM	Chrysene	0.0079	ug/L	J B	U	BL1	N
580-73407-1	Outfall-120517	REG	580-73407-1	8270C SIM	Benzo[a]pyrene	0.0089	ug/L	J * B	U	BL1	N
580-73407-1	Outfall-120517	REG	580-73407-1	8270C SIM	Indeno[1,2,3-cd]pyrene	0.0078	ug/L	J B	U	BL1	N
580-73407-1	Outfall-120517	REG	580-73407-1	8270C SIM	Dibenz(a,h)anthracene	0.0083	ug/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

SIM: Selective Ion Monitoring

ug/L: microgram per liter

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

N: analyte not detected

*: LCS or LCSD is outside acceptance limits.

Rush

Short Hold

Chain of Custody Record

Address: 1100 Olive Way Ste 800
City: Seattle WA 98101

Client Contact: Peter Campbell
Telephone Number (Area Code)/Fax Number: _____

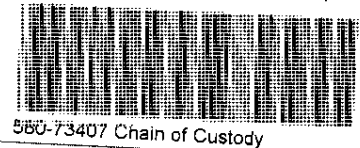
Date: 12/5/2017
Lab Number: _____

Chain of Custody Number: 31176
Page of

Project Name and Location (State): Chevron Edmonds Terminal
Contract/Purchase Order/Quote No.: 8871

Sampler: Scott Wenning
Lab Contact: Elaine Walker
Billing Contact: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Analysis (Attach list if more space is needed)	Special Instructions/ Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH				
<u>Outfall - 120517</u>	<u>12/05/17</u>	<u>1530</u>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>					Loc: 580 73407 Benzene <u>CPH</u> CRU <u>NWTR-6x</u> DRU/HD <u>P-1/56</u> CPATs <u>82705</u>	(A fee may be assessed if samples are retained longer than 1 month)
<u>Trip Blank</u>	<u>12/05/17</u>	<u>-</u>							<input checked="" type="checkbox"/>							



Therm. ID A² Cor 5.1 Unc 5.8
Cooler Desc Small Red @ Lab
10 Packs Packing Bubble
Custody Seal: Yes No X

Cooler: Yes No Cooler Temp: _____

Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown

Sample Disposal: Return To Client Disposal By Lab Archive For _____ Months

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____

QC Requirements (Specify): _____

1. Relinquished By Sign/Print: <u>Ryan W. Brauch / Ryan W. Brauch</u>	Date: <u>12-6-17</u>	Time: <u>1110</u>	1. Received By Sign/Print: <u>B. Gell</u>	Date: <u>12.6.17</u>	Time: <u>1110</u>
2. Relinquished By Sign/Print: _____	Date: _____	Time: _____	2. Received By Sign/Print: _____	Date: _____	Time: _____
3. Relinquished By Sign/Print: _____	Date: _____	Time: _____	3. Received By Sign/Print: _____	Date: _____	Time: _____

Comments: _____

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Client Sample ID: Outfall-120517

Lab Sample ID: 580-73407-1

Date Collected: 12/05/17 15:30

Matrix: Water

Date Received: 12/06/17 11:10

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/09/17 21:37	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					12/09/17 21:37	1
Toluene-d8 (Surr)	104		79 - 122					12/09/17 21:37	1
4-Bromofluorobenzene (Surr)	102		78 - 119					12/09/17 21:37	1
Dibromofluoromethane (Surr)	102		70 - 120					12/09/17 21:37	1
1,2-Dichloroethane-d4 (Surr)	98		70 - 120					12/09/17 21:37	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0090	J-B U	0.020	0.0020	ug/L		12/11/17 09:32	12/13/17 11:58	1
Chrysene	0.0079	J-B U	0.020	0.0061	ug/L		12/11/17 09:32	12/13/17 11:58	1
Benzo[b]fluoranthene	0.0098	J	0.020	0.0081	ug/L		12/11/17 09:32	12/13/17 11:58	1
Benzo[k]fluoranthene	ND		0.031	0.0092	ug/L		12/11/17 09:32	12/13/17 11:58	1
Benzo[a]pyrene	0.0089	J*B U	0.020	0.0031	ug/L		12/11/17 09:32	12/13/17 11:58	1
Indeno[1,2,3-cd]pyrene	0.0078	J-B U	0.020	0.0071	ug/L		12/11/17 09:32	12/13/17 11:58	1
Dibenz[a,h]anthracene	0.0083	J-B U	0.020	0.0020	ug/L		12/11/17 09:32	12/13/17 11:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	60		53 - 112				12/11/17 09:32	12/13/17 11:58	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/09/17 03:04	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/09/17 03:04	1
Trifluorotoluene (Surr)	118		77 - 128					12/09/17 03:04	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.024	J	0.10	0.019	mg/L		12/07/17 09:33	12/09/17 03:11	1
Motor Oil (>C24-C36)	ND		0.25	0.078	mg/L		12/07/17 09:33	12/09/17 03:11	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	73		50 - 150				12/07/17 09:33	12/09/17 03:11	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73407-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-73407-2

Date Collected: 12/05/17 15:30

Matrix: Water

Date Received: 12/06/17 11:10

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/09/17 15:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					12/09/17 15:54	1
Toluene-d8 (Surr)	103		79 - 122					12/09/17 15:54	1
4-Bromofluorobenzene (Surr)	100		78 - 119					12/09/17 15:54	1
Dibromofluoromethane (Surr)	102		70 - 120					12/09/17 15:54	1
1,2-Dichloroethane-d4 (Surr)	98		70 - 120					12/09/17 15:54	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/12/17 13:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/12/17 13:48	1
Trifluorotoluene (Surr)	97		77 - 128					12/12/17 13:48	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-73617-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 13, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-73617-1 for 2 air samples collected on December 14, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the requirement of the Compliance Monitoring **Plan (CMP), which is provided as Appendix B of the Draft Cleanup Action Plan (CAP) submitted to Ecology on July 31, 2017 (Arcadis 2017)**. Air samples are collected monthly from the pre-treatment and post-treatment effluent stack and samples are analyzed for the following compounds:

- Benzene, toluene, ethylbenzene, xylenes, (BTEX collectively)
- Gasoline range organics (GRO)
- Fixed Gases (carbon dioxide, oxygen and methane)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)

- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Air samples were analyzed for BTEX and GRO (USEPA method TO-15) and Fixed Gases in air (ASTM method D1946).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

The SDG 580-73617-1 contains results for the air samples recorded in the chain-of-custody documentations (COC). The water sample results recorded in the COC are reported under separate cover in the SDG 580-73617-2. Air sample analyses were performed as requested on COC. The laboratory reported all requested air sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks are prepared to identify any contamination which may have been introduced into the samples.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for USEPA method TO-15 analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample VSP-801, the surrogate recovery for TO-15 analysis was above the upper control limit (37%) and all associated detected sample results were qualified as estimated "J".

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
VSP 801	1,2-Dichloroethane-d4	167	70-130

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-73617-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-73617-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-73617-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample results were qualified as estimated for high surrogate recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
VSP 801	580-73617-3	12/14/2017	09:35	Regular
VSP 802	580-73617-4	12/14/2017	09:45	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-73617-3	VSP 801	REG	580-73617-1	TO-15	Benzene	2,400	ppb v/v		J	SURH	Y
580-73617-3	VSP 801	REG	580-73617-1	TO-15	Ethylbenzene	3,600	ppb v/v		J	SURH	Y
580-73617-3	VSP 801	REG	580-73617-1	TO-15	Toluene	29	ppb v/v		J	SURH	Y
580-73617-3	VSP 801	REG	580-73617-1	TO-15	m, p-Xylene	2,500	ppb v/v		J	SURH	Y
580-73617-3	VSP 801	REG	580-73617-1	TO-15	o-Xylene	240	ppb v/v		J	SURH	Y
580-73617-3	VSP 801	REG	580-73617-1	TO-15	GRO	290,000	ppb v/v		J	SURH	Y

Notes:

REG: regular

SDG: sample delivery group

GRO: gasoline range organics reported as TPH (as Gasoline)

ppb v/v: parts per billion volume/volume

J: the concentration is an approximate value

SURH: surrogate recovery above upper acceptance limit

Y: analyte detected

Chain of Custody Record



Client Information (Sub Contract Lab)		Sampler: Walker, Elaine M		Lab PM: Elaine M Walker		Carrier Tracking Note(s):		COC No: 580-52003.1	
Client Contact: Elaine Walker		Phone: elaine.walker@testamericainc.com		E-Mail: elaine.walker@testamericainc.com		State of Origin: Washington		Page: Page 1 of 1	
Company: TestAmerica Laboratories, Inc.		Address: 880 Riverside Parkway		City: West Sacramento		State: CA		Job #: 580-73617-1	
City: West Sacramento		State: CA		Zip: 95605		Phone: 916-373-5600(Tel) 916-372-1059(Fax)		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other: M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4.5 Z - other (specify)	
Project Name: Chevron Edmonds Terminal		Project #: 58011413		WO #: SSOW#		Due Date Requested: 12/21/2017		Analysis Requested:	
Site: Chevron Edmonds Terminal		Sample Date: 12/14/17		Sample Time: 09:35 Pacific		Sample Type (C=Comp, G=grab): Air		Matrix (W=water, S=solid, D=wasteoil, BT=tissue, Adv):	
Sample Identification - Client ID (Lab ID)		Sample Date		Sample Time		Sample Type (C=Comp, G=grab)		Matrix (W=water, S=solid, D=wasteoil, BT=tissue, Adv)	
VSP 801 (580-73617-3)		12/14/17		09:35 Pacific		Air		Field Filtered Sample (Yes or No) X	
VSP 802 (580-73617-4)		12/14/17		09:45 Pacific		Air		Perform MS/MSD (Yes or No) X	
								D196/Air_Tedlar_Bag (MOD) Local Method X	
								T015/Air_Tedlar_Bag (MOD) MBTEX Only X	
								Total Number of Containers	
								Special Instructions/Note:	
								1	
								1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
 Unconfirmed
 Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return To Client Disposal By Lab Archive For _____ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date: 12/15/17	Company: TA-Sci	Received by: [Signature]	Date/Time: 12-16-17 9:50	Company: [Signature]
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No	Cooler Temperature(s) °C and Other Remarks:				



Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Client Sample ID: VSP 801

Lab Sample ID: 580-73617-3

Date Collected: 12/14/17 09:35

Matrix: Air

Date Received: 12/14/17 15:40

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	2400	J	25	5.0	ppb v/v			12/21/17 17:22	62.9
Ethylbenzene	3600	J	25	4.0	ppb v/v			12/21/17 17:22	62.9
Toluene	29	J	25	3.2	ppb v/v			12/21/17 17:22	62.9
m,p-Xylene	2500	J	50	6.3	ppb v/v			12/21/17 17:22	62.9
o-Xylene	240	J	25	3.4	ppb v/v			12/21/17 17:22	62.9
TPH (as Gasoline)	290000	J	6300	2500	ppb v/v			12/21/17 17:22	62.9

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	105		70 - 130		12/21/17 17:22	62.9
1,2-Dichloroethane-d4 (Surr)	167	X	70 - 130		12/21/17 17:22	62.9
Toluene-d8 (Surr)	100		70 - 130		12/21/17 17:22	62.9

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.34	J	0.77	0.016	% v/v			12/18/17 11:49	1.54
Methane (FID)	0.0072		0.00015	0.000031	% v/v			12/19/17 10:27	1.54
Oxygen	19		0.31	0.011	% v/v			12/18/17 11:49	1.54

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-1

Client Sample ID: VSP 802

Lab Sample ID: 580-73617-4

Date Collected: 12/14/17 09:45

Matrix: Air

Date Received: 12/14/17 15:40

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	2.0		0.40	0.079	ppb v/v			12/21/17 18:13	1
Ethylbenzene	11		0.40	0.063	ppb v/v			12/21/17 18:13	1
Toluene	1.5		0.40	0.051	ppb v/v			12/21/17 18:13	1
m,p-Xylene	12		0.80	0.10	ppb v/v			12/21/17 18:13	1
o-Xylene	1.8		0.40	0.054	ppb v/v			12/21/17 18:13	1
TPH (as Gasoline)	570		100	40	ppb v/v			12/21/17 18:13	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		12/21/17 18:13	1
1,2-Dichloroethane-d4 (Surr)	108		70 - 130		12/21/17 18:13	1
Toluene-d8 (Surr)	101		70 - 130		12/21/17 18:13	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.57	J	0.77	0.016	% v/v			12/18/17 12:02	1.53
Methane (FID)	0.0061		0.00015	0.000031	% v/v			12/19/17 10:46	1.53
Oxygen	18		0.31	0.011	% v/v			12/18/17 12:02	1.53

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-73617-2
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 13, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-73617-2 for 1 water sample and 1 trip blank collected on December 14, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

The SDG 580-73617-2 contains results for the water samples recorded in the chain-of-custody documentations (COC). The air sample results recorded in the COC are reported under separate cover in the SDG 580-73617-1. Water sample analyses were performed as requested on COC. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Two of the cPAHs, reported as Dibenz(a,h)anthracene and Indeno[1,2,3-cd]pyrene were detected at concentration greater than the MDL in method blank MB 580-263608/1-A. The associated sample results

were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270D SIM	Dibenz(a,h)anthracene	ug/L	0.00486	0.0078	U
Outfall #002	MB	8270D SIM	Indeno[1,2,3-cd]pyrene	ug/L	0.00727	0.0080	U

Notes:

MB: method blank

U: non-detect

SIM: Selective Ion Monitoring

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270D SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-73617-2.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-73617-2.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-73617-2.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. cPAHs, reported as Dibenz(a,h)anthracene and Indeno[1,2,3-cd]pyrene were detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

- Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.
- Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.
- USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-73617-1	12/14/2017	09:00	Regular
Trip Blank - 2	580-73617-2	12/14/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-73617-1	Outfall #002	REG	580-73617-2	8270D SIM	Dibenz(a,h)anthracene	0.0078	ug/L	J B	U	BL1	N
580-73617-1	Outfall #002	REG	580-73617-2	8270D SIM	Indeno[1,2,3-cd]pyrene	0.0080	ug/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

SIM: Selective Ion Monitoring

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

N: analyte not detected

TestAmerica Seattle

5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Chain of Custody Record

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Client Information		Sampler: <u>Eric Krueger</u>		Lab PM: Walker, Elaine M		Carrier Tracking No(s):		COC No: 580-27035-8908.1					
Client Contact: Jason Little		Phone: 303-519-7192		E-Mail: elaine.walker@testamericainc.com				Page: Page 1 of 1					
Company: ARCADIS U.S. Inc		Due Date Requested:		Analysis Requested						Job #: 73617			
Address: 1100 Olive Way Suite 800		TAT Requested (days): Five days		Field Filtered Sample (Yes or No) <input type="checkbox"/> Perform MS/MSA (Yes or No) <input type="checkbox"/> 8270C_SIM - cPAHS <input type="checkbox"/> NNTPH_DX - Northwest - DROIRRO <input type="checkbox"/> 624_5ml_NNTPH_Gx <input type="checkbox"/> Benzene by EPA 624 <input type="checkbox"/> BTEX by TO-15 <input type="checkbox"/> TPH GRO by EPA TO-15 <input type="checkbox"/> Fixed Gas CH4, O2, CO2 <input type="checkbox"/>						Preservation Codes:			
City: Seattle		PO #: B0045362.0010								A - HCL		M - Hexane	
State, Zip: WA, 98101		WO #: 0015254061								B - NaOH		N - None	
Phone: 206-726-4720(Tel)		Project Name: Chevron Edmonds Terminal								C - Zn Acetate		O - AsNaO2	
Email: Jason.Little@arcadis.com		SSOW#:								D - Nitric Acid		P - Na2O4S	
Project Name: Chevron Edmonds Terminal				E - NaHSO4		Q - Na2SO3							
Site: Washington				F - MeOH		R - Na2S2O3							
				G - Amchlor		S - H2SO4							
				H - Ascorbic Acid		T - TSP Dodecahydrate							
				I - Ice		U - Acetone							
				J - DI Water		V - MCAA							
				K - EDTA		W - pH 4-5							
				L - EDA		Z - other (specify)							
				Other:									
				Total Number of containers									
				Special Instructions/Note:									
Sample Identification		Sample Date		Sample Time		Sample Type (C=Comp, G=grab)		Matrix (W=water, S=solid, O=waste/soil)					
								BT=Tissue, A=Air					
								Preservation Code:					
Outfall # 002		12/14/17		0900		G		Water					
Trip blank						G		Water					
								Water					
VSP 801		12/14/17		0935		G		Air					
VSP 802		12/14/17		0945		G		Air					
								PH = 8.02					
								PID = 301.5 ppm					
								PID = 0.1 ppm					
								Therm. ID <u>4R4</u> Cor <u>2.2</u> Unc <u>2.3</u>					
								Cooler Desc <u>in blue</u> @ Lab					
								Wet/Packs Packing <u>Bvb</u>					
								Labco Custody Seal: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>					
								580-73617 Chain of Custody					
Possible Hazard Identification					Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)								
<input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological					<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months								
Deliverable Requested: I, II, III, IV, Other (specify)					Special Instructions/QC Requirements:								
Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:							
Relinquished by: <u>Peter Campbell</u>		Date/Time: 12/14/17 10:05		Company: <u>ARCADIS</u>		Received by: <u>[Signature]</u>		Date/Time: 12/14/17 10:15					
Relinquished by: <u>[Signature]</u>		Date/Time: 12/14/17 1540		Company: <u>ARCADIS</u>		Received by: <u>Tom [Signature]</u>		Date/Time: 12/14/17 1540					
Relinquished by:		Date/Time:		Company:		Received by:		Date/Time: Company:					
Custody Seals Intact: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:									

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Client Sample ID: Outfall #002

Lab Sample ID: 580-73617-1

Date Collected: 12/14/17 09:00

Matrix: Water

Date Received: 12/14/17 15:40

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/15/17 19:37	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					12/15/17 19:37	1
Toluene-d8 (Surr)	97		79 - 122					12/15/17 19:37	1
4-Bromofluorobenzene (Surr)	103		78 - 119					12/15/17 19:37	1
Dibromofluoromethane (Surr)	103		70 - 120					12/15/17 19:37	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120					12/15/17 19:37	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0039	J	0.021	0.0021	ug/L		12/18/17 09:31	12/18/17 15:32	1
Benzo[a]pyrene	0.0062	J	0.021	0.0031	ug/L		12/18/17 09:31	12/18/17 15:32	1
Benzo[b]fluoranthene	ND		0.021	0.0083	ug/L		12/18/17 09:31	12/18/17 15:32	1
Benzo[k]fluoranthene	ND		0.031	0.0093	ug/L		12/18/17 09:31	12/18/17 15:32	1
Chrysene	ND		0.021	0.0062	ug/L		12/18/17 09:31	12/18/17 15:32	1
Dibenz(a,h)anthracene	0.0078	J B U	0.021	0.0021	ug/L		12/18/17 09:31	12/18/17 15:32	1
Indeno[1,2,3-cd]pyrene	0.0080	J B U	0.021	0.0072	ug/L		12/18/17 09:31	12/18/17 15:32	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	74		53 - 112				12/18/17 09:31	12/18/17 15:32	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/15/17 17:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		58 - 133					12/15/17 17:51	1
Trifluorotoluene (Surr)	107		77 - 128					12/15/17 17:51	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.028	J	0.10	0.020	mg/L		12/19/17 14:12	12/19/17 22:27	1
Motor Oil (>C24-C36)	ND		0.26	0.081	mg/L		12/19/17 14:12	12/19/17 22:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	75		50 - 150				12/19/17 14:12	12/19/17 22:27	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73617-2

Client Sample ID: Trip Blank - 2

Lab Sample ID: 580-73617-2

Date Collected: 12/14/17 00:01

Matrix: Water

Date Received: 12/14/17 15:40

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/15/17 19:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	99		74 - 123					12/15/17 19:12	1
<i>Toluene-d8 (Surr)</i>	97		79 - 122					12/15/17 19:12	1
<i>4-Bromofluorobenzene (Surr)</i>	101		78 - 119					12/15/17 19:12	1
<i>Dibromofluoromethane (Surr)</i>	104		70 - 120					12/15/17 19:12	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	102		70 - 120					12/15/17 19:12	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/15/17 17:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	95		58 - 133					12/15/17 17:19	1
<i>Trifluorotoluene (Surr)</i>	100		77 - 128					12/15/17 17:19	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-73804-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 14, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-73804-1 for 2 air samples collected on December 20, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the requirement of the Compliance Monitoring **Plan (CMP), which is provided as Appendix B of the Draft Cleanup Action Plan (CAP) submitted to Ecology on July 31, 2017 (Arcadis 2017)**. Air samples are collected monthly from the pre-treatment and post-treatment effluent stack and samples are analyzed for the following compounds:

- Benzene, toluene, ethylbenzene, xylenes, (BTEX collectively)
- Gasoline range organics (GRO)
- Fixed Gases (carbon dioxide, oxygen and methane)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)

- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Air samples were analyzed for BTEX and GRO (USEPA method TO-15) and Fixed Gases in air (ASTM method D1946).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

The SDG 580-73804-1 contains results for the air samples recorded in the chain-of-custody documentations (COC). The water sample results recorded in the COC are reported under separate cover in the SDG 580-73804-2. Air sample analyses were performed as requested on COC. The laboratory reported all requested air sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks are prepared to identify any contamination which may have been introduced into the samples.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for USEPA method TO-15 analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample VSP-801, the surrogate recovery for TO-15 analysis was above the upper control limit (4%) and all associated detected sample results were qualified as estimated "J".

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
VSP 801	1,2-Dichloroethane-d4	134	70-130

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-73804-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-73804-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-73804-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample results were qualified as estimated for high surrogate recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
VSP-801	580-73804-3	12/20/2017	16:30	Regular
VSP-802	580-73804-4	12/20/2017	16:45	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-73804-3	VSP-801	REG	580-73804-1	TO-15	Benzene	910	ppb v/v		J	SURH	Y
580-73804-3	VSP-801	REG	580-73804-1	TO-15	Ethylbenzene	2,500	ppb v/v		J	SURH	Y
580-73804-3	VSP-801	REG	580-73804-1	TO-15	Toluene	13	ppb v/v		J	SURH	Y
580-73804-3	VSP-801	REG	580-73804-1	TO-15	m, p-Xylene	1,600	ppb v/v		J	SURH	Y
580-73804-3	VSP-801	REG	580-73804-1	TO-15	o-Xylene	160	ppb v/v		J	SURH	Y
580-73804-3	VSP-801	REG	580-73804-1	TO-15	GRO	160,000	ppb v/v		J	SURH	Y

Notes:

REG: regular

SDG: sample delivery group

GRO: gasoline range organics reported as TPH (as Gasoline)

ppb v/v: parts per billion volume/volume

J: the concentration is an approximate value

SURH: surrogate recovery above upper acceptance limit

Y: analyte detected

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Client Sample ID: VSP-801

Lab Sample ID: 580-73804-3

Date Collected: 12/20/17 16:30

Matrix: Air

Date Received: 12/21/17 13:55

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	910	J	6.2	1.2	ppb v/v			12/27/17 21:56	15.6
Toluene	13	J	6.2	0.80	ppb v/v			12/27/17 21:56	15.6
m,p-Xylene	1600	J	12	1.6	ppb v/v			12/27/17 21:56	15.6
o-Xylene	160	J	6.2	0.84	ppb v/v			12/27/17 21:56	15.6
TPH (as Gasoline)	160000	J	1600	620	ppb v/v			12/27/17 21:56	15.6

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	113		70 - 130		12/27/17 21:56	15.6
1,2-Dichloroethane-d4 (Surr)	134	X	70 - 130		12/27/17 21:56	15.6
Toluene-d8 (Surr)	100		70 - 130		12/27/17 21:56	15.6

Method: TO-15 - Volatile Organic Compounds in Ambient Air - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylbenzene	2500		23	3.7	ppb v/v			12/28/17 09:20	58.5

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		70 - 130		12/28/17 09:20	58.5
1,2-Dichloroethane-d4 (Surr)	127		70 - 130		12/28/17 09:20	58.5
Toluene-d8 (Surr)	99		70 - 130		12/28/17 09:20	58.5

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.32	J	0.78	0.017	% v/v			12/26/17 10:09	1.56
Methane (FID)	0.0048		0.00047	0.000094	% v/v			12/28/17 09:28	4.68
Oxygen	19		0.31	0.012	% v/v			12/26/17 10:09	1.56

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-1

Client Sample ID: VSP-802

Lab Sample ID: 580-73804-4

Date Collected: 12/20/17 16:45

Matrix: Air

Date Received: 12/21/17 13:55

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.67		0.40	0.079	ppb v/v			12/27/17 22:47	1
Ethylbenzene	8.2		0.40	0.063	ppb v/v			12/27/17 22:47	1
Toluene	0.60		0.40	0.051	ppb v/v			12/27/17 22:47	1
m,p-Xylene	8.6		0.80	0.10	ppb v/v			12/27/17 22:47	1
o-Xylene	1.2		0.40	0.054	ppb v/v			12/27/17 22:47	1
TPH (as Gasoline)	600		100	40	ppb v/v			12/27/17 22:47	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		12/27/17 22:47	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 130		12/27/17 22:47	1
Toluene-d8 (Surr)	100		70 - 130		12/27/17 22:47	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.43	J	0.74	0.016	% v/v			12/26/17 10:21	1.47
Methane (FID)	0.0033		0.00026	0.000052	% v/v			12/28/17 09:49	2.58
Oxygen	19		0.29	0.011	% v/v			12/26/17 10:21	1.47

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-73804-2
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 14, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-73804-2 for 1 water sample and 1 trip blank collected on December 20, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

The SDG 580-73804-2 contains results for the water samples recorded in the chain-of-custody documentations (COC). The air sample results recorded in the COC are reported under separate cover in the SDG 580-73804-1. Water sample analyses were performed as requested on COC. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Two of the cPAHs, reported as benzo[a]pyrene and dibenz(a,h)anthracene were detected at concentration greater than the MDL in method blank MB 580-263972/1-A. The associated sample result was non-detect, therefore not qualified.

One of the cPAHs, reported as benzo(a)anthracene was detected at concentration greater than the MDL in method blank MB 580-263972/1-A. The associated sample results were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-264046/1-B. The associated sample result was less than five times the blank value, therefore associated sample result was qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270C SIM	Benzo(a)anthracene	ug/L	0.00697	0.0038	U
Outfall #002	MB	Ecology NWTPH-Dx	DRO	mg/L	0.0426	0.081	U

Notes:

MB: method blank

SIM: Selective Ion Monitoring

DRO: reported as #2 diesel (C10-C24)

ug/L: microgram per liter

mg/L: milligram per liter

U: non-detect

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-73804-2.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-73804-2.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-73804-2.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. cPAHs, reported as benzo(a)anthracene and DRO, reported as #2 diesel (C10-C24) were detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

- Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.
- Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.
- USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-73804-1	12/20/2017	16:00	Regular
Trip Blank	580-73804-2	12/20/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-73804-1	Outfall #002	REG	580-73804-2	8270C SIM	Benzo[a]anthracene	0.0038	ug/L	J B	U	BL1	N
580-73804-1	Outfall #002	REG	580-73804-2	Ecology NWTPH-Dx	DRO	0.081	mg/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

SIM: selective ion monitoring

DRO: diesel range organics reported as #2 diesel (C10-C24)

Ecology: Washington State Department of Ecology

ug/L: microgram per liter

mg/L: milligram per liter

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

N: analyte not detected

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Client Sample ID: Outfall #002

Lab Sample ID: 580-73804-1

Date Collected: 12/20/17 16:00

Matrix: Water

Date Received: 12/21/17 13:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/27/17 23:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					12/27/17 23:44	1
Toluene-d8 (Surr)	101		79 - 122					12/27/17 23:44	1
4-Bromofluorobenzene (Surr)	96		78 - 119					12/27/17 23:44	1
Dibromofluoromethane (Surr)	100		70 - 120					12/27/17 23:44	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					12/27/17 23:44	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0038	J-B U	0.021	0.0021	ug/L		12/21/17 14:55	12/26/17 13:42	1
Chrysene	ND		0.021	0.0063	ug/L		12/21/17 14:55	12/26/17 13:42	1
Benzo[b]fluoranthene	ND		0.021	0.0084	ug/L		12/21/17 14:55	12/26/17 13:42	1
Benzo[k]fluoranthene	ND		0.032	0.0095	ug/L		12/21/17 14:55	12/26/17 13:42	1
Benzo[a]pyrene	ND		0.021	0.0032	ug/L		12/21/17 14:55	12/26/17 13:42	1
Indeno[1,2,3-cd]pyrene	ND		0.021	0.0074	ug/L		12/21/17 14:55	12/26/17 13:42	1
Dibenz(a,h)anthracene	ND		0.021	0.0021	ug/L		12/21/17 14:55	12/26/17 13:42	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	78		53 - 112				12/21/17 14:55	12/26/17 13:42	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/23/17 18:24	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					12/23/17 18:24	1
Trifluorotoluene (Surr)	109		77 - 128					12/23/17 18:24	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.081	J-B U	0.10	0.019	mg/L		12/22/17 13:07	12/26/17 21:54	1
Motor Oil (>C24-C36)	ND		0.26	0.079	mg/L		12/22/17 13:07	12/26/17 21:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	81		50 - 150				12/22/17 13:07	12/26/17 21:54	1
n-Decanoic Acid (Surr)							12/22/17 13:07	12/26/17 21:54	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-73804-2

Client Sample ID: Trip Blank

Lab Sample ID: 580-73804-2

Date Collected: 12/20/17 00:01

Matrix: Water

Date Received: 12/21/17 13:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			12/27/17 23:15	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123					12/27/17 23:15	1
Toluene-d8 (Surr)	101		79 - 122					12/27/17 23:15	1
4-Bromofluorobenzene (Surr)	100		78 - 119					12/27/17 23:15	1
Dibromofluoromethane (Surr)	99		70 - 120					12/27/17 23:15	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					12/27/17 23:15	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/23/17 16:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	92		58 - 133					12/23/17 16:49	1
Trifluorotoluene (Surr)	97		77 - 128					12/23/17 16:49	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-73946-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 21, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-73946-1 for 2 air samples collected on December 28, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the requirement of the Compliance Monitoring **Plan (CMP), which is provided as Appendix B of the Draft Cleanup Action Plan (CAP) submitted to Ecology on July 31, 2017 (Arcadis 2017)**. Air samples are collected monthly from the pre-treatment and post-treatment effluent stack and samples are analyzed for the following compounds:

- Benzene, toluene, ethylbenzene, xylenes, (BTEX collectively)
- Gasoline range organics (GRO)
- Fixed Gases (carbon dioxide, oxygen and methane)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)

- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Air samples were analyzed for BTEX and GRO (USEPA method TO-15) and Fixed Gases in air (ASTM method D1946).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

The SDG 580-73946-1 contains results for the air samples recorded in the chain-of-custody documentations (COC). The water sample results recorded in the COC are reported under separate cover in the SDG 580-73946-2. Air sample analyses were performed as requested on COC. The laboratory reported all requested air sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks are prepared to identify any contamination which may have been introduced into the samples.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for USEPA method TO-15 analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample VSP-801, the surrogate recovery for TO-15 analysis was above the upper control limit (25%) and all associated detected sample results were qualified as estimated "J".

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
VSP-801	1,2-Dichloroethane-d4	165	70-130

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-73946-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-73946-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-73946-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample results were qualified as estimated for high surrogate recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
VSP-801	580-73946-3	12/28/2017	11:20	Regular
VSP-802	580-73946-4	12/28/2017	11:15	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-73946-3	VSP-801	REG	580-73946-1	TO-15	Benzene	480	ppb v/v		J	SURH	Y
580-73946-3	VSP-801	REG	580-73946-1	TO-15	Ethylbenzene	1,300	ppb v/v	E	J	SURH	Y
580-73946-3	VSP-801	REG	580-73946-1	TO-15	Toluene	8.1	ppb v/v		J	SURH	Y
580-73946-3	VSP-801	REG	580-73946-1	TO-15	m, p-Xylene	1,100	ppb v/v		J	SURH	Y
580-73946-3	VSP-801	REG	580-73946-1	TO-15	o-Xylene	110	ppb v/v		J	SURH	Y
580-73946-3	VSP-801	REG	580-73946-1	TO-15	GRO	100,000	ppb v/v		J	SURH	Y

Notes:

REG: regular

SDG: sample delivery group

GRO: gasoline range organics reported as TPH (as Gasoline)

Ecology: Washington State Department of Ecology

ppb v/v: parts per billion volume/volume

E: result exceeded calibration range

J: the concentration is an approximate value

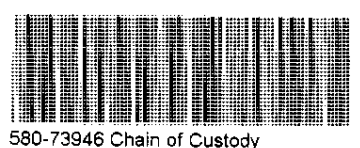
SURH: surrogate recovery above upper acceptance limit

Y: analyte detected

Client: Arcadis Client Contact: Peter Campbell Date: 12/28/17 Chain of Custody Number: 36552
Address: 1100 Olive Way Ste 80 Telephone Number (Area Code)/Fax Number: 206-910-0217 Lab Number: 73946 Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jan Little Lab Contact: Elaine
Project Name and Location (State): Edmonds terminal Billing Contact: _____
Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives											Special Instructions/ Conditions of Receipt						
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Tedlo	Biospec EPA 624	GRO(MTH-6x)	DAG/HO(N-MTH-6x VSGT)	CIAH		DTEX (EPA 1315)	Hydro 70-B	5.000 g/L (Arishore)			
<u>OUT Fall #002</u>	<u>12/28/17</u>	<u>1020</u>		<input checked="" type="checkbox"/>			<u>2</u>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>Any questions call Peter Campbell.</u>
<u>Trip Blank</u>				<input checked="" type="checkbox"/>			<u>0</u>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>PID - 137.6</u>
<u>VSP-801</u>	<u>12/28/17</u>	<u>1120</u>		<input checked="" type="checkbox"/>															<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>PID - 0.3</u>
<u>VSP-802</u>	<u>12/28/17</u>	<u>1115</u>		<input checked="" type="checkbox"/>															<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			



Therm. ID: AZ Cor: 0.4 Unc: 0.5
Cooler Disc: See Red @ Lab: _____
Wet/Packs Packing: Bubble
Custody Seal: Yes ___ No X

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By: <u>Jan Little</u> Date: <u>12/28/17</u> Time: <u>1125</u>	1. Received By: <u>Francisco Luna Jr</u> Date: <u>12/28/17</u> Time: <u>1125</u>
2. Relinquished By: <u>Francisco Luna Jr</u> Date: <u>12/28/17</u> Time: <u>1455</u>	2. Received By: <u>Tom Blunt</u> Date: <u>12/28/17</u> Time: <u>1455</u>
3. Relinquished By: _____ Date: _____ Time: _____	3. Received By: _____ Date: _____ Time: _____

Comments: _____

Rush
 Short Hold

Chain of Custody Record

Client: **Arcadis** Date: **12/28/17** Chain of Custody Number: **36552**
 Address: **1100 Olive Way Ste 80** Lab Number: **Page 1 of 1**
 City: **Seattle** State: **WA** Zip Code: **98101**
 Project Name and Location (State): **Edwards Terminal**
 Contract/Purchase Order/Quote No. _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix					Containers & Preservatives					Analysis (Attach list if more space is needed)	Special Instructions/ Conditions of Receipt
			Air	Sed	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Tedlo		
OUT Fall #002	12/28/17	1020	✓			2				8			✓	Any questions call Peter Campbell.
Trip Blank						0				6			✓	
VSP-801	12/28/17	1120	✓										✓	PID - 137.6
VSP-802	12/28/17	1115	✓										✓	PID - 0.3



580-73946 Chain of Custody

Therm. ID A2 Cor-0.4 Unc-0.5
 Cooler Dsc 5.0 @ Lab _____
 Wet/Packs Packing Bbb/bj
 Custody Seal: Yes No

Client Contact: **Peter Campbell** Date: **12/28/17**
 Telephone Number (Alpha Code)/Fax Number: **206-910-5214**
 Sampler: **Jana Little** Lab Contact: **Elaine**
 Billing Contact: _____

Sample Disposal: Return To Client Disposal By Lab Archive For _____ Months

OC Requirements (Specify):
 1. Received By Sign/Print: **Jana Little** Date: **12/28/17** Time: **1125**
 2. Relinquished By Sign/Print: **Francisco Luna Jr** Date: **12/29/17** Time: **10:30**
 3. Relinquished By Sign/Print: _____ Date: _____ Time: _____

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Client Sample ID: VSP-801

Lab Sample ID: 580-73946-3

Date Collected: 12/28/17 11:20

Matrix: Air

Date Received: 12/28/17 14:55

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	480	J	7.5	1.5	ppb v/v			01/04/18 00:47	18.78
Ethylbenzene	1300	E J	7.5	1.2	ppb v/v			01/04/18 00:47	18.78
Toluene	8.1	J	7.5	0.96	ppb v/v			01/04/18 00:47	18.78
m,p-Xylene	1100	J	15	1.9	ppb v/v			01/04/18 00:47	18.78
o-Xylene	110	J	7.5	1.0	ppb v/v			01/04/18 00:47	18.78
TPH (as Gasoline)	100000	J	1900	750	ppb v/v			01/04/18 00:47	18.78

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	110		70 - 130		01/04/18 00:47	18.78
1,2-Dichloroethane-d4 (Surr)	165	X	70 - 130		01/04/18 00:47	18.78
Toluene-d8 (Surr)	101		70 - 130		01/04/18 00:47	18.78

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.39	J	0.73	0.016	% v/v			01/02/18 13:25	1.45
Methane (FID)	0.0076		0.00015	0.000029	% v/v			01/03/18 09:30	1.45
Oxygen	18		0.29	0.011	% v/v			01/02/18 13:25	1.45

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-1

Client Sample ID: VSP-802

Lab Sample ID: 580-73946-4

Date Collected: 12/28/17 11:15

Matrix: Air

Date Received: 12/28/17 14:55

Sample Container: Summa Canister 1L

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.58		0.40	0.079	ppb v/v			01/04/18 01:38	1
Ethylbenzene	5.7		0.40	0.063	ppb v/v			01/04/18 01:38	1
Toluene	1.4		0.40	0.051	ppb v/v			01/04/18 01:38	1
m,p-Xylene	7.8		0.80	0.10	ppb v/v			01/04/18 01:38	1
o-Xylene	1.5		0.40	0.054	ppb v/v			01/04/18 01:38	1
TPH (as Gasoline)	180		100	40	ppb v/v			01/04/18 01:38	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	101		70 - 130		01/04/18 01:38	1
1,2-Dichloroethane-d4 (Surr)	96		70 - 130		01/04/18 01:38	1
Toluene-d8 (Surr)	104		70 - 130		01/04/18 01:38	1

Method: D1946 - Fixed Gases in Air (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon Dioxide (TCD)	0.45	J	0.73	0.016	% v/v			01/02/18 13:40	1.46
Methane (FID)	0.0087		0.00015	0.000029	% v/v			01/03/18 09:45	1.46
Oxygen	18		0.29	0.011	% v/v			01/02/18 13:40	1.46

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-73946-2
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 5, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-73946-2 for 1 water sample and 1 trip blank collected on December 28, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

The SDG 580-73946-2 contains results for the water samples recorded in the chain-of-custody documentations (COC). The air sample results recorded in the COC are reported under separate cover in the SDG 580-73946-1. Water sample analyses were performed as requested on COC. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

One of the cPAHs, reported as benzo[a]anthracene was detected at concentration greater than the MDL in method blank MB 580-264392/1-A. The associated sample result was non-detect, therefore not qualified.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-264464/1-B. The associated sample result was less than five times the blank value, therefore associated sample result was qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	Ecology NWTPH-Dx	DRO	mg/L	0.0299	0.077	U

Notes:

MB: method blank

DRO: reported as #2 diesel (C10-C24)

mg/L: milligrams per liter

U: non-detect

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-73946-2.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-73946-2.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-73946-2.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. DRO, reported as #2 diesel (C10-C24) was detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

- Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.
- Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.
- USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-73946-1	12/28/2017	10:20	Regular
Trip Blank	580-73946-2	12/28/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-73946-1	Outfall #002	REG	580-73946-2	Ecology NWTPH-Dx	DRO	0.077	mg/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

DRO: diesel range organics reported as #2 diesel (C10-C24)

Ecology: Washington State Department of Ecology

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

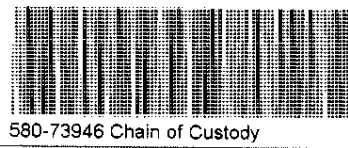
mg/L: milligrams per liter

N: analyte not detected

Client: Arcadis Client Contact: Peter Campbell Date: 12/28/17 Chain of Custody Number: 36552
 Address: 1100 Olive Way Ste 80 Telephone Number (Area Code)/Fax Number: 206-910-0217 Lab Number: 73946 Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jan Little Lab Contact: Elaine
 Project Name and Location (State): Edmonds Terminal Billing Contact: _____
 Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives										Special Instructions/ Conditions of Receipt						
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Tedlo	Biosorb EPA 624	GRO(MTH-6x)	DAG/HO(N-MTH-6x VSGT)		CIAM	DTEX (EPA 1515)	PolyBPA 70-B	5.000 g/L (Arishore)		
OUT Fall #002	12/28/17	1020		✓			2			8						✓	✓	✓	✓				Any questions call Peter Campbell.
Trip Blank	-	-		✓			0			6						✓	✓	✓	✓				PID - 137.6
VSP-801	12/28/17	1120		✓									1					✓	✓	✓			PID - 0.3
VSP-802	12/28/17	1115		✓									1					✓	✓	✓			PID - 0.3



Therm. ID: AZ Cor: 0.4 Unc: 0.5
 Cooler Disc: See Red @Lab: _____
 Wet/Packs Packing: Bubble
 Custody Seal: Yes _____ No X

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
 Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____
 QC Requirements (Specify): _____

1. Relinquished By: <u>Jan Little</u> Date: <u>12/28/17</u> Time: <u>1125</u>	1. Received By: <u>Francisco Luna Jr</u> Date: <u>12/28/17</u> Time: <u>1125</u>
2. Relinquished By: <u>Francisco Luna Jr</u> Date: <u>12/28/17</u> Time: <u>1455</u>	2. Received By: <u>Tom Blunt</u> Date: <u>12/28/17</u> Time: <u>1455</u>
3. Relinquished By: _____ Date: _____ Time: _____	3. Received By: _____ Date: _____ Time: _____

Comments: _____

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Client Sample ID: Outfall #002

Lab Sample ID: 580-73946-1

Date Collected: 12/28/17 10:20

Matrix: Water

Date Received: 12/28/17 14:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/03/18 17:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	91		74 - 123					01/03/18 17:02	1
Toluene-d8 (Surr)	105		79 - 122					01/03/18 17:02	1
4-Bromofluorobenzene (Surr)	101		78 - 119					01/03/18 17:02	1
Dibromofluoromethane (Surr)	91		70 - 120					01/03/18 17:02	1
1,2-Dichloroethane-d4 (Surr)	100		70 - 120					01/03/18 17:02	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.22	0.022	ug/L		01/02/18 09:08	01/02/18 17:55	10
Chrysene	ND		0.22	0.067	ug/L		01/02/18 09:08	01/02/18 17:55	10
Benzo[b]fluoranthene	ND		0.22	0.089	ug/L		01/02/18 09:08	01/02/18 17:55	10
Benzo[k]fluoranthene	ND		0.33	0.10	ug/L		01/02/18 09:08	01/02/18 17:55	10
Benzo[a]pyrene	ND		0.22	0.033	ug/L		01/02/18 09:08	01/02/18 17:55	10
Indeno[1,2,3-cd]pyrene	ND		0.22	0.078	ug/L		01/02/18 09:08	01/02/18 17:55	10
Dibenz(a,h)anthracene	ND		0.22	0.022	ug/L		01/02/18 09:08	01/02/18 17:55	10
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	82		53 - 112				01/02/18 09:08	01/02/18 17:55	10

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/02/18 16:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		58 - 133					01/02/18 16:21	1
Trifluorotoluene (Surr)	98		77 - 128					01/02/18 16:21	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<u>#2 Diesel (C10-C24)</u>	<u>0.077</u>	<u>J-B</u> <u>U</u>	0.11	0.021	mg/L		01/03/18 08:30	01/05/18 13:59	1
<u>Motor Oil (>C24-C36)</u>	<u>0.19</u>	<u>J</u>	0.27	0.085	mg/L		01/03/18 08:30	01/05/18 13:59	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>o</i> -Terphenyl	75		50 - 150				01/03/18 08:30	01/05/18 13:59	1
<i>n</i> -Decanoic Acid (Surr)							01/03/18 08:30	01/05/18 13:59	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-73946-2

Client Sample ID: Trip Blank

Lab Sample ID: 580-73946-2

Date Collected: 12/28/17 00:01

Matrix: Water

Date Received: 12/28/17 14:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			01/02/18 17:32	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	95		74 - 123					01/02/18 17:32	1
Toluene-d8 (Surr)	106		79 - 122					01/02/18 17:32	1
4-Bromofluorobenzene (Surr)	101		78 - 119					01/02/18 17:32	1
Dibromofluoromethane (Surr)	91		70 - 120					01/02/18 17:32	1
1,2-Dichloroethane-d4 (Surr)	96		70 - 120					01/02/18 17:32	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			12/29/17 21:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		58 - 133					12/29/17 21:48	1
Trifluorotoluene (Surr)	109		77 - 128					12/29/17 21:48	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-74109-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 20, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-74109-1 for 1 water sample and 1 trip blank collected on January 05, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentations (COC). The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Three of the cPAHs, reported as benzo[a]anthracene, benzo[a]pyrene and dibenz(a,h)anthracene were detected at concentration greater than the MDL in method blank MB 580-264742/1-A. The associated sample results were not detected, therefore associated sample results were not qualified.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-74109-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-74109-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-74109-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.

- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method/field blank samples were generally free of contamination with no qualification required. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-74109-1	01/05/2018	11:15	Regular
Trip Blank	580-74109-2	01/05/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-74216-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 20, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-74216-1 for 1 water sample and 1 trip blank collected on January 09, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentations (COC). The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

One of the cPAHs, reported as benzo(a)anthracene was detected at concentration greater than the MDL in method blank MB 580-265037/1-A. The associated sample result was non-detect, therefore not qualified.

DRO, reported as #2 diesel (C10-C24) and HO, reported as motor oil (>C24-C36), were detected at concentrations greater than the MDL in method blank MB 580-265035/1-B. The associated sample results

were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	Ecology NWTPH-Dx	DRO	mg/L	0.0356	0.046	U
Outfall #002	MB	Ecology NWTPH-Dx	HO	mg/L	0.0841	0.14	U

Notes:

MB: method blank

U: non-detect

DRO: reported as #2 diesel (C10-C24)

HO: reported as motor oil (>C24-C36)

mg/L: milligrams per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-74216-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-74216-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-74216-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. DRO, reported as #2 diesel (C10-C24) and HO, reported as motor oil (>C24-C36) were detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-74216-1	01/09/2018	11:10	Regular
Trip Blank	580-74216-2	01/09/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-74216-1	Outfall #002	REG	580-74216-1	Ecology NWTPH-Dx	DRO	0.046	mg/L	J B	U	BL1	N
580-74216-1	Outfall #002	REG	580-74216-1	Ecology NWTPH-Dx	HO	0.14	mg/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

DRO: diesel range organics reported as #2 diesel (C10-C24)

HO: reported as motor oil (>C24-C36)

Ecology: Washington State Department of Ecology

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

mg/L: milligrams per liter

N: analyte not detected

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-74473-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 20, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-74473-1 for 1 water sample and 1 trip blank collected on January 18, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentations (COC) besides for benzene analyses. The COC requested benzene to be analyzed by USEPA method 624. Benzene was analyzed by USEPA method 8260C with a detection limit of 0.42 microgram per liter (ug/L) and a reporting limit of 2 ug/L but both methods are comparable for the constituent analysed. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Five of the cPAHs, reported as benzo(a)anthracene, benzo[a]pyrene, chrysene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene were detected at concentration greater than the MDL in method blank MB 580-

265687/1-A. The associated sample results were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

DRO, reported as #2 diesel (C10-C24) and HO, reported as motor oil (>C24-C36), were detected at concentration greater than the MDL in method blank MB 580-265742/1-B. The associated sample results were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270D SIM	Benzo[a]anthracene	ug/L	0.00596	0.0078	U
Outfall #002	MB	8270D SIM	Benzo[a]pyrene	ug/L	0.00450	0.0063	U
Outfall #002	MB	8270D SIM	Chrysene	ug/L	0.00728	0.0065	U
Outfall #002	MB	8270D SIM	Dibenz(a,h)anthracene	ug/L	0.00627	0.0053	U
Outfall #002	MB	8270D SIM	Indeno[1,2,3-cd]pyrene	ug/L	0.00790	0.0075	U
Outfall #002	MB	Ecology NWTPH-Dx	DRO	mg/L	0.0349	0.058	U
Outfall #002	MB	Ecology NWTPH-Dx	HO	mg/L	0.365	0.13	U

Notes:

MB: method blank

U: non-detect

DRO: reported as #2 diesel (C10-C24)

HO: reported as motor oil (>C24-C36)

SIM: selective ion monitoring

ug/L: micrograms per liter

mg/L: milligrams per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270D SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-74473-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-74473-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-74473-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. cPAHs, reported as benzo(a)anthracene, benzo[a]pyrene, chrysene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene; DRO, reported as #2 diesel (C10-C24) and; HO, reported as motor oil (>C24-C36) were detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. USEPA 624 and USEPA 8260C methods are comparable for the constituent analysed. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

- Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.
- Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-74473-1	01/18/2018	10:30	Regular
Trip Blank	580-74473-2	01/18/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-74473-1	Outfall #002	REG	580-74473-1	8270D SIM	Benzo[a]anthracene	0.0078	ug/L	J B	U	BL1	N
580-74473-1	Outfall #002	REG	580-74473-1	8270D SIM	Benzo[a]pyrene	0.0063	ug/L	J B	U	BL1	N
580-74473-1	Outfall #002	REG	580-74473-1	8270D SIM	Chrysene	0.0065	ug/L	J B	U	BL1	N
580-74473-1	Outfall #002	REG	580-74473-1	8270D SIM	Dibenz(a,h)anthracene	0.0053	ug/L	J B	U	BL1	N
580-74473-1	Outfall #002	REG	580-74473-1	8270D SIM	Indeno[1,2,3-cd]pyrene	0.0075	ug/L	J B	U	BL1	N
580-74473-1	Outfall #002	REG	580-74473-1	Ecology NWTPH-Dx	DRO	0.058	mg/L	J B	U	BL1	N
580-74473-1	Outfall #002	REG	580-74473-1	Ecology NWTPH-Dx	HO	0.13	mg/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

SIM: selective ion monitoring

DRO: diesel range organics reported as #2 diesel (C10-C24)

HO: reported as motor oil (>C24-C36)

Ecology: Washington State Department of Ecology

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

ug/L: micrograms per liter

mg/L: milligrams per liter

N: analyte not detected

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-74658-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 26, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-74658-1 for 1 water sample and 1 trip blank collected on January 24, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentations (COC) besides for benzene analyses. The COC requested benzene to be analyzed by USEPA method 624. Benzene was analyzed by USEPA method 8260C with a detection limit of 0.42 microgram per liter (ug/L) and a reporting limit of 2 ug/L. USEPA 624 method is a wastewater method while USEPA 8260C method is applicable to nearly all types of samples and matrices but both methods are comparable for the constituent analysed. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

One of the cPAHs, reported as benzo[k]fluoranthene was detected at concentration greater than the MDL in method blank MB 580-266194/1-A. The associated sample result was non-detect, therefore not qualified.

Five of the cPAHs, reported as benzo[a]anthracene, benzo[a]pyrene, chrysene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene was detected at concentrations greater than the MDLs in method blank MB 580-266194/1-A. The associated sample results were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270D SIM	benzo[a]anthracene	ug/L	0.00608	0.0079	U
Outfall #002	MB	8270D SIM	benzo[a]pyrene	ug/L	0.00544	0.0070	U
Outfall #002	MB	8270D SIM	chrysene	ug/L	0.0101	0.0073	U
Outfall #002	MB	8270D SIM	dibenz(a,h)anthracene	ug/L	0.00702	0.0060	U
Outfall #002	MB	8270D SIM	indeno[1,2,3-cd] pyrene	ug/L	0.00936	0.0075	U

Notes:

MB: method blank

SIM: selective ion monitoring

U: non-detect

ug/L: micrograms per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 8260C, USEPA method 8270D SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
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NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-74658-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-74658-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-74658-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. Five of the cPAHs, reported as benzo[a]anthracene, benzo[a]pyrene, chrysene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene were detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. USEPA 624 and USEPA 8260C methods are comparable for the constituent analysed. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.



ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-74658-1	01/24/2018	10:20	Regular
Trip Blank	580-74658-2	01/24/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-74658-1	Outfall #002	REG	580-74658-1	8270D SIM	Benzo[a]anthracene	0.0079	ug/L	J B	U	BL1	N
580-74658-1	Outfall #002	REG	580-74658-1	8270D SIM	Benzo[a]pyrene	0.0070	ug/L	J B	U	BL1	N
580-74658-1	Outfall #002	REG	580-74658-1	8270D SIM	Chrysene	0.0073	ug/L	J B	U	BL1	N
580-74658-1	Outfall #002	REG	580-74658-1	8270D SIM	Dibenz(a,h)anthracene	0.0060	ug/L	J B	U	BL1	N
580-74658-1	Outfall #002	REG	580-74658-1	8270D SIM	Indeno[1,2,3-cd]pyrene	0.0075	ug/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

SIM: selective ion monitoring

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

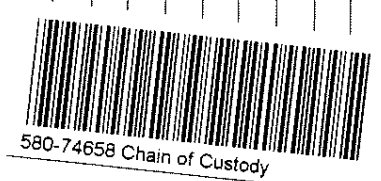
ug/L: micrograms per liter

N: analyte not detected

Client: Arcadis Client Contact: Peter Campbell Date: 1/24/18 Chain of Custody Number: 36554
Address: 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____
Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Wailer
Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed): _____
Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH				
<u>Outfall #002</u>	<u>1/24/18</u>	<u>1020</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>2</u>			<u>8</u>					Loc: 580 74658	<u>pH = 7.58</u>
<u>Trip Blank</u>	<u>—</u>	<u>—</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<u>6</u>							



580-74658 Chain of Custody

erm. ID 124 Cor 40 Unc 4.1
oler Dsc Med Blue @Lab _____
t/Packs Packing Bubble
Custody Seal: Yes ___ No X

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By: <u>Jason Little</u> Sign/Print: _____ Date: <u>1/25/17</u> Time: <u>1145</u>	1. Received By: <u>Francisco Luna, Jr</u> Sign/Print: _____ Date: <u>1/25/18</u> Time: <u>1145</u>
2. Relinquished By: <u>Francisco Luna, Jr</u> Sign/Print: _____ Date: <u>1/25/18</u> Time: <u>1410</u>	2. Received By: <u>Henry Hobbs</u> Sign/Print: _____ Date: <u>1-25-18</u> Time: <u>1410</u>
3. Relinquished By: _____ Sign/Print: _____ Date: _____ Time: _____	3. Received By: _____ Sign/Print: _____ Date: _____ Time: _____

Comments: _____

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-74658-1

Date Collected: 01/24/18 10:20

Matrix: Water

Date Received: 01/25/18 14:10

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/31/18 20:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		80 - 120					01/31/18 20:17	1
Toluene-d8 (Surr)	100		80 - 122					01/31/18 20:17	1
1,2-Dichloroethane-d4 (Surr)	98		80 - 126					01/31/18 20:17	1
4-Bromofluorobenzene (Surr)	103		75 - 125					01/31/18 20:17	1
Dibromofluoromethane (Surr)	99		77 - 120					01/31/18 20:17	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0079	J-B U	0.021	0.0021	ug/L		01/29/18 14:21	01/30/18 23:34	1
Benzo[a]pyrene	0.0070	J-B U	0.021	0.0031	ug/L		01/29/18 14:21	01/30/18 23:34	1
Benzo[b]fluoranthene	ND		0.021	0.0082	ug/L		01/29/18 14:21	01/30/18 23:34	1
Benzo[k]fluoranthene	ND		0.031	0.0092	ug/L		01/29/18 14:21	01/30/18 23:34	1
Chrysene	0.0073	J-B U	0.021	0.0062	ug/L		01/29/18 14:21	01/30/18 23:34	1
Dibenz(a,h)anthracene	0.0060	J-B U	0.021	0.0021	ug/L		01/29/18 14:21	01/30/18 23:34	1
Indeno[1,2,3-cd]pyrene	0.0075	J-B U	0.021	0.0072	ug/L		01/29/18 14:21	01/30/18 23:34	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	67		53 - 112				01/29/18 14:21	01/30/18 23:34	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/26/18 16:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		58 - 133					01/26/18 16:41	1
Trifluorotoluene (Surr)	106		77 - 128					01/26/18 16:41	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		01/30/18 14:37	01/31/18 17:52	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		01/30/18 14:37	01/31/18 17:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	59		50 - 150				01/30/18 14:37	01/31/18 17:52	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-74658-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-74658-2

Date Collected: 01/24/18 10:20

Matrix: Water

Date Received: 01/25/18 14:10

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			01/30/18 21:33	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	100		80 - 120					01/30/18 21:33	1
<i>Toluene-d8 (Surr)</i>	100		80 - 122					01/30/18 21:33	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	100		80 - 126					01/30/18 21:33	1
<i>4-Bromofluorobenzene (Surr)</i>	103		75 - 125					01/30/18 21:33	1
<i>Dibromofluoromethane (Surr)</i>	101		77 - 120					01/30/18 21:33	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			01/26/18 15:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	94		58 - 133					01/26/18 15:38	1
<i>Trifluorotoluene (Surr)</i>	107		77 - 128					01/26/18 15:38	1

optionData Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-74854-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 26, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-74854-1 for 1 water sample, 1 field duplicate and 1 trip blank collected on February 01, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results, MS/MSD results, field duplicate results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentations. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270D SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

Matrix spikes were prepared in duplicate and analyzed. MS and MSD analysis must exhibit a percent recoveries and relative percent differences within the laboratory's acceptance criteria.

The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where compound concentration detected in the parent sample exceeds the MS/MSD concentration by factor four.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	Method	MS Recovery	MSD Recovery	RPD	Validation Qualifier	Laboratory Limit
NE	NE	NE	NE	NE	NE	NE	NE

Field Duplicates

Field duplicates were collected for SDG 580-74854-1 and all precision criteria were met.

Duplicate sample ID and Parent field sample ID were updated in the following table:

Duplicate Sample ID	Field Sample ID
DUP-1	Outfall #002

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-74854-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD and FD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-74854-1	02/01/2018	15:00	Regular
Dup-1	580-74854-2	02/01/2018	NA	Field Duplicate
Trip Blank	580-74854-3	02/01/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-74956-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 26, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-74956-1 for 1 water sample and 1 trip blank collected on February 06, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentations. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270D SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-74956-1.

Field Duplicates

According to the SAP, Field duplicate was not collected for SDG 580-74956-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-74956-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS. Accuracy was acceptable.

- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-74956-1	02/06/2018	10:30	Regular
Trip Blank	580-74956-2	02/06/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-75109-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	March 26, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-75109-1 for 1 water sample and 1 trip blank collected on February 13, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

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- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentations. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

One of the cPAHs, reported as benzo(a)anthracene was detected at concentration greater than the MDL in method blank MB 580-267557/1-A. The associated sample result was less than five times the blank value, therefore associated sample result was qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270D SIM	benzo(a)anthracene	ug/L	0.00255	0.0043	U

Notes:

MB: method blank

SIM: selective ion monitoring

U: non-detect

ug/L: micrograms per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270D SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-75109-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-75109-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-75109-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. One of the cPAHs, reported as benzo(a)anthracene was detected in the associated laboratory method blank; this laboratory method blank detect resulted in associated sample detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-75109-1	02/13/2018	11:30	Regular
Trip Blank	580-75109-2	02/13/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-75109-1	Outfall #002	REG	580-75109-1	8270D SIM	benzo[a]anthracene	0.0043	ug/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

SIM: selective ion monitoring

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

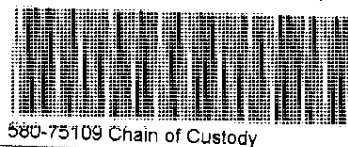
BL1: result less than some multiple of that found in laboratory method blank

ug/L: micrograms per liter

N: analyte not detected

Client: Arcadis Client Contact: Peter Campbell Date: 2/13/18 Chain of Custody Number: 36687
 Address: 1100 Olive way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____
 City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Walker Page 1 of 1
 Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed): _____
 Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Special Instructions/ Conditions of Receipt			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	Benzene EPA 624		NWTPH-6x	NWTPH-DX.W/SBC	CPAHS 8270C SW
<u>Outfall #00Z</u>	<u>2/13/17</u>	<u>1130</u>	<input checked="" type="checkbox"/>				<u>2</u>			<u>8</u>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>PH=</u>
<u>Trip Blank</u>	<u>---</u>	<u>---</u>	<input checked="" type="checkbox"/>							<u>6</u>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	



Therm. ID AZ Cor 0.8° Unc 1.7°
 Cooler Dsc: Ins Red
 Wet/Packs Packing: Bubble
 Custody Seal: Yes No

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify): _____

1. Relinquished By <u>Jason Little</u> Sign/Print	Date <u>2/14/18</u>	Time <u>1220</u>	1. Received By <u>Francisco Luna, Jr</u> Sign/Print	Date <u>2/14/18</u>	Time <u>1220</u>
2. Relinquished By _____ Sign/Print	Date _____	Time _____	2. Received By _____ Sign/Print	Date _____	Time _____
3. Relinquished By _____ Sign/Print	Date _____	Time _____	3. Received By _____ Sign/Print	Date _____	Time _____

Comments: _____

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-75109-1

Date Collected: 02/13/18 11:30

Matrix: Water

Date Received: 02/14/18 12:20

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			02/15/18 23:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	105		74 - 123					02/15/18 23:03	1
Toluene-d8 (Surr)	99		79 - 122					02/15/18 23:03	1
4-Bromofluorobenzene (Surr)	106		78 - 119					02/15/18 23:03	1
Dibromofluoromethane (Surr)	110		70 - 120					02/15/18 23:03	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 120					02/15/18 23:03	1

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0043	J B U	0.020	0.0020	ug/L		02/19/18 08:56	02/19/18 15:18	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		02/19/18 08:56	02/19/18 15:18	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		02/19/18 08:56	02/19/18 15:18	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		02/19/18 08:56	02/19/18 15:18	1
Chrysene	ND		0.020	0.0061	ug/L		02/19/18 08:56	02/19/18 15:18	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		02/19/18 08:56	02/19/18 15:18	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		02/19/18 08:56	02/19/18 15:18	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	83		53 - 112				02/19/18 08:56	02/19/18 15:18	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/15/18 15:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		58 - 133					02/15/18 15:49	1
Trifluorotoluene (Surr)	117		77 - 128					02/15/18 15:49	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		02/15/18 13:17	02/16/18 01:30	1
Motor Oil (>C24-C36)	ND		0.36	0.097	mg/L		02/15/18 13:17	02/16/18 01:30	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	62		50 - 150				02/15/18 13:17	02/16/18 01:30	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75109-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-75109-2

Date Collected: 02/13/18 00:01

Matrix: Water

Date Received: 02/14/18 12:20

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.42	ug/L			02/15/18 15:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	105		74 - 123					02/15/18 15:28	1
<i>Toluene-d8 (Surr)</i>	96		79 - 122					02/15/18 15:28	1
<i>4-Bromofluorobenzene (Surr)</i>	102		78 - 119					02/15/18 15:28	1
<i>Dibromofluoromethane (Surr)</i>	104		70 - 120					02/15/18 15:28	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	107		70 - 120					02/15/18 15:28	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			02/15/18 14:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	89		58 - 133					02/15/18 14:48	1
<i>Trifluorotoluene (Surr)</i>	109		77 - 128					02/15/18 14:48	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-75387-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	April 06, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-75387-1 for 1 water sample and 1 trip blank collected on February 27, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory’s acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory’s acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-75387-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-75387-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-75387-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.

- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-75387-1	02/27/2018	10:00	Regular
Trip Blank	580-75387-2	02/27/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-75584-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	April 06, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-75584-1 for 1 water sample and 1 trip blank collected on March 05, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Five of the cPAHs, reported as chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene and indeno[1,2,3-cd] pyrene were detected at concentration greater than the MDL in method blank MB 580-268855/1-A. The associated sample results were non-detect, therefore not qualified.

Two of the cPAHs, reported as benzo(a)anthracene and dibenz(a,h)anthracene were detected at concentration greater than the MDL in method blank MB 580-268855/1-A. The associated sample results were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270C SIM	benzo(a)anthracene	ug/L	0.0111	0.0044	U
Outfall #002	MB	8270C SIM	dibenz(a,h)anthracene	ug/L	0.0108	0.0021	U

Notes:

MB: method blank

SIM: selective ion monitoring

U: non-detect

ug/L: micrograms per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria besides for benzene.

LCS/LCSD for analysis batch 268906, RPD was exceeding the acceptance criteria. The associated sample result was non-detect therefore associated sample result was not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-755584-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-75584-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-75584-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. Two of the cPAHs, reported as benzo(a)anthracene and dibenz(a,h)anthracene were detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

- Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.
- Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.
- USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-75584-1	03/05/2018	10:30	Regular
Trip Blank	580-75584-2	03/05/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-75584-1	Outfall #002	REG	580-75584-1	8270C SIM	benzo[a]anthracene	0.0044	ug/L	J B	U	BL1	N
580-75584-1	Outfall #002	REG	580-75584-1	8270C SIM	dibenz(a,h)anthracene	0.0021	ug/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

SIM: selective ion monitoring

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

ug/L: micrograms per liter

N: analyte not detected

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-75584-1

Date Collected: 03/05/18 10:30

Matrix: Water

Date Received: 03/06/18 12:50

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	*	1.0	0.53	ug/L			03/13/18 21:10	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		74 - 123					03/13/18 21:10	1
Toluene-d8 (Surr)	98		79 - 122					03/13/18 21:10	1
4-Bromofluorobenzene (Surr)	105		78 - 119					03/13/18 21:10	1
Dibromofluoromethane (Surr)	103		70 - 120					03/13/18 21:10	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 120					03/13/18 21:10	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0044	J B U	0.021	0.0021	ug/L		03/12/18 13:31	03/13/18 19:26	1
Chrysene	ND		0.021	0.0064	ug/L		03/12/18 13:31	03/13/18 19:26	1
Benzo[b]fluoranthene	ND		0.021	0.0085	ug/L		03/12/18 13:31	03/13/18 19:26	1
Benzo[k]fluoranthene	ND		0.032	0.0096	ug/L		03/12/18 13:31	03/13/18 19:26	1
Benzo[a]pyrene	ND		0.021	0.0032	ug/L		03/12/18 13:31	03/13/18 19:26	1
Indeno[1,2,3-cd]pyrene	ND		0.021	0.0074	ug/L		03/12/18 13:31	03/13/18 19:26	1
Dibenz(a,h)anthracene	0.0021	J B U	0.021	0.0021	ug/L		03/12/18 13:31	03/13/18 19:26	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	72		53 - 112				03/12/18 13:31	03/13/18 19:26	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/10/18 22:06	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133					03/10/18 22:06	1
Trifluorotoluene (Surr)	109		77 - 128					03/10/18 22:06	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		03/15/18 13:34	03/17/18 00:25	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		03/15/18 13:34	03/17/18 00:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	53		50 - 150				03/15/18 13:34	03/17/18 00:25	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-75584-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-75584-2

Date Collected: 03/05/18 00:01

Matrix: Water

Date Received: 03/06/18 12:50

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	*	1.0	0.53	ug/L			03/13/18 14:30	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	104		74 - 123					03/13/18 14:30	1
Toluene-d8 (Surr)	101		79 - 122					03/13/18 14:30	1
4-Bromofluorobenzene (Surr)	106		78 - 119					03/13/18 14:30	1
Dibromofluoromethane (Surr)	106		70 - 120					03/13/18 14:30	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120					03/13/18 14:30	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/10/18 14:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133					03/10/18 14:09	1
Trifluorotoluene (Surr)	109		77 - 128					03/10/18 14:09	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-75831-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	April 06, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP.

Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-75831-1 for 1 water sample and 1 trip blank collected on March 14, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

One of the cPAHs, reported as benzo(a)anthracene was detected at concentration greater than the MDL in method blank MB 580-269355/1-A. The associated sample result was non-detect, therefore not qualified.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria except benzene.

LCS/LCSD for analysis batch 269460, RPD was exceeding the acceptance criteria. The associated sample result was non-detect therefore associated sample result was not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-75831-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-75831-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-75831-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blanks and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-75831-1	03/14/2018	10:00	Regular
Trip Blank	580-75831-2	03/14/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-75831-1

Date Collected: 03/14/18 10:00

Matrix: Water

Date Received: 03/14/18 13:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			03/20/18 22:20	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					03/20/18 22:20	1
Toluene-d8 (Surr)	102		79 - 122					03/20/18 22:20	1
4-Bromofluorobenzene (Surr)	101		78 - 119					03/20/18 22:20	1
Dibromofluoromethane (Surr)	99		70 - 120					03/20/18 22:20	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					03/20/18 22:20	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.020	0.0020	ug/L		03/19/18 10:06	03/19/18 19:26	1
Chrysene	ND		0.020	0.0061	ug/L		03/19/18 10:06	03/19/18 19:26	1
Benzo[b]fluoranthene	ND		0.020	0.0082	ug/L		03/19/18 10:06	03/19/18 19:26	1
Benzo[k]fluoranthene	ND		0.031	0.0092	ug/L		03/19/18 10:06	03/19/18 19:26	1
Benzo[a]pyrene	ND		0.020	0.0031	ug/L		03/19/18 10:06	03/19/18 19:26	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0072	ug/L		03/19/18 10:06	03/19/18 19:26	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		03/19/18 10:06	03/19/18 19:26	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	71		53 - 112				03/19/18 10:06	03/19/18 19:26	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/17/18 23:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		58 - 133					03/17/18 23:19	1
Trifluorotoluene (Surr)	111		77 - 128					03/17/18 23:19	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		03/19/18 14:21	03/21/18 12:45	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		03/19/18 14:21	03/21/18 12:45	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	63		50 - 150				03/19/18 14:21	03/21/18 12:45	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-75831-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-75831-2

Date Collected: 03/14/18 00:01

Matrix: Water

Date Received: 03/14/18 13:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	*	1.0	0.53	ug/L			03/20/18 17:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	117		74 - 123					03/20/18 17:02	1
<i>Toluene-d8 (Surr)</i>	95		79 - 122					03/20/18 17:02	1
<i>4-Bromofluorobenzene (Surr)</i>	112		78 - 119					03/20/18 17:02	1
<i>Dibromofluoromethane (Surr)</i>	120		70 - 120					03/20/18 17:02	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	125	X	70 - 120					03/20/18 17:02	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			03/17/18 21:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	89		58 - 133					03/17/18 21:44	1
<i>Trifluorotoluene (Surr)</i>	102		77 - 128					03/17/18 21:44	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-77215-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	May 21, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-77215-1 for 1 water sample and 1 trip blank collected on May 08, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Four of the cPAHs, reported as benzo(a)anthracene, chrysene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene were detected at concentration greater than the MDL in method blank MB 580-273742/1-A. The associated sample results were non-detect, therefore not qualified.

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria besides for DRO reported as #2 Diesel (C10-C24) in SDG 580-77215-1.

LCS/LCSD for analysis batch 273587, RPD was exceeding the acceptance criteria. The associated sample result was non-detect therefore associated sample result was not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-77215-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-77215-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-77215-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.

- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-77215-1	05/08/2018	9:00	Regular
Trip Blank	580-77215-2	05/08/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-77414-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	June 19, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-77414-1 for 1 water sample and 1 trip blank collected on May 17, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Six of the seven cPAHs, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene, were detected at concentrations greater than the MDL in method blank MB 580-274341/1-A. The associated sample results were non-detect, therefore not qualified.

The seventh benzo[a]anthracene was also detected at concentration greater than the MDL in method blank MB 580-274341/1-A. The associated sample result was less than the blank value, therefore the associated sample result was qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270C SIM	benzo(a)anthracene	ug/L	0.0160	0.0045	U

Notes:

MB: method blank

SIM: selective ion monitoring

U: non-detect

ug/L: micrograms per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-77414-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-77414-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-77414-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. One of the cPAH, reported as benzo(a)anthracene was detected in the associated laboratory method blank; this laboratory method blank detect resulted in associated sample detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

- Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.
- Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.
- USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-77414-1	05/17/2018	14:30	Regular
Trip Blank	580-77414-2	05/17/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-77414-1	Outfall #002	REG	580-77414-1	8270C SIM	benzo[a]anthracene	0.0045	ug/L	J B	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

SIM: selective ion monitoring

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

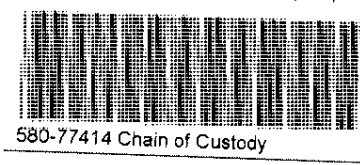
ug/L: micrograms per liter

N: analyte not detected

Client: Arcadis Client Contact: Peter Campbell Date: 5/17/18 Chain of Custody Number: 36775
 Address: 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____ Page 1 of 1

City: Seattle State: WA Zip Code: 98101 Sampler: Jason Little Lab Contact: Elaine Walker
 Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed): _____
 Contract/Purchase Order/Quote No.: _____ Loc: 580 Special Instructions/Conditions of Receipt: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Analysis (Attach list if more space is needed)	Special Instructions/Conditions of Receipt
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH			
<u>Outfall #002</u>	<u>5/17/18</u>	<u>1430</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>2</u>			<u>8</u>					* NWTPH - DX w/ SGC - use standard SGC * Benzene & cPAHS w/ quantitative level less than 1 mg/L
<u>Trip Blank</u>	—	—	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<u>6</u>						



Therm ID: 02 Cor: 1.2 Unc: 1.4
 Cooler Desc: Red Cool
 Packing: Sub FedEx: _____
 Cust. Seal: Yes _____ No UPS: _____
 Wet Packs/Dry Ice/None Lab Cour: X
 Other: _____

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
 Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ OC Requirements (Specify): _____

1. Relinquished By Sign/Print: <u>Jason Little</u>	Date: <u>5/18/18</u> Time: <u>1125</u>	1. Received By Sign/Print: <u>B. Gail</u>	Date: <u>5-18-18</u> Time: <u>1125</u>
2. Relinquished By Sign/Print: <u>B. Gail</u>	Date: <u>5/18/18</u> Time: <u>1434</u>	2. Received By Sign/Print: <u>Kevin Little</u>	Date: <u>5-18-18</u> Time: <u>1434</u>
3. Relinquished By Sign/Print: _____	Date: _____ Time: _____	3. Received By Sign/Print: _____	Date: _____ Time: _____

Comments: _____

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77414-1

Date Collected: 05/17/18 14:30

Matrix: Water

Date Received: 05/18/18 14:34

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/23/18 16:02	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					05/23/18 16:02	1
Toluene-d8 (Surr)	106		79 - 122					05/23/18 16:02	1
4-Bromofluorobenzene (Surr)	97		78 - 119					05/23/18 16:02	1
Dibromofluoromethane (Surr)	101		70 - 120					05/23/18 16:02	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120					05/23/18 16:02	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0045	J-B U	0.020	0.0020	ug/L		05/22/18 09:41	05/23/18 14:54	1
Benzo[a]pyrene	ND		0.020	0.0030	ug/L		05/22/18 09:41	05/23/18 14:54	1
Benzo[b]fluoranthene	ND		0.020	0.0081	ug/L		05/22/18 09:41	05/23/18 14:54	1
Benzo[k]fluoranthene	ND		0.030	0.0091	ug/L		05/22/18 09:41	05/23/18 14:54	1
Chrysene	ND		0.020	0.0061	ug/L		05/22/18 09:41	05/23/18 14:54	1
Dibenz(a,h)anthracene	ND		0.020	0.0020	ug/L		05/22/18 09:41	05/23/18 14:54	1
Indeno[1,2,3-cd]pyrene	ND		0.020	0.0071	ug/L		05/22/18 09:41	05/23/18 14:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	71		53 - 120				05/22/18 09:41	05/23/18 14:54	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/22/18 15:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	96		50 - 150					05/22/18 15:49	1
Trifluorotoluene (Surr)	110		50 - 150					05/22/18 15:49	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		05/23/18 09:49	05/24/18 14:47	1
Motor Oil (>C24-C36)	ND		0.35	0.096	mg/L		05/23/18 09:49	05/24/18 14:47	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	67		50 - 150				05/23/18 09:49	05/24/18 14:47	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-77414-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77414-2

Date Collected: 05/17/18 00:00

Matrix: Water

Date Received: 05/18/18 14:34

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/23/18 15:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					05/23/18 15:12	1
Toluene-d8 (Surr)	107		79 - 122					05/23/18 15:12	1
4-Bromofluorobenzene (Surr)	96		78 - 119					05/23/18 15:12	1
Dibromofluoromethane (Surr)	102		70 - 120					05/23/18 15:12	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					05/23/18 15:12	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/20/18 00:22	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		50 - 150					05/20/18 00:22	1
Trifluorotoluene (Surr)	99		50 - 150					05/20/18 00:22	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-77584-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	June 19, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-77584-1 for 1 water sample and 1 trip blank collected on May 23, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Two of the cPAHs, reported as benzo(a)anthracene and dibenz(a,h)anthracene were detected at concentrations greater than the MDL in method blank MB 580-274804/1-A. The associated sample results were non-detect, therefore not qualified.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-77584-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-77584-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-77584-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.

- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-77584-1	05/23/2018	09:00	Regular
Trip Blank	580-77584-2	05/23/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered

SDG: sample delivery group

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77584-1

Date Collected: 05/23/18 09:00

Matrix: Water

Date Received: 05/26/18 11:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/29/18 20:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					05/29/18 20:27	1
Toluene-d8 (Surr)	105		79 - 122					05/29/18 20:27	1
4-Bromofluorobenzene (Surr)	99		78 - 119					05/29/18 20:27	1
Dibromofluoromethane (Surr)	100		70 - 120					05/29/18 20:27	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					05/29/18 20:27	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.022	0.0022	ug/L		05/26/18 12:15	05/29/18 14:38	1
Benzo[a]pyrene	ND		0.022	0.0032	ug/L		05/26/18 12:15	05/29/18 14:38	1
Benzo[b]fluoranthene	ND		0.022	0.0087	ug/L		05/26/18 12:15	05/29/18 14:38	1
Benzo[k]fluoranthene	ND		0.032	0.0097	ug/L		05/26/18 12:15	05/29/18 14:38	1
Chrysene	ND		0.022	0.0065	ug/L		05/26/18 12:15	05/29/18 14:38	1
Dibenz[a,h]anthracene	ND		0.022	0.0022	ug/L		05/26/18 12:15	05/29/18 14:38	1
Indeno[1,2,3-cd]pyrene	ND		0.022	0.0076	ug/L		05/26/18 12:15	05/29/18 14:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	63		53 - 120				05/26/18 12:15	05/29/18 14:38	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/26/18 16:40	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		50 - 150					05/26/18 16:40	1
Trifluorotoluene (Surr)	95		50 - 150					05/26/18 16:40	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.066	mg/L		05/30/18 09:16	05/31/18 15:25	1
Motor Oil (>C24-C36)	ND		0.36	0.098	mg/L		05/30/18 09:16	05/31/18 15:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	78		50 - 150				05/30/18 09:16	05/31/18 15:25	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77584-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77584-2

Date Collected: 05/23/18 00:01

Matrix: Water

Date Received: 05/26/18 11:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			05/29/18 15:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					05/29/18 15:00	1
Toluene-d8 (Surr)	106		79 - 122					05/29/18 15:00	1
4-Bromofluorobenzene (Surr)	99		78 - 119					05/29/18 15:00	1
Dibromofluoromethane (Surr)	99		70 - 120					05/29/18 15:00	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120					05/29/18 15:00	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			05/26/18 16:08	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		50 - 150					05/26/18 16:08	1
Trifluorotoluene (Surr)	104		50 - 150					05/26/18 16:08	1

Data Validation Memorandum

TO: Ophélie Encelle

SDG: 580-77727-1

FROM: Dilip Kumar

SITE: Former Unocal
Edmonds Bulk Fuel
Terminal Edmonds,
Washington

DATE: June 19, 2018

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-77727-1 for 1 water sample, 1 field duplicate and 1 trip blank collected on May 29, 2018. Matrix spike/matrix spike duplicates (MS/MSD) were prepared for 1 water sample. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results, MS/MSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

One of the cPAH, reported as benzo(a)anthracene was detected at concentration greater than the MDL in method blank MB 580-275384/1-A. The associated sample results were less than five times the blank value, therefore associated sample results were qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	8270C SIM	benzo(a)anthracene	ug/L	0.00274	0.0049	U
DUP-1	MB	8270C SIM	benzo(a)anthracene	ug/L	0.00274	0.0050	U

Notes:

MB: method blank

SIM: selective ion monitoring

U: non-detect

ug/L: micrograms per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

MS and MSD analysis must exhibit a percent recoveries and relative percent differences within the laboratory's acceptance criteria. The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where compound concentration detected in the parent sample exceeds the MS/MSD concentration by factor four.

A MS/MSD was performed using sample Outfall #002 and the results were observed within the acceptance criteria besides for one cPAH, benzo[a]anthracene. The MS recovery result for benzo[a]anthracene was observed 2% low bias compared to the acceptance criteria. The associated benzo[a]anthracene parent

sample and duplicate sample results were already qualified for blank contamination as “U”; therefore, not changed as UJ.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	MS Recovery	MSD Recovery	RPD	Validation Qualifier	Laboratory Limit
Outfall #002	Benzo[a]anthracene	59%	68%	13	U	61-120

Note:

U: non-detect

Field Duplicates

Field duplicate was collected for SDG 580-77727-1 and all precision criteria were met.

Duplicate sample ID and Parent field sample ID were updated in the following table:

Duplicate Sample ID	Field Sample ID
DUP-1	Outfall #002

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-77727-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD and FD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Accuracy was acceptable. One MS result exhibited low recovery by 2%, therefore results were qualified as estimated and the data is considered as valid. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. One of the cPAH, reported as benzo(a)anthracene was detected in the associated laboratory method blank; this laboratory method blank detect resulted in associated samples detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.



REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-77727-1	05/29/2018	16:00	Regular
DUP-1	580-77727-2	05/29/2018	16:10	Field Duplicate
Trip Blank	580-77727-3	05/29/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-77727-1	Outfall #002	REG	580-77727-1	8270C SIM	benzo[a]anthracene	0.0049	ug/L	J B F1	U	BL1, MSL	N
580-77727-2	DUP-1	FD	580-77727-1	8270C SIM	benzo[a]anthracene	0.0050	ug/L	J B	U	BL1, MSL	N

Notes:

REG: regular

FD: field duplicate

SDG: sample delivery group

SIM: selective ion monitoring

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

F1: MS and/or MSD recovery is outside acceptance limits

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

MSL: MS recovery was below the lower control limit

ug/L: micrograms per liter

N: analyte not detected

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77727-1

Date Collected: 05/29/18 16:00

Matrix: Water

Date Received: 05/31/18 14:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/06/18 17:21	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					06/06/18 17:21	1
Toluene-d8 (Surr)	103		79 - 122					06/06/18 17:21	1
4-Bromofluorobenzene (Surr)	99		78 - 119					06/06/18 17:21	1
Dibromofluoromethane (Surr)	96		70 - 120					06/06/18 17:21	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					06/06/18 17:21	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0049	J-B-F4 U	0.022	0.0022	ug/L		06/05/18 09:44	06/07/18 10:53	1
Benzo[a]pyrene	ND		0.022	0.0032	ug/L		06/05/18 09:44	06/07/18 10:53	1
Benzo[b]fluoranthene	ND		0.022	0.0087	ug/L		06/05/18 09:44	06/07/18 10:53	1
Benzo[k]fluoranthene	ND		0.032	0.0097	ug/L		06/05/18 09:44	06/07/18 10:53	1
Chrysene	ND		0.022	0.0065	ug/L		06/05/18 09:44	06/07/18 10:53	1
Dibenz(a,h)anthracene	0.0061	J	0.022	0.0022	ug/L		06/05/18 09:44	06/07/18 10:53	1
Indeno[1,2,3-cd]pyrene	ND		0.022	0.0076	ug/L		06/05/18 09:44	06/07/18 10:53	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	74		53 - 120				06/05/18 09:44	06/07/18 10:53	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/02/18 19:56	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		50 - 150					06/02/18 19:56	1
Trifluorotoluene (Surr)	101		50 - 150					06/02/18 19:56	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.072	mg/L		06/04/18 10:56	06/06/18 15:47	1
Motor Oil (>C24-C36)	ND		0.39	0.11	mg/L		06/04/18 10:56	06/06/18 15:47	1
Surrogate									
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	68		50 - 150				06/04/18 10:56	06/06/18 15:47	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Client Sample ID: DUP-1
Date Collected: 05/29/18 16:10
Date Received: 05/31/18 14:00

Lab Sample ID: 580-77727-2
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/06/18 18:35	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	103		74 - 123					06/06/18 18:35	1
Toluene-d8 (Surr)	105		79 - 122					06/06/18 18:35	1
4-Bromofluorobenzene (Surr)	102		78 - 119					06/06/18 18:35	1
Dibromofluoromethane (Surr)	101		70 - 120					06/06/18 18:35	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					06/06/18 18:35	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	0.0050	J-B U	0.022	0.0022	ug/L		06/05/18 09:44	06/07/18 11:59	1
Benzo[a]pyrene	ND		0.022	0.0032	ug/L		06/05/18 09:44	06/07/18 11:59	1
Benzo[b]fluoranthene	ND		0.022	0.0086	ug/L		06/05/18 09:44	06/07/18 11:59	1
Benzo[k]fluoranthene	ND		0.032	0.0097	ug/L		06/05/18 09:44	06/07/18 11:59	1
Chrysene	ND		0.022	0.0065	ug/L		06/05/18 09:44	06/07/18 11:59	1
Dibenz(a,h)anthracene	0.0060	J	0.022	0.0022	ug/L		06/05/18 09:44	06/07/18 11:59	1
Indeno[1,2,3-cd]pyrene	ND		0.022	0.0075	ug/L		06/05/18 09:44	06/07/18 11:59	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	65		53 - 120				06/05/18 09:44	06/07/18 11:59	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/02/18 17:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		50 - 150					06/02/18 17:21	1
Trifluorotoluene (Surr)	101		50 - 150					06/02/18 17:21	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		06/04/18 10:56	06/06/18 16:53	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		06/04/18 10:56	06/06/18 16:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	72		50 - 150				06/04/18 10:56	06/06/18 16:53	1

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77727-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77727-3

Date Collected: 05/29/18 00:01

Matrix: Water

Date Received: 05/31/18 14:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/06/18 16:08	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	101		74 - 123					06/06/18 16:08	1
<i>Toluene-d8 (Surr)</i>	104		79 - 122					06/06/18 16:08	1
<i>4-Bromofluorobenzene (Surr)</i>	102		78 - 119					06/06/18 16:08	1
<i>Dibromofluoromethane (Surr)</i>	98		70 - 120					06/06/18 16:08	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	101		70 - 120					06/06/18 16:08	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/02/18 14:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	94		50 - 150					06/02/18 14:46	1
<i>Trifluorotoluene (Surr)</i>	100		50 - 150					06/02/18 14:46	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-77886-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	June 19, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-77886-1 for 1 water sample and 1 trip blank collected on June 07, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-77886-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-77886-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-77886-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-77886-1	06/07/2018	08:45	Regular
Trip Blank	580-77886-2	06/07/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-77886-1

Date Collected: 06/07/18 08:45

Matrix: Water

Date Received: 06/07/18 11:50

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	2.9		1.0	0.53	ug/L			06/11/18 14:34	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					06/11/18 14:34	1
Toluene-d8 (Surr)	107		79 - 122					06/11/18 14:34	1
4-Bromofluorobenzene (Surr)	103		78 - 119					06/11/18 14:34	1
Dibromofluoromethane (Surr)	98		70 - 120					06/11/18 14:34	1
1,2-Dichloroethane-d4 (Surr)	99		70 - 120					06/11/18 14:34	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.023	0.0023	ug/L		06/08/18 09:38	06/12/18 18:14	1
Benzo[a]pyrene	ND		0.023	0.0034	ug/L		06/08/18 09:38	06/12/18 18:14	1
Benzo[b]fluoranthene	ND		0.023	0.0090	ug/L		06/08/18 09:38	06/12/18 18:14	1
Benzo[k]fluoranthene	ND		0.034	0.010	ug/L		06/08/18 09:38	06/12/18 18:14	1
Chrysene	ND		0.023	0.0068	ug/L		06/08/18 09:38	06/12/18 18:14	1
Dibenz(a,h)anthracene	ND		0.023	0.0023	ug/L		06/08/18 09:38	06/12/18 18:14	1
Indeno[1,2,3-cd]pyrene	ND		0.023	0.0079	ug/L		06/08/18 09:38	06/12/18 18:14	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	72		53 - 120				06/08/18 09:38	06/12/18 18:14	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/12/18 18:45	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		50 - 150					06/12/18 18:45	1
Trifluorotoluene (Surr)	102		50 - 150					06/12/18 18:45	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.073	mg/L		06/11/18 13:05	06/12/18 14:24	1
Motor Oil (>C24-C36)	ND		0.40	0.11	mg/L		06/11/18 13:05	06/12/18 14:24	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	106		50 - 150				06/11/18 13:05	06/12/18 14:24	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-77886-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-77886-2

Date Collected: 06/07/18 00:00

Matrix: Water

Date Received: 06/07/18 11:50

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			06/11/18 12:56	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					06/11/18 12:56	1
Toluene-d8 (Surr)	106		79 - 122					06/11/18 12:56	1
4-Bromofluorobenzene (Surr)	100		78 - 119					06/11/18 12:56	1
Dibromofluoromethane (Surr)	99		70 - 120					06/11/18 12:56	1
1,2-Dichloroethane-d4 (Surr)	102		70 - 120					06/11/18 12:56	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/08/18 17:16	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		50 - 150					06/08/18 17:16	1
Trifluorotoluene (Surr)	105		50 - 150					06/08/18 17:16	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-78119-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	July 03, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-78119-1 for 1 water sample and 1 trip blank collected on June 15, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance besides for three cPAHs, benzo[a]anthracene, benzo[a]pyrene and benzo[b]fluoranthene. The LCS and LCSD recoveries for cPAHs were observed the range of 1% to 7% high bias compared to the acceptance criteria. The associated sample results were non-detect, therefore not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-78119-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-78119-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-78119-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.

- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-78119-1	06/15/2018	09:55	Regular
Trip Blank	580-78119-2	06/15/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-78160-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	July 03, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-78160-1 for 1 water sample and 1 trip blank collected on June 18, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-78160-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-78160-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-78160-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-78160-1	06/18/2018	9:00	Regular
Trip Blank	580-78160-2	06/18/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered

SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-78490-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	July 27, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-78490-1 for 1 water sample and 1 trip blank collected on June 29, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance besides for one cPAH, Indeno[1,2,3-cd] pyrene. The relative percent difference of LCS and LCSD recoveries for Indeno[1,2,3-cd] pyrene was observed 5% high bias compared to the acceptance criteria. The associated sample results were non-detect, therefore not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-78490-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-78490-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-78490-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.

- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-78490-1	06/29/2018	10:45	Regular
Trip Blank	580-78490-2	06/29/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

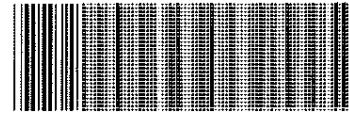
Rush
 Short Hold

Chain of Custody Record

Client: Arcois Client Contact: Peter Campbell Date: 6/29/18 Chain of Custody Number: 37557
Address: 1720 Vnoco Rd Telephone Number (Area Code)/Fax Number: _____ Lab Number: _____
Page 1 of 1

City: Edmonds State: WA Zip Code: 98109 Sampler: Jason Little Lab Contact: Elaine Walker
Project Name and Location (State): Edmonds Terminal Billing Contact: _____ Analysis (Attach list if more space is needed):
Contract/Purchase Order/Quote No.: _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/ Conditions of Receipt			
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH				
<u>Outfall #002</u>	<u>6/29/18</u>	<u>1045</u>		<u>10</u>			<u>2</u>			<u>8</u>						<p>Loc: 580 78490</p> <p>PH = 6.78</p> <p>* vsc standard silica gel cleanup</p> <p>* Birene and clasts should have a quantitative detection limit of 1ug/L</p>
<u>Tripp Block</u>	<u>-</u>	<u>-</u>		<u>6</u>						<u>6</u>						



580-78490 Chain of Custody

Therm. ID: A2 Cor: +42.0 Unc: 0.1
Cooler Dsc: Sm Blue FedEx: PO
Packing: Box UPS: _____
Cust. Seal: Yes X No _____ Lab Cour: _____
 Pkts/Dry Ice/None Other: _____

Cooler: Yes No Cooler Temp: _____ Possible Hazard Identification: Non-Hazard Flammable Skin Irritant Poison B Unknown
Sample Disposal: Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): 24 Hours 48 Hours 5 Days 10 Days 15 Days Other Standard (TA)
QC Requirements (Specify): _____
1. Relinquished By: Jason Little Date: 6/29/18 Time: 1130 Received By: Ken Hobbs Date: 6-30-18 Time: 1000
2. Relinquished By: _____ Date: _____ Time: _____ Received By: _____ Date: _____ Time: _____
3. Relinquished By: _____ Date: _____ Time: _____ Received By: _____ Date: _____ Time: _____

Comments: _____

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78490-1

Date Collected: 06/29/18 10:45

Matrix: Water

Date Received: 06/30/18 10:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/04/18 02:29	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		74 - 123					07/04/18 02:29	1
Toluene-d8 (Surr)	106		79 - 122					07/04/18 02:29	1
4-Bromofluorobenzene (Surr)	100		78 - 119					07/04/18 02:29	1
Dibromofluoromethane (Surr)	100		70 - 120					07/04/18 02:29	1
1,2-Dichloroethane-d4 (Surr)	105		70 - 120					07/04/18 02:29	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.055	0.015	ug/L		07/02/18 14:04	07/05/18 18:42	1
Benzo[a]pyrene	ND		0.11	0.012	ug/L		07/02/18 14:04	07/05/18 18:42	1
Benzo[b]fluoranthene	ND		0.055	0.012	ug/L		07/02/18 14:04	07/05/18 18:42	1
Benzo[k]fluoranthene	ND		0.055	0.013	ug/L		07/02/18 14:04	07/05/18 18:42	1
Chrysene	ND		0.11	0.017	ug/L		07/02/18 14:04	07/05/18 18:42	1
Dibenz[a,h]anthracene	ND		0.11	0.011	ug/L		07/02/18 14:04	07/05/18 18:42	1
Indeno[1,2,3-cd]pyrene	ND *		0.055	0.015	ug/L		07/02/18 14:04	07/05/18 18:42	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	77		53 - 120				07/02/18 14:04	07/05/18 18:42	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	0.10	J	0.25	0.10	mg/L			06/30/18 23:43	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		50 - 150					06/30/18 23:43	1
Trifluorotoluene (Surr)	84		50 - 150					06/30/18 23:43	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.14	0.083	mg/L		07/05/18 10:41	07/06/18 12:43	1
Motor Oil (>C24-C36)	ND		0.45	0.12	mg/L		07/05/18 10:41	07/06/18 12:43	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	78		50 - 150				07/05/18 10:41	07/06/18 12:43	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78490-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-78490-2

Date Collected: 06/29/18 00:00

Matrix: Water

Date Received: 06/30/18 10:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/03/18 23:14	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					07/03/18 23:14	1
Toluene-d8 (Surr)	105		79 - 122					07/03/18 23:14	1
4-Bromofluorobenzene (Surr)	102		78 - 119					07/03/18 23:14	1
Dibromofluoromethane (Surr)	100		70 - 120					07/03/18 23:14	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120					07/03/18 23:14	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			06/30/18 18:03	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		50 - 150					06/30/18 18:03	1
Trifluorotoluene (Surr)	85		50 - 150					06/30/18 18:03	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-78657-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	July 27, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-78657-1 for 1 water sample and 1 trip blank collected on July 05, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance besides for two cPAHs, Dibenz(a, h)anthracene and Indeno[1,2,3-cd] pyrene. The LCS and/or LCSD recoveries for Dibenz(a, h)anthracene and Indeno[1,2,3-cd] pyrene were observed at 5% and 1% high bias compared to the acceptance criteria, respectively. The associated sample results were non-detect, therefore not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-78657-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-78657-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-78657-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.

- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-78657-1	07/05/2018	14:45	Regular
Trip Blank	580-78657-2	07/05/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

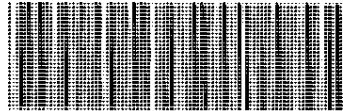
Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Client **Arcadis** Client Contact **Peter Campbell** Date **7/5/18** Chain of Custody Number **37650**
 Address **1100 Olive Way, Suite 800,** Telephone Number (Area Code)/Fax Number _____ Lab Number _____
 City **Seattle** State **WA** Zip Code **98101** Sampler **Eric Krueger** Lab Contact **Elaine Walker** Page **1** of **1**

Project Name and Location (State) **Edmonds Terminal** Billing Contact _____ Analysis (Attach list if more space is needed) _____
 Contract/Purchase Order/Quote No. _____ Loc: 580 **78657** Special Instructions/Conditions of Receipt _____

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives						Special Instructions/Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH			
Outfall #002	7/5/18	1445	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			2			8					pH = 8.17
Trip Blank	—	—	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					6						
															* use Standard SGC
															* Benzene & CPAH w/ quantitative level less than 1 ug/L



580-78657 Chain of Custody

Therm. ID: **A2** Cor: **5.3** ° Unc: **5.2** °
 Cooler Desc: **Med Blue**
 Packing: **Bubble** FedEx: _____
 Cust. Seal: Yes _____ No UPS: _____
 Wet/Packs/Dry Ice/None Lab Cour: Other: _____

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other _____ QC Requirements (Specify) _____

1. Relinquished By Sign/Print Eric Krueger Date 7/6/18 Time 1130	1. Received By Sign/Print Francisco Luna, Jr Date 7/6/18 Time 1130
2. Relinquished By Sign/Print _____ Date _____ Time _____	2. Received By Sign/Print _____ Date _____ Time _____
3. Relinquished By Sign/Print _____ Date _____ Time _____	3. Received By Sign/Print _____ Date _____ Time _____

Comments _____

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78657-1

Date Collected: 07/05/18 14:45

Matrix: Water

Date Received: 07/06/18 11:30

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/09/18 18:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					07/09/18 18:46	1
Toluene-d8 (Surr)	104		79 - 122					07/09/18 18:46	1
4-Bromofluorobenzene (Surr)	101		78 - 119					07/09/18 18:46	1
Dibromofluoromethane (Surr)	100		70 - 120					07/09/18 18:46	1
1,2-Dichloroethane-d4 (Surr)	110		70 - 120					07/09/18 18:46	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.050	0.014	ug/L		07/10/18 09:51	07/19/18 15:17	1
Benzo[a]pyrene	ND		0.10	0.011	ug/L		07/10/18 09:51	07/19/18 15:17	1
Benzo[b]fluoranthene	ND		0.050	0.011	ug/L		07/10/18 09:51	07/19/18 15:17	1
Benzo[k]fluoranthene	ND		0.050	0.012	ug/L		07/10/18 09:51	07/19/18 15:17	1
Chrysene	ND		0.10	0.016	ug/L		07/10/18 09:51	07/19/18 15:17	1
Dibenz(a,h)anthracene	ND		0.10	0.010	ug/L		07/10/18 09:51	07/19/18 15:17	1
Indeno[1,2,3-cd]pyrene	ND		0.050	0.014	ug/L		07/10/18 09:51	07/19/18 15:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	81		53 - 120				07/10/18 09:51	07/19/18 15:17	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/12/18 07:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		50 - 150					07/12/18 07:41	1
Trifluorotoluene (Surr)	99		50 - 150					07/12/18 07:41	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		07/10/18 09:44	07/12/18 13:19	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		07/10/18 09:44	07/12/18 13:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	87		50 - 150				07/10/18 09:44	07/12/18 13:19	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78657-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-78657-2

Date Collected: 07/05/18 00:00

Matrix: Water

Date Received: 07/06/18 11:30

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/09/18 17:33	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	101		74 - 123					07/09/18 17:33	1
<i>Toluene-d8 (Surr)</i>	102		79 - 122					07/09/18 17:33	1
<i>4-Bromofluorobenzene (Surr)</i>	100		78 - 119					07/09/18 17:33	1
<i>Dibromofluoromethane (Surr)</i>	101		70 - 120					07/09/18 17:33	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	109		70 - 120					07/09/18 17:33	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/11/18 20:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	94		50 - 150					07/11/18 20:48	1
<i>Trifluorotoluene (Surr)</i>	100		50 - 150					07/11/18 20:48	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-78765-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	July 27, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-78765-1 for 1 water sample and 1 trip blank collected on July 11, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance besides for one cPAH, Indeno[1,2,3-cd] pyrene. The LCS and/or LCSD recoveries for Indeno[1,2,3-cd] pyrene were observed in the range of 3% to 4% high bias compared to the acceptance criteria. The associated sample results were non-detect, therefore not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-78765-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-78765-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-78765-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.

- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-78765-1	07/11/2018	08:15	Regular
Trip Blank	580-78765-2	07/11/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-78765-1

Date Collected: 07/11/18 08:15

Matrix: Water

Date Received: 07/11/18 11:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/16/18 19:48	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					07/16/18 19:48	1
Toluene-d8 (Surr)	103		79 - 122					07/16/18 19:48	1
4-Bromofluorobenzene (Surr)	101		78 - 119					07/16/18 19:48	1
Dibromofluoromethane (Surr)	102		70 - 120					07/16/18 19:48	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120					07/16/18 19:48	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.28	0.078	ug/L		07/15/18 11:18	07/18/18 02:18	5
Benzo[a]pyrene	ND		0.56	0.062	ug/L		07/15/18 11:18	07/18/18 02:18	5
Benzo[b]fluoranthene	ND		0.28	0.062	ug/L		07/15/18 11:18	07/18/18 02:18	5
Benzo[k]fluoranthene	ND		0.28	0.067	ug/L		07/15/18 11:18	07/18/18 02:18	5
Chrysene	ND		0.56	0.090	ug/L		07/15/18 11:18	07/18/18 02:18	5
Dibenz[a,h]anthracene	ND		0.56	0.056	ug/L		07/15/18 11:18	07/18/18 02:18	5
Indeno[1,2,3-cd]pyrene	ND		0.28	0.078	ug/L		07/15/18 11:18	07/18/18 02:18	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	89		53 - 120				07/15/18 11:18	07/18/18 02:18	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/25/18 20:56	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	111		50 - 150					07/25/18 20:56	1
Trifluorotoluene (Surr)	101		50 - 150					07/25/18 20:56	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.070	mg/L		07/15/18 11:10	07/16/18 23:10	1
Motor Oil (>C24-C36)	ND		0.38	0.10	mg/L		07/15/18 11:10	07/16/18 23:10	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	79		50 - 150				07/15/18 11:10	07/16/18 23:10	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-78765-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-78765-2

Date Collected: 07/11/18 00:00

Matrix: Water

Date Received: 07/11/18 11:55

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/16/18 16:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					07/16/18 16:58	1
Toluene-d8 (Surr)	105		79 - 122					07/16/18 16:58	1
4-Bromofluorobenzene (Surr)	100		78 - 119					07/16/18 16:58	1
Dibromofluoromethane (Surr)	101		70 - 120					07/16/18 16:58	1
1,2-Dichloroethane-d4 (Surr)	106		70 - 120					07/16/18 16:58	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			07/25/18 20:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		50 - 150					07/25/18 20:25	1
Trifluorotoluene (Surr)	105		50 - 150					07/25/18 20:25	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-79184-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	September 05, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-79184-1 for 1 water sample, 1 field duplicate and 1 trip blank collected on July 26, 2018. Matrix spike/matrix spike duplicates (MS/MSD) were prepared for 1 water sample. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results, MS/MSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria besides for three cPAHs, benzo[b]fluoranthene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene. The relative percent difference of LCS and/or LCSD recoveries for these three cPAHs were observed range of 1% to 14% high bias compared to the acceptance criteria. The associated sample results were non-detect, therefore not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

Matrix spikes were prepared in duplicate and analyzed. MS and MSD analysis must exhibit a percent recoveries and relative percent differences within the laboratory's acceptance criteria.

The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where compound concentration detected in the parent sample exceeds the MS/MSD concentration by factor four.

A MS/MSD was performed using sample Outfall #002 and the results were observed within the acceptance criteria besides for two cPAHs, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene. The relative percent difference of MS and MSD recoveries for these two cPAHs were observed range of 2% to 13% high bias compared to the acceptance criteria. The associated sample results were non-detect, therefore not qualified.

In addition, benzene RPD was exceeding the acceptance criteria. The associated sample result was non-detect therefore associated sample result was not qualified.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	MS Recovery	MSD Recovery	RPD	Validation Qualifier	Laboratory Limit
NE	NE	NE	NE	NE	NE	NE

Field Duplicates

Field duplicate was collected for SDG 580-79184-1 and all precision criteria were met.

Duplicate sample ID and Parent field sample ID were updated in the following table:

Duplicate Sample ID	Field Sample ID
Dup-1	Outfall 002

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-79184-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD and FD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

- Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.
- Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.
- USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.



ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-79184-1	07/26/2018	12:05	Regular
Dup-1	580-79184-3	07/26/2018	NA	Field Duplicate
Trip Blank	580-79184-2	07/26/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79184-1

Date Collected: 07/26/18 12:05

Matrix: Water

Date Received: 07/27/18 13:15

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	F2	1.0	0.53	ug/L			07/31/18 19:42	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	107		74 - 123					07/31/18 19:42	1
Toluene-d8 (Surr)	101		79 - 122					07/31/18 19:42	1
4-Bromofluorobenzene (Surr)	102		78 - 119					07/31/18 19:42	1
Dibromofluoromethane (Surr)	97		70 - 120					07/31/18 19:42	1
1,2-Dichloroethane-d4 (Surr)	79		70 - 120					07/31/18 19:42	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.26	0.074	ug/L		08/01/18 09:57	08/02/18 17:36	5
Benzo[a]pyrene	ND		0.53	0.058	ug/L		08/01/18 09:57	08/02/18 17:36	5
Benzo[b]fluoranthene	ND	*	0.26	0.058	ug/L		08/01/18 09:57	08/02/18 17:36	5
Benzo[k]fluoranthene	ND		0.26	0.063	ug/L		08/01/18 09:57	08/02/18 17:36	5
Chrysene	ND		0.53	0.084	ug/L		08/01/18 09:57	08/02/18 17:36	5
Dibenz(a,h)anthracene	ND	F1*	0.53	0.053	ug/L		08/01/18 09:57	08/02/18 17:36	5
Indeno[1,2,3-cd]pyrene	ND	F1*	0.26	0.074	ug/L		08/01/18 09:57	08/02/18 17:36	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	88		53 - 120				08/01/18 09:57	08/02/18 17:36	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/04/18 21:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	84		50 - 150					08/04/18 21:54	1
Trifluorotoluene (Surr)	116		50 - 150					08/04/18 21:54	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.071	mg/L		07/31/18 10:17	08/01/18 13:04	1
Motor Oil (>C24-C36)	ND		0.38	0.10	mg/L		07/31/18 10:17	08/01/18 13:04	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	76		50 - 150				07/31/18 10:17	08/01/18 13:04	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-79184-2

Date Collected: 07/26/18 00:00

Matrix: Water

Date Received: 07/27/18 13:15

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/31/18 15:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	107		74 - 123					07/31/18 15:46	1
Toluene-d8 (Surr)	99		79 - 122					07/31/18 15:46	1
4-Bromofluorobenzene (Surr)	100		78 - 119					07/31/18 15:46	1
Dibromofluoromethane (Surr)	99		70 - 120					07/31/18 15:46	1
1,2-Dichloroethane-d4 (Surr)	82		70 - 120					07/31/18 15:46	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/04/18 23:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	84		50 - 150					08/04/18 23:27	1
Trifluorotoluene (Surr)	117		50 - 150					08/04/18 23:27	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79184-1

Client Sample ID: Dup-1
Date Collected: 07/26/18 00:00
Date Received: 07/27/18 13:15

Lab Sample ID: 580-79184-3
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			07/31/18 21:00	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	108		74 - 123					07/31/18 21:00	1
Toluene-d8 (Surr)	100		79 - 122					07/31/18 21:00	1
4-Bromofluorobenzene (Surr)	101		78 - 119					07/31/18 21:00	1
Dibromofluoromethane (Surr)	98		70 - 120					07/31/18 21:00	1
1,2-Dichloroethane-d4 (Surr)	78		70 - 120					07/31/18 21:00	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.27	0.075	ug/L		08/01/18 09:57	08/02/18 18:42	5
Benzo[a]pyrene	ND		0.54	0.059	ug/L		08/01/18 09:57	08/02/18 18:42	5
Benzo[b]fluoranthene	ND		0.27	0.059	ug/L		08/01/18 09:57	08/02/18 18:42	5
Benzo[k]fluoranthene	ND		0.27	0.064	ug/L		08/01/18 09:57	08/02/18 18:42	5
Chrysene	ND		0.54	0.086	ug/L		08/01/18 09:57	08/02/18 18:42	5
Dibenz(a,h)anthracene	ND		0.54	0.054	ug/L		08/01/18 09:57	08/02/18 18:42	5
Indeno[1,2,3-cd]pyrene	ND		0.27	0.075	ug/L		08/01/18 09:57	08/02/18 18:42	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	83		53 - 120				08/01/18 09:57	08/02/18 18:42	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/04/18 23:58	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		50 - 150					08/04/18 23:58	1
Trifluorotoluene (Surr)	119		50 - 150					08/04/18 23:58	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.071	mg/L		07/31/18 10:17	08/01/18 14:09	1
Motor Oil (>C24-C36)	ND		0.38	0.10	mg/L		07/31/18 10:17	08/01/18 14:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	79		50 - 150				07/31/18 10:17	08/01/18 14:09	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-79422-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	September 05, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-79422-1 for 1 water sample and 1 trip blank collected on August 07, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance besides for one cPAH, indeno[1,2,3-cd]pyrene. The LCSD recovery for this cPAH was observed 1% high bias compared to the acceptance criteria. The associated sample result was non-detect, therefore not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-79422-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-79422-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-79422-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.

- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-79422-1	08/07/2018	10:30	Regular
Trip Blank - 2	580-79422-2	08/07/2018	NA	Trip Blank

Note:

NA: not applicable

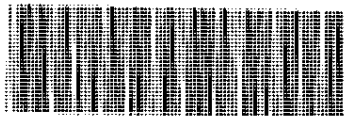


Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Client ArCADIS		Client Contact Peter Campbell		Date 8/7/18	Chain of Custody Number 37490
Address 11770 UNACO Rd		Telephone Number (Area Code)/Fax Number 206-726-4741		Lab Number	Page 1 of 1
City Seattle	State WA	Zip Code 98199	Sampler Jason Little	Lab Contact Elaine Walker	Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal			Billing Contact		
Contract/Purchase Order/Quote No.					

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Special Instructions/ Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	A2S04	HNO3	HCl	NaOH	ZnAc/NaOH	Other			
OUTFALL #002	8/7/18	1030	X				2			8						Loc: 580 79422 pH = 8.69 * use standard silica gel cleanup * Benzene + CPAH w/quinniac level less than 1mg/L
Trip Blank	—	—	X							b						
 580-79422 Chain of Custody																

Therm. ID: **AZ** Cor: **15** Unc: **4**
 Cooler Dsc: **SM B16** FedEx: **A**
 Packing: **Bub** UPS:
 Cust. Seal: Yes No Lab Cour: **+**
 Wet/Packs/Dry Ice: None Other:

Cooler <input type="checkbox"/> Yes <input type="checkbox"/> No Cooler Temp: _____		Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown			Sample Disposal <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months		(A fee may be assessed if samples are retained longer than 1 month)				
Turn Around Time Required (business days) <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input type="checkbox"/> 5 Days <input type="checkbox"/> 10 Days <input type="checkbox"/> 15 Days <input checked="" type="checkbox"/> Other Standard				QC Requirements (Specify)							
1. Relinquished By Sign/Print [Signature] / Jason Little		Date 8/7/18		Time 1205		1. Received By Sign/Print [Signature] Francisco Luna, Jr		Date 8/7/18		Time 1205	
2. Relinquished By Sign/Print		Date		Time		2. Received By Sign/Print		Date		Time	
3. Relinquished By Sign/Print		Date		Time		3. Received By Sign/Print		Date		Time	
Comments											

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79422-1

Date Collected: 08/07/18 10:30

Matrix: Water

Date Received: 08/07/18 12:05

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/15/18 04:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					08/15/18 04:49	1
Toluene-d8 (Surr)	107		79 - 122					08/15/18 04:49	1
4-Bromofluorobenzene (Surr)	97		78 - 119					08/15/18 04:49	1
Dibromofluoromethane (Surr)	95		70 - 120					08/15/18 04:49	1
1,2-Dichloroethane-d4 (Surr)	96		70 - 120					08/15/18 04:49	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.26	0.072	ug/L		08/10/18 11:14	08/14/18 21:37	5
Benzo[a]pyrene	ND		0.51	0.056	ug/L		08/10/18 11:14	08/14/18 21:37	5
Benzo[b]fluoranthene	ND		0.26	0.056	ug/L		08/10/18 11:14	08/14/18 21:37	5
Benzo[k]fluoranthene	ND		0.26	0.062	ug/L		08/10/18 11:14	08/14/18 21:37	5
Chrysene	ND		0.51	0.082	ug/L		08/10/18 11:14	08/14/18 21:37	5
Dibenz(a,h)anthracene	ND		0.51	0.051	ug/L		08/10/18 11:14	08/14/18 21:37	5
Indeno[1,2,3-cd]pyrene	ND		0.26	0.072	ug/L		08/10/18 11:14	08/14/18 21:37	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	95		53 - 120				08/10/18 11:14	08/14/18 21:37	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/10/18 01:13	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		50 - 150					08/10/18 01:13	1
Trifluorotoluene (Surr)	113		50 - 150					08/10/18 01:13	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.065	mg/L		08/08/18 09:57	08/08/18 23:01	1
Motor Oil (>C24-C36)	0.19	J	0.35	0.096	mg/L		08/08/18 09:57	08/08/18 23:01	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	88		50 - 150				08/08/18 09:57	08/08/18 23:01	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-79422-1

Client Sample ID: Trip Blank - 2

Lab Sample ID: 580-79422-2

Date Collected: 08/07/18 00:00

Matrix: Water

Date Received: 08/07/18 12:05

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/15/18 00:01	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	99		74 - 123					08/15/18 00:01	1
Toluene-d8 (Surr)	107		79 - 122					08/15/18 00:01	1
4-Bromofluorobenzene (Surr)	98		78 - 119					08/15/18 00:01	1
Dibromofluoromethane (Surr)	96		70 - 120					08/15/18 00:01	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 120					08/15/18 00:01	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/10/18 01:43	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	104		50 - 150					08/10/18 01:43	1
Trifluorotoluene (Surr)	119		50 - 150					08/10/18 01:43	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-79614-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	September 11, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-79614-1 for 1 water sample and 1 trip blank collected on August 15, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-79614-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-79614-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-79614-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-79614-1	08/15/2018	10:00	Regular
Trip Blank	580-79614-2	08/15/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79614-1

Date Collected: 08/15/18 10:00

Matrix: Water

Date Received: 08/15/18 11:54

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/16/18 23:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	94		74 - 123					08/16/18 23:28	1
Toluene-d8 (Surr)	106		79 - 122					08/16/18 23:28	1
4-Bromofluorobenzene (Surr)	101		78 - 119					08/16/18 23:28	1
Dibromofluoromethane (Surr)	101		70 - 120					08/16/18 23:28	1
1,2-Dichloroethane-d4 (Surr)	114		70 - 120					08/16/18 23:28	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.053	0.015	ug/L		08/17/18 13:42	08/21/18 00:37	1
Benzo[a]pyrene	ND		0.11	0.012	ug/L		08/17/18 13:42	08/21/18 00:37	1
Benzo[b]fluoranthene	ND		0.053	0.012	ug/L		08/17/18 13:42	08/21/18 00:37	1
Benzo[k]fluoranthene	ND		0.053	0.013	ug/L		08/17/18 13:42	08/21/18 00:37	1
Chrysene	ND		0.11	0.017	ug/L		08/17/18 13:42	08/21/18 00:37	1
Dibenz[a,h]anthracene	ND		0.11	0.011	ug/L		08/17/18 13:42	08/21/18 00:37	1
Indeno[1,2,3-cd]pyrene	ND		0.053	0.015	ug/L		08/17/18 13:42	08/21/18 00:37	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	65		53 - 120				08/17/18 13:42	08/21/18 00:37	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/27/18 19:18	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	108		50 - 150					08/27/18 19:18	1
Trifluorotoluene (Surr)	124		50 - 150					08/27/18 19:18	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12	0.073	mg/L		08/26/18 14:00	08/27/18 14:28	1
Motor Oil (>C24-C36)	ND		0.39	0.11	mg/L		08/26/18 14:00	08/27/18 14:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	77		50 - 150				08/26/18 14:00	08/27/18 14:28	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79614-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-79614-2

Date Collected: 08/15/18 10:00

Matrix: Water

Date Received: 08/15/18 11:54

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/16/18 17:46	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	96		74 - 123					08/16/18 17:46	1
Toluene-d8 (Surr)	104		79 - 122					08/16/18 17:46	1
4-Bromofluorobenzene (Surr)	101		78 - 119					08/16/18 17:46	1
Dibromofluoromethane (Surr)	101		70 - 120					08/16/18 17:46	1
1,2-Dichloroethane-d4 (Surr)	122	X	70 - 120					08/16/18 17:46	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/27/18 20:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	107		50 - 150					08/27/18 20:19	1
Trifluorotoluene (Surr)	123		50 - 150					08/27/18 20:19	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-79751-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	September 11, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-79751-1 for 1 water sample and 1 trip blank collected on August 21, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

A method blank was analyzed for each method. No method blank contamination was detected.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-79751-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-79751-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-79751-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-79751-1	08/21/2018	10:30	Regular
Trip Blank	580-79751-2	08/21/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-79751-1

Date Collected: 08/21/18 10:30

Matrix: Water

Date Received: 08/21/18 10:35

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/22/18 23:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	97		74 - 123					08/22/18 23:21	1
Toluene-d8 (Surr)	107		79 - 122					08/22/18 23:21	1
4-Bromofluorobenzene (Surr)	97		78 - 119					08/22/18 23:21	1
Dibromofluoromethane (Surr)	95		70 - 120					08/22/18 23:21	1
1,2-Dichloroethane-d4 (Surr)	90		70 - 120					08/22/18 23:21	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.057	0.016	ug/L		08/23/18 09:46	08/25/18 20:41	1
Benzo[a]pyrene	ND		0.11	0.013	ug/L		08/23/18 09:46	08/25/18 20:41	1
Benzo[b]fluoranthene	ND		0.057	0.013	ug/L		08/23/18 09:46	08/25/18 20:41	1
Benzo[k]fluoranthene	ND		0.057	0.014	ug/L		08/23/18 09:46	08/25/18 20:41	1
Chrysene	ND		0.11	0.018	ug/L		08/23/18 09:46	08/25/18 20:41	1
Dibenz[a,h]anthracene	ND		0.11	0.011	ug/L		08/23/18 09:46	08/25/18 20:41	1
Indeno[1,2,3-cd]pyrene	ND		0.057	0.016	ug/L		08/23/18 09:46	08/25/18 20:41	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	89		53 - 120				08/23/18 09:46	08/25/18 20:41	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/28/18 00:22	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	111		50 - 150					08/28/18 00:22	1
Trifluorotoluene (Surr)	122		50 - 150					08/28/18 00:22	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.13	0.074	mg/L		08/26/18 14:00	08/27/18 15:23	1
Motor Oil (>C24-C36)	0.12	J	0.40	0.11	mg/L		08/26/18 14:00	08/27/18 15:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	81		50 - 150				08/26/18 14:00	08/27/18 15:23	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-79751-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-79751-2

Date Collected: 08/21/18 00:00

Matrix: Water

Date Received: 08/21/18 10:35

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			08/22/18 18:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123					08/22/18 18:09	1
Toluene-d8 (Surr)	104		79 - 122					08/22/18 18:09	1
4-Bromofluorobenzene (Surr)	101		78 - 119					08/22/18 18:09	1
Dibromofluoromethane (Surr)	99		70 - 120					08/22/18 18:09	1
1,2-Dichloroethane-d4 (Surr)	108		70 - 120					08/22/18 18:09	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			08/28/18 00:52	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	108		50 - 150					08/28/18 00:52	1
Trifluorotoluene (Surr)	122		50 - 150					08/28/18 00:52	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-81046-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 22, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-81046-1 for 1 water sample and 1 trip blank collected on October 10, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-81046-1.

Field Duplicates

According to the SAP, field duplicate was not performed for SDG 580-81046-1

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-81046-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-81046-1	10/10/2018	09:00	Regular
Trip Blank	580-81046-1	10/10/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-81239-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	January 31, 2019		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-81239-1 for 1 water sample and 1 trip blank collected on October 18, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-81239-1.

Field Duplicates

According to the SAP, field duplicate was not performed for SDG 580-81239-1

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-81239-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-81239-1	10/18/2018	13:30	Regular
Trip Blank	580-81239-2	10/18/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-81378-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 22, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-81378-1 for 1 water sample and 1 trip blank collected on October 26, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-81378-1.

Field Duplicates

According to the SAP, field duplicate was not performed for SDG 580-81378-1

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-81378-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-81378-1	10/26/2018	09:00	Regular
Trip Blank	580-81378-1	10/26/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-81704-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	December 28, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-81704-1 for one water sample, one field duplicate and one trip blank collected on November 07, 2018. Matrix spike/matrix spike duplicates (MS/MSD) were prepared for one water sample. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks

- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results, MS/MSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix Spike Duplicates

Matrix spikes were prepared in duplicate and analyzed. MS and MSD analysis must exhibit a percent recoveries and relative percent differences within the laboratory's acceptance criteria.

The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where compound concentration detected in the parent sample exceeds the MS/MSD concentration by factor four.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table: Case narrative noted that spike compounds were inadvertently omitted during the extraction process for the matrix spike/matrix spike duplicate (MS/MSD), therefore validation qualifiers were not applicable for associated samples.

Field Sample ID	Parameter	MS Recovery (%)	MSD Recovery (%)	RPD	Validation Qualifier	Laboratory Limit
Outfall #002	DRO	0.3	0	NC	NA	50-120
	HO	0	0	NC	NA	64-120

Notes:

NC: not calculated

NA: not applicable

DRO: reported as #2 Diesel (C10-C24)

HO: reported as Motor Oil (>C24-C36)

Field Duplicates

Field duplicate was collected for SDG 580-81704-1 and all precision criteria were met.

Duplicate sample ID and Parent field sample ID were updated in the following table:

Duplicate Sample ID	Field Sample ID
Dup-1	Outfall #002

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-81704-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD and FD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.



ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-81704-1	11/07/2018	09:30	Regular
Dup-1	580-81704-2	11/07/2018	NA	Field Duplicate
Trip Blank	580-81704-3	11/07/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-81805-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	December 28, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-81805-1 for one water sample and one trip blank collected on November 13, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time except for method NWTPH-DX. DRO reported as #2 Diesel (C10-C24) and HO reported as Motor Oil (>C24-C36) exceeded acceptance criteria due to a high LCS in the original analysis. Laboratory was reported out of holding time results for sample Outfall#002; Hence the results were qualified as estimated "J".

Holding time exceedance presented in the following table:

Field Sample ID	Analyte	Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
Outfall #002	DRO	Ecology NWTPH-Dx	14 days	11/13/2018	11/30/2018	17 days
	HO					

Notes:

DRO: reported as #2 Diesel (C10-C24)

HO: reported as Motor Oil (>C24-C36)

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-289897/1-B. The associated sample result was less than five times the blank value, therefore

associated sample result was qualified as non-detect (U). But sample Outfall#002 was already qualified as estimated "J" for holding time exceedances, validation qualifier updated as "UJ" instead of "U".

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	Ecology NWTPH-Dx	DRO	ug/L	0.0687	0.25	UJ

Notes:

MB: method blank

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

DRO: reported as #2 Diesel (C10-C24)

ug/L: micrograms per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-81805-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-81805-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-81805-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time except for one sample for DRO reported as #2 Diesel (C10-C24) and exceeding the holding time and therefore qualified as estimated. DRO was detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated sample detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

- Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.
- Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.
- USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-81805-1	11/13/2018	10:00	Regular
Trip Blank	580-81805-2	11/13/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-81805-1	Outfall #002	REG	580-81805-1	Ecology NWTPH-Dx	DRO	0.25	ug/L	H B	UJ	HTA, BL1	N
580-81805-1	Outfall #002	REG	580-81805-1	Ecology NWTPH-Dx	HO	0.42	ug/L	H	J	HTA	Y

Notes:

REG: regular

SDG: sample delivery group

DRO: reported as #2 Diesel (C10-C24)

HO: reported as Motor Oil (>C24-C36)

J: the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

H: sample was prepped or analyzed beyond the specified holding time

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

BL1: result less than some multiple of that found in laboratory method blank

HTA: analytical holding time exceeded

ug/L: micrograms per liter

N: analyte not detected

Y: analyte detected

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-82036-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	December 28, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-82036-1 for 1 water sample and 1 trip blank collected on November 21, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Notes:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-289897/1-B. The associated sample result was less than five times the blank value, therefore associated sample result was qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
Outfall #002	MB	Ecology NWTPH-Dx	#2 Diesel (C10-C24)	ug/L	0.0687	0.17	U

Notes:

MB: method blank

U: non-detect

ug/L: micrograms per liter

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample Outfall #002, the surrogate recovery for 8270 C SIM analysis was below the lower control limit and all associated non-detected sample results were qualified as estimated "UJ".

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
Outfall #002	Terphenyl-d14	8 %	53-150

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-82036-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-82036-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-82036-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample results were qualified as estimated for low surrogate recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. DRO, reported as #2 Diesel (C10-C24) was detected in the associated laboratory method blank; this laboratory method blank detects resulted in associated sample detected data qualified as non-detect. The trip blank was free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-82036-1	11/21/2018	08:00	Regular
Trip Blank	580-82036-2	11/21/2018	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-82036-1	Outfall #002	REG	580-82036-1	Ecology NWTPH-Dx	#2 Diesel (C10-C24)	0.17	ug/L	B	U	BL1	N
580-82036-1	Outfall #002	REG	580-82036-1	8270-SIM	Benzo[a]anthracene	ND	ug/L	--	UJ	SURL	N
580-82036-1	Outfall #002	REG	580-82036-1	8270-SIM	Benzo[a]pyrene	ND	ug/L	--	UJ	SURL	N
580-82036-1	Outfall #002	REG	580-82036-1	8270-SIM	Benzo[b]fluoranthene	ND	ug/L	--	UJ	SURL	N
580-82036-1	Outfall #002	REG	580-82036-1	8270-SIM	Benzo[k]fluoranthene	ND	ug/L	--	UJ	SURL	N
580-82036-1	Outfall #002	REG	580-82036-1	8270-SIM	Chrysene	ND	ug/L	--	UJ	SURL	N
580-82036-1	Outfall #002	REG	580-82036-1	8270-SIM	Dibenz(a,h)anthracene	ND	ug/L	--	UJ	SURL	N
580-82036-1	Outfall #002	REG	580-82036-1	8270-SIM	Indeno[1,2,3-cd]pyrene	ND	ug/L	--	UJ	SURL	N

Notes:

REG: regular

SDG: sample delivery group

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

SURL: : surrogate recovery below lower acceptance limit

ug/L: micrograms per liter

N: analyte not detected

Y: analyte detected

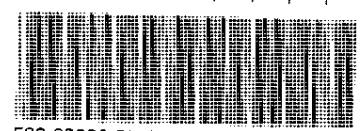
Client Arcadis Client Contact Peter Campbell Date 11/21/18 Chain of Custody Number 34917
Address 1100 Olive Way, Suite 800 Telephone Number (Area Code)/Fax Number _____ Lab Number _____
Page 1 of 1

City Seattle State WA Zip Code 98101 Sampler Eric Krueger Lab Contact Elaine Walker Analysis (Attach list if more space is needed)
Project Name and Location (State) Edmonds Terminal Billing Contact _____
Contract/Purchase Order/Quote No. _____

Matrix Containers & Preservatives
Air Aqueous Sed. Soil Unpres. H2SO4 HNO3 HCl NaOH ZnAc/NaOH

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix				Containers & Preservatives							Special Instructions/ Conditions of Receipt		
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH				
<u>Outfall #002</u>	<u>11/21/18</u>	<u>0800</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>2</u>			<u>8</u>						<p>pH = 7.86</p> <p>* use standard SGL</p> <p>* Benzene & CPATH w/ quantitative level than less than 1 ug/L</p>
<u>Trip Blank</u>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						<u>6</u>						

BENZENE EPA 624
 N,N-DITH-LPX
 N,N-DITH-DX w/ SGL
 CPATHS 8270C SGL



580-82036 Chain of Custody

Therm ID: A2 Cor: 1.5 Unc: 1.2
Cooler Desc: Med Blue FedEx: _____
Packing: Bubble UPS: _____
Cust. Seal: Yes No Lab Cour: X
Blue Ice: Wet, Dry, None Other: _____

Cooler Yes No Cooler Temp: _____ Possible Hazard Identification Non-Hazard Flammable Skin Irritant Poison B Unknown Sample Disposal Disposal By Lab Return To Client Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days) 24 Hours 48 Hours 5 Days 10 Days 15 Days Other STAT QC Requirements (Specify) _____

1. Relinquished By Sign/Print <u>Eric Krueger</u>	Date <u>11/21/18</u>	Time <u>1200</u>	1. Received By Sign/Print <u>Francisco Lamy Jr</u>	Date <u>11/21/18</u>	Time <u>1200</u>
2. Relinquished By Sign/Print	Date	Time	2. Received By Sign/Print	Date	Time
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments _____

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-82036-1

Date Collected: 11/21/18 08:00

Matrix: Water

Date Received: 11/21/18 12:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/29/18 22:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	100		74 - 123					11/29/18 22:21	1
Toluene-d8 (Surr)	107		79 - 122					11/29/18 22:21	1
4-Bromofluorobenzene (Surr)	101		78 - 119					11/29/18 22:21	1
Dibromofluoromethane (Surr)	97		70 - 120					11/29/18 22:21	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 120					11/29/18 22:21	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND	UJ	0.051	0.014	ug/L		11/28/18 08:33	11/29/18 01:07	1
Benzo[a]pyrene	ND	UJ	0.10	0.011	ug/L		11/28/18 08:33	11/29/18 01:07	1
Benzo[b]fluoranthene	ND	UJ	0.051	0.011	ug/L		11/28/18 08:33	11/29/18 01:07	1
Benzo[k]fluoranthene	ND	UJ	0.051	0.012	ug/L		11/28/18 08:33	11/29/18 01:07	1
Chrysene	ND	UJ	0.10	0.016	ug/L		11/28/18 08:33	11/29/18 01:07	1
Dibenz[a,h]anthracene	ND	UJ	0.10	0.010	ug/L		11/28/18 08:33	11/29/18 01:07	1
Indeno[1,2,3-cd]pyrene	ND	UJ	0.051	0.014	ug/L		11/28/18 08:33	11/29/18 01:07	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	8	X	53 - 120				11/28/18 08:33	11/29/18 01:07	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/28/18 23:39	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	88		50 - 150					11/28/18 23:39	1
Trifluorotoluene (Surr)	119		50 - 150					11/28/18 23:39	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.17	B U	0.11	0.066	mg/L		11/29/18 09:06	11/30/18 21:12	1
Motor Oil (>C24-C36)	0.23	J	0.36	0.098	mg/L		11/29/18 09:06	11/30/18 21:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	93		50 - 150				11/29/18 09:06	11/30/18 21:12	1

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82036-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-82036-2

Date Collected: 11/21/18 00:01

Matrix: Water

Date Received: 11/21/18 12:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			11/29/18 21:56	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	98		74 - 123					11/29/18 21:56	1
Toluene-d8 (Surr)	106		79 - 122					11/29/18 21:56	1
4-Bromofluorobenzene (Surr)	99		78 - 119					11/29/18 21:56	1
Dibromofluoromethane (Surr)	96		70 - 120					11/29/18 21:56	1
1,2-Dichloroethane-d4 (Surr)	95		70 - 120					11/29/18 21:56	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			11/28/18 15:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	85		50 - 150					11/28/18 15:55	1
Trifluorotoluene (Surr)	120		50 - 150					11/28/18 15:55	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-82599-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	December 28, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-82599-1 for 1 water sample and 1 trip blank collected on December 10, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Notes:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-82599-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-82599-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-82599-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not

note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-82599-1	11/10/2018	13:00	Regular
Trip Blank	580-82599-2	11/10/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

Client Sample Results

Client: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Client Sample ID: Outfall #002

Lab Sample ID: 580-82599-1

Date Collected: 12/10/18 13:00

Matrix: Water

Date Received: 12/11/18 13:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/18/18 22:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	102		74 - 123					12/18/18 22:28	1
Toluene-d8 (Surr)	104		79 - 122					12/18/18 22:28	1
4-Bromofluorobenzene (Surr)	101		78 - 119					12/18/18 22:28	1
Dibromofluoromethane (Surr)	106		70 - 120					12/18/18 22:28	1
1,2-Dichloroethane-d4 (Surr)	114		70 - 120					12/18/18 22:28	1

Method: 8270C SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		0.25	0.071	ug/L		12/16/18 06:57	12/17/18 20:24	5
Benzo[a]pyrene	ND		0.51	0.056	ug/L		12/16/18 06:57	12/17/18 20:24	5
Benzo[b]fluoranthene	ND		0.25	0.056	ug/L		12/16/18 06:57	12/17/18 20:24	5
Benzo[k]fluoranthene	ND		0.25	0.061	ug/L		12/16/18 06:57	12/17/18 20:24	5
Chrysene	ND		0.51	0.081	ug/L		12/16/18 06:57	12/17/18 20:24	5
Dibenz(a,h)anthracene	ND		0.51	0.051	ug/L		12/16/18 06:57	12/17/18 20:24	5
Indeno[1,2,3-cd]pyrene	ND		0.25	0.071	ug/L		12/16/18 06:57	12/17/18 20:24	5
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	76		53 - 120				12/16/18 06:57	12/17/18 20:24	5

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			12/14/18 14:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	86		50 - 150					12/14/18 14:44	1
Trifluorotoluene (Surr)	117		50 - 150					12/14/18 14:44	1

Method: NWTPH-Dx - Semi-Volatile Petroleum Products by NWTPH with Silica Gel Cleanup

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11	0.067	mg/L		12/13/18 15:47	12/16/18 19:51	1
Motor Oil (>C24-C36)	ND		0.36	0.099	mg/L		12/13/18 15:47	12/16/18 19:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	75		50 - 150				12/13/18 15:47	12/16/18 19:51	1

TestAmerica Seattle

Client Sample Results

Client: ARCADIS U.S. Inc
 Project/Site: Edmonds Terminal

TestAmerica Job ID: 580-82599-1

Client Sample ID: Trip Blank

Lab Sample ID: 580-82599-2

Date Collected: 12/10/18 00:01

Matrix: Water

Date Received: 12/11/18 13:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		1.0	0.53	ug/L			12/18/18 22:53	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>Trifluorotoluene (Surr)</i>	99		74 - 123					12/18/18 22:53	1
<i>Toluene-d8 (Surr)</i>	106		79 - 122					12/18/18 22:53	1
<i>4-Bromofluorobenzene (Surr)</i>	102		78 - 119					12/18/18 22:53	1
<i>Dibromofluoromethane (Surr)</i>	97		70 - 120					12/18/18 22:53	1
<i>1,2-Dichloroethane-d4 (Surr)</i>	109		70 - 120					12/18/18 22:53	1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.10	mg/L			12/14/18 13:23	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>4-Bromofluorobenzene (Surr)</i>	70		50 - 150					12/14/18 13:23	1
<i>Trifluorotoluene (Surr)</i>	107		50 - 150					12/14/18 13:23	1

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-82864-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	January 23, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-82864-1 for 1 water sample and 1 trip blank collected on December 20, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results, MS/MSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
NE	NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-82864-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-82864-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-82864-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was acceptable.

- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-82864-1	12/20/2018	14:00	Regular
Trip Blank	580-82864-2	12/20/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-82965-1
FROM:	Dilip Kumar	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	January 23, 2018		

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation samples associated with the dual-phase extraction (DPE) System present at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site). The DPE System is running since December 1st, 2017 and is implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements for the confirmation samples associated with the DPE System are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. Treated water from the DPE System is discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-82965-1 for 1 water sample and 1 trip blank collected on December 27, 2018. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA, 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples must be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy oil range organics (HO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs)

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)

- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR)

Water Samples were analyzed for benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results, MS/MSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

Water sample analyses were performed as requested on chain-of-custody documentation. The laboratory reported all requested water sample analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

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Laboratory Method Blanks

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Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Unit	Blank Result	Sample Result	Validation Qualifier
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Notes:

NE: not encountered

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 8270C SIM, Ecology NWTPH-Gx and Ecology NWTPH-Dx. All surrogate compound recoveries were within the laboratory's acceptance criteria.

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Field Sample ID	Surrogates	Recovery	Laboratory Limit
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Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-82965-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-82965-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-82965-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD. Precision was acceptable.
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- Representativeness of the data was verified through the sample collection, storage and preservation procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not note any discrepancies with sample collection, storage or preservation procedures. All data were reported from analyses within the recommended holding time. The method blank and trip blank samples were free of contamination with no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

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USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall #002	580-82965-1	12/27/2018	10:55	Regular
Trip Blank	580-82965-2	12/27/2018	NA	Trip Blank

Note:

NA: not applicable



Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Unit	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
SDG: sample delivery group
NE: not encountered

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A decorative graphic consisting of three thin orange lines. One line is horizontal, extending across the bottom of the page. Two other lines are diagonal, starting from the bottom left and extending towards the top right, crossing the horizontal line.