APPENDIX J

LNAPL Bills-of-lading

EMERALD
An Environmental Company

7343 E. MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
PH. (206) 832-3000
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24 HOUR EMERGENCY PHONE: 1-888-832-3008

81664

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR	CONTACT	JOB #
ADDRESS	PHONE#	LOAD # 1
CITY, STATE, ZIP		DATE
CARRIER	PHONE#	DOCUMENT #
CONSIGNEE	CONTACT	TRUCK #
ADDRESS	PHONE#	PRODUCT TYPE
CITY, STATE, ZIP		EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A				
	B				
	C				
	D				

A. WPQ # _____ DISP. CODE: _____ C. WPQ # _____ DISP. CODE: _____

B. WPQ # _____ DISP. CODE: _____ D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( ) TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway, vessel and rail according to applicable international and national government regulations and this material is not regulated as a hazardous waste in accordance with WAC 173-303, 40 CFR. Part 261 or 40 CFR Part 761.

X Ricardo Castro SHIPPER (PRINT NAME)	X SIGNATURE	DATE: 9.28.17
X Jose Godoy CARRIER - DRIVER 1 (PRINT NAME)	X SIGNATURE	DATE: 9/28/17
X CARRIER - DRIVER 2 (PRINT NAME)	X SIGNATURE	DATE:
X CONSIGNEE (PRINT NAME)	X SIGNATURE	DATE:

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81665

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR UNOCAL		CONTACT	JOB # 1704412.2461
ADDRESS 11700 UNOCAL		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmonds WA			DATE 9-28-17
CARRIER EGS		PHONE#	DOCUMENT # 81665
CONSIGNEE ERC		CONTACT	TRUCK # 6794
ADDRESS 1500 air port Way		PHONE#	PRODUCT TYPE AG
CITY, STATE, ZIP Seattle WA			EST. GALLONS 3000

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Fuel oil not regulated by DOT	1	BT	3000
	B				
	C				
	D				

A. WPQ # 6501 DISP. CODE: _____ C. WPQ # _____ DISP. CODE: _____

B. WPQ # _____ DISP. CODE: _____ D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( ) TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Ricardo Castro SHIPPER (PRINT NAME)	X _____ SIGNATURE	DATE: 9/28/17
X EGS CARRIER - DRIVER 1 (PRINT NAME)	X _____ SIGNATURE	DATE: 9/28/17
X _____ CARRIER - DRIVER 2 (PRINT NAME)	X _____ SIGNATURE	DATE: _____
X _____ CONSIGNEE (PRINT NAME)	X _____ SIGNATURE	DATE: _____

G-2

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81967

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR Arcadis		CONTACT	JOB # 170427461
ADDRESS 11720 Unocal Rd		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmond, WA			DATE 9-15-17
CARRIER Emerald Services		PHONE#	DOCUMENT #
CONSIGNEE APW Facility		CONTACT	TRUCK # 68194 68360
ADDRESS 1500 Airport Way S		PHONE#	PRODUCT TYPE Liq.
CITY, STATE, ZIP Seattle, WA			EST. GALLONS 16

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Hazardous Liquid.	1	TT	1434
	B	(water)			
	C				
	D				

A. WPQ # _____ DISP. CODE: GC0707

B. WPQ # _____ DISP. CODE: _____

C. WPQ # _____ DISP. CODE: _____

D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( )

TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Eric Krueger on behalf of CENC SHIPPER (PRINT NAME)	X _____ SIGNATURE	DATE: 9/15/17
X Sullivan CARRIER - DRIVER 1 (PRINT NAME)	X _____ SIGNATURE	DATE: 9/15-17.
X _____ CARRIER - DRIVER 2 (PRINT NAME)	X _____ SIGNATURE	DATE: _____
X _____ CONSIGNEE (PRINT NAME)	X _____ SIGNATURE	DATE: _____

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81978

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170443746
ADDRESS 11720 Unocal Road		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 9-22-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE EBS		CONTACT	TRUCK # 68794
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste Liquid	1	TT	2,730
	B	(oily water)			
	C				
	D				

A. WPQ # _____ DISP. CODE: 400501 C. WPQ # _____ DISP. CODE: _____

B. WPQ # _____ DISP. CODE: _____ D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( ) TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Eric Krueger on behalf of CEMC SHIPPER (PRINT NAME)	X _____ SIGNATURE	DATE: 09-22-17
X ALVIN B. SIMPSON CARRIER - DRIVER 1 (PRINT NAME)	X _____ SIGNATURE	DATE: 9-22-17
X _____ CARRIER - DRIVER 2 (PRINT NAME)	X _____ SIGNATURE	DATE: _____
X _____ CONSIGNEE (PRINT NAME)	X _____ SIGNATURE	DATE: _____

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81980

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442761
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 9-26-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68794
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste, Liquid,	1	TT	2817
	B				
	C	(oily water)			
	D				

A. WPQ # _____ DISP. CODE: 600107 C. WPQ # _____ DISP. CODE: _____

B. WPQ # _____ DISP. CODE: _____ D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( ) TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Eric Krueger on behalf of CEMC SHIPPER (PRINT NAME)	X _____ SIGNATURE	DATE: 9-26-17
X ALVIN B. SIMPSON CARRIER - DRIVER 1 (PRINT NAME)	X Alvin B. Simpson SIGNATURE	DATE: 9-26-17
X _____ CARRIER - DRIVER 2 (PRINT NAME)	X _____ SIGNATURE	DATE: _____
X _____ CONSIGNEE (PRINT NAME)	X _____ SIGNATURE	DATE: _____

G-2

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81981

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442746
ADDRESS 11720 Woco Road		PHONE#	LOAD # 2
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 9-26-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68794
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste - Liquid	1	TT	2801
	B				
	C	(oily water)			
	D				

A. WPQ # _____ DISP. CODE: 900707 C. WPQ # _____ DISP. CODE: _____

B. WPQ # _____ DISP. CODE: _____ D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( ) TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Sam Miles on Behalf of ERS SHIPPER (PRINT NAME)	X _____ SIGNATURE	DATE: 9-26-17
X ALVIN B. Simpson CARRIER - DRIVER 1 (PRINT NAME)	X Alvin B. Simpson SIGNATURE	DATE: 9-26-17
X _____ CARRIER - DRIVER 2 (PRINT NAME)	X _____ SIGNATURE	DATE: _____
X _____ CONSIGNEE (PRINT NAME)	X _____ SIGNATURE	DATE: _____

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81982

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442746.1
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 9-27-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68794
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste - Liquid (oily water)	1	TT	2,827
	B				
	C				
	D				

A. WPQ # _____ DISP. CODE: 600707

B. WPQ # _____ DISP. CODE: _____

C. WPQ # _____ DISP. CODE: _____

D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( )

TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Eric Krueger on behalf of CENC SHIPPER (PRINT NAME)	X Eric K SIGNATURE	DATE: 9-27-17
X ALVIN B. SIMPSON CARRIER - DRIVER 1 (PRINT NAME)	X Alvin B. Simpson SIGNATURE	DATE: 9-27-17
X _____ CARRIER - DRIVER 2 (PRINT NAME)	X _____ SIGNATURE	DATE: _____
X _____ CONSIGNEE (PRINT NAME)	X _____ SIGNATURE	DATE: _____

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81983

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442746 1
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 2
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 9-27-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE EBS		CONTACT	TRUCK # 68794
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste - Liquid	1	TT	2,800
	B				
	C	(oily water)			
	D				

A. WPQ # _____ DISP. CODE: 900707 C. WPQ # _____ DISP. CODE: _____

B. WPQ # _____ DISP. CODE: _____ D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( ) TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Eric Krueger on behalf of CE NC
SHIPPER (PRINT NAME)

X _____
SIGNATURE

DATE: 9-27-17

X ALVIN B. Simpson
CARRIER - DRIVER 1 (PRINT NAME)

X Alvin B. Simpson
SIGNATURE

DATE: 9-27-17

X _____
CARRIER - DRIVER 2 (PRINT NAME)

X _____
SIGNATURE

DATE: _____

X _____
CONSIGNEE (PRINT NAME)

X _____
SIGNATURE

DATE: _____

G-2

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81984

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442761
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 9-29-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68194-68360
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste Liquid	1	TT	5,000
	B				
	C	(oily water)			
	D				

A. WPQ # _____ DISP. CODE: GOC707

B. WPQ # _____ DISP. CODE: _____

C. WPQ # _____ DISP. CODE: _____

D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( )

TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Eric Krueger on behalf of CEMC SHIPPER (PRINT NAME)	X _____ SIGNATURE	DATE: 9-29-17
X ALVIN B. Simpson CARRIER - DRIVER 1 (PRINT NAME)	X Alvin B. Simpson SIGNATURE	DATE: 9-29-17
X _____ CARRIER - DRIVER 2 (PRINT NAME)	X _____ SIGNATURE	DATE: _____
X _____ CONSIGNEE (PRINT NAME)	X _____ SIGNATURE	DATE: _____

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81985

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR		CONTACT	JOB # 170492746
ADDRESS	11720 UNOCO Road	PHONE#	LOAD # 2
CITY, STATE, ZIP	Edmonds, Wa.	Dispatch	DATE 9-29-17
CARRIER	Emerald Services	PHONE# 832-3000	DOCUMENT #
CONSIGNEE	ERS	CONTACT	TRUCK # 68194-68360
ADDRESS	1500 Airport Way So.	PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP	Seattle, Wa.		EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste, Liquid	1	TT	4,985
	B				
	C	(oily water)			
	D				

A. WPQ # _____ DISP. CODE: 900707

B. WPQ # _____ DISP. CODE: _____

C. WPQ # _____ DISP. CODE: _____

D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( )

TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Eric Krueger on behalf of CEMC SHIPPER (PRINT NAME)	X _____ SIGNATURE	DATE: 9-29-17
X ALVIN B. Simpson CARRIER - DRIVER 1 (PRINT NAME)	X ALVIN B. Simpson SIGNATURE	DATE: 9-29-17
X _____ CARRIER - DRIVER 2 (PRINT NAME)	X _____ SIGNATURE	DATE: _____
X _____ CONSIGNEE (PRINT NAME)	X _____ SIGNATURE	DATE: _____

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81986

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442746
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 10-2-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68751
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste - Liquid	1	TT	3,182
	B	(oily water)			
	C				
	D				

A. WPQ # _____ DISP. CODE: 900707 C. WPQ # _____ DISP. CODE: _____

B. WPQ # _____ DISP. CODE: _____ D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( ) TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

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X Sam Milos on Behalf of CFM L — SHIPPER (PRINT NAME) X _____ SIGNATURE DATE: 10-2-17

X Alvin B. Simpson — CARRIER - DRIVER 1 (PRINT NAME) X Alvin B. Simpson SIGNATURE DATE: 10-2-17

X _____ CARRIER - DRIVER 2 (PRINT NAME) X _____ SIGNATURE DATE: _____

X _____ CONSIGNEE (PRINT NAME) X _____ SIGNATURE DATE: _____

G-2

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81987

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 17044274161
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 2
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 10-2-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68751
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste - Liquid	1	TT	3,201
	B	&			
	C	(oily water)			
	D				

A. WPQ # _____ DISP. CODE: 400707

B. WPQ # _____ DISP. CODE: _____

C. WPQ # _____ DISP. CODE: _____

D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( )

TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway, vessel and rail according to applicable international and national government regulations and this material is not regulated as a hazardous waste in accordance with WAC 173-303, 40 CFR. Part 261 or 40 CFR Part 761.

X Eric Krueger on behalf of CENC
SHIPPER (PRINT NAME)

X _____
SIGNATURE

DATE: 10-2-17

X Alvin B. Simpson
CARRIER - DRIVER 1 (PRINT NAME)

X Alvin B. Simpson
SIGNATURE

DATE: 10-2-17

X _____
CARRIER - DRIVER 2 (PRINT NAME)

X _____
SIGNATURE

DATE: _____

X _____
CONSIGNEE (PRINT NAME)

X _____
SIGNATURE

DATE: _____

G-2

CUSTOMER

EMERALD
An Environmental Company

7343 E. MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
PH. (206) 832-3000
FAX (206) 832-3030
24 HOUR EMERGENCY PHONE: 1-888-832-3008

81988

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442761
ADDRESS 11720 Unoco Road		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 10-3-17
CARRIER Emerald Svs.		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68751
ADDRESS 1500 Airport Way S		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste - Liquid	1	T	3219
	B				
	C	(oily water)			
	D				

A. WPQ # _____ DISP. CODE: 900707 C. WPQ # _____ DISP. CODE: _____

B. WPQ # _____ DISP. CODE: _____ D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( ) TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway, vessel and rail according to applicable international and national government regulations and this material is not regulated as a hazardous waste in accordance with WAC 173-303, 40 CFR. Part 261 or 40 CFR Part 761.

X Eric Krueger on behalf of CEMC
SHIPPER (PRINT NAME)

X _____
SIGNATURE

DATE: 10-3-17

X ALVIN B. SIMPSON
CARRIER - DRIVER 1 (PRINT NAME)

X Alvin B. Simpson
SIGNATURE

DATE: 10-3-17

X _____
CARRIER - DRIVER 2 (PRINT NAME)

X _____
SIGNATURE

DATE: _____

X _____
CONSIGNEE (PRINT NAME)

X _____
SIGNATURE

DATE: _____

G-2

CUSTOMER

EMERALD
An Environmental Company

7343 E. MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
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FAX (206) 832-3030
24 HOUR EMERGENCY PHONE: 1-888-832-3008

81989

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442746 1
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 2
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 10-3-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 681751
ADDRESS 1500 Airport Way So		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste - Liquid	1	TT	3,212
	B	(only water)			
	C				
	D				

A. WPQ # _____ DISP. CODE: G00707

B. WPQ # _____ DISP. CODE: _____

C. WPQ # _____ DISP. CODE: _____

D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( )

TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway, vessel and rail according to applicable international and national government regulations and this material is not regulated as a hazardous waste in accordance with WAC 173-303, 40 CFR. Part 261 or 40 CFR Part 761.

X Eric Krueger on behalf of CEMC
SHIPPER (PRINT NAME)

X _____
SIGNATURE DATE: 10-3-17

X Alvin B. Simpson
CARRIER - DRIVER 1 (PRINT NAME)

X Alvin B. Simpson
SIGNATURE DATE: 10-3-17

X _____
CARRIER - DRIVER 2 (PRINT NAME)

X _____
SIGNATURE DATE: _____

X _____
CONSIGNEE (PRINT NAME)

X _____
SIGNATURE DATE: _____

CUSTOMER

EMERALD
An Environmental Company

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SEATTLE, WASHINGTON 98108
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81990

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442761
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 1
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 10-4-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68751
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste, Liquid	1	TT	3,210
	B				
	C	(oily water)			
	D				

A. WPQ # _____ DISP. CODE: 400707

B. WPQ # _____ DISP. CODE: _____

C. WPQ # _____ DISP. CODE: _____

D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( )

TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway, vessel and rail according to applicable international and national government regulations and this material is not regulated as a hazardous waste in accordance with WAC 173-303, 40 CFR. Part 261 or 40 CFR Part 761.

X Scott Hicks on behalf of ARCADIS — SHIPPER (PRINT NAME) — X _____ SIGNATURE — DATE: 10-4-17

X ALVIN B. Simpson — CARRIER - DRIVER 1 (PRINT NAME) — X Alvin B. Simpson SIGNATURE — DATE: 10-4-17

X _____ CARRIER - DRIVER 2 (PRINT NAME) — X _____ SIGNATURE — DATE: _____

X _____ CONSIGNEE (PRINT NAME) — X _____ SIGNATURE — DATE: _____

CUSTOMER

G-2

EMERALD
An Environmental Company

7343 E. MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
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FAX (206) 832-3030
24 HOUR EMERGENCY PHONE: 1-888-832-3008

81991

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENERATOR ARCADIS		CONTACT	JOB # 170442761
ADDRESS 11720 UNOCO Road		PHONE#	LOAD # 2
CITY, STATE, ZIP Edmonds, Wa.		Dispatch	DATE 10-4-17
CARRIER Emerald Services		PHONE# 832-3000	DOCUMENT #
CONSIGNEE ERS		CONTACT	TRUCK # 68751
ADDRESS 1500 Airport Way So.		PHONE#	PRODUCT TYPE L
CITY, STATE, ZIP Seattle, Wa.			EST. GALLONS

HM	ITEM #	U.S. DOT DESCRIPTION	#	TYPE	QTY.
	A	Non Regulated Waste Liquid NOS oily water	1	T	3213
	B				
	C				
	D				

A. WPQ # _____ DISP. CODE: G00707

B. WPQ # _____ DISP. CODE: _____

C. WPQ # _____ DISP. CODE: _____

D. WPQ # _____ DISP. CODE: _____

DISPOSAL

DUMP DELAY TIME _____

WASH OUT: YES ( ) NO ( )

TIME IN _____ TIME OUT _____

E. WATER _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

F. SOLIDS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

_____ % SUSPENDED SOLIDS BY CENTRIFUGE + _____ GALS SEDIMENT

G. OIL/DIESEL/GAS _____ GALLONS LOCATION _____ TEST _____ DISP. CODE _____

HOC'S _____ PCB'S _____ B.S.&W. _____ API _____ LAB: Y / N

Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway, vessel and rail according to applicable international and national government regulations and this material is not regulated as a hazardous waste in accordance with WAC 173-303, 40 CFR. Part 261 or 40 CFR Part 761.

X Eric Krueger on behalf of CEMC
SHIPPER (PRINT NAME)

X Eric K
SIGNATURE

DATE: 10-4-17

X Alvin B. Simpson
CARRIER - DRIVER 1 (PRINT NAME)

X Alvin B. Simpson
SIGNATURE

DATE: 10-4-17

X _____
CARRIER - DRIVER 2 (PRINT NAME)

X _____
SIGNATURE

DATE: _____

X _____
CONSIGNEE (PRINT NAME)

X _____
SIGNATURE

DATE: _____

G-2

CUSTOMER

5788

EMERALD®
An Environmental Company

Field Services Multi-Task Worksheet

Day & Date: 9-22-17
Sales Order #: 1704427461

Job Complete: Yes / No (Circle One)

Job Description / Comments:
Pump water deliver to APW

Customer: Arcadis
Billing Address:

PO# / COD Amount:
Per Diem: Yes / No (Circle One) If yes, how many?:
Change Order Initiated: Yes / No (Circle One)

Contact:
Job Location: 11720 Unocord Edmonds, Wa

Task # / Description	Task # / Description	Task # / Description
Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Labor

Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
Alvin	Driver										

Disposal — Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum						
SOLID: Bulk / Drum						

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	[redacted]							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _____) Hot / Cold (Circle One)									
Hydro Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
# of Complete Sets of PPE Used:				PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
# of People in PPE:				PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
				PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
				PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPED1=Level D w/(Tyvek, boots, gloves)
PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit)
PPEC3=Level C w/(CPF3 or Saranex suit)
PPEC4=Level C w/(CPF4,or Barricade suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit)
PPEB3=Level B w/(CPF3 or Saranex suit)
PPEB4=Level B w/(CPF4 or Barricade suit)
PPEA5=Level A w/(Responder suit)

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name
Subcontractor Name	**Description of Service**		**Description of Service**		**Description of Service**	

Emerald Rep (Print) ALVIN B. SIMPSON
Emerald Rep (Sign) Alvin B. Simpson
Date: 9-22-17

Customer (Print) Eric Krueger on behalf of CEMC
Customer (Sign)
Date: 09-22-17

CUSTOMER COPY

5842

EMERALD®
An Environmental Company

Field Services Multi-Task Worksheet

Day & Date: 9-26-17
Sales Order #: 1704427461

Job Complete: Yes / No (Circle One)

Job Description / Comments: Pump Water from Well

Customer: ARCADIS
Billing Address:
Contact:
Job Location: 11720 Unoco Rd Edwards, CO

PO# / COD Amount:
Per Diem: Yes / No (Circle One) If yes, how many?:
Change Order Initiated: Yes / No (Circle One)

Task # / Description	Task # / Description	Task # / Description
Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Labor

Component Type	Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
	Alvin	Driver										

Disposal	Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum							
SOLID: Bulk / Drum							

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	68794							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _____) Hot / Cold (Circle One)									
Hydro Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
# of Complete Sets of PPE Used:				PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
# of People in PPE:				PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
				PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
				PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPED1=Level D w/(Tyvek, boots, gloves)
PPEC3=Level C w/(CPF3 or Saranex suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit)
PPEB4=Level B w/(CPF4 or Barricade suit)
PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit)
PPEC4=Level C w/(CPF4 or Barricade suit)
PPEB3=Level B w/(CPF3 or Saranex suit)
PPEA5=Level A w/(Responder suit)

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name

Subcontractor Name	Description of Service	Description of Service	Description of Service

Emerald Rep (Print): ALVIN B. SIMPSON
Emerald Rep (Sign): Alvin B. Simpson
Date: 9-26-17

Customer (Print): SAM MILES ANA
Customer (Sign):
Date: 9-26-17

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5843

EMERALD
An Environmental Company

Field Services Multi-Task Worksheet

Day & Date: 9-27-17
Sales Order #: 170442746l

Job Complete: Yes / No (Circle One)

Job Description / Comments:
Pump Waste Water

Customer: ARCADIS
Billing Address:

PO# / COD Amount:
Per Diem: Yes / No (Circle One) If yes, how many?:
Change Order Initiated: Yes / No (Circle One)

Contact:
Job Location: 11720 Unoco Rd
Edmonds. Wa

Task # / Description	Task # / Description	Task # / Description
Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Component Type

Labor

Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
ALVIN	Driver										

Disposal — Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum						
SOLID: Bulk / Drum						

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	68794							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _____) Hot / Cold (Circle One)									
Hydro Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
# of Complete Sets of PPE Used:				PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
# of People in PPE:				PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
				PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
				PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPED1=Level D w/(Tyvek, boots, gloves)
PPEC3=Level C w/(CPF3 or Saranex suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit)
PPEB4=Level B w/(CPF4 or Barricade suit)
PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit)
PPEC4=Level C w/(CPF4,or Barricade suit)
PPEB3=Level B w/(CPF3 or Saranex suit)
PPEA5=Level A w/(Responder suit)

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name

Subcontractor Name	Description of Service	Description of Service	Description of Service

Emerald Rep (Print) ALVIN B. Simpson
Customer (Print) Eric Krueger on behalf of CEMC

Emerald Rep (Sign) Alvin B. Simpson
Customer (Sign)

Date: 9-27-17
Date: 9-27-17

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5859

EMERALD®
An Environmental Company

Field Services Multi-Task Worksheet

Day & Date: 9-27-17
Sales Order #: 1704427461

Job Complete: Yes / No (Circle One)

Job Description / Comments: Dump Truck

Customer: Arcadis
Billing Address:

Contact:
Job Location: 11720 Unocord Rd Edwards, CO

PO# / COD Amount:
Per Diem: Yes / No (Circle One) If yes, how many?:
Change Order Initiated: Yes / No (Circle One)

Task # / Description	Task # / Description	Task # / Description
Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Labor

Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
Alvin	Driver										

Disposal — Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum						
SOLID: Bulk / Drum						

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	6879							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _____) Hot / Cold (Circle One)									
Hydro Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
# of Complete Sets of PPE Used:				PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
# of People in PPE:				PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
				PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
				PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPED1=Level D w/(Tyvek, boots, gloves) PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit)
PPEC3=Level C w/(CPF3 or Saranex suit) PPEC4=Level C w/(CPF4,or Barricade suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit) PPEB3=Level B w/(CPF3 or Saranex suit)
PPEB4=Level B w/(CPF4 or Barricade suit) PPEA5=Level A w/(Responder suit)

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name

Subcontractor Name	Description of Service	Description of Service	Description of Service

Emerald Rep (Print) ALVIN B. SIMPSON
Customer (Print) Eric Krueger on behalf of CEMC

Emerald Rep (Sign) Alvin B. Simpson
Customer (Sign)

Date: 9-27-17
Date: 9-27-17

CUSTOMER COPY

5865

EMERALD®
An Environmental Company

Field Services Multi-Task Worksheet

Day & Date: 9-28-17
Sales Order #: 1704427461

Job Complete: Yes / No (Circle One)

Job Description / Comments: Pump & Take To LPW
Take Rubber Boots

Customer: Arcadis	PO# / COD Amount:		
Billing Address:	Per Diem: Yes / No (Circle One) If yes, how many?:		
	Change Order Initiated: Yes / No (Circle One)		
	Task # / Description	Task # / Description	Task # / Description
Contact:			
Job Location: 11720 Unoco Rd Edmonds, Wa			
Component Type	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Labor

Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
Greg M	Driver	055494	6.00								

Disposal	Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum	606707 Arby NT						
SOLID: Bulk / Drum							

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	68794							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _______) Hot / Cold (Circle One)									
Hydro Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3
# of Complete Sets of PPE Used:			
# of People in PPE:			

PPED1=Level D w/(Tyvek, boots, gloves)
PPEC3=Level C w/(CPF3 or Saranex suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit)
PPEB4=Level B w/(CPF4 or Barricade suit)
PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit)
PPEC4=Level C w/(CPF4,or Barricade suit)
PPEB3=Level B w/(CPF3 or Saranex suit)
PPEA5=Level A w/(Responder suit)

Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name

Subcontractor Name	Description of Service	Description of Service	Description of Service

Emerald Rep (Print)	Emerald Rep (Sign)	Date:
Customer (Print) Ricardo Castro	Customer (Sign) [signature]	Date: 9.28.17

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5909

EMERALD®
An Environmental Company

Field Services Multi-Task Worksheet

Day & Date: 10-2-17
Sales Order #: 1704427461

Job Complete: Yes / No (Circle One)

Job Description / Comments:
Pump water

Customer: Arcadis
Billing Address:

Contact:
Job Location:

PO# / COD Amount:
Per Diem: Yes / No (Circle One) If yes, how many?:
Change Order Initiated: Yes / No (Circle One)

Task # / Description	Task # / Description	Task # / Description
Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Labor

Component Type	Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
Labor	Alvin	Driver										

Disposal	Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum							
SOLID: Bulk / Drum							

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	68251							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _____) Hot / Cold (Circle One)									
Hydro-Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
# of Complete Sets of PPE Used:				PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
# of People in PPE:				PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
				PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
				PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPED1=Level D w/(Tyvek, boots, gloves) PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit)
PPEC3=Level C w/(CPF3 or Saranex suit) PPEC4=Level C w/(CPF4,or Barricade suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit) PPEB3=Level B w/(CPF3 or Saranex suit)
PPEB4=Level B w/(CPF4 or Barricade suit) PPEA5=Level A w/(Responder suit)

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name

Subcontractor Name	Description of Service	Description of Service	Description of Service

Emerald Rep (Print) ALVIN B. SIMPSON
Customer (Print) Eric Krueger on behalf of CEMC

Emerald Rep (Sign) Alvin B. Simpson
Customer (Sign)

Date: 10-2-17
Date:

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10-2-17

EMERALD®
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Field Services Multi-Task Worksheet

5923

Day & Date: 10-3-17
Sales Order #: 1704427461

Job Complete: Yes / No (Circle One)

Job Description / Comments:
Pump oily water, deliver to APC

Customer: Arcadis
Billing Address:

Contact:
Job Location: 1720 Unocal Rd
Edmonds, WA

PO# / COD Amount:
Per Diem: Yes / No (Circle One) If yes, how many?:
Change Order Initiated: Yes / No (Circle One)

Task # / Description	Task # / Description	Task # / Description
Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Labor

Component Type	Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
	Alvin	Driver										

Disposal	Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum							
SOLID: Bulk / Drum							

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	68751							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _____) Hot / Cold (Circle One)									
Hydro Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
# of Complete Sets of PPE Used:				PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
# of People in PPE:				PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
				PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
				PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPED1=Level D w/(Tyvek, boots, gloves) PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit)
PPEC3=Level C w/(CPF3 or Saranex suit) PPEC4=Level C w/(CPF4 or Barricade suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit) PPEB3=Level B w/(CPF3 or Saranex suit)
PPEB4=Level B w/(CPF4 or Barricade suit) PPEA5=Level A w/(Responder suit)

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name

Subcontractor Name	Description of Service	Description of Service	Description of Service

Emerald Rep (Print)
Emerald Rep (Sign) ALVIN B. SIMPSON
Date: 10-3-17

Customer (Print) Eric Krueger
Customer (Sign)
Date: 10-3-17

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EMERALD®
An Environmental Company

Field Services Multi-Task Worksheet

5925

Day & Date: 10-3-17
Sales Order #: 704427461

Job Complete: Yes / No (Circle One)

Job Description / Comments: Dump Truck

Customer: Arcardis
Billing Address:

PO# / COD Amount:
Per Diem: Yes / No (Circle One) If yes, how many?:
Change Order Initiated: Yes / No (Circle One)

Contact:
Job Location: 11720 Unoco Rd Edmonds, WA

Task # / Description	Task # / Description	Task # / Description
Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Labor

Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
Alvin	Driver										

Disposal — Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum						
SOLID: Bulk / Drum						

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	68751							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _____) Hot / Cold (Circle One)									
Hydro Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
# of Complete Sets of PPE Used:				PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
# of People in PPE:				PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
				PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
				PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPED1=Level D w/(Tyvek, boots, gloves)
PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit)
PPEC3=Level C w/(CPF3 or Saranex suit)
PPEC4=Level C w/(CPF4,or Barricade suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit)
PPEB3=Level B w/(CPF3 or Saranex suit)
PPEB4=Level B w/(CPF4 or Barricade suit)
PPEA5=Level A w/(Responder suit)

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name

Subcontractor Name	Description of Service	Description of Service	Description of Service

Emerald Rep (Print)
Customer (Print) Eric Krueger

Emerald Rep (Sign) Alvin B. Simpson
Customer (Sign)

Date: 10-3-17
Date: 10-3-17

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5926

EMERALD®
An Environmental Company

Field Services Multi-Task Worksheet

Day & Date: 10-4-17
Sales Order #: 1704427461

Job Complete: Yes / No (Circle One)

Job Description / Comments:
Pump Oily Water

Customer: Arcades
Billing Address:

PO# / COD Amount:
Per Diem: Yes / No (Circle One) If yes, how many?:
Change Order Initiated: Yes / No (Circle One)

Contact:
Job Location: 11720 Unpco Rd Edmonds, WA

Task # / Description	Task # / Description	Task # / Description
Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)	Task Complete: Yes / No (Circle One)

Labor

Component Type	Name	Title	ID	ST	OT	DT	ST	OT	DT	ST	OT	DT
	Alvin	Driver	055498	06:00								

Disposal	Write Description/Destination	Manifest #	Amount	Manifest #	Amount	Manifest #	Amount
LIQUID: Bulk / Drum		81990	3,210				
SOLID: Bulk / Drum		81991	3,213				

Equipment Type	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet #	# of Hr/Day
Pickup / Van / Car / Crew Cab									
Vacuum Trailer									
Tractor									
Vacuum Truck, Small	1	68754							
Tripod (CSE Gear)									
Guzzler / Vactor (Circle One)									
Air Compressor (185 / 375 / 1600 CFM)									
Super Macs									
Blower / Tank Fan									
Gear Truck									
Pump									
Pressure Washer (PSI: _____) Hot / Cold (Circle One)									
Hydro Blaster									
Fresh Air Machine									
Power Pac									
Rental Equipment:									
Air Compressor									
Blowers									

Material Description	Quantity	Size	Quantity	Size	Quantity	Size
Drum Type:						
Degreaser Type:						
Polycoated Rain Gear, 22mil						
Poly Sheet, 6mil, 20ft x 100ft						
Poly Bags, 6mil, per roll						
Absorbent Pad (101 Grade) 100/bale						
Rags						
Duct Tape						

Container Management	Size	Fleet #	Size	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)						

PPE Sets	Task 1	Task 2	Task 3	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty	Type	Qty
# of Complete Sets of PPE Used:				PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	
# of People in PPE:				PPEC2		PPEB3		PPEC2		PPEB3		PPEC2		PPEB3	
				PPEC3		PPEB4		PPEC3		PPEB4		PPEC3		PPEB4	
				PPEC4		PPEB5		PPEC4		PPEB5		PPEC4		PPEB5	

PPED1=Level D w/(Tyvek, boots, gloves)
PPEC2=Level C w/(CPF1;2 or Poly Tyvek suit)
PPEC3=Level C w/(CPF3 or Saranex suit)
PPEC4=Level C w/(CPF4,or Barricade suit)
PPEB2=Level B w/(CPF2 or Poly Tyvek suit)
PPEB3=Level B w/(CPF3 or Saranex suit)
PPEB4=Level B w/(CPF4 or Barricade suit)
PPEA5=Level A w/(Responder suit)

PPE Items Used in Addition to Sets Above	Quantity	Type	Quantity	Type	Quantity	Type
Cartridge						
Respirator						
Suit						
Inner Gloves						
Outer Gloves						
Breathing Air Bottle						

Analytical - Analysis Description	# of Tests	Lab Name	# of Tests	Lab Name	# of Tests	Lab Name

Subcontractor Name	Description of Service	Description of Service	Description of Service

Emerald Rep (Print)
Customer (Print) Eric Kruesser

Emerald Rep (Sign) Alvin B. Simpson
Customer (Sign)

Date: 10-4-17
Date: 10-4-17

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APPENDIX K

TWT System Treated Water Field Notes

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9-13-2017

Sampler: Joe Latham

NPDES Compliance Sample Collected Today? (sample name, time): NA

If sample collected, chitosan screening results (positive, negative): NA

Beginning of Day Totalizer Reading: 5667

Yesterday's Daily Totalizer Reading: -

Water Discharged in Last 24 Hours: 5667

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1100, JL

Turbidimeter Calibrated Today: (time, initials) 1100, JL

AM Time: 1120	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.38	No Discharge	7.04
Temperature (°C)	15.8°C		15.8°C
Dissolved O_2 (mg/L)	4.56 mg/L		6.15 mg/L
Turbidity (NTU)	6.99 NTU		7.92 NTU

PM Time: 1440	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.39	7.39	7.12
Temperature (°C)	5.85 mg/L	17.8°C	18.2°C
Dissolved O_2 (mg/L)		5.85 mg/L	6.09 mg/L
Turbidity (NTU)	4.58 NTU	4.58 NTU	4.30 NTU

AM Notes:
Discharge point parameters collected from tank rather than outfall point - will collect from Willow Creek outflow point today

PM Notes:
Upstream Sample point inaccessable due to excavation.

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9-14-17

Sampler: Joe Latham

NPDES Compliance Sample Collected Today? (sample name, time): OUTFALL#002-091417, 1630

If sample collected, chitosan screening results (positive, negative): negative

Beginning of Day Totalizer Reading: 21,413

Yesterday's Daily Totalizer Reading: 5,667

Water Discharged in Last 24 Hours: 15,746

NPDES Compliant <21,600 gal (Y/N): Yes

YSI pH Meter Calibrated Today: (time, initials) 1045, JZ

Turbidimeter Calibrated Today: (time, initials) 1045, JZ

AM Time: 1055	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.56	7.36	6.93
Temperature (°C)	14.8°C	15.6°C	15.8°C
Dissolved O_2 (mg/L)	5.61 mg/L	5.45 mg/L	5.87 mg/L
Turbidity (NTU)	2.59 NTU	2.92 NTU	4.35 NTU

PM Time: 1450	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.77	7.70	7.76
Temperature (°C)	14.7°C	16.7°C	14.2°C
Dissolved O_2 (mg/L)	5.57 mg/L	5.03 mg/L	5.88 mg/L
Turbidity (NTU)	1.70 NTU	1.82 NTU	1.29 NTU

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9/15/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 41,051

Water Discharged in Last 24 Hours: 19,638

Yesterday's Daily Totalizer Reading: 21,413

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1050, AP

Turbidimeter Calibrated Today: (time, initials) 1050, AP

AM Time: 1100	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.34	7.81	7.31
Temperature (°C)	14.2	17.8	13.8
Dissolved O_2 (mg/L)	5.24	6.75	6.39
Turbidity (NTU)	2.54	1.49	3.81

PM Time:	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	unable to access due to backfill activities	No Discharge	7.70
Temperature (°C)			14.0
Dissolved O_2 (mg/L)			6.93
Turbidity (NTU)			1.83

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 4/18/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 64277

Yesterday's Daily Totalizer Reading: 49237

Water Discharged in Last 24 Hours: 15,040

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 0850, AP

Turbidimeter Calibrated Today: (time, initials) 0850, AP

AM Time: 0905	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.05	7.71	6.89
Temperature (°C)	12.6	14.3	12.7
Dissolved O_2 (mg/L)	4.74	7.63	5.12
Turbidity (NTU)	2.70	1.66	5.04

PM Time: 1405	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.30	7.55	7.02
Temperature (°C)	16.1	16.8	17.1
Dissolved O_2 (mg/L)	6.20	7.05	6.98
Turbidity (NTU)	2.57	1.64	3.37

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9/19/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 82912

Yesterday's Daily Totalizer Reading: 64277

Water Discharged in Last 24 Hours: 18635

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1110, AP

Turbidimeter Calibrated Today: (time, initials) 1110, AP

AM Time: 1120	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.24	7.52	6.95
Temperature (°C)	13.8	15.3	14.0
Dissolved O_2 (mg/L)	5.43	6.90	5.43
Turbidity (NTU)	2.06	1.20	3.23

PM Time: 1530	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.05		7.22
Temperature (°C)	16.4		16.7
Dissolved O_2 (mg/L)	6.90		5.44
Turbidity (NTU)	4.62		3.31

No Discharge

AM Notes:

PM Notes:
River flow reversed due to tidal influences.

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9/20/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 94030

Yesterday's Daily Totalizer Reading: 82912

Water Discharged in Last 24 Hours: 11,118

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1000, AP

Turbidimeter Calibrated Today: (time, initials) 1000, AP

AM Time: 1010	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.14	7.27	6.92
Temperature (°C)	13.6	14.5	12.9
Dissolved O_2 (mg/L)	5.00	7.15	5.40
Turbidity (NTU)	1.65	1.32	2.55

PM Time: 1435	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.06	1110 Discharge	6.99
Temperature (°C)	15.4	/	16.1
Dissolved O_2 (mg/L)	5.47	/	6.86
Turbidity (NTU)	2.13	/	2.82

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9-21-17

Sampler: Joe Latham

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: ~~11194~~ 105224

Yesterday's Daily Totalizer Reading: 94030

Water Discharged in Last 24 Hours: ~~82,836~~ 11,194

NPDES Compliant <21,600 gal (Y/N): ~~N~~ Y

YSI pH Meter Calibrated Today: (time, initials) 1050, JL

Turbidimeter Calibrated Today: (time, initials) 1050, JL

AM Time: 1100	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.33	No Discharge	6.87
Temperature (°C)	13.4°C		14.0°C
Dissolved O_2 (mg/L)	5.10 mg/L		4.19 mg/L
Turbidity (NTU)	3.02 NTU		2.60 NTU

PM Time:	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.85	7.21	6.89
Temperature (°C)	14.6°C	16.4°C	17.1°C
Dissolved O_2 (mg/L)	5.91 mg/L	5.64 mg/L	5.35 mg/L
Turbidity (NTU)	2.84 NTU	2.59 mg/L	3.06 NTU

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9/22/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 114,846

Yesterday's Daily Totalizer Reading: 105,224

Water Discharged in Last 24 Hours: 9,622

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1145, AP

Turbidimeter Calibrated Today: (time, initials) 1145, AP

AM Time: 1205	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.27	No Discharge	7.15
Temperature (°C)	14.8		15.6
Dissolved O_2 (mg/L)	5.00		5.63
Turbidity (NTU)	2.61		3.43

PM Time: 1700	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	7.26	No Discharge	7.18
Temperature (°C)	18.9		18.5
Dissolved O_2 (mg/L)	6.17		6.70
Turbidity (NTU)	1.83		3.24

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9-25-17

Sampler: Joe Latham

NPDES Compliance Sample Collected Today? (sample name, time): NA

If sample collected, chitosan screening results (positive, negative): NA

Beginning of Day Totalizer Reading: 120,972

Yesterday's Daily Totalizer Reading: 114,846

Water Discharged in Last 24 Hours: 6,126

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 0940, JL

Turbidimeter Calibrated Today: (time, initials) 0940, JL

AM Time: 1030	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		7.68	7.14
Temperature (°C)		16.3°C	13.6°C
Dissolved O_2 (mg/L)		6.60 mg/L	5.63 mg/L
Turbidity (NTU)		2.19 NTU	2.79 NTU

PM Time:	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		No Discharge	
Temperature (°C)		↓	
Dissolved O_2 (mg/L)			
Turbidity (NTU)		↓	

AM Notes:
Willow creek Coffer Dam removed in morning
Natural Flow restored

PM Notes:
No Discharge.

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9/26/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): OUTFALL#002-092617

If sample collected, chitosan screening results (positive, negative): negative

Beginning of Day Totalizer Reading: 140,980

Yesterday's Daily Totalizer Reading: 120,972

Water Discharged in Last 24 Hours: 20,008

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1150, AP

Turbidimeter Calibrated Today: (time, initials) 1150, AP

AM Time: 1200	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		8.02	
Temperature (°C)		18.1	
Dissolved O_2 (mg/L)		7.80	
Turbidity (NTU)		1.94	

PM Time: 1630	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		NO Discharge	
Temperature (°C)			
Dissolved O_2 (mg/L)			
Turbidity (NTU)			

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9/27/17

Sampler: Jan Lirk

NPDES Compliance Sample Collected Today? (sample name, time): N

If sample collected, chitosan screening results (positive, negative): No Samp

Beginning of Day Totalizer Reading: 151,543

Yesterday's Daily Totalizer Reading: 140,980

Water Discharged in Last 24 Hours: 10,563

NPDES Compliant <21,600 gal (Y/N): 10,563 Y

YSI pH Meter Calibrated Today: (time, initials) 0830 JL

Turbidimeter Calibrated Today: (time, initials) 0840 JL

AM Time: 1010	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		7.38	
Temperature (°C)		12.6	
Dissolved O_2 (mg/L)		7.15	
Turbidity (NTU)		6.60	

PM Time: 1530	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH			
Temperature (°C)			
Dissolved O_2 (mg/L)			
Turbidity (NTU)			

No discharge

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9/28/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 164193

Yesterday's Daily Totalizer Reading: 151543

Water Discharged in Last 24 Hours: 12,650

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) —

Turbidimeter Calibrated Today: (time, initials) —

AM Time: 1030	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		No Discharge	
Temperature (°C)			
Dissolved O_2 (mg/L)			
Turbidity (NTU)			

PM Time: 1530	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		No Discharge	
Temperature (°C)			
Dissolved O_2 (mg/L)			
Turbidity (NTU)			

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 9/29/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 169442

Yesterday's Daily Totalizer Reading: 164193

Water Discharged in Last 24 Hours: 5,249

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1340, AP

Turbidimeter Calibrated Today: (time, initials) 1340, AP

AM Time: 1100	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		No Discharge	
Temperature (°C)			
Dissolved O_2 (mg/L)			
Turbidity (NTU)			

PM Time: 1355	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		7.66	
Temperature (°C)		18.4	
Dissolved O_2 (mg/L)		6.65	
Turbidity (NTU)		2.73	

AM Notes:

PM Notes:

Weekly Discharge Monitoring
WA0991007 (outfall002)

Week 1 / 9/11 – 9/15

chitosan acetate

pH – 8.17

Turbidity 1.77 NTU

9/11

Week 2 / 9-18 to 9-22

chitosan acetate

pH - 7.40

Turbidity - 0.95 NTU

9/14

Week 2 B

9-18 to 9-22

pH - 6.99

Turbidity - 1.25 NTU

Week 4 / 10-2 to 10-6

pH – 7.29

Turbidity – 1.32 NTUs

chitosan acetate

Week 3 / 9-25 to 9-29

chitosan acetate

pH - 8.02

Turbidity - 3.18 NTU

OUTFALL #002

NPDES

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 10/2/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): OUTFALL #002 - 100220?

If sample collected, chitosan screening results (positive, negative): negative

Beginning of Day Totalizer Reading: 181321

Yesterday's Daily Totalizer Reading: 169442

Water Discharged in Last 24 Hours: 11,879

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1010, AP

Turbidimeter Calibrated Today: (time, initials) 1010, AP

AM Time: 1030	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		7.65	
Temperature (°C)		14.5	
Dissolved O_2 (mg/L)		8.42	
Turbidity (NTU)	3.63	1.75	4.60

PM Time: 1430	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		NO Discharge	
Temperature (°C)		↓	
Dissolved O_2 (mg/L)		↓	
Turbidity (NTU)		↓	

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 10/3/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 193729

Yesterday's Daily Totalizer Reading: 181321

Water Discharged in Last 24 Hours: 12,408

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1030, AP

Turbidimeter Calibrated Today: (time, initials) 1030, AP

AM Time: 1050	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		7.61	
Temperature (°C)		14.6	
Dissolved O_2 (mg/L)		7.77	
Turbidity (NTU)		1.66	

PM Time: 1530	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		No Discharge	
Temperature (°C)			
Dissolved O_2 (mg/L)			
Turbidity (NTU)			

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 10/4/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 206115

Yesterday's Daily Totalizer Reading: 193729

Water Discharged in Last 24 Hours: 12,386

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1300, AP

Turbidimeter Calibrated Today: (time, initials) 1300, AP

AM Time: 1030	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		NO Discharge	
Temperature (°C)			
Dissolved O_2 (mg/L)			
Turbidity (NTU)			

PM Time: 1330	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		7.56	
Temperature (°C)		15.9	
Dissolved O_2 (mg/L)		7.08	
Turbidity (NTU)		1.96	

AM Notes:

PM Notes:

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 10/5/17

Sampler: AP

NPDES Compliance Sample Collected Today? (sample name, time): N/A

If sample collected, chitosan screening results (positive, negative): N/A

Beginning of Day Totalizer Reading: 215212

Yesterday's Daily Totalizer Reading: 206115

Water Discharged in Last 24 Hours: 9,097

NPDES Compliant <21,600 gal (Y/N): Y

YSI pH Meter Calibrated Today: (time, initials) 1445, AP

Turbidimeter Calibrated Today: (time, initials) 1445, AP

AM Time: 1045	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		7.31	
Temperature (°C)		16.6	
Dissolved O_2 (mg/L)		—	
Turbidity (NTU)		1.63	

PM Time: 1500	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH		7.73	
Temperature (°C)		16.7	
Dissolved O_2 (mg/L)		6.46	
Turbidity (NTU)		1.50	

AM Notes:
YSI batteries dead. Readings taken from IWTS system trailer probes. No DO probe available.

PM Notes:
YSI batteries replaced, readings taken from Willow Creek outfall 002 discharge point.

WATER MONITORING FORM
Former Unocal Edmonds Terminal
11720 Unoco Road, Edmonds, WA

Date: 10/6/17

Sampler: Jason Little

NPDES Compliance Sample Collected Today? (sample name, time): No

If sample collected, chitosan screening results (positive, negative): NO

Beginning of Day Totalizer Reading: 215212

Yesterday's Daily Totalizer Reading: 233227

Water Discharged in Last 24 Hours: Y

NPDES Compliant <21,600 gal (Y/N): 18,015

YSI pH Meter Calibrated Today: (time, initials) JL 0830

Turbidimeter Calibrated Today: (time, initials) JL 0835

AM Time: 0945	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	–	7.45	–
Temperature (°C)	–	10.2	–
Dissolved O_2 (mg/L)	–	6.79	–
Turbidity (NTU)	–	3.65	–

PM Time: 1435	Location		
Parameters	Upstream (MW-530)	Discharge Point (OUTFALL#002)	Downstream (50' from outflow)
pH	–	7.48	–
Temperature (°C)	–	14.1	–
Dissolved O_2 (mg/L)	–	7.85	–
Turbidity (NTU)	–	2.32	–

AM Notes:

PM Notes:

APPENDIX L

TWT System Treated Water Laboratory Analytical Reports and Chain of Custody Documents

Appendix L
Laboraty Reports Index
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Laboratory Report ID	Sample Date	Data Validation Memorandum	Sample Matrix	Analyzes performed	Samples Description	
					Sample	Trip Blank
Temporary Water Treatment System Treated Water Laboratory Analytical Reports and Chain of Custody Documents (Appendix L)						
580-71163-1	09/11/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	1
580-71291-2	09/14/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	1
580-71420-1	09/19/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	1
580-71583-1	09/26/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	1
580-71756-1	10/02/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	*
				Total	**5**	**5**

Notes:

GRO = Gasoline by Washington State Department of Ecology (Ecology) Method NWTPH-Gx

DRO = diesel range organics by Ecology Method NWTPH-Dx (after silica gel cleanup)

HO = heavy oil range organics by Ecology Method NWTPH-Dx (after silica gel cleanup)

Benzene by Method United States Environmental Protection Agency (USEPA) 8260C.

Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs) analyzed by USEPA 8270D SIM: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. Samples with detectable DRO and/or HO concentrations were also analyzed for cPAHs.

Quality Assurance Sample:

A total of 4 water trip blanks were collected for water samples (one per cooler containing samples that will be analyzed for volatile compounds). * for this event, the soil trip blank reported in 580-71754-2 was associated with the water sample.

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: 580-71163-1
Client Project/Site: Edmonds Terminal Edmonds, WA
Revision: 1

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

Attn: Samuel Miles

Kristine D. Allen

Authorized for release by:
9/18/2017 4:04:32 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.

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Definitions 5
Client Sample Results 6
QC Sample Results 8
Chronicle 12
Certification Summary 13
Sample Summary 14
Chain of Custody 15
Receipt Checklists 16

Job ID: 580-71163-1

Laboratory: TestAmerica Seattle

Narrative

Report was revised 9-18-17 to change the analyte list for method 625.

CASE NARRATIVE
Client: ARCADIS U.S. Inc
Project: Edmonds Terminal Edmonds, WA
Report Number: 580-71163-1

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 9/11/2017 2:27 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.1º 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#002-091117 (580-71163-1) and TB-09112017 (580-71163-2) were analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 09/12/2017.

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

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample OUTFALL#002-091117 (580-71163-1) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared and analyzed on 09/11/2017.

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

GASOLINE RANGE ORGANICS (GRO)

Samples OUTFALL#002-091117 (580-71163-1) and TB-09112017 (580-71163-2) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 09/12/2017.

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#002-091117 (580-71163-1) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared and analyzed on 09/12/2017.

Job ID: 580-71163-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

Please note - the laboratory is unable to process the reverse surrogate used in the Silica Gel Cleanup for NWTPH-Dx as it contains a 1-point calibration and the associated samples are run with a 5-point calibration. This surrogate will not be present in the forms for the Level IV report; however this surrogate is reported in the raw data section for this analysis.

#2 Diesel (C10-C24) was detected in method blank MB 580-255886/1-B 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.

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 Edmonds, WA

TestAmerica Job ID: 580-71163-1

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.
¤	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: ARCADIS U.S. Inc
Project/Site: Edmonds Terminal Edmonds, WA

TestAmerica Job ID: 580-71163-1

Client Sample ID: OUTFALL#002-091117
Date Collected: 09/11/17 11:30
Date Received: 09/11/17 14:27

Lab Sample ID: 580-71163-1
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			09/12/17 04:30	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*95*		*74 - 123*		*09/12/17 04:30*	*1*
Toluene-d8 (Surr)	*100*		*79 - 122*		*09/12/17 04:30*	*1*
4-Bromofluorobenzene (Surr)	*109*		*78 - 119*		*09/12/17 04:30*	*1*
Dibromofluoromethane (Surr)	*100*		*70 - 120*		*09/12/17 04:30*	*1*
1,2-Dichloroethane-d4 (Surr)	*107*		*70 - 120*		*09/12/17 04:30*	*1*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.1	0.020	ug/L		09/11/17 16:21	09/11/17 21:01	1
Chrysene	ND		0.61	0.010	ug/L		09/11/17 16:21	09/11/17 21:01	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/11/17 16:21	09/11/17 21:01	1
Indeno[1,2,3-cd]pyrene	ND		1.0	0.051	ug/L		09/11/17 16:21	09/11/17 21:01	1
Dibenz(a,h)anthracene	ND		0.61	0.020	ug/L		09/11/17 16:21	09/11/17 21:01	1
Benzo[k]fluoranthene	ND		1.0	0.020	ug/L		09/11/17 16:21	09/11/17 21:01	1
Benzo[b]fluoranthene	ND		1.0	0.051	ug/L		09/11/17 16:21	09/11/17 21:01	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*79*		*60 - 135*	*09/11/17 16:21*	*09/11/17 21:01*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			09/12/17 11:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*58 - 133*		*09/12/17 11:55*	*1*
Trifluorotoluene (Surr)	*107*		*77 - 128*		*09/12/17 11:55*	*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 B**	0.10	0.019	mg/L		09/12/17 08:05	09/12/17 16:24	1
Motor Oil (>C24-C36)	ND		0.25	0.078	mg/L		09/12/17 08:05	09/12/17 16:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*78*		*43 - 119*	*09/12/17 08:05*	*09/12/17 16:24*	*1*

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

TestAmerica Job ID: 580-71163-1

Client Sample ID: TB-09112017
Date Collected: 09/11/17 00:00
Date Received: 09/11/17 14:27

Lab Sample ID: 580-71163-2
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			09/12/17 04:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*94*		*74 - 123*		*09/12/17 04:05*	*1*
Toluene-d8 (Surr)	*100*		*79 - 122*		*09/12/17 04:05*	*1*
4-Bromofluorobenzene (Surr)	*110*		*78 - 119*		*09/12/17 04:05*	*1*
Dibromofluoromethane (Surr)	*98*		*70 - 120*		*09/12/17 04:05*	*1*
1,2-Dichloroethane-d4 (Surr)	*107*		*70 - 120*		*09/12/17 04:05*	*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			09/12/17 12:27	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*90*		*58 - 133*		*09/12/17 12:27*	*1*
Trifluorotoluene (Surr)	*107*		*77 - 128*		*09/12/17 12:27*	*1*

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

Lab Sample ID: MB 580-255871/5
Matrix: Water
Analysis Batch: 255871

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			09/12/17 02:50	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*96*		*74 - 123*		*09/12/17 02:50*	*1*
Toluene-d8 (Surr)	*100*		*79 - 122*		*09/12/17 02:50*	*1*
4-Bromofluorobenzene (Surr)	*112*		*78 - 119*		*09/12/17 02:50*	*1*
Dibromofluoromethane (Surr)	*97*		*70 - 120*		*09/12/17 02:50*	*1*
1,2-Dichloroethane-d4 (Surr)	*107*		*70 - 120*		*09/12/17 02:50*	*1*

Lab Sample ID: LCS 580-255871/6
Matrix: Water
Analysis Batch: 255871

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	9.35		ug/L		93	37 - 151		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Trifluorotoluene (Surr)	*95*		*74 - 123*
Toluene-d8 (Surr)	*99*		*79 - 122*
4-Bromofluorobenzene (Surr)	*110*		*78 - 119*
Dibromofluoromethane (Surr)	*97*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*105*		*70 - 120*

Lab Sample ID: LCSD 580-255871/7
Matrix: Water
Analysis Batch: 255871

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	8.40		ug/L		84	37 - 151	11	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Trifluorotoluene (Surr)	*95*		*74 - 123*
Toluene-d8 (Surr)	*101*		*79 - 122*
4-Bromofluorobenzene (Surr)	*108*		*78 - 119*
Dibromofluoromethane (Surr)	*97*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*104*		*70 - 120*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-255859/1-A
Matrix: Water
Analysis Batch: 255876

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 255859

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		09/11/17 16:21	09/11/17 18:55	1
Chrysene	ND		0.60	0.010	ug/L		09/11/17 16:21	09/11/17 18:55	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/11/17 16:21	09/11/17 18:55	1

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-255859/1-A
Matrix: Water
Analysis Batch: 255876

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 255859

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Indeno[1,2,3-cd]pyrene	ND		1.0	0.050	ug/L		09/11/17 16:21	09/11/17 18:55	1
Dibenz(a,h)anthracene	ND		0.60	0.020	ug/L		09/11/17 16:21	09/11/17 18:55	1
Benzo[k]fluoranthene	ND		1.0	0.020	ug/L		09/11/17 16:21	09/11/17 18:55	1
Benzo[b]fluoranthene	ND		1.0	0.050	ug/L		09/11/17 16:21	09/11/17 18:55	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*91*		*60 - 135*	*09/11/17 16:21*	*09/11/17 18:55*	*1*

Lab Sample ID: LCS 580-255859/2-A
Matrix: Water
Analysis Batch: 255876

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 255859

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	2.00	1.85	J	ug/L		93	33 - 143
Chrysene	2.00	1.68		ug/L		84	17 - 168
Benzo[a]pyrene	2.00	1.99		ug/L		100	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	1.97		ug/L		98	1 - 171
Dibenz(a,h)anthracene	2.00	2.11		ug/L		106	1 - 227
Benzo[k]fluoranthene	2.00	2.29		ug/L		114	11 - 162
Benzo[b]fluoranthene	2.00	2.05		ug/L		102	24 - 159

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Terphenyl-d14	*86*		*60 - 135*

Lab Sample ID: LCSD 580-255859/3-A
Matrix: Water
Analysis Batch: 255876

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 255859

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	2.00	2.00	J	ug/L		100	33 - 143	8	50
Chrysene	2.00	1.79		ug/L		90	17 - 168	6	50
Benzo[a]pyrene	2.00	2.12		ug/L		106	17 - 163	6	50
Indeno[1,2,3-cd]pyrene	2.00	2.06		ug/L		103	1 - 171	5	50
Dibenz(a,h)anthracene	2.00	2.05		ug/L		103	1 - 227	3	50
Benzo[k]fluoranthene	2.00	2.23		ug/L		112	11 - 162	2	50
Benzo[b]fluoranthene	2.00	2.36		ug/L		118	24 - 159	14	50

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Terphenyl-d14	*85*		*60 - 135*

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

Lab Sample ID: MB 580-255887/6
Matrix: Water
Analysis Batch: 255887

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			09/12/17 10:20	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*92*		*58 - 133*		*09/12/17 10:20*	*1*
Trifluorotoluene (Surr)	*107*		*77 - 128*		*09/12/17 10:20*	*1*

Lab Sample ID: LCS 580-255887/7
Matrix: Water
Analysis Batch: 255887

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	0.860		mg/L		86	79 - 110		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*97*		*58 - 133*
Trifluorotoluene (Surr)	*98*		*77 - 128*

Lab Sample ID: LCSD 580-255887/8
Matrix: Water
Analysis Batch: 255887

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	0.857		mg/L		86	79 - 110	0	10

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*96*		*58 - 133*
Trifluorotoluene (Surr)	*97*		*77 - 128*

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

Lab Sample ID: MB 580-255886/1-B
Matrix: Water
Analysis Batch: 255937

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 255886

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0241	J	0.10	0.019	mg/L		09/12/17 08:05	09/12/17 15:16	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		09/12/17 08:05	09/12/17 15:16	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*83*		*43 - 119*	*09/12/17 08:05*	*09/12/17 15:16*	*1*

Lab Sample ID: LCS 580-255886/2-B
Matrix: Water
Analysis Batch: 255937

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 255886

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
#2 Diesel (C10-C24)			2.00	1.48		mg/L		74	59 - 112		

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

Lab Sample ID: LCS 580-255886/2-B
Matrix: Water
Analysis Batch: 255937

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 255886

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Motor Oil (>C24-C36)			2.00	1.84		mg/L		92	64 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*80*		*43 - 119*

Lab Sample ID: LCSD 580-255886/3-B
Matrix: Water
Analysis Batch: 255937

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 255886

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)			2.00	1.66		mg/L		83	59 - 112	12	16
Motor Oil (>C24-C36)			2.00	2.04		mg/L		102	64 - 120	10	17

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*83*		*43 - 119*

Lab Chronicle

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

TestAmerica Job ID: 580-71163-1

Client Sample ID: OUTFALL#002-091117

Lab Sample ID: 580-71163-1

Date Collected: 09/11/17 11:30

Matrix: Water

Date Received: 09/11/17 14:27

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	255871	09/12/17 04:30	JSM	TAL SEA
Total/NA	Prep	CWA_Prep			255859	09/11/17 16:21	DSO	TAL SEA
Total/NA	Analysis	625		1	255876	09/11/17 21:01	ERB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	255887	09/12/17 11:55	RSB	TAL SEA
Total/NA	Prep	3510C			255886	09/12/17 08:05	NDB	TAL SEA
Total/NA	Cleanup	3630C			255909	09/12/17 10:43	REY	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	255937	09/12/17 16:24	ADB	TAL SEA

Client Sample ID: TB-09112017

Lab Sample ID: 580-71163-2

Date Collected: 09/11/17 00:00

Matrix: Water

Date Received: 09/11/17 14:27

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	255871	09/12/17 04:05	JSM	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	255887	09/12/17 12:27	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 Edmonds, WA

TestAmerica Job ID: 580-71163-1

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
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
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 Edmonds, WA

TestAmerica Job ID: 580-71163-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-71163-1	OUTFALL#002-091117	Water	09/11/17 11:30	09/11/17 14:27
580-71163-2	TB-09112017	Water	09/11/17 00:00	09/11/17 14:27

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Loc: 580
71163

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: Ryan Brauchla		Date: 9-11-2017	Chain of Custody Number: 31442
Address: 1100 Olive Way, Suite 800	Telephone Number (Area Code)/Fax Number: 509-438-9828		Lab Number: 253-922-2310	Page 1 of 1
City: Seattle / State: WA / Zip Code: 98125	Sampler: Ryan Brauchla	Lab Contact: Elaine Walker	Analysis (Attach list if more space is needed)	
Project Name and Location (State): Edmonds Terminal Edmonds, WA	Billing Contact			
Contract/Purchase Order/Quote No.: ~~Wo~~ B0045362.0010				

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	NWTPH-Gx	NWTPH-Dx (SGC)	EPA 624 (Benzene)	EPA 625 (cPAHs)	Special Instructions/ Conditions of Receipt
OUTFALL#002-091117	9-11-17	1130		X			8			8			X	X	X	X	Email results to:
TB-09112017	9-11-17	—		X						4			X		X		ryan.brauchla@arcadis.com
																	samuel.miles@arcadis.com
																	eric.krueger@arcadis.com
																	ophelie.enell@arcadis.com
																	scott.zorn@arcadis.com
																	WBS Code: NWENVPMG001430803

580-71163 Chain of Custody

TB A2 Cooler ___ Cor 0.1 Unc 0.9
Cooler Dsc lg blue white @Lab ___
~~Wet~~ Packs Packing bubble
Cii drop 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)

	Date	Time		Date	Time
1. Relinquished By Sign/Print: [signature] / Ryan W Brauchla	9-11-17	1230	1. Received By Sign/Print: [signature] ~~9-11-~~ Joe Latham	9-11-17	1236
2. Relinquished By Sign/Print: [signature] / Joe Latham	9-11-17	1425	2. Received By Sign/Print: [signature] / Francisco Luna, Jr	9/11/17	1427
3. Relinquished By Sign/Print			3. Received By Sign/Print		

Comments

DISTRIBUTION: WHITE – Stays with the Samples; CANARY – Returned to Client with Report; PINK – Field Copy

TAL-8274-580 (0210)

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-71163-1

Login Number: 71163
List Number: 1
Creator: Ponce-McDermott, Monica

List Source: TestAmerica Seattle

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: 580-71291-2
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:
9/20/2017 4:40:40 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Definitions 5
Client Sample Results 6
QC Sample Results 8
Chronicle 12
Certification Summary 13
Sample Summary 14
Chain of Custody 15
Receipt Checklists 16

Job ID: 580-71291-2

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE
Client: ARCADIS U.S. Inc
Project: Chevron Edmonds Terminal
Report Number: 580-71291-2

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

The samples were received on 9/15/2017 10:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.1° C.

This report contains results for the water samples received with this delivery group. The soil sample results are reported under separate cover in job 580-71291-1.

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#002-091417 (580-71291-3) was analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 09/18/2017.

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

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample Outfall#002-091417 (580-71291-3) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared on 09/15/2017 and analyzed on 09/17/2017.

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

GASOLINE RANGE ORGANICS (GRO)

Samples Outfall#002-091417 (580-71291-3) and TB-091417 (water) (580-71291-5) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 09/16/2017 and 09/17/2017.

4-Bromofluorobenzene (Surr) recovered outside acceptable drift limits for the batch opening CCV. All other surrogates and analytes passed in the CCV, and all surrogates and analytes met limits for the MB, LCS, LCSD, and samples. The data has been reported.

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

DIESEL AND MOTOR OIL RANGE ORGANICS

Job ID: 580-71291-2 (Continued)

Laboratory: TestAmerica Seattle (Continued)

Sample Outfall#002-091417 (580-71291-3) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared on 09/15/2017 and analyzed on 09/18/2017.

#2 Diesel (C10-C24) was detected in method blank MB 580-256280/1-B 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.

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: 580-71291-2

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.
¤	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 ID: Outfall#002-091417

Date Collected: 09/14/17 16:30
Date Received: 09/15/17 10:25

Lab Sample ID: 580-71291-3
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			09/18/17 23:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*101*		*74 - 123*		*09/18/17 23:05*	*1*
Toluene-d8 (Surr)	*103*		*79 - 122*		*09/18/17 23:05*	*1*
4-Bromofluorobenzene (Surr)	*101*		*78 - 119*		*09/18/17 23:05*	*1*
Dibromofluoromethane (Surr)	*100*		*70 - 120*		*09/18/17 23:05*	*1*
1,2-Dichloroethane-d4 (Surr)	*104*		*70 - 120*		*09/18/17 23:05*	*1*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.3	0.022	ug/L		09/15/17 11:13	09/17/17 20:55	1
Chrysene	ND		0.66	0.011	ug/L		09/15/17 11:13	09/17/17 20:55	1
Benzo[a]pyrene	ND		1.1	0.022	ug/L		09/15/17 11:13	09/17/17 20:55	1
Indeno[1,2,3-cd]pyrene	ND		1.1	0.055	ug/L		09/15/17 11:13	09/17/17 20:55	1
Dibenz(a,h)anthracene	ND		0.66	0.022	ug/L		09/15/17 11:13	09/17/17 20:55	1
Benzo[k]fluoranthene	ND		1.1	0.022	ug/L		09/15/17 11:13	09/17/17 20:55	1
Benzo[b]fluoranthene	ND		1.1	0.055	ug/L		09/15/17 11:13	09/17/17 20:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*111*		*60 - 135*	*09/15/17 11:13*	*09/17/17 20:55*	*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			09/17/17 16:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*58 - 133*		*09/17/17 16:05*	*1*
Trifluorotoluene (Surr)	*105*		*77 - 128*		*09/17/17 16:05*	*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)	**0.050**	**J B**	0.11	0.020	mg/L		09/15/17 11:15	09/18/17 10:59	1
Motor Oil (>C24-C36)	ND		0.26	0.081	mg/L		09/15/17 11:15	09/18/17 10:59	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*71*		*43 - 119*	*09/15/17 11:15*	*09/18/17 10:59*	*1*

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

TestAmerica Job ID: 580-71291-2

Client Sample ID: TB-091417 (water)
Date Collected: 09/14/17 00:01
Date Received: 09/15/17 10:25

Lab Sample ID: 580-71291-5
Matrix: Water

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			09/16/17 17:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*78*		*58 - 133*		*09/16/17 17:38*	*1*
Trifluorotoluene (Surr)	*115*		*77 - 128*		*09/16/17 17:38*	*1*

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

Lab Sample ID: MB 580-256621/5
Matrix: Water
Analysis Batch: 256621

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			09/18/17 20:59	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*101*		*74 - 123*		*09/18/17 20:59*	*1*
Toluene-d8 (Surr)	*102*		*79 - 122*		*09/18/17 20:59*	*1*
4-Bromofluorobenzene (Surr)	*98*		*78 - 119*		*09/18/17 20:59*	*1*
Dibromofluoromethane (Surr)	*99*		*70 - 120*		*09/18/17 20:59*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*70 - 120*		*09/18/17 20:59*	*1*

Lab Sample ID: LCS 580-256621/6
Matrix: Water
Analysis Batch: 256621

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)	*101*		*74 - 123*
Toluene-d8 (Surr)	*102*		*79 - 122*
4-Bromofluorobenzene (Surr)	*99*		*78 - 119*
Dibromofluoromethane (Surr)	*99*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*99*		*70 - 120*

Lab Sample ID: LCSD 580-256621/7
Matrix: Water
Analysis Batch: 256621

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)	*100*		*74 - 123*
Toluene-d8 (Surr)	*102*		*79 - 122*
4-Bromofluorobenzene (Surr)	*100*		*78 - 119*
Dibromofluoromethane (Surr)	*100*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*100*		*70 - 120*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-256279/1-A
Matrix: Water
Analysis Batch: 256416

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256279

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		09/15/17 11:13	09/17/17 19:40	1
Chrysene	ND		0.60	0.010	ug/L		09/15/17 11:13	09/17/17 19:40	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/15/17 11:13	09/17/17 19:40	1

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-256279/1-A
Matrix: Water
Analysis Batch: 256416

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256279

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Indeno[1,2,3-cd]pyrene	ND		1.0	0.050	ug/L		09/15/17 11:13	09/17/17 19:40	1
Dibenz(a,h)anthracene	ND		0.60	0.020	ug/L		09/15/17 11:13	09/17/17 19:40	1
Benzo[k]fluoranthene	ND		1.0	0.020	ug/L		09/15/17 11:13	09/17/17 19:40	1
Benzo[b]fluoranthene	ND		1.0	0.050	ug/L		09/15/17 11:13	09/17/17 19:40	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*98*		*60 - 135*	*09/15/17 11:13*	*09/17/17 19:40*	*1*

Lab Sample ID: LCS 580-256279/2-A
Matrix: Water
Analysis Batch: 256416

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256279

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	2.00	1.53	J	ug/L		76	33 - 143
Chrysene	2.00	1.53		ug/L		76	17 - 168
Benzo[a]pyrene	2.00	1.66		ug/L		83	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	1.53		ug/L		77	1 - 171
Dibenz(a,h)anthracene	2.00	1.64		ug/L		82	1 - 227
Benzo[k]fluoranthene	2.00	1.69		ug/L		85	11 - 162
Benzo[b]fluoranthene	2.00	1.88		ug/L		94	24 - 159

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Terphenyl-d14	*91*		*60 - 135*

Lab Sample ID: LCSD 580-256279/3-A
Matrix: Water
Analysis Batch: 256416

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 256279

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	2.00	1.63	J	ug/L		82	33 - 143	7	50
Chrysene	2.00	1.54		ug/L		77	17 - 168	0	50
Benzo[a]pyrene	2.00	1.65		ug/L		82	17 - 163	1	50
Indeno[1,2,3-cd]pyrene	2.00	1.66		ug/L		83	1 - 171	8	50
Dibenz(a,h)anthracene	2.00	1.74		ug/L		87	1 - 227	6	50
Benzo[k]fluoranthene	2.00	1.70		ug/L		85	11 - 162	0	50
Benzo[b]fluoranthene	2.00	1.91		ug/L		96	24 - 159	2	50

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Terphenyl-d14	*90*		*60 - 135*

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

Lab Sample ID: MB 580-256386/5
Matrix: Water
Analysis Batch: 256386

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			09/16/17 16:37	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*79*		*58 - 133*		*09/16/17 16:37*	*1*
Trifluorotoluene (Surr)	*99*		*77 - 128*		*09/16/17 16:37*	*1*

Lab Sample ID: LCS 580-256386/6
Matrix: Water
Analysis Batch: 256386

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	0.906		mg/L		91	79 - 110		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*80*		*58 - 133*
Trifluorotoluene (Surr)	*112*		*77 - 128*

Lab Sample ID: MB 580-256407/6
Matrix: Water
Analysis Batch: 256407

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			09/17/17 14:29	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*88*		*58 - 133*		*09/17/17 14:29*	*1*
Trifluorotoluene (Surr)	*93*		*77 - 128*		*09/17/17 14:29*	*1*

Lab Sample ID: LCS 580-256407/7
Matrix: Water
Analysis Batch: 256407

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	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*95*		*58 - 133*
Trifluorotoluene (Surr)	*92*		*77 - 128*

Lab Sample ID: LCSD 580-256407/8
Matrix: Water
Analysis Batch: 256407

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	0.882		mg/L		88	79 - 110	2	10

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

Lab Sample ID: LCSD 580-256407/8
Matrix: Water
Analysis Batch: 256407

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

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

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

Lab Sample ID: MB 580-256280/1-B
Matrix: Water
Analysis Batch: 256424

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256280

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0479	J	0.10	0.019	mg/L		09/15/17 11:15	09/18/17 09:52	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		09/15/17 11:15	09/18/17 09:52	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
o-Terphenyl	*76*		*43 - 119*	*09/15/17 11:15*	*09/18/17 09:52*	*1*

Lab Sample ID: LCS 580-256280/2-B
Matrix: Water
Analysis Batch: 256424

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256280

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
Motor Oil (>C24-C36)	2.00	1.73		mg/L		86	64 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
o-Terphenyl	*76*		*43 - 119*

Lab Sample ID: LCSD 580-256280/3-B
Matrix: Water
Analysis Batch: 256424

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 256280

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.42		mg/L		71	59 - 112	6	16
Motor Oil (>C24-C36)	2.00	1.67		mg/L		83	64 - 120	4	17

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
o-Terphenyl	*75*		*43 - 119*

Lab Chronicle

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

TestAmerica Job ID: 580-71291-2

Client Sample ID: Outfall#002-091417

Lab Sample ID: 580-71291-3

Date Collected: 09/14/17 16:30

Matrix: Water

Date Received: 09/15/17 10:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	256621	09/18/17 23:05	IWH	TAL SEA
Total/NA	Prep	CWA_Prep			256279	09/15/17 11:13	MRG	TAL SEA
Total/NA	Analysis	625		1	256416	09/17/17 20:55	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	256407	09/17/17 16:05	RSB	TAL SEA
Total/NA	Prep	3510C			256280	09/15/17 11:15	MRG	TAL SEA
Total/NA	Cleanup	3630C			256373	09/16/17 08:24	JWL	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	256424	09/18/17 10:59	ADB	TAL SEA

Client Sample ID: TB-091417 (water)

Lab Sample ID: 580-71291-5

Date Collected: 09/14/17 00:01

Matrix: Water

Date Received: 09/15/17 10:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	NWTPH-Gx		1	256386	09/16/17 17:38	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: 580-71291-2

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
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
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: 580-71291-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-71291-3	Outfall#002-091417	Water	09/14/17 16:30	09/15/17 10:25
580-71291-5	TB-091417 (water)	Water	09/14/17 00:01	09/15/17 10:25

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

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	Ryan Bravchla
Date	9-14-17
Chain of Custody Number	29436
Address	1100 Olive Way, Suite 800
Telephone Number (Area Code)/Fax Number	509-438-9828
Lab Number	J1291
Page	1 of 1
City	Seattle
State	WA
Zip Code	98101
Sampler	Ryan Bravchla (RB)
Lab Contact	Elaine Walker
Project Name and Location (State)	Edmonds Terminal
Billing Contact	
Contract/Purchase Order/Quote No.	WO045362.0010

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Matrix: Aqueous	Matrix: Sed.	Matrix: Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	MeOH 10 mL	Analysis: NWTPH-Gx	NWTPH-Dx w SGC	8260C (Benzene)	8270D (cPAHs)	EPA 624 (Benzene)	EPA 625 (cPAHs)
~~EX-DB2-A2-5-SW~~	~~9-14-17~~					X		2						2	X	X	X	*		
EX-DB2-B2-10	9-14-17	0840				X		2						2	X	X	X	*		
EX-DB2-B2-10-MS	9-14-17	0840				X		2						2	X	X	X	*		
EX-DB2-B2-10-MSD	9-14-17	0840				X		2						2	X	X	X	*		
EX-DB2-C2-10	9-14-17	1155				X		2						2	X	X	X	*		
OUTFALL#002-091417	9-14-17	1630		X				8			8				X	X			X	X
RB-091417	9-14-17	1030		X							2				X					
TB-091417 (water)	9-14-17	—		X		X					2			1	X		X		X	
TB-091417 (solid)																				

Special Instructions/Conditions of Receipt:
Email results to
ryan.bravchla@arcadis.com
ophelie.encelle@arcadis.com
samuel.miles@arcadis.com
scott.zorn@arcadis.com
eric.krueger@arcadis.com
WBS Codes:
NWENVPM600143003- Surface Water
NWENVPM600143004-Soil
* Analyze sample IF DRO/HO detected

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)

	Sign/Print	Date	Time		Sign/Print	Date	Time
1. Relinquished By	[signature] / Ryan Bravchla	9-15-17	0900	1. Received By	[signature] / Francisco Luna, Jr	9/15/17	0900
2. Relinquished By	[signature] / Francisco Luna, Jr	9/15/17	1040	2. Received By	Tom Blankinship / Blankinship	9/15/17	1040
3. Relinquished By				3. Received By			

Comments

TB AZ Cooler____ Cor 0.1 Unc 0.7
Cooler Dsc Lg Blue @Lab____
Wet Packs Packing bubble
LabCorr
Custody Seal: Yes____ No X

580-71291 Chain of Custody

DISTRIBUTION: WHITE – Stays with the Samples; CA...

TAL-8274-580 (0210)

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-71291-2

Login Number: 71291
List Number: 1
Creator: Blankinship, Tom X

List Source: TestAmerica Seattle

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	additional labels on pretared vial.
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.	True	

TestAmerica

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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: 580-71420-1
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:
9/21/2017 4:23:14 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Definitions 5
Client Sample Results 6
QC Sample Results 8
Chronicle 12
Certification Summary 13
Sample Summary 14
Chain of Custody 15
Receipt Checklists 16

Job ID: 580-71420-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE
Client: ARCADIS U.S. Inc
Project: Chevron Edmonds Terminal
Report Number: 580-71420-1

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 9/20/2017 11:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.6º 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)

Sample OUTFALL#002-091917 (580-71420-1) was analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 09/20/2017.

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

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample OUTFALL#002-091917 (580-71420-1) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared on 09/20/2017 and analyzed on 09/21/2017.

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

GASOLINE RANGE ORGANICS (GRO)

Samples OUTFALL#002-091917 (580-71420-1) and TB-091917 (580-71420-2) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 09/20/2017.

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#002-091917 (580-71420-1) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared on 09/20/2017 and analyzed on 09/21/2017.

Please note - the laboratory is unable to process the reverse surrogate used in the Silica Gel Cleanup for NWTPH-Dx as it contains a 1-point calibration and the associated samples are run with a 5-point calibration. This surrogate will not be present in the forms for the Level IV report; however this surrogate is reported in the raw data section for this analysis.

Job ID: 580-71420-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

#2 Diesel (C10-C24) was detected in method blank MB 580-256726/1-B 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 was not performed.

CCV recoveries were below %D control limits for o-Terphenyl surrogate, but within %R limits. Therefore, the data were reported. (CCV 580-256786/15), (CCV 580-256786/17), (CCVRT 580-256786/4) and (MB 580-256726/1-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: Chevron Edmonds Terminal

TestAmerica Job ID: 580-71420-1

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.
¤	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 ID: OUTFALL#002-091917
Date Collected: 09/19/17 14:50
Date Received: 09/20/17 11:05

Lab Sample ID: 580-71420-1
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			09/20/17 16:21	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*112*		*74 - 123*		*09/20/17 16:21*	*1*
Toluene-d8 (Surr)	*91*		*79 - 122*		*09/20/17 16:21*	*1*
4-Bromofluorobenzene (Surr)	*102*		*78 - 119*		*09/20/17 16:21*	*1*
Dibromofluoromethane (Surr)	*105*		*70 - 120*		*09/20/17 16:21*	*1*
1,2-Dichloroethane-d4 (Surr)	*93*		*70 - 120*		*09/20/17 16:21*	*1*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.1	0.021	ug/L		09/20/17 12:35	09/21/17 12:16	1
Chrysene	ND		0.63	0.010	ug/L		09/20/17 12:35	09/21/17 12:16	1
Benzo[a]pyrene	ND		1.0	0.021	ug/L		09/20/17 12:35	09/21/17 12:16	1
Indeno[1,2,3-cd]pyrene	ND		1.0	0.052	ug/L		09/20/17 12:35	09/21/17 12:16	1
Dibenz(a,h)anthracene	ND		0.63	0.021	ug/L		09/20/17 12:35	09/21/17 12:16	1
Benzo[k]fluoranthene	ND		1.0	0.021	ug/L		09/20/17 12:35	09/21/17 12:16	1
Benzo[b]fluoranthene	ND		1.0	0.052	ug/L		09/20/17 12:35	09/21/17 12:16	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*88*		*60 - 135*	*09/20/17 12:35*	*09/21/17 12:16*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			09/20/17 18:16	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*91*		*58 - 133*		*09/20/17 18:16*	*1*
Trifluorotoluene (Surr)	*105*		*77 - 128*		*09/20/17 18:16*	*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)	**0.040**	**J B**	0.11	0.020	mg/L		09/20/17 12:41	09/21/17 00:55	1
Motor Oil (>C24-C36)	ND		0.27	0.083	mg/L		09/20/17 12:41	09/21/17 00:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*71*		*43 - 119*	*09/20/17 12:41*	*09/21/17 00:55*	*1*
n-Decanoic Acid (Surr)	*0.0005*		*0 - 1*	*09/20/17 12:41*	*09/21/17 00:55*	*1*

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

TestAmerica Job ID: 580-71420-1

Client Sample ID: TB-091917
Date Collected: 09/19/17 00:01
Date Received: 09/20/17 11:05

Lab Sample ID: 580-71420-2
Matrix: Water

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			09/20/17 17:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*90*		*58 - 133*		*09/20/17 17:44*	*1*
Trifluorotoluene (Surr)	*106*		*77 - 128*		*09/20/17 17:44*	*1*

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

Lab Sample ID: MB 580-256753/5
Matrix: Water
Analysis Batch: 256753

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			09/20/17 12:57	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*111*		*74 - 123*		*09/20/17 12:57*	*1*
Toluene-d8 (Surr)	*93*		*79 - 122*		*09/20/17 12:57*	*1*
4-Bromofluorobenzene (Surr)	*101*		*78 - 119*		*09/20/17 12:57*	*1*
Dibromofluoromethane (Surr)	*104*		*70 - 120*		*09/20/17 12:57*	*1*
1,2-Dichloroethane-d4 (Surr)	*92*		*70 - 120*		*09/20/17 12:57*	*1*

Lab Sample ID: LCS 580-256753/6
Matrix: Water
Analysis Batch: 256753

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)	*112*		*74 - 123*
Toluene-d8 (Surr)	*93*		*79 - 122*
4-Bromofluorobenzene (Surr)	*99*		*78 - 119*
Dibromofluoromethane (Surr)	*104*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*90*		*70 - 120*

Lab Sample ID: LCSD 580-256753/7
Matrix: Water
Analysis Batch: 256753

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	9.84		ug/L		98	37 - 151	3	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Trifluorotoluene (Surr)	*111*		*74 - 123*
Toluene-d8 (Surr)	*92*		*79 - 122*
4-Bromofluorobenzene (Surr)	*101*		*78 - 119*
Dibromofluoromethane (Surr)	*106*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*91*		*70 - 120*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-256724/1-A
Matrix: Water
Analysis Batch: 256810

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256724

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		09/20/17 12:35	09/21/17 11:01	1
Chrysene	ND		0.60	0.010	ug/L		09/20/17 12:35	09/21/17 11:01	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/20/17 12:35	09/21/17 11:01	1

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-256724/1-A
Matrix: Water
Analysis Batch: 256810

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256724

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Indeno[1,2,3-cd]pyrene	ND		1.0	0.050	ug/L		09/20/17 12:35	09/21/17 11:01	1
Dibenz(a,h)anthracene	ND		0.60	0.020	ug/L		09/20/17 12:35	09/21/17 11:01	1
Benzo[k]fluoranthene	ND		1.0	0.020	ug/L		09/20/17 12:35	09/21/17 11:01	1
Benzo[b]fluoranthene	ND		1.0	0.050	ug/L		09/20/17 12:35	09/21/17 11:01	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*98*		*60 - 135*	*09/20/17 12:35*	*09/21/17 11:01*	*1*

Lab Sample ID: LCS 580-256724/2-A
Matrix: Water
Analysis Batch: 256810

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256724

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	2.00	2.14	J	ug/L		107	33 - 143
Chrysene	2.00	2.02		ug/L		101	17 - 168
Benzo[a]pyrene	2.00	2.15		ug/L		108	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	2.07		ug/L		104	1 - 171
Dibenz(a,h)anthracene	2.00	2.38		ug/L		119	1 - 227
Benzo[k]fluoranthene	2.00	2.22		ug/L		111	11 - 162
Benzo[b]fluoranthene	2.00	2.18		ug/L		109	24 - 159

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Terphenyl-d14	*100*		*60 - 135*

Lab Sample ID: LCSD 580-256724/3-A
Matrix: Water
Analysis Batch: 256810

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 256724

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	2.00	2.28	J	ug/L		114	33 - 143	6	50
Chrysene	2.00	2.11		ug/L		105	17 - 168	4	50
Benzo[a]pyrene	2.00	2.25		ug/L		113	17 - 163	4	50
Indeno[1,2,3-cd]pyrene	2.00	2.14		ug/L		107	1 - 171	3	50
Dibenz(a,h)anthracene	2.00	2.41		ug/L		121	1 - 227	1	50
Benzo[k]fluoranthene	2.00	2.29		ug/L		114	11 - 162	3	50
Benzo[b]fluoranthene	2.00	2.14		ug/L		107	24 - 159	2	50

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Terphenyl-d14	*112*		*60 - 135*

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

Lab Sample ID: MB 580-256728/6
Matrix: Water
Analysis Batch: 256728

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			09/20/17 15:36	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*90*		*58 - 133*		*09/20/17 15:36*	*1*
Trifluorotoluene (Surr)	*105*		*77 - 128*		*09/20/17 15:36*	*1*

Lab Sample ID: LCS 580-256728/7
Matrix: Water
Analysis Batch: 256728

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	0.871		mg/L		87	79 - 110		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*95*		*58 - 133*
Trifluorotoluene (Surr)	*96*		*77 - 128*

Lab Sample ID: LCSD 580-256728/8
Matrix: Water
Analysis Batch: 256728

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	0.865		mg/L		86	79 - 110	1	10

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*96*		*58 - 133*
Trifluorotoluene (Surr)	*93*		*77 - 128*

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

Lab Sample ID: MB 580-256726/1-B
Matrix: Water
Analysis Batch: 256786

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256726

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0242	J	0.10	0.019	mg/L		09/20/17 12:41	09/20/17 23:27	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		09/20/17 12:41	09/20/17 23:27	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*69*		*43 - 119*	*09/20/17 12:41*	*09/20/17 23:27*	*1*
n-Decanoic Acid (Surr)	*0.000009*		*0 - 1*	*09/20/17 12:41*	*09/20/17 23:27*	*1*

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

Lab Sample ID: LCS 580-256726/2-B
Matrix: Water
Analysis Batch: 256786

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256726

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
#2 Diesel (C10-C24)			2.00	1.24		mg/L		62	59 - 112		
Motor Oil (>C24-C36)			2.00	1.38		mg/L		69	64 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*63*		*43 - 119*
n-Decanoic Acid (Surr)	*0.03*		*0 - 1*

Lab Sample ID: LCSD 580-256726/3-B
Matrix: Water
Analysis Batch: 256786

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 256726

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)			2.00	1.39		mg/L		69	59 - 112	11	16
Motor Oil (>C24-C36)			2.00	1.46		mg/L		73	64 - 120	6	17

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*66*		*43 - 119*
n-Decanoic Acid (Surr)	*0.03*		*0 - 1*

Lab Chronicle

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

TestAmerica Job ID: 580-71420-1

Client Sample ID: OUTFALL#002-091917

Lab Sample ID: 580-71420-1

Date Collected: 09/19/17 14:50

Matrix: Water

Date Received: 09/20/17 11:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	256753	09/20/17 16:21	T1W	TAL SEA
Total/NA	Prep	CWA_Prep			256724	09/20/17 12:35	MRG	TAL SEA
Total/NA	Analysis	625		1	256810	09/21/17 12:16	ERB	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	256728	09/20/17 18:16	RSB	TAL SEA
Total/NA	Prep	3510C			256726	09/20/17 12:41	MRG	TAL SEA
Total/NA	Cleanup	3630C			256771	09/20/17 15:21	APR	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	256786	09/21/17 00:55	ERZ	TAL SEA

Client Sample ID: TB-091917

Lab Sample ID: 580-71420-2

Date Collected: 09/19/17 00:01

Matrix: Water

Date Received: 09/20/17 11:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	NWTPH-Gx		1	256728	09/20/17 17:44	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: Chevron Edmonds Terminal

TestAmerica Job ID: 580-71420-1

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
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
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: 580-71420-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-71420-1	OUTFALL#002-091917	Water	09/19/17 14:50	09/20/17 11:05
580-71420-2	TB-091917	Water	09/19/17 00:01	09/20/17 11:05

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

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	Client Contact	Date	Chain of Custody Number
Arcadis	Ryan Brauchla	9-19-2017	31870
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page** 1 of 1
1100 Olive Way, Suite 800	509-438-9828	253-922-2310	
City	**State**	**Zip Code**	**Sampler**	**Lab Contact**
Seattle	WA	98101	Ryan Brauchla (RB)	Elaine Walker
Project Name and Location (State)			**Billing Contact**	
Edmonds Terminal Edmonds, WA				
Contract/Purchase Order/Quote No.				
BO045362.0010				

Analysis (Attach list if more space is needed)

71420
Special Instructions/ Conditions of Receipt

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	NWTPH-Gx	NWTPH-Dx w/SGC	EPA 624 (Benzene)	EPA 625 (PAHs)
OUTFALL#002-091917	9-19-17	1450		X			8			8			X	X	X	X
TB-091917	9-19-17	—		X						2			X			

Email results to
ryan.brauchla@arcadis.com
samuel.miles@arcadis.com
ophelie.encelle@arcadis.com
scott.zorn@arcadis.com

WBS Codes:
NWENVPMG001430804-Soil
NWENVPMG001430803-Surface water

580-71420 Chain of Custody

TB A2 Cooler ___ Cor 0.6 Unc 1.4
Cooler Dsc Lt Green @Lab ___
Wet/Packs Packing Ice
LabCor
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)

	Sign/Print	Date	Time
1. Relinquished By	Ryan W Brauchla	9-20-17	0950
2. Relinquished By	Francisco Luna, Jr	9/20/17	1105
3. Relinquished By			
1. Received By	Francisco Luna, Jr	9/20/17	0950
2. Received By	Tom Blankinship	9/20/17	1105
3. Received By			

Comments

DISTRIBUTION: WHITE – Stays with the Samples; CANARY – Returned to Client with Report; PINK – Field Copy

TAL-8274-580 (0210)

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-71420-1

Login Number: 71420
List Number: 1
Creator: Blankinship, Tom X

List Source: TestAmerica Seattle

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").	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

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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: 580-71583-1
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:
9/27/2017 3:59:34 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Definitions 4
Client Sample Results 5
QC Sample Results 7
Chronicle 11
Certification Summary 12
Sample Summary 13
Chain of Custody 14
Receipt Checklists 15

Job ID: 580-71583-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE
Client: ARCADIS U.S. Inc
Project: Edmonds Terminal
Report Number: 580-71583-1

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 9/26/2017 12:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.5º 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#002-092617 (580-71583-1) and TB-092617 (water) (580-71583-2) were analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 09/26/2017.

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

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample OUTFALL#002-092617 (580-71583-1) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared and analyzed on 09/26/2017.

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

GASOLINE RANGE ORGANICS (GRO)

Samples OUTFALL#002-092617 (580-71583-1) and TB-092617 (water) (580-71583-2) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 09/26/2017.

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#002-092617 (580-71583-1) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared and analyzed on 09/26/2017.

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

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

TestAmerica Job ID: 580-71583-1

Client Sample ID: OUTFALL#002-092617
Date Collected: 09/26/17 08:45
Date Received: 09/26/17 12:00

Lab Sample ID: 580-71583-1
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			09/26/17 19:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*114*		*74 - 123*		*09/26/17 19:49*	*1*
Toluene-d8 (Surr)	*91*		*79 - 122*		*09/26/17 19:49*	*1*
4-Bromofluorobenzene (Surr)	*104*		*78 - 119*		*09/26/17 19:49*	*1*
Dibromofluoromethane (Surr)	*106*		*70 - 120*		*09/26/17 19:49*	*1*
1,2-Dichloroethane-d4 (Surr)	*95*		*70 - 120*		*09/26/17 19:49*	*1*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		2.9	0.019	ug/L		09/26/17 13:09	09/26/17 19:03	1
Chrysene	ND		0.58	0.0097	ug/L		09/26/17 13:09	09/26/17 19:03	1
Benzo[a]pyrene	ND		0.97	0.019	ug/L		09/26/17 13:09	09/26/17 19:03	1
Indeno[1,2,3-cd]pyrene	ND		0.97	0.048	ug/L		09/26/17 13:09	09/26/17 19:03	1
Dibenz(a,h)anthracene	ND		0.58	0.019	ug/L		09/26/17 13:09	09/26/17 19:03	1
Benzo[k]fluoranthene	ND		0.97	0.019	ug/L		09/26/17 13:09	09/26/17 19:03	1
Benzo[b]fluoranthene	ND		0.97	0.048	ug/L		09/26/17 13:09	09/26/17 19:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*88*		*60 - 135*	*09/26/17 13:09*	*09/26/17 19:03*	*1*

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			09/26/17 14:51	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*58 - 133*		*09/26/17 14:51*	*1*
Trifluorotoluene (Surr)	*95*		*77 - 128*		*09/26/17 14:51*	*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)	ND		0.10	0.019	mg/L		09/26/17 13:13	09/26/17 20:10	1
Motor Oil (>C24-C36)	ND		0.26	0.079	mg/L		09/26/17 13:13	09/26/17 20:10	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*79*		*43 - 119*	*09/26/17 13:13*	*09/26/17 20:10*	*1*
n-Decanoic Acid (Surr)	*0.0002*		*0 - 1*	*09/26/17 13:13*	*09/26/17 20:10*	*1*

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

TestAmerica Job ID: 580-71583-1

Client Sample ID: TB-092617 (water)
Date Collected: 09/26/17 00:01
Date Received: 09/26/17 12:00

Lab Sample ID: 580-71583-2
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			09/26/17 19:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*114*		*74 - 123*		*09/26/17 19:25*	*1*
Toluene-d8 (Surr)	*91*		*79 - 122*		*09/26/17 19:25*	*1*
4-Bromofluorobenzene (Surr)	*102*		*78 - 119*		*09/26/17 19:25*	*1*
Dibromofluoromethane (Surr)	*107*		*70 - 120*		*09/26/17 19:25*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*70 - 120*		*09/26/17 19:25*	*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			09/26/17 15:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*58 - 133*		*09/26/17 15:23*	*1*
Trifluorotoluene (Surr)	*98*		*77 - 128*		*09/26/17 15:23*	*1*

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

Lab Sample ID: MB 580-257337/5
Matrix: Water
Analysis Batch: 257337

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			09/26/17 12:12	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*113*		*74 - 123*		*09/26/17 12:12*	*1*
Toluene-d8 (Surr)	*91*		*79 - 122*		*09/26/17 12:12*	*1*
4-Bromofluorobenzene (Surr)	*104*		*78 - 119*		*09/26/17 12:12*	*1*
Dibromofluoromethane (Surr)	*105*		*70 - 120*		*09/26/17 12:12*	*1*
1,2-Dichloroethane-d4 (Surr)	*93*		*70 - 120*		*09/26/17 12:12*	*1*

Lab Sample ID: LCS 580-257337/6
Matrix: Water
Analysis Batch: 257337

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	9.98		ug/L		100	37 - 151		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Trifluorotoluene (Surr)	*114*		*74 - 123*
Toluene-d8 (Surr)	*91*		*79 - 122*
4-Bromofluorobenzene (Surr)	*104*		*78 - 119*
Dibromofluoromethane (Surr)	*104*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*92*		*70 - 120*

Lab Sample ID: LCSD 580-257337/7
Matrix: Water
Analysis Batch: 257337

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	3	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Trifluorotoluene (Surr)	*113*		*74 - 123*
Toluene-d8 (Surr)	*90*		*79 - 122*
4-Bromofluorobenzene (Surr)	*102*		*78 - 119*
Dibromofluoromethane (Surr)	*105*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*91*		*70 - 120*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-257305/1-A
Matrix: Water
Analysis Batch: 257377

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257305

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		09/26/17 13:09	09/26/17 17:49	1
Chrysene	ND		0.60	0.010	ug/L		09/26/17 13:09	09/26/17 17:49	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/26/17 13:09	09/26/17 17:49	1

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-257305/1-A
Matrix: Water
Analysis Batch: 257377

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257305

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Indeno[1,2,3-cd]pyrene	ND		1.0	0.050	ug/L		09/26/17 13:09	09/26/17 17:49	1
Dibenz(a,h)anthracene	ND		0.60	0.020	ug/L		09/26/17 13:09	09/26/17 17:49	1
Benzo[k]fluoranthene	ND		1.0	0.020	ug/L		09/26/17 13:09	09/26/17 17:49	1
Benzo[b]fluoranthene	ND		1.0	0.050	ug/L		09/26/17 13:09	09/26/17 17:49	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*91*		*60 - 135*	*09/26/17 13:09*	*09/26/17 17:49*	*1*

Lab Sample ID: LCS 580-257305/2-A
Matrix: Water
Analysis Batch: 257377

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257305

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	2.00	2.08	J	ug/L		104	33 - 143
Chrysene	2.00	1.96		ug/L		98	17 - 168
Benzo[a]pyrene	2.00	2.15		ug/L		107	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	2.01		ug/L		101	1 - 171
Dibenz(a,h)anthracene	2.00	2.30		ug/L		115	1 - 227
Benzo[k]fluoranthene	2.00	2.12		ug/L		106	11 - 162
Benzo[b]fluoranthene	2.00	2.10		ug/L		105	24 - 159

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Terphenyl-d14	*86*		*60 - 135*

Lab Sample ID: LCSD 580-257305/3-A
Matrix: Water
Analysis Batch: 257377

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 257305

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	2.00	2.11	J	ug/L		105	33 - 143	1	50
Chrysene	2.00	1.93		ug/L		97	17 - 168	1	50
Benzo[a]pyrene	2.00	1.87		ug/L		93	17 - 163	14	50
Indeno[1,2,3-cd]pyrene	2.00	1.81		ug/L		91	1 - 171	10	50
Dibenz(a,h)anthracene	2.00	2.00		ug/L		100	1 - 227	14	50
Benzo[k]fluoranthene	2.00	1.89		ug/L		95	11 - 162	11	50
Benzo[b]fluoranthene	2.00	1.96		ug/L		98	24 - 159	7	50

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Terphenyl-d14	*82*		*60 - 135*

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

Lab Sample ID: MB 580-257293/6
Matrix: Water
Analysis Batch: 257293

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			09/26/17 11:02	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*58 - 133*		*09/26/17 11:02*	*1*
Trifluorotoluene (Surr)	*104*		*77 - 128*		*09/26/17 11:02*	*1*

Lab Sample ID: LCS 580-257293/7
Matrix: Water
Analysis Batch: 257293

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	0.901		mg/L		90	79 - 110		

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

Lab Sample ID: LCSD 580-257293/8
Matrix: Water
Analysis Batch: 257293

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	0.895		mg/L		90	79 - 110	1	10

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*99*		*58 - 133*
Trifluorotoluene (Surr)	*98*		*77 - 128*

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

Lab Sample ID: MB 580-257307/1-B
Matrix: Water
Analysis Batch: 257364

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257307

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		09/26/17 13:13	09/26/17 19:10	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		09/26/17 13:13	09/26/17 19:10	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*81*		*43 - 119*	*09/26/17 13:13*	*09/26/17 19:10*	*1*
n-Decanoic Acid (Surr)	*0.00006*		*0 - 1*	*09/26/17 13:13*	*09/26/17 19:10*	*1*

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

Lab Sample ID: LCS 580-257307/2-B
Matrix: Water
Analysis Batch: 257364

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257307

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)	2.00	1.43		mg/L		72	59 - 112
Motor Oil (>C24-C36)	2.00	1.74		mg/L		87	64 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*77*		*43 - 119*
n-Decanoic Acid (Surr)	*0.07*		*0 - 1*

Lab Sample ID: LCSD 580-257307/3-B
Matrix: Water
Analysis Batch: 257364

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 257307

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)	2.00	1.27		mg/L		64	59 - 112	12	16
Motor Oil (>C24-C36)	2.00	1.54		mg/L		77	64 - 120	12	17

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*67*		*43 - 119*
n-Decanoic Acid (Surr)	*0.06*		*0 - 1*

Lab Chronicle

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

TestAmerica Job ID: 580-71583-1

Client Sample ID: OUTFALL#002-092617

Lab Sample ID: 580-71583-1

Date Collected: 09/26/17 08:45

Matrix: Water

Date Received: 09/26/17 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	257337	09/26/17 19:49	TL1	TAL SEA
Total/NA	Prep	CWA_Prep			257305	09/26/17 13:09	NDB	TAL SEA
Total/NA	Analysis	625		1	257377	09/26/17 19:03	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	257293	09/26/17 14:51	TL1	TAL SEA
Total/NA	Prep	3510C			257307	09/26/17 13:13	NDB	TAL SEA
Total/NA	Cleanup	3630C			257357	09/26/17 16:17	APR	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	257364	09/26/17 20:10	ADB	TAL SEA

Client Sample ID: TB-092617 (water)

Lab Sample ID: 580-71583-2

Date Collected: 09/26/17 00:01

Matrix: Water

Date Received: 09/26/17 12:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	257337	09/26/17 19:25	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	257293	09/26/17 15:23	TL1	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: 580-71583-1

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
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
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: 580-71583-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-71583-1	OUTFALL#002-092617	Water	09/26/17 08:45	09/26/17 12:00
580-71583-2	TB-092617 (water)	Water	09/26/17 00:01	09/26/17 12:00

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

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	Client Contact	Date	Chain of Custody Number
Arcadis	Ryan Brauchla 71583	9-26-2017	29431
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
1100 Olive Way, Suite 800	509-438-9828	253-922-2310	
City / **State** / **Zip Code**	**Sampler** / **Lab Contact**		
Seattle / WA / 98101	Ryan Brauchla (RB) / Elaine Walker		
Project Name and Location (State)	**Billing Contact**		
Edmonds Terminal Edmonds WA			
Contract/Purchase Order/Quote No.			
B0045362.0010			

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: NWTPH-Gx	NWTPH-Dx w/SGC	EPA 624 (Benzene)	EPA 625 (cPAHs)
OUTFALL#002-092617	9-26-17	0845		X			2			8			X	X	X	X
TB-092617 (water)	9-26-17	—		X						2			X		X	

Analysis (Attach list if more space is needed)

Special Instructions/ Conditions of Receipt

Email results to
ryan.brauchla@arcadis.com
samuel.miles@arcadis.com
scott.zorn@arcadis.com
ophelie.ercelle@arcadis.com

WBS Code: surface water
NWENVPMG001430803

580-71583 Chain of Custody

TB A2 Cooler Cor 0.5 w/o 1.2 Unc
Cooler Dsc Lg Blue @Lab
Wet/Packs Packing bub
lab Cor

Cooler	Possible Hazard Identification	Sample Disposal	(A fee may be assessed if samples are retained longer than 1 month)
☒ Yes ☐ No Cooler Temp: ____	☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown	☐ 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)

	Relinquished By Sign/Print	Date	Time	Received By Sign/Print	Date	Time
1.	Ryan Brauchla	9-26-17	1030	Francisco Lunq, Jr.	9/26/17	1030
2.	Francisco Lunq, Jr.	9/26/17	1215	Tom Blankinship	9/26/17	1215
3.						

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: 580-71583-1

Login Number: 71583
List Number: 1
Creator: Blankinship, Tom X

List Source: TestAmerica Seattle

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	

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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: 580-71756-1
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:
10/4/2017 4:12:12 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Case Narrative 3
Definitions 5
Client Sample Results 6
QC Sample Results 7
Chronicle 11
Certification Summary 12
Sample Summary 13
Chain of Custody 14
Receipt Checklists 15

Job ID: 580-71756-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE
Client: ARCADIS U.S. Inc
Project: Chevron Edmonds Terminal
Report Number: 580-71756-1

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

One sample was received on 10/3/2017 8:45 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was -0.5º C.

The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. The Trip Blank was listed on the COC but no containers were received. The sample was not logged in.

Containers A-D for sample 1 did not have labels: Outfall #002-100217 (580-71756-1) Samples logged in per the COC.

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 #002-100217 (580-71756-1) was analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 10/04/2017.

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

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample Outfall #002-100217 (580-71756-1) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared and analyzed on 10/03/2017.

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

GASOLINE RANGE ORGANICS (GRO)

Sample Outfall #002-100217 (580-71756-1) was analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 10/03/2017.

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 #002-100217 (580-71756-1) was analyzed for diesel and motor oil range organics in accordance with Method

Job ID: 580-71756-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

NWTPH-Dx. The samples were prepared and analyzed on 10/03/2017.

Continuing calibration verification (CCV) recovered below %D control limits for o-Terphenyl surrogate. However, the CCV and all associated samples recovered within %R control limits; therefore, the data are qualified and reported.

A deviation from the Standard Operating Procedure (SOP) occurred. Details are as follows: The time between CCVs exceeded the 12 hour limit required by the SOP. However, this CCV window and the number of injections between CCVs (10) meet the NWTPH-DX method requirements.

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

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 ID: Outfall #002-100217

Date Collected: 10/02/17 12:15
Date Received: 10/03/17 08:45

Lab Sample ID: 580-71756-1
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			10/04/17 13:59	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*107*		*74 - 123*		*10/04/17 13:59*	*1*
Toluene-d8 (Surr)	*99*		*79 - 122*		*10/04/17 13:59*	*1*
4-Bromofluorobenzene (Surr)	*101*		*78 - 119*		*10/04/17 13:59*	*1*
Dibromofluoromethane (Surr)	*106*		*70 - 120*		*10/04/17 13:59*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*70 - 120*		*10/04/17 13:59*	*1*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		10/03/17 10:10	10/03/17 18:27	1
Chrysene	ND		0.59	0.0099	ug/L		10/03/17 10:10	10/03/17 18:27	1
Benzo[a]pyrene	ND		0.99	0.020	ug/L		10/03/17 10:10	10/03/17 18:27	1
Indeno[1,2,3-cd]pyrene	ND		0.99	0.049	ug/L		10/03/17 10:10	10/03/17 18:27	1
Dibenz(a,h)anthracene	ND		0.59	0.020	ug/L		10/03/17 10:10	10/03/17 18:27	1
Benzo[k]fluoranthene	ND		0.99	0.020	ug/L		10/03/17 10:10	10/03/17 18:27	1
Benzo[b]fluoranthene	ND		0.99	0.049	ug/L		10/03/17 10:10	10/03/17 18:27	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*84*		*60 - 135*	*10/03/17 10:10*	*10/03/17 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			10/03/17 12:19	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*58 - 133*		*10/03/17 12:19*	*1*
Trifluorotoluene (Surr)	*113*		*77 - 128*		*10/03/17 12:19*	*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	0.019	mg/L		10/03/17 10:15	10/03/17 20:26	1
Motor Oil (>C24-C36)	ND		0.25	0.078	mg/L		10/03/17 10:15	10/03/17 20:26	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*67*		*43 - 119*	*10/03/17 10:15*	*10/03/17 20:26*	*1*
n-Decanoic Acid (Surr)	*0.0001*		*0 - 1*	*10/03/17 10:15*	*10/03/17 20:26*	*1*

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

Lab Sample ID: MB 580-258049/5
Matrix: Water
Analysis Batch: 258049

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			10/04/17 12:37	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*106*		*74 - 123*		*10/04/17 12:37*	*1*
Toluene-d8 (Surr)	*101*		*79 - 122*		*10/04/17 12:37*	*1*
4-Bromofluorobenzene (Surr)	*103*		*78 - 119*		*10/04/17 12:37*	*1*
Dibromofluoromethane (Surr)	*106*		*70 - 120*		*10/04/17 12:37*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*70 - 120*		*10/04/17 12:37*	*1*

Lab Sample ID: LCS 580-258049/6
Matrix: Water
Analysis Batch: 258049

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)	*98*		*79 - 122*
4-Bromofluorobenzene (Surr)	*105*		*78 - 119*
Dibromofluoromethane (Surr)	*112*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*102*		*70 - 120*

Lab Sample ID: LCSD 580-258049/7
Matrix: Water
Analysis Batch: 258049

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	37 - 151	2	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Trifluorotoluene (Surr)	*108*		*74 - 123*
Toluene-d8 (Surr)	*99*		*79 - 122*
4-Bromofluorobenzene (Surr)	*99*		*78 - 119*
Dibromofluoromethane (Surr)	*106*		*70 - 120*
1,2-Dichloroethane-d4 (Surr)	*102*		*70 - 120*

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-257888/1-A
Matrix: Water
Analysis Batch: 257956

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257888

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		10/03/17 10:10	10/03/17 16:23	1
Chrysene	ND		0.60	0.010	ug/L		10/03/17 10:10	10/03/17 16:23	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		10/03/17 10:10	10/03/17 16:23	1

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 580-257888/1-A
Matrix: Water
Analysis Batch: 257956

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257888

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Indeno[1,2,3-cd]pyrene	ND		1.0	0.050	ug/L		10/03/17 10:10	10/03/17 16:23	1
Dibenz(a,h)anthracene	ND		0.60	0.020	ug/L		10/03/17 10:10	10/03/17 16:23	1
Benzo[k]fluoranthene	ND		1.0	0.020	ug/L		10/03/17 10:10	10/03/17 16:23	1
Benzo[b]fluoranthene	ND		1.0	0.050	ug/L		10/03/17 10:10	10/03/17 16:23	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Terphenyl-d14	*92*		*60 - 135*	*10/03/17 10:10*	*10/03/17 16:23*	*1*

Lab Sample ID: LCS 580-257888/2-A
Matrix: Water
Analysis Batch: 257956

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257888

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[a]anthracene	2.00	1.77	J	ug/L		88	33 - 143
Chrysene	2.00	1.72		ug/L		86	17 - 168
Benzo[a]pyrene	2.00	1.90		ug/L		95	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	1.75		ug/L		87	1 - 171
Dibenz(a,h)anthracene	2.00	1.96		ug/L		98	1 - 227
Benzo[k]fluoranthene	2.00	1.81		ug/L		90	11 - 162
Benzo[b]fluoranthene	2.00	1.87		ug/L		93	24 - 159

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Terphenyl-d14	*83*		*60 - 135*

Lab Sample ID: LCSD 580-257888/3-A
Matrix: Water
Analysis Batch: 257956

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 257888

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[a]anthracene	2.00	1.82	J	ug/L		91	33 - 143	3	50
Chrysene	2.00	1.78		ug/L		89	17 - 168	4	50
Benzo[a]pyrene	2.00	1.94		ug/L		97	17 - 163	2	50
Indeno[1,2,3-cd]pyrene	2.00	1.86		ug/L		93	1 - 171	6	50
Dibenz(a,h)anthracene	2.00	2.03		ug/L		102	1 - 227	4	50
Benzo[k]fluoranthene	2.00	1.77		ug/L		89	11 - 162	2	50
Benzo[b]fluoranthene	2.00	2.02		ug/L		101	24 - 159	8	50

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Terphenyl-d14	*86*		*60 - 135*

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

Lab Sample ID: MB 580-257895/6
Matrix: Water
Analysis Batch: 257895

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			10/03/17 10:12	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*58 - 133*		*10/03/17 10:12*	*1*
Trifluorotoluene (Surr)	*104*		*77 - 128*		*10/03/17 10:12*	*1*

Lab Sample ID: LCS 580-257895/7
Matrix: Water
Analysis Batch: 257895

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	0.892		mg/L		89	79 - 110		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*99*		*58 - 133*
Trifluorotoluene (Surr)	*101*		*77 - 128*

Lab Sample ID: LCSD 580-257895/8
Matrix: Water
Analysis Batch: 257895

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	0.879		mg/L		88	79 - 110	2	10

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*99*		*58 - 133*
Trifluorotoluene (Surr)	*98*		*77 - 128*

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

Lab Sample ID: MB 580-257890/1-B
Matrix: Water
Analysis Batch: 257985

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257890

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		10/03/17 10:15	10/03/17 19:24	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		10/03/17 10:15	10/03/17 19:24	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*76*		*43 - 119*	*10/03/17 10:15*	*10/03/17 19:24*	*1*
n-Decanoic Acid (Surr)	*0.00004*		*0 - 1*	*10/03/17 10:15*	*10/03/17 19:24*	*1*

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

Lab Sample ID: LCS 580-257890/2-B
Matrix: Water
Analysis Batch: 257985

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257890

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
#2 Diesel (C10-C24)			2.00	1.36		mg/L		68	59 - 112		
Motor Oil (>C24-C36)			2.00	1.63		mg/L		81	64 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*70*		*43 - 119*
n-Decanoic Acid (Surr)	*0*		*0 - 1*

Lab Sample ID: LCSD 580-257890/3-B
Matrix: Water
Analysis Batch: 257985

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 257890

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)			2.00	1.34		mg/L		67	59 - 112	2	16
Motor Oil (>C24-C36)			2.00	1.61		mg/L		81	64 - 120	1	17

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*72*		*43 - 119*
n-Decanoic Acid (Surr)	*0*		*0 - 1*

Lab Chronicle

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

TestAmerica Job ID: 580-71756-1

Client Sample ID: Outfall #002-100217
Date Collected: 10/02/17 12:15
Date Received: 10/03/17 08:45

Lab Sample ID: 580-71756-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	258049	10/04/17 13:59	IWH	TAL SEA
Total/NA	Prep	CWA_Prep			257888	10/03/17 10:10	MRG	TAL SEA
Total/NA	Analysis	625		1	257956	10/03/17 18:27	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	257895	10/03/17 12:19	RSB	TAL SEA
Total/NA	Prep	3510C			257890	10/03/17 10:15	MRG	TAL SEA
Total/NA	Cleanup	3630C			257963	10/03/17 15:41	JWL	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	257985	10/03/17 20:26	ADB	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: 580-71756-1

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
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
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: 580-71756-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-71756-1	Outfall #002-100217	Water	10/02/17 12:15	10/03/17 08:45

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Seattle
5755 8th Street E.
Tacoma, WA 98424
Tel. 253-922-2310
Fax 253-922-5047
www.testamericainc.com

Loc: 580
71756

☐ Rush
☐ Short Hold

Chain of Custody Record

Client	Arcadis
Client Contact	Ryan Braughton
Date	10/2/17
Chain of Custody Number	29429
Address	1100 Olive Way Suite 800
Telephone Number (Area Code)/Fax Number	509-438-9828
Lab Number	253-922-2310
Page ___ of ___	
City	Seattle
State	
Zip Code	
Sampler	Jason Little
Lab Contact	Elaine Walker
Project Name and Location (State)	Edmonds Terminal (WA)
Billing Contact	
Contract/Purchase Order/Quote No.	B0045362.0010

Analysis (Attach list if more space is needed): NWTPH-Gx; NWTPH-Dx (w/sgc); EPA-624 (Benzene); EPA-625 (cPAHs)

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	NWTPH-Gx	NWTPH-Dx (w/sgc)	EPA-624 (Benzene)	EPA-625 (cPAHs)
Outfall #002-100217	10/2/17	1215		X			2			8			X	X	X	X
TB-100117	10/2/17			X						4			X		X	

Special Instructions/Conditions of Receipt:
Email Results to:
ryan.braughton@arcadis.com
samuel.miles@arcadis.com
eric.krueger@arcadis.com
ophelie.arcelle@arcadis.com

WBS Code
NWEWPM600143?8.03

580-71756 Chain of Custody

TB A2 Cooler ___ Cor 0.5 Unc 0.2
Cooler Dsc lg blue white @Lab ___
Wet Packs Packing bubble
Cli drop 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)

	Date	Time		Date	Time
1. Relinquished By Sign/Print: [signature] / Jason Little			1. Received By Sign/Print: [signature] M. Bonnie McDermott	10/3/17	0845
2. Relinquished By Sign/Print			2. Received By Sign/Print		
3. Relinquished By Sign/Print			3. Received By Sign/Print		

Comments

DISTRIBUTION: WHITE – Stays with the Samples; CANARY – Returned to Client with Report; PINK – Field Copy

TAL-8274-580 (0210)

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 580-71756-1

Login Number: 71756
List Number: 1
Creator: Ponce-McDermott, Monica

List Source: TestAmerica Seattle

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.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	False	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 <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX M

Discharge Monitoring Reports

Washington State Department of Ecology **Discharge Monitoring Report (DMR)**

Permit Number: WA0991007 **Permittee:** Former Unocal Edmonds Bulk Terminal

Facility County: Snohomish **Receiving Waterbody:** Shelleberger Creek

Monitoring Period: 09/01/2017 - 09/30/2017 **Outfall:** 002 - Willow Creek **Version:** 1

Week	Monitoring Point	Flow Gallons/minute (gpm) Once per defined event Metered/Recorded	pH Standard Units Weekly Grab	Benzene Micrograms/L (ug/L) Weekly Grab	NWTPHGx Gasoline (NWTPH Gx) (volatile) Micrograms/L (ug/L) Weekly Grab	NWTPHDx Diesel (NWTPH Dx) (semi-volatile) Micrograms/L (ug/L) Weekly Grab	Polynuclear Aromatic Hydrocarbons (PAH) Carcinogenic PAHs Micrograms/L (ug/L) Weekly Calculated	Benzo[a]anthracene Micrograms/L (ug/L) Weekly Grab	Benzo[b]fluoranthene (3,4-Benzofluoranthene) Micrograms/L (ug/L) Weekly Grab	Benzo[k]fluoranthene (11,12-benzofluoranthene) Micrograms/L (ug/L) Weekly Grab	Chrysene Micrograms/L (ug/L) Weekly Grab	Benzo[a]pyrene Micrograms/L (ug/L) Weekly Grab
		DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1
1-F	**9/1/17**	C	C	C	C	C	C	C	C	C	C	C
1-Sa	**9/2/17**											
2-Su	**9/3/17**	C	C	C	C	C	C	C	C	C	C	C
2-M	**9/4/17**											
2-T	**9/5/17**											
2-W	**9/6/17**											
2-Th	**9/7/17**											
2-F	**9/8/17**											
2-Sa	**9/9/17**											
3-Su	**9/10/17**					C						
3-M	**9/11/17**		8.17	< 0.42	< 0.050	< 0.019	0.0185	< 0.020	< 0.051	< 0.020	< 0.010	< 0.020
3-T	**9/12/17**	3.94										
3-W	**9/13/17**	10.93										
3-Th	**9/14/17**	13.64	7.40	< 0.42	< 0.050	J|0.050	0.0199	< 0.022	< 0.055	< 0.022	< 0.011	< 0.022
3-F	**9/15/17**	10.44										
3-Sa	**9/16/17**											
4-Su	**9/17/17**											
4-M	**9/18/17**	12.94										
4-T	**9/19/17**	7.72	6.99	< 0.042	< 0.050	J|0.040	0.0189	< 0.021	< 0.052	< 0.021	< 0.010	< 0.021
4-W	**9/20/17**	7.78										
4-Th	**9/21/17**	6.68										
4-F	**9/22/17**	4.25										
4-Sa	**9/23/17**											
5-Su	**9/24/17**											
5-M	**9/25/17**	13.89										
5-T	**9/26/17**	7.34	8.02	< 0.042	< 0.050	< 0.019	0.0179	< 0.019	< 0.048	< 0.019	< 0.097	< 0.019
5-W	**9/27/17**	8.78										
5-Th	**9/28/17**	3.65										
5-F	**9/29/17**	8.60										
5-Sa	**9/30/17**											
Daily Minimum												
			>= 6.0 (RO)									
Daily Maximum		13.89	8.17	0.42	0.05	0.05	0.0189	0.022	0.055	0.022	0.097	0.022
		<= 15 (RO)	<= 9.0 (RO)	<= 16 (RO)	<= 800 (RO)	<= 500 (RO)	<= 0.05 (RO)	Report Only	Report Only	Report Only	Report Only	Report Only

Reporting Codes Used: B - Below Detection Limit/No Detection, C - No Discharge, J - Estimated Value/Below Quantitation Limit

Overall DMR Notes/Comment

Discharge of the dewatering system began on 9/12/17. The minimum detection limit is reported for all non-detects.

Week	Monitoring Point	Dibenzo(a,h)anthracene Micrograms/L (ug/L) Weekly Grab	Indeno(1,2,3-cd)pyrene Micrograms/L (ug/L) Weekly Grab	Chitosan Acetate Yes/No Weekly Grab	Flow Gallons/minute (gpm) Weekly Metered/Recorded	pH Standard Units Weekly Grab	Benzene Micrograms/L (ug/L) Weekly Grab	NWTPHGx Gasoline (NWTPH Gx) (volatile) Micrograms/L (ug/L) Weekly Grab	NWTPHDx Diesel (NWTPH Dx) (semi-volatile) Micrograms/L (ug/L) Weekly Grab	Polynuclear Aromatic Hydrocarbons (PAH) Carcinogenic PAHs Micrograms/L (ug/L) Weekly Calculated	Benzo[a]anthracene Micrograms/L (ug/L) Weekly Grab	Benzo[b]fluoranthene (3,4-Benzofluoranthene) Micrograms/L (ug/L) Weekly Grab
		DE1	DE1	DE1	DPE	DPE	DPE	DPE	DPE	DPE	DPE	DPE
1-F	**9/1/17**	C	C	C								
1-Sa	**9/2/17**											
2-Su	**9/3/17**	C	C	C								
2-M	**9/4/17**											
2-T	**9/5/17**											
2-W	**9/6/17**											
2-Th	**9/7/17**											
2-F	**9/8/17**											
2-Sa	**9/9/17**											
3-Su	**9/10/17**											
3-M	**9/11/17**	< 0.020	< 0.051	No								
3-T	**9/12/17**											
3-W	**9/13/17**											
3-Th	**9/14/17**	< 0.022	< 0.055	No								
3-F	**9/15/17**											
3-Sa	**9/16/17**											
4-Su	**9/17/17**											
4-M	**9/18/17**											
4-T	**9/19/17**	< 0.021	< 0.052	NO								
4-W	**9/20/17**											
4-Th	**9/21/17**											
4-F	**9/22/17**											
4-Sa	**9/23/17**											
5-Su	**9/24/17**											
5-M	**9/25/17**											
5-T	**9/26/17**	< 0.019	< 0.048	No								
5-W	**9/27/17**											
5-Th	**9/28/17**											
5-F	**9/29/17**											
5-Sa	**9/30/17**											
Daily Minimum												
						>= 6.0 (RO)						
Daily Maximum		0.022	0.055	No							C	C
		Report Only	Report Only	<= 0 (RO)	<= 100 (RO)	<= 9.0 (RO)	<= 16 (RO)	<= 800 (RO)	<= 500 (RO)	<= 0.05 (RO)	Report Only	Report Only

Week	Monitoring Point	Benzo[k]fluoranthene (11,12-benzofluoranthene) Micrograms/L (ug/L) Weekly Grab	Chrysene Micrograms/L (ug/L) Weekly Grab	Benzo[a]pyrene Micrograms/L (ug/L) Weekly Grab	Dibenzo[a,h]anthracene Micrograms/L (ug/L) Weekly Grab	Indeno(1,2,3-cd)pyrene Micrograms/L (ug/L) Weekly Grab	Chitosan Acetate Yes/No Weekly Grab
		DPE	DPE	DPE	DPE	DPE	DPE
1-F	**9/1/17**						
1-Sa	**9/2/17**						
2-Su	**9/3/17**						
2-M	**9/4/17**						
2-T	**9/5/17**						
2-W	**9/6/17**						
2-Th	**9/7/17**						
2-F	**9/8/17**						
2-Sa	**9/9/17**						
3-Su	**9/10/17**						
3-M	**9/11/17**						
3-T	**9/12/17**						
3-W	**9/13/17**						
3-Th	**9/14/17**						
3-F	**9/15/17**						
3-Sa	**9/16/17**						
4-Su	**9/17/17**						
4-M	**9/18/17**						
4-T	**9/19/17**						
4-W	**9/20/17**						
4-Th	**9/21/17**						
4-F	**9/22/17**						
4-Sa	**9/23/17**						
5-Su	**9/24/17**						
5-M	**9/25/17**						
5-T	**9/26/17**						
5-W	**9/27/17**						
5-Th	**9/28/17**						
5-F	**9/29/17**						
5-Sa	**9/30/17**						
Daily Minimum							
Daily Maximum		C	C	C	C	C	C
		Report Only	Report Only	Report Only	Report Only	Report Only	<= 0 (RO)

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Garrick Jauregui

Signature

10/26/2017 9:10:03 AM

Date

Washington State Department of Ecology **Discharge Monitoring Report (DMR)**

Permit Number: WA0991007 **Permittee:** Former Unocal Edmonds Bulk Terminal

Facility County: Snohomish **Receiving Waterbody:** Shelleberger Creek

Monitoring Period: 10/01/2017 - 10/31/2017 **Outfall:** 002 - Willow Creek **Version:** 1

Week	Monitoring Point	Flow Gallons/minute (gpm) Once per defined event Metered/Recorded	pH Standard Units Weekly Grab	Benzene Micrograms/L (ug/L) Weekly Grab	NWTPHGx Gasoline (NWTPH Gx) (volatile) Micrograms/L (ug/L) Weekly Grab	NWTPHDx Diesel (NWTPH Dx) (semi-volatile) Micrograms/L (ug/L) Weekly Grab	Polynuclear Aromatic Hydrocarbons (PAH) Carcinogenic PAHs Micrograms/L (ug/L) Weekly Calculated	Benzo[a]anthracene Micrograms/L (ug/L) Weekly Grab	Benzo[b]fluoranthene (3,4-Benzofluoranthene) Micrograms/L (ug/L) Weekly Grab	Benzo[k]fluoranthene (11,12-benzofluoranthene) Micrograms/L (ug/L) Weekly Grab	Chrysene Micrograms/L (ug/L) Weekly Grab	Benzo[a]pyrene Micrograms/L (ug/L) Weekly Grab
		DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1
1-Su	**10/1/17**											
1-M	**10/2/17**	8.62	7.3	B|0.42*	B|0.050*	B|0.019*	0.00755	B|0.020*	B|0.049	B|0.020*	B|0.0099	B|0.020*
1-T	**10/3/17**											
1-W	**10/4/17**											
1-Th	**10/5/17**											
1-F	**10/6/17**											
1-Sa	**10/7/17**											
2-Su	**10/8/17**											
2-M	**10/9/17**											
2-T	**10/10/17**	C	C	C	C	C	C	C	C	C	C	C
2-W	**10/11/17**											
2-Th	**10/12/17**											
2-F	**10/13/17**											
2-Sa	**10/14/17**											
3-Su	**10/15/17**	C	C	C	C	C	C	C	C	C	C	C
3-M	**10/16/17**											
3-T	**10/17/17**											
3-W	**10/18/17**											
3-Th	**10/19/17**											
3-F	**10/20/17**											
3-Sa	**10/21/17**											
4-Su	**10/22/17**	C	C	C	C	C	C	C	C	C	C	C
4-M	**10/23/17**											
4-T	**10/24/17**											
4-W	**10/25/17**											
4-Th	**10/26/17**											
4-F	**10/27/17**											
4-Sa	**10/28/17**											
5-Su	**10/29/17**	C	C	C	C	C	C	C	C	C	C	C
5-M	**10/30/17**											
5-T	**10/31/17**											
Daily Minimum			7.3									
			>= 6.0 (RO)									
Daily Maximum		8.62	7.3	B|0.42	B|0.050	B|0.019	0.00755	B|0.020	B|0.049	B|0.020	B|0.0099	B|0.020
		<= 15 (RO)	<= 9.0 (RO)	<= 16 (RO)	<= 800 (RO)	<= 500 (RO)	<= 0.05 (RO)	Report Only	Report Only	Report Only	Report Only	Report Only

Reporting Codes Used: B - Below Detection Limit/No Detection, C - No Discharge

Overall DMR Notes/Comment

No discharge weeks 2 through 5.

Week	Monitoring Point	Dibenzo(a,h)anthracene Micrograms/L (ug/L) Weekly Grab	Indeno(1,2,3-cd)pyrene Micrograms/L (ug/L) Weekly Grab	Chitosan Acetate Yes/No Weekly Grab	Flow Gallons/minute (gpm) Weekly Metered/Recorded	pH Standard Units Weekly Grab	Benzene Micrograms/L (ug/L) Weekly Grab	NWTPHGx Gasoline (NWTPH Gx) (volatile) Micrograms/L (ug/L) Weekly Grab	NWTPHDx Diesel (NWTPH Dx) (semi-volatile) Micrograms/L (ug/L) Weekly Grab	Polynuclear Aromatic Hydrocarbons (PAH) Carcinogenic PAHs Micrograms/L (ug/L) Weekly Calculated	Benzo[a]anthracene Micrograms/L (ug/L) Weekly Grab	Benzo[b]fluoranthene (3,4-Benzofluoranthene) Micrograms/L (ug/L) Weekly Grab
		DE1	DE1	DE1	DPE	DPE	DPE	DPE	DPE	DPE	DPE	DPE
1-Su	**10/1/17**											
1-M	**10/2/17**	B|0.020	B|0.049*	no								
1-T	**10/3/17**											
1-W	**10/4/17**											
1-Th	**10/5/17**											
1-F	**10/6/17**											
1-Sa	**10/7/17**											
2-Su	**10/8/17**											
2-M	**10/9/17**											
2-T	**10/10/17**	C	C	C								
2-W	**10/11/17**											
2-Th	**10/12/17**											
2-F	**10/13/17**											
2-Sa	**10/14/17**											
3-Su	**10/15/17**	C	C	C								
3-M	**10/16/17**											
3-T	**10/17/17**											
3-W	**10/18/17**											
3-Th	**10/19/17**											
3-F	**10/20/17**											
3-Sa	**10/21/17**											
4-Su	**10/22/17**	C	C	C								
4-M	**10/23/17**											
4-T	**10/24/17**											
4-W	**10/25/17**											
4-Th	**10/26/17**											
4-F	**10/27/17**											
4-Sa	**10/28/17**											
5-Su	**10/29/17**	C	C	C								
5-M	**10/30/17**											
5-T	**10/31/17**											
Daily Minimum												
						>= 6.0 (RO)						
Daily Maximum		B|0.020	B|0.049	B|no								
		Report Only	Report Only	<= 0 (RO)	<= 100 (RO)	<= 9.0 (RO)	<= 16 (RO)	<= 800 (RO)	<= 500 (RO)	<= 0.05 (RO)	Report Only	Report Only

Week	Monitoring Point	Benzo[k]fluoranthene (11,12-benzofluoranthene) Micrograms/L (ug/L) Weekly Grab	Chrysene Micrograms/L (ug/L) Weekly Grab	Benzo[a]pyrene Micrograms/L (ug/L) Weekly Grab	Dibenzo[a,h]anthracene Micrograms/L (ug/L) Weekly Grab	Indeno(1,2,3-cd)pyrene Micrograms/L (ug/L) Weekly Grab	Chitosan Acetate Yes/No Weekly Grab
		DPE	DPE	DPE	DPE	DPE	DPE
1-Su	**10/1/17**						
1-M	**10/2/17**						
1-T	**10/3/17**						
1-W	**10/4/17**						
1-Th	**10/5/17**						
1-F	**10/6/17**						
1-Sa	**10/7/17**						
2-Su	**10/8/17**						
2-M	**10/9/17**						
2-T	**10/10/17**						
2-W	**10/11/17**						
2-Th	**10/12/17**						
2-F	**10/13/17**						
2-Sa	**10/14/17**						
3-Su	**10/15/17**						
3-M	**10/16/17**						
3-T	**10/17/17**						
3-W	**10/18/17**						
3-Th	**10/19/17**						
3-F	**10/20/17**						
3-Sa	**10/21/17**						
4-Su	**10/22/17**						
4-M	**10/23/17**						
4-T	**10/24/17**						
4-W	**10/25/17**						
4-Th	**10/26/17**						
4-F	**10/27/17**						
4-Sa	**10/28/17**						
5-Su	**10/29/17**						
5-M	**10/30/17**						
5-T	**10/31/17**						
Daily Minimum							
Daily Maximum		Report Only	Report Only	Report Only	Report Only	Report Only	<= 0 (RO)

Outfall: 002 - Willow Creek

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
DE1	Benzene Not Applicable Micrograms/L (ug/L)	10/2/2017	B|0.42	MDL
DE1	Petroleum Hydrocarbons Gasoline (NWTPH Gx) (volatile) Micrograms/L (ug/L)	10/2/2017	B|0.050	MDL
DE1	Petroleum Hydrocarbons Diesel (NWTPH Dx) (semi-volatile) Micrograms/L (ug/L)	10/2/2017	B|0.019	MDL
DE1	Benzo[a]anthracene Not Applicable Micrograms/L (ug/L)	10/2/2017	B|0.020	MDL
DE1	Benzo(k)fluoranthene (11,12-benzofluoranthene) Not Applicable Micrograms/L (ug/L)	10/2/2017	B|0.020	MDL
DE1	Benzo(a)pyrene Not Applicable Micrograms/L (ug/L)	10/2/2017	B|0.020	MDL
DE1	Indeno(1,2,3-cd)pyrene Not Applicable Micrograms/L (ug/L)	10/2/2017	B|0.049	MDL
DPE	All Parameters		C	

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Garrick Jauregui
Signature

11/17/2017 2:40:44 PM
Date

APPENDIX N

Compaction Testing Forms

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	Entact	**Date:**	September 28, 2017
Address:	2873 W Hardies Road Suite 300	**Project:**	DB-2 Excavation
	Gibsonia, PA 15044	**Project #:**	17B196
Attn:	James Curl	**Sample #:**	B17-1008
Revised on:		**Sample date:**	September 26, 2017

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	See Report		Sulfate Soundness	
X	Proctor	124.0 pcf at 7.2%		Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	Specific Gravity, Coarse				
	Specific Gravity, Fine				
	Hydrometer Analysis				
	Atterberg Limits				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,
Cheryl Meredith
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: DB-2 Excavation
Project #: 17B196
Client: Entact
Source: OSSP - "Vadasen"
Sample#: B17-1008

Date Received: 26-Sep-17
Sampled By: J. Butorac
Date Tested: 27-Sep-17
Tested By: M. Carrillo

ASTM D-2487 Unified Soils Classification System
SW-SM, Well-graded Sand with Silt
Sample Color:
gray

ACCREDITED
Certificate #: 1366.01, 1366.02

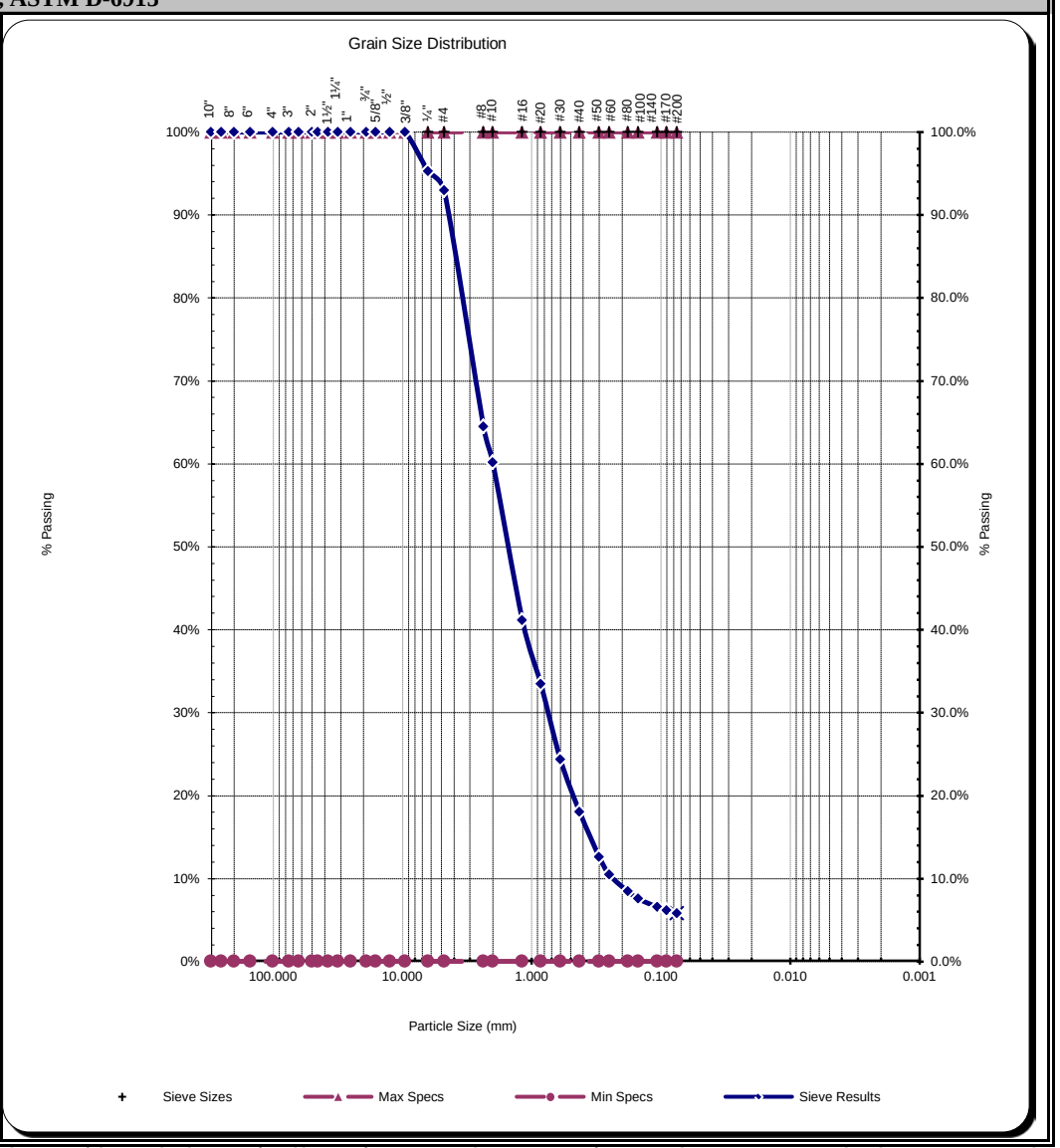
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.065 mm	% Gravel =	7.1%	Coeff. of Curvature, C_C =	1.22
$D_{(10)}$ =	0.235 mm	% Sand =	87.1%	Coeff. of Uniformity, C_U =	8.50
$D_{(15)}$ =	0.355 mm	% Silt & Clay =	5.8%	Fineness Modulus =	3.57
$D_{(30)}$ =	0.755 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	1.563 mm	Plasticity Index =	n/a	Moisture %, as sampled =	n/a
$D_{(60)}$ =	1.993 mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	4.504 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	10/31	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00		100%	100.0%	0.0%
3/4"	19.00		100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		95%	100.0%	0.0%
#4	4.75	93%	93%	100.0%	0.0%
#8	2.36		64%	100.0%	0.0%
#10	2.00	60%	60%	100.0%	0.0%
#16	1.18		41%	100.0%	0.0%
#20	0.850	33%	33%	100.0%	0.0%
#30	0.600		24%	100.0%	0.0%
#40	0.425	18%	18%	100.0%	0.0%
#50	0.300		13%	100.0%	0.0%
#60	0.250	10%	10%	100.0%	0.0%
#80	0.180		8%	100.0%	0.0%
#100	0.150	8%	8%	100.0%	0.0%
#140	0.106		7%	100.0%	0.0%
#170	0.090		6%	100.0%	0.0%
#200	0.075	5.8%	5.8%	100.0%	0.0%



Comments:

Reviewed by:
Cheryl Meredith

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Materials Testing & Consulting, Inc.

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Proctor Report

Project: DB-2 Excavation
Project #: 17B196
Client: Entact
Source: OSSP - "Vadasen"
Sample#: B17-1008

Date Received: 26-Sep-17
Sampled By: J. Butorac
Date Tested: 27-Sep-17
Tested By: M. Carrillo

Unified Soils Classification System, ASTM D-2487
SW-SM, Well-graded Sand with Silt
Sample Color
gray

Sample Prepared: Moist: X Manual:
Dry: Mechanical: X
Test Standard: ASTM D698: AASHTO T 99: Method
ASTM D 1557: X AASHTO T 180: A

Assumed Sp. Gr. 2.60

ACCREDITED
Certificate #: 1366.01, 1366.02

Point Number	Percent Moisture	Dry Density
1	4.6 %	117.6
2	6.7 %	121.5
3	8.5 %	121.5
4	10.6 %	118.2

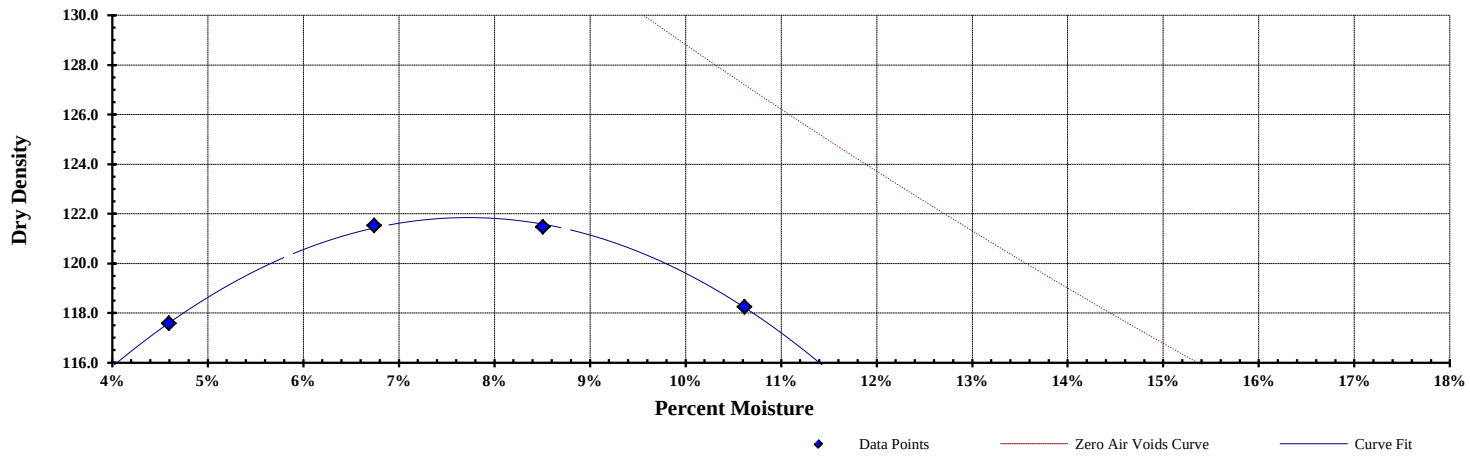
Uncorrected Proctor Value

Max. Dry Density		Optimum Moist
121.8	**lbs/ft³**	**7.7 %**

Value w/ Oversize Correction Applied

Max. Dry Density		Optimum Moist
124.0	**lbs/ft³**	**7.2%**

Moisture Density Relationship



ASTM C-136

Sieve US	Size mm	Percent Passing	Specifications Max	Specifications Min
12.00"	300.00		100.0 %	0.0 %
10.00"	250.00		100.0 %	0.0 %
8.00"	200.00		100.0 %	0.0 %
6.00"	150.00		100.0 %	0.0 %
4.00"	100.00		100.0 %	0.0 %
3.00"	75.00		100.0 %	0.0 %
2.50"	63.00		100.0 %	0.0 %
2.00"	50.00		100.0 %	0.0 %
1.75"	45.00		100.0 %	0.0 %
1.50"	37.50		100.0 %	0.0 %
1.25"	31.50		100.0 %	0.0 %
1.00"	25.00		100.0 %	0.0 %
3/4"	19.00		100.0 %	0.0 %
5/8"	16.00		100.0 %	0.0 %
1/2"	12.50	100 %	100.0 %	0.0 %
3/8"	9.50	100 %	100.0 %	0.0 %
1/4"	6.30		100.0 %	0.0 %
#4	4.75	93 %	100.0 %	0.0 %
#8	2.36		100.0 %	0.0 %
#10	2.00	60 %	100.0 %	0.0 %
#16	1.18		100.0 %	0.0 %
#20	0.850	33 %	100.0 %	0.0 %
#30	0.600		100.0 %	0.0 %
#40	0.425	18 %	100.0 %	0.0 %
#50	0.300		100.0 %	0.0 %
#60	0.250	10 %	100.0 %	0.0 %
#80	0.180		100.0 %	0.0 %
#100	0.150	8 %	100.0 %	0.0 %
#140	0.106		100.0 %	0.0 %
#170	0.090		100.0 %	0.0 %
#200	0.075	5.8 %	100.0 %	0.0 %

ASTM D-4718, Misc. Oversize Correction Values

% Oversize Mat'l: 7%

% Oversize Retained	Corrected Density	Optimum Moisture
5%	123.4	7.3%
10%	125.0	7.0%
15%	126.6	6.6%
20%	128.2	6.3%
25%	129.9	5.9%
30%	131.7	5.5%

Specs: No Specs **Meets Specs? N/A**

% Gravel: 7.1%	C_C: 1.22	$D_{(10)}$: 0.235
% Sand: 87.1%	C_U: 8.50	$D_{(30)}$: 0.755
% Silt&Clay: 5.8%	FM: 3.57	$D_{(60)}$: 1.993
LL: n/a	PL: n/a	PI: n/a
Sand Equivalent: n/a	Req'd Sand Equivalent:	
Fracture %, 1 Face: n/a	Req'd Fracture %, 1 Face:	
Fracture %, 2+ Faces: n/a	Req'd Fracture %, 2+ Faces:	

Comments: _____

Reviewed by: _____
Cheryl Meredith

Materials Testing & Consulting, Inc.

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Engineered Assurance Since 1981

DB-2 Excavation - 17B196 - IPD-Soil Compaction: Report #D39883

CLIENT	Entact	**DATE**	10/10/2017
PROJECT LOCATION	11720 Unaco Road Edmonds WA 98020	**PERMIT #**	

Inspection Information:

Inspection Date: 10/10/2017 **Time Onsite:** 10:30 AM **Weather Conditions:** Cloudy, 60*F, Dry

Inspection Performed: IPD-Soil Compaction

Field Data:

Work / Location:	Western Pad	**Gauge Standard MS:**	763
Equipment ID & Serial #:	Instrotek 3500, Ser. #1241	**Gauge Standard DS:**	2268

Test Samples:

	Sample #:	Description:	Proctor Value(pcf):	Optimum Moisture and Oversize Rock Correction:
1.	B17-1008	SW-SM, Well graded SAND with SILT	124.0	7.2% OM, 7.0% ORC

TEST METHOD ☒ ASTM D-1557 /AASHTO T-180

In Place Density Test Results (ASTM D-6938):

Test #	Mode / Depth	Location of Test	Elev.	Wet Dens.	Dry Dens.	Moist %	Sample #	% Comp.	% Reqd.
1	12"	North End	-3.5' BFG	129.4	123.6	4.7	1	99.7	90
2	12"	Central	-3.5' BFG	132.7	123.8	7.2	1	99.8	90
3	12"	South End	-3.5' BFG	130.7	123.9	5.5	1	99.9	90

☐ Native Soils	Soils consistent with Proctor	◉ Yes	○ No
☒ Imported Fills	Soils found to be firm and stable; and to the best of our knowledge, meet compaction	◉ Yes	○ No
	Contractor notified of results	◉ Yes	○ No

Remarks:

MTC onsite at the contractors request for in place density testing of imported fill. Compaction efforts were concluded prior to the arrival of MTC.

All areas tested met or exceeded 90% compaction as required by plan specifications.

Images:

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SW Region • 2118 Black Lake Blvd. S.W.• Olympia, WA 98512 • Phone 360.534.9777 • Fax 360.534.9779
NW Region • 805 Dupont Street, Suite 5 • Bellingham, WA 98225 • Phone 360.647.6061 • Fax 360.647.8111
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UPLOADED: 10/10/2017 11:21:00

Image is oriented north

REPORTED BY: Kevin Parine REVIEWED BY: Kevin Walters, Project Manager

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NW Region • 805 Dupont Street, Suite 5 • Bellingham, WA 98225 • Phone 360.647.6061 • Fax 360.647.8111
Visit our website: www.mtc-inc.net

DB-2 Excavation - 17B196 - IPD-Soil Compaction: Report #D39903

CLIENT	Entact	**DATE**	10/11/2017
PROJECT LOCATION	11720 Unaco Road Edmonds WA 98020	**PERMIT #**	

Inspection Information:

Inspection Date: 10/11/2017 **Time Onsite:** 02:00 PM **Weather Conditions:** Sunny, 70*F, Dry

Inspection Performed: IPD-Soil Compaction

Field Data:

Work / Location:	West Pad	**Gauge Standard MS:**	32689
Equipment ID & Serial #:	CPN MC-1, Ser. #MD50302505	**Gauge Standard DS:**	7558

Test Samples:

	Sample #:	Description:	Proctor Value(pcf):	Optimum Moisture and Oversize Rock Correction:
1.	B17-1008	SW-SM, Well graded SAND with SILT	124.0	7.2% OM, 7.0% ORC

TEST METHOD ☒ ASTM D-1557 /AASHTO T-180

In Place Density Test Results (ASTM D-6938):

Test #	Mode / Depth	Location of Test	Elev.	Wet Dens.	Dry Dens.	Moist %	Sample #	% Comp.	% Reqd.
1	12"	South	-3' BFG	129.5	123	5.3	1	99.2	90
2	12"	North	-3' BFG	127.5	121.9	4.6	1	98.3	90

☐	Native Soils	Soils consistent with Proctor	◉ Yes	○ No
☒	Imported Fills	Soils found to be firm and stable; and to the best of our knowledge, meet compaction	◉ Yes	○ No
		Contractor notified of results	◉ Yes	○ No

Remarks:

MTC onsite at the contractors request for in place density testing of imported fill. Compaction efforts were concluded prior to the arrival of MTC.

All areas tested met or exceeded 90% compaction as required by plan specifications.

Images:

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UPLOADED: 10/11/2017 14:36:00

Oriented North

REPORTED BY: Kevin Parine REVIEWED BY: Kevin Walters, Project Manager

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DB-2 Excavation - 17B196 - IPD-Soil Compaction: Report #D39918

CLIENT	Entact	**DATE**	10/12/2017
PROJECT LOCATION	11720 Unaco Road Edmonds WA 98020	**PERMIT #**	

Inspection Information:

Inspection Date: 10/12/2017 **Time Onsite:** 2:30 PM **Weather Conditions:** Rainy, 50s, wet

Inspection Performed: IPD-Soil Compaction

Field Data:

Work / Location:	West Pad	**Gauge Standard MS:**	765
Equipment ID & Serial #:	Instrotek 3500, Ser. #1241	**Gauge Standard DS:**	2249

Test Samples:

	Sample #:	Description:	Proctor Value(pcf):	Optimum Moisture and Oversize Rock Correction:
1.	B17-1008	SW-SM, Well graded SAND with SILT	124.0	7.2% OM, 7.0% ORC

TEST METHOD ☒ ASTM D-1557 /AASHTO T-180

In Place Density Test Results (ASTM D-6938):

Test #	Mode / Depth	Location of Test	Elev.	Wet Dens.	Dry Dens.	Moist %	Sample #	% Comp.	% Reqd.
1	12"	South	-1' BFG	125.1	119.7	4.5	1	96.5	90
2	12"	North	-1' BFG	124.7	118.1	5.6	1	95.2	90
3	12	Middle	-1' BFG	123.3	118	4.5	1	95.2	90

☐ Native Soils	Soils consistent with Proctor	◉ Yes	○ No
☒ Imported Fills	Soils found to be firm and stable; and to the best of our knowledge, meet compaction	◉ Yes	○ No
	Contractor notified of results	◉ Yes	○ No

Remarks:

MTC was on site to test the compaction of soils placed on the western pad. The project manager Mike instructed MTC where to take the density/moisture readings, and were surveyed after testing.

Soils were placed in approximately 1ft lifts and compacted using a CAT CS44B single drum vibratory roller.

Soils were found to be sufficently compacted, meeting the 90% compaction required by site plans.

Images:

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UPLOADED: 10/12/2017 15:02:00

Western pad tested. Looking north.

REPORTED BY: Kevin Quillan REVIEWED BY: Kevin Walters, Project Manager

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DB-2 Excavation - 17B196 - IPD-Soil Compaction: Report #D39957

CLIENT	Entact	**DATE**	10/17/2017
PROJECT LOCATION	11720 Unaco Road Edmonds WA 98020	**PERMIT #**	

Inspection Information:

Inspection Date: 10/17/2017 **Time Onsite:** 4:15 pm **Weather Conditions:** Rainy, 50s, wet

Inspection Performed: IPD-Soil Compaction

Field Data:

Work / Location:	Willow Creek Berm	**Gauge Standard MS:**	771
Equipment ID & Serial #:	Instrotek 3500, Ser. #1241	**Gauge Standard DS:**	2241

Test Samples:

	Sample #:	Description:	Proctor Value(pcf):	Optimum Moisture and Oversize Rock Correction:
1.	B17-1008	SW-SM, Well graded SAND with SILT	124.0	7.2% OM, 7.0% ORC

TEST METHOD ☒ ASTM D-1557 /AASHTO T-180

In Place Density Test Results (ASTM D-6938):

Test #	Mode / Depth	Location of Test	Elev.	Wet Dens.	Dry Dens.	Moist %	Sample #	% Comp.	% Reqd.
1	12"	South	12ft ASL	127.6	123.2	3.6	1	99.4	90
2	12"	Middle	12ft ASL	123.4	118	4.6	1	95.2	90
3	12	North	12ft ASL	129.2	124	4.2	1	100	90

☐ Native Soils	Soils consistent with Proctor	◉ Yes	○ No
☒ Imported Fills	Soils found to be firm and stable; and to the best of our knowledge, meet compaction	◉ Yes	○ No
	Contractor notified of results	◉ Yes	○ No

Remarks:

MTC was on site to test the compaction of soils placed to build the berm adjacent to Willow Creek to 12ft above sea level. The project manager Mike instructed MTC where to take the density/moisture readings, and were surveyed after testing.

Soils were placed in approximately 1ft lifts and compacted using a CAT CS44B single drum vibratory roller prior to MTC's arrival.

Soils were found to be sufficently compacted, meeting the 90% compaction required by site plans.

Images:

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UPLOADED: 10/17/2017 16:28:00

Willow Creek Berm. Looking northwest

REPORTED BY: Kevin Quillan REVIEWED BY: Kevin Walters, Project Manager

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APPENDIX P

Data Validation Package

APPENDIX P

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71085-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 9, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71085-1 for 6 soil samples, 1 trip blank and 2 rinsate blanks collected on September 6 to September 7, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC) besides cPAHs by USEPA method 8270D Selective Ion Method (SIM) and the full suite of Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) by USEPA method 8260C. The laboratory reported benzene, GRO, DRO and HO analyses and the deliverable data reports were complete for those analysis.

In the COC, BTEX analysis was mentioned but only benzene was reported in the laboratory report because only benzene analysis is mentioned in the SAP analytical program. No action required.

In the COC, cPAHs analysis was mentioned but not reported in the laboratory report because samples did not present detectable DRO and/or HO concentrations. No action required.

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 exceedances are 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.

GRO, reported as gasoline in the SDG 580-71085-1, was detected at concentration greater than the MDL in method blank MB 580-25574/1. The associated samples result were more than five times the blank value and/or non-detect therefore the samples do not qualified for blank contamination and results are meeting QA requirements.

Field sample IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blanks

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 580-71085-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71085-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples were summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-A3-10	580-71085-1	09/06/2017	16:45	Regular
EX-DB2-A4-10	580-71085-2	09/07/2017	11:25	Regular
EX-DB2-A5-10	580-71085-3	09/07/2017	11:00	Regular
EX-DB2-A6-10	580-71085-4	09/07/2017	10:50	Regular
EX-DB2-A7-10	580-71085-5	09/07/2017	10:55	Regular
EX-DB2-A8-10	580-71085-6	09/07/2017	11:10	Regular
RB-09062017	580-71085-7	09/07/2017	17:00	Rinsate Blank
RB-09072017	580-71085-8	09/06/2017	10:00	Rinsate Blank
TB-09062017	580-71085-9	09/07/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

APPENDIX P

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71120-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 14, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71120-1 for 6 soil samples, 1 field duplicate, 1 trip blank and 1 rinsate blank collected on September 7 to September 8, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and 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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in COC but performed only for samples presenting detectable DRO and/or HO concentrations.

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 exceedances are 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.

GRO, reported as gasoline in the SDG 580-71120-1, was detected at concentration greater than the MDL in method blanks MB 580-255758/1-A & MB 580-255785/5. The associated samples results were non-detect therefore the samples do not qualified for blank contamination and results are meeting QA requirements.

Benzo[a]anthracene, one of the seven cPAHs analyzed, was detected at concentration greater than the MDL in method blank MB 580-255689/1-A. The associated samples results were less than five times the blank value therefore associated sample results were qualified as non-detects (U).

Field sample IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
EX-DB2-A5-5-SW	MB	8270D SIM	Benzo[a]anthracene	0.9	1	U
EX-DB2-A6-5-SW	MB	8270D SIM	Benzo[a]anthracene	0.9	1	U
EX-DB2-A7-5-SW	MB	8270D SIM	Benzo[a]anthracene	0.9	1.2	U
DUP01-SO-09082017	MB	8270D SIM	Benzo[a]anthracene	0.9	0.84	U

Rinsate Blanks

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are presented in the following table:

APPENDIX P					
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

A field duplicate was collected for SDG 580-71120-1 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
DUP01-SO-09082017	EX-DB2-A5-5-SW

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples were summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD, laboratory duplicate and field duplicate 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. 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-detect. The field blank samples (trip blank and rinsate blank) were free of contamination with no qualification required and met QA requirements.

- 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
EX-DB2-A3-5-SW	580-71120-1	09/08/2017	10:50	Regular
EX-DB2-A4-5-SW	580-71120-2	09/08/2017	10:00	Regular
EX-DB2-A5-5-SW	580-71120-3	09/08/2017	08:30	Regular
EX-DB2-A6-5-SW	580-71120-4	09/07/2017	16:10	Regular
EX-DB2-A7-5-SW	580-71120-5	09/07/2017	15:45	Regular
EX-DB2-A8-5-SW	580-71120-6	09/07/2017	15:35	Regular
DUP01-SO-09082017	580-71120-7	09/08/2017	NA	Field Duplicate
RB-09082017	580-71120-8	09/08/2017	09:00	Rinsate Blank
TB-09082017	580-71120-9	09/08/2017	NA	Trip Blank

Note:
NA: not applicable
Rinsate blank results for 09/07/2017 are presented in the sample delivery group 580-71085-1.

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical method	Parameter	Laboratory result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71120-3	EX-DB2-A5-5-SW	REG	580-71120-1	8270D SIM	Benzo[a]anthracene	1.0	J B	U	BL1	N
580-71120-4	EX-DB2-A6-5-SW	REG	580-71120-1	8270D SIM	Benzo[a]anthracene	1.0	J B	U	BL1	N
580-71120-5	EX-DB2-A7-5-SW	REG	580-71120-1	8270D SIM	Benzo[a]anthracene	1.2	J B	U	BL1	N
580-71120-7	DUP01-SO-09082017	FD	580-71120-1	8270D SIM	Benzo[a]anthracene	0.84	J B	U	BL1	N

Notes:
REG: regular
SDG: sample delivery group
FD: field duplicate
J: Result is less than the reporting limit but greater than or equal to the method detection limit and 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

APPENDIX P

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71216-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 20, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71216-1 for 6 soil samples, 1 trip blank and 1 rinsate blank collected on September 12, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 580-71216-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71216-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 laboratory method blank and field blank samples were free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-B3-10	580-71216-1	9/12/2017	14:15	Regular
EX-DB2-B4-10	580-71216-2	9/12/2017	14:05	Regular
EX-DB2-B5-10	580-71216-3	9/12/2017	14:00	Regular
EX-DB2-B6-10	580-71216-4	9/12/2017	13:55	Regular
EX-DB2-B7-10	580-71216-5	9/12/2017	13:45	Regular
EX-DB2-B8-10	580-71216-6	9/12/2017	13:40	Regular
RB-091217	580-71216-7	9/12/2017	15:30	Rinsate Blank
TB-091217	580-71216-8	9/12/2017	NA	Tri Blank

Note:
NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
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:**	580-71255-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 11, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71255-1 for 1 soil sample, 1 trip blank and 1 rinsate blank collected on September 13, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program.

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported benzene, GRO, DRO and HO analyses and the deliverable data reports were complete for those analysis.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 580-71255-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71255-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-A2-10	580-71255-1	09/13/2017	12:10	Regular
RB-091317	580-71255-2	09/13/2017	15:45	Rinsate Blank
TB-091317	580-71255-3	09/13/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
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:**	580-71291-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 14, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71291-1 for 2 soil samples, 1 trip blank and 1 rinsate blank collected on September 14, 2017. Matrix spike/matrix spike duplicates (MS/MSD) were performed for 1 soil 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

The SDG 580-71291-1 contains results for the soil 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 580-71291-2. Soil sample analyses were performed as requested on COC. The laboratory reported all requested soil sample analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations. No action required.

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 exceedances are 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.

HO, reported as motor oil (>C24-C36) in the SDG 580-71291-1, was detected at concentration greater than the MDL in method blank MB 580-256277/1-B. The associated samples result were less than five times the blank value therefore associated sample results were qualified as non-detects (U).

Field sample IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
EX-DB2-B2-10	MB	Ecology NWTPH-Dx	HO	9.72	22	U
EX-DB2-C2-10	MB	Ecology NWTPH-Dx	HO	9.72	13	U

Notes:
MB: method blank
HO: reported as motor oil (>C24-C36)
U: non-detect

Rinsate Blanks

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 EX-DB2-B2-10 and the results were observed within the acceptance criteria besides for DRO, reported as #2 diesel in SDG 580-71291-1. The MSD recovery results for DRO was observed with a 1% recovery low bias compared to the acceptance criteria. The associated detected sample result was qualified as "J".

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
EX-DB2-B2-10	DRO	Ecology NWTPH-Dx	71	69	5	J	70-125

Notes:
DRO: reported as #2 diesel (C10-C24)
J: Result is less than the reporting limit (RL) but greater than or equal to the MDL and the concentration is an approximate value

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71291-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 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 laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. One matrix spike duplicate exhibited low recovery by 1% therefore result was 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. HO, reported as motor oil (>C24-C36) was detected in the associated laboratory method blank; This laboratory method blank detects resulted in associated samples detected data qualified as non-detect. The field blank samples (trip blank and rinsate blank) were free of contamination with no qualification required and met QA requirements.

- 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
EX-DB2-B2-10	580-71291-1	09/14/2017	08:40	Regular
EX-DB2-B2-10-MS	580-71291-1 MS	09/14/2017	08:40	QA
EX-DB2-B2-10-MSD	580-71291-1 MSD	09/14/2017	08:40	QA
EX-DB2-C2-10	580-71291-2	09/14/2017	11:55	Regular
RB-091417	580-71291-4	09/14/2017	10:30	Rinsate Blank
TB-091417 (solid)	580-71291-6	09/14/2017	NA	Trip Blank

Note:
NA: not applicable
QA: quality assurance

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71291-1	EX-DB2-B2-10	REG	580-71291-1	Ecology NWTPH-Dx	HO	22	J B	U	BL1	N
580-71291-2	EX-DB2-C2-10	REG	580-71291-1	Ecology NWTPH-Dx	HO	13	J B	U	BL1	N
580-71291-1	EX-DB2-B2-10	REG	580-71291-1	Ecology NWTPH-Dx	DRO	14	J F1	J	MSDL	Y

Notes:
REG: regular
SDG: sample delivery group
HO: heavy-oil range organics reported as motor oil (>C24-C36)
DRO: diesel range organics reported as #2 diesel (C10-C24)
Ecology: Washington State Department of Ecology
J: Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value
B: compound was found in the laboratory method blank and sample
F1: matrix spike and/or matrix spike duplicate recovery is outside acceptance limits
U: non-detect
BL1: result less than some multiple of that found in laboratory method blank
MSDL: matrix spike duplicate recovery below limit
N: analyte not detected
Y: analytes detected

Data Validation Memorandum

TO:	Ophelie Encelle	**SDG:**	580-71327-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 20, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71327-1 for 3 soil samples, 1 trip blank and 1 rinsate blank collected on September 15, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound 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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 1 sample presenting detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 was prepared in duplicate and analyzed by laboratory using field sample EX-DB2-A2-5-SW, MS and MSD recoveries and the RPDs between the MS and MSD recoveries were within the laboratory's acceptance criteria.

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

According to the SAP, field duplicates were not collected for SDG 580-71327-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met except for HO, reported as motor oil (>C24-C36), in sample EX-DB2-B1-8-SW. The RPD was observed above the laboratory criteria and associated sample result was qualified as "J".

Results for laboratory duplicate samples are summarized in the following table:

Sample ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier	Laboratory Limit
EX-DB2-B1-8-SW	HO	18	27.7	40	J	35

Notes:
HO: reported as motor oil (>C24-C36)
J: result is less than the reporting limit (RL) but greater than or equal to the MDL and the concentration is an approximate value

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 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 laboratory duplicate RPDs. One sample result for HO, reported as motor oil (>C24-C36) was qualified as estimated due to RPD exceedances observed in laboratory duplicate; however, the data is considered as valid. 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 laboratory method blank and field blank samples were free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-A1-8-SW	580-71327-1	09/15/2017	11:50	Regular
EX-DB2-A2-5-SW	580-71327-2	09/15/2017	10:35	Regular
EX-DB2-B1-8-SW	580-71327-3	09/15/2017	14:30	Regular
RB-091517	580-71327-4	09/15/2017	11:25	Rinsate Blank
TB-091517	580-71327-5	09/15/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71327-3	EX-DB2-B1-8-SW	REG	580-71327-1	Ecology NWTPH-Dx	HO	18	J	J	LDP	Y

Notes:
REG: regular
SDG: sample delivery group
HO: heavy-oil range organics, reported as motor oil (>C10-C24)
Ecology: Washington State Department of Ecology
LDP: laboratory duplicate relative percent difference acceptance limit exceeded.
J: result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value
Y: analyte detected

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71376-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 14, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71376-1 for 4 soil samples, 1 trip blank and 1 rinsate blank collected on September 18, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound 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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 1 sample presenting detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

GRO, reported as gasoline in SDG 580-71376-1, was detected at concentration greater than the MDL but lower than the reporting limit in trip blank TB-091817. The samples results were more than five times the blank value and/or non-detect therefore the samples results do not qualified for blank contamination and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 580-71376-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71376-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-C1-8-SW	580-71376-1	09/18/2017	09:50	Regular
EX-DB2-D1-8-SW	580-71376-2	09/18/2017	14:30	Regular
EX-DB2-D2-10	580-71376-3	09/18/2017	16:00	Regular
EX-DB2-E0-1	580-71376-4	09/18/2017	16:15	Regular
RB-091817	580-71376-5	09/18/2017	10:20	Rinsate Blank
TB-091817	580-71376-6	09/18/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
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:**	580-71419-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 15, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71419-1 for 2 soil samples, 1 trip blank and 1 rinsate blank collected on September 19, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 580-71419-1.

Field Duplicates

Field duplicates were collected for SDG 580-71419-1 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
DUP02-SO-09192017	EX-DB2-E1-8-SW

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-E1-8-SW	580-71419-1	09/19/2017	09:55	Regular
EX-DB2-E1-10	580-71419-2	09/19/2017	09:50	Regular
DUP02-SO-091917	580-71419-3	09/19/2017	NA	Regular
RB-091917	580-71085-4	09/19/2017	10:00	Rinsate Blank
TB-091917	580-71085-5	09/19/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered
SDG: sample delivery group

Data Validation Memorandum

TO:	Ophelie Encelle	**SDG:**	580-71458-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 15, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71458-1 for 3 soil samples, 1 trip blank and 1 rinsate blank collected on September 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound 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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 2 samples presenting detectable DRO and/or HO concentrations.

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 exceedances are 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 analyzed, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene were detected at concentration greater than the MDL in method blank MB 580-256861/1-A. The associated samples results were more than five times the blank value besides dibenz(a,h)anthracene detection for EX-DB2-F0-1, therefore the samples do not qualify for blank contamination and results are meeting QA requirements. Dibenz(a,h)anthracene detection for EX-DB2-F0-1 was less than five times the blank value therefore the result was qualified as non-detects “U”.

Field sample IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
EX-DB2-F0-1	MB	8270D SIM	dibenz(a,h)anthracene	1.41	6.6	U

Notes:
MB: method blank
U: non-detect

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory’s acceptance criteria except for sample EX-DB2-F0-1, the surrogate recovery for 8270D SIM analysis was below the lower control limit (15%) and all associated detected sample results were qualified as estimated “J”.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
EX-DB2-F0-1	Terphenyl-d14	53	68-138

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 are 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 580-71458-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71458-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 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 laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Six samples results were qualified as estimated due to low bias surrogate recovery; however, 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. Dibenz(a,h)anthracene was detected in the associated laboratory method blank; This laboratory method blank detects resulted in the associated sample EX-DB2-F0-1 detected data qualified as non-detect. The field blank samples (trip and rinsate blank) were free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-A2-4-SW	580-71458-1	09/20/2017	16:15	Regular
EX-DB2-F0-1	580-71458-2	09/20/2017	13:20	Regular
EX-DB2-F1-10	580-71458-3	09/20/2017	11:15	Regular
RB-092017	580-71458-4	09/20/2017	12:40	Rinsate Blank
TB-092017	580-71458-5	09/20/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71458-2	EX-DB2-F0-1	REG	580-71458-1	8270D SIM	Dibenz (a, h) anthracene	6.6	J B	UJ	BL1, SURL	N
580-71458-2	EX-DB2-F0-1	REG	580-71458-1	8270D SIM	Benzo[a]anthracene	51	B	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580-71458-1	8270D SIM	Benzo[a]pyrene	49	B	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580-71458-1	8270D SIM	Benzo[b]fluoranthene	110	B	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580-71458-1	8270D SIM	Benzo[k]fluoranthene	30	B	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580-71458-1	8270D SIM	Chrysene	100	B	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580-71458-1	8270D SIM	Indeno[1,2,3-cd] pyrene	60	B	J	SURL	Y

Notes:
REG: regular
SDG: sample delivery group
SIM: selected ion monitoring
UJ: the analyte was analyzed for, but was not detected and the reported limit (RL) is approximate
J: result is less than the RL but greater than or equal to the method detection limit and 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
SURL: surrogate recovery below lower acceptance limit
N: analyte not detected
Y: analytes detected

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71539-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 20, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71539-1 for 8 soil samples, 1 trip blank and 2 rinsate blanks collected on September 21 and September 22, 2017. Matrix spike/matrix spike duplicates (MS/MSD) were performed for 1 soil 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound 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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 1 sample presenting detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blanks

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample EX-DB2-C4-10 in method 8260C, a surrogate recovery was above the upper control limit (by 3%), but associated sample result was non-detect therefore associated sample result was not qualified.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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.

APPENDIX P

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

According to the SAP, field duplicates were not collected for SDG 580-71539-1.

Laboratory Duplicates

According to the SAP, laboratory duplicates were not performed for SDG 580-71539-1.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 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 laboratory duplicate 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 laboratory method blank and field blank samples were free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-C3-10	580-71539-1	09/22/2017	07:55	Regular
EX-DB2-C4-10	580-71539-2	09/22/2017	08:10	Regular
EX-DB2-C5-10	580-71539-3	09/22/2017	08:30	Regular
EX-DB2-C6-10	580-71539-4	09/22/2017	08:45	Regular
EX-DB2-C7-11	580-71539-5	09/22/2017	13:10	Regular
EX-DB2-C8-10	580-71539-6	09/22/2017	10:05	Regular
EX-DB2-C8-10-MS	580-71539-6 MS	09/22/2017	10:05	QA
EX-DB2-C8-10-MSD	580-71539-6 MSD	09/22/2017	10:05	QA
EX-DB2-D3-10	580-71539-7	09/22/2017	07:45	Regular
EX-DB2-F2-12	580-71539-8	09/21/2017	11:20	Regular
RB-092117	580-71539-9	09/21/2017	12:40	Rinsate Blank
RB-092217	580-71539-10	09/22/2017	09:00	Rinsate Blank
Trip Blank	580-71539-11	09/21/2017	NA	Trip Blank

Note:
NA: not applicable
QA: quality assurance

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not applicable
SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71582-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 16, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71582-1 for 1 soil sample, 1 trip blank and 1 rinsate blank collected on September 25, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
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- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because the sample did not present detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 580-71582-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71582-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-A2-6-SW	580-71582-1	09/25/2017	1600	Regular
RB-092517	580-71582-2	09/25/2017	1630	Rinsate Blank
TB-092517 (soil)	580-71582-3	09/25/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
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:**	580-71607-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 16, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71607-1 for 1 soil sample, 1 trip blank and 1 rinsate blank collected on September 26, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because the sample did not present detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation operation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 580-71607-1.

LCS/LCSD were performed for DRO in analysis batch 257523 but LCSD 580-257428/3-C exhibited a 1% recovery low bias in LCSD recovery compared to the acceptance criteria. The associated non-detect sample result was qualified as "UJ". Also, the RPD for this batch was exceeding the acceptance criteria. The associated sample result was non-detect therefore associated sample result was not qualified. Identically, LCS/LCSD were performed for HO, reported as motor oil (>C10-C36) in SDG 580-71607-1, as part of the same analysis batch, and the RPD was exceeding the acceptance criteria. The associated sample result was non-detect therefore associated sample result was not qualified.

APPENDIX P

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	Method	LCS Recovery	LCSD Recovery	Laboratory Limit	RPD	RPD Limit	Validation Qualifier
EX-DB2-E2-10	DRO	Ecology NWTPH-Dx	77	63	64-127	19	16	UJ
EX-DB2-E2-10	HO	Ecology NWTPH-Dx	88	73	70-125	19	17	-

Note:
DRO: reported as #2 diesel (C10-C24)
UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate
-: the associated sample result was non-detect therefore associated sample result was not qualified

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71607-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71607-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample result was exhibited low LCSD recovery by 1% therefore the result was qualified as estimated and 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. The laboratory method blank and field blank samples were free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-E2-10	580-71607-1	09/26/2017	16:10	Regular
RB-092617	580-71607-2	09/26/2017	16:30	Rinsate Blank
TB-092617	580-71607-3	09/26/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71607-1	EX-DB2-E2-10	REG	580-71607-1	Ecology Method NWTPH-Dx	DRO	ND	*	UJ	LCSDL	N

Notes:
REG: regular
SDG: sample delivery group
DRO: diesel range organics reported as #2 diesel (C10-C24)
Ecology: Washington State Department of Ecology
ND: not detected
*: laboratory control sample (LCS) or laboratory control sample duplicate (LCSD) is outside acceptance limits and relative percent difference of LCS and LCSD exceeds the control limits
UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate
LCSDL: LCSD recovery below lower acceptance limit.
N: analyte not detected

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71638-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 16, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71638-1 for 5 soil samples, 1 trip blank and 1 rinsate blank collected on September 27, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in COC but not performed because samples did not present detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 580-71638-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71638-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 laboratory method blank and field blank samples were free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-D4-10	580-71638-1	09/27/2017	10:15	Regular
EX-DB2-D5-10	580-71638-2	09/27/2017	11:15	Regular
EX-DB2-D6-10	580-71638-3	09/27/2017	14:30	Regular
EX-DB2-D7-11	580-71638-4	09/27/2017	15:10	Regular
EX-DB2-D8-10	580-71638-5	09/27/2017	16:20	Regular
RB-092717	580-71638-6	09/27/2017	10:50	Rinsate Blank
TB-092717	580-71638-7	09/27/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
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:**	580-71704-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 17, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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) 580-71704-1 for 4 soil samples, 1 field duplicate, 1 trip blank and 1 rinsate blank collected on September 29, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample EX-DB2-E5-10 in method 8260C, a surrogate recovery was above the upper control limit by 1%, but associated sample result was non-detect therefore associated sample result was not qualified.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 580-71704-1.

Field Duplicates

Field duplicates were collected for SDG 580-71704-1 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
DUP03-SO-09292017	EX-DB2-E4-10

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, laboratory duplicate and field duplicate 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 laboratory method blank and field blank samples were free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-E3-11	580-71704-1	09/29/2017	11:10	Regular
EX-DB2-E4-10	580-71704-2	09/29/2017	14:20	Regular
EX-DB2-E5-10	580-71704-3	09/29/2017	15:15	Regular
EX-DB2-E6-11	580-71704-4	09/29/2017	16:25	Regular
DUP03-SO-092917	580-71704-5	09/29/2017	NA	Regular
RB-092917	580-71704-6	09/29/2017	11:50	Rinsate Blank
TB-092917	580-71704-7	09/29/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
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:**	580-71754-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 20, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted 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 groups (SDG) 580-71754-1 and 580-71754-2 for 8 soil samples,1 rinsate blank and 1 trip blank collected on October 02, 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), cPAHs (8270D SIM), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The trip blank results were reported in SDG 580-71754-2. The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 1 sample presenting detectable DRO and/or HO concentrations.

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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample SP-B1-B6-1 in method 8260C, a surrogate recovery was above the upper control limit (by 1%), but associated sample result was non-detect therefore associated sample result was not qualified.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 SDGs 580-71754-1&2.

Field Duplicates

According to the SAP, field duplicates were not collected for SDGs 580-71754-1&2.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 laboratory method blank and field blank samples were free of contamination with no qualification required and met QA requirements.
- 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
SP-B1-B6-1	580-71754-1	10/2/2017	18:00	Regular
SP-B1-B4-4	580-71754-2	10/2/2017	18:05	Regular
SP-B1-I8-1	580-71754-3	10/2/2017	18:10	Regular
SP-B1-C6-13	580-71754-4	10/2/2017	18:15	Regular
SP-B1-H4-4	580-71754-5	10/2/2017	18:20	Regular
SP-B1-B5-7	580-71754-6	10/2/2017	18:25	Regular
SP-B1-D8-2	580-71754-7	10/2/2017	18:30	Regular
TB-100217	580-71754-8	10/2/2017	NA	Trip Blank
RB-100217	580-71754-9	10/2/2017	19:10	Rinsate Blank
EX-DB2-E7-10	580-71754-10	10/2/2017	15:30	Regular

Note:
NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
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:**	1851306
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 21, 2017		

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 soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report.

The confirmation soil sample for grid A2 was submitted to both Eurofins Lancaster Laboratories Environmental (Eurofins) in Lancaster, Pennsylvania and Test America Laboratories, Inc. (TA) in Tacoma, Washington, two Washington State Department of Ecology (Ecology) approved laboratory, for laboratories comparison. This report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 1851306 for the confirmation soil sample for grid A2 collected on September 15, 2017 and submitted to Eurofins. The analytical results for the confirmation soil sample for grid A2 from TA are presented in SDG 580-71327-1. The sample for analysis and qualified results is 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 SAP, samples from the excavation were to 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)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation

- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260B), 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 and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested 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 exceedances are 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.

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 IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

The rinsate blank for September 15, 2017 is provided under SDG 580-71327-1. No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No trip blank was performed for SDG 1851306.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
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 are 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 was analyzed by laboratory; MS recoveries were within the laboratory's acceptance criteria.

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

According to the SAP, field duplicates were not collected for SDG 1851306.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

APPENDIX P						
Sample ID	**Parameter**	**Sample Result**	**Duplicate Result**	**RPD**	**Validation Qualifier**	**Laboratory Limit**
NE	NE	NE	NE	NE	NE	NE

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 SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate 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 laboratory method blank samples were free of contamination with no qualification required and met QA requirements.
- 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
EX-DB2-A2-5-SW	9212720	09/15/2017	10:35	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group

Appendix **P**
Data Validation Package
Laboratories Comparison
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Constituents of Concern	Units	Test America (SDG 580-71327-1) EX-DB2-A2-5-SW					Eurofins (SDG 1851306) EX-DB2-A2-5-SW-S-170915				
		Method	Result	RL	MDL	Dilution Factor	Method	Result	RL	MDL	Dilution Factor
Benzene	ug/kg	8260C	ND	37	16	1	8260B	ND	See MDL	31	42.74
Benzo(a)anthracene	ug/kg	8270D SIM	160	69	11	10	8270C SIM	ND	See MDL	4.7	5
Benzo(a)pyrene	ug/kg	8270D SIM	10	69	5.5	10	8270C SIM	ND	See MDL	4.7	5
Benzo(b)fluoranthene	ug/kg	8270D SIM	18	69	8.2	10	8270C SIM	ND	See MDL	4.7	5
Benzo(k)fluoranthene	ug/kg	8270D SIM	11	69	8.3	10	8270C SIM	ND	See MDL	4.7	5
Chrysene	ug/kg	8270D SIM	ND	69	21	10	8270C SIM	89	See MDL	2.4	5
Dibenz(a,h)anthracene	ug/kg	8270D SIM	20	69	10	10	8270C SIM	5.6	See MDL	4.7	5
Indeno(1,2,3-cd)pyrene	ug/kg	8270D SIM	77	69	8.3	10	8270C SIM	14	See MDL	4.7	5
cPAHs	mg/kg	[1]	0.039	-	-	-	[1]	0.006	-	-	-
GRO	mg/kg	NWTPH-Gx	ND	7.5	3.9	1	NWTPH-Gx	ND	See MDL	64	1,124.07
DRO	mg/kg	NWTPH-Dx	1,500	68	17	1	NWTPH-Dx	970	See MDL	21	5
HO	mg/kg	NWTPH-Dx	1,500	68	12	1	NWTPH-Dx	750	See MDL	71	5
TPH	mg/kg	[2]	3,004	-	-	-	[2]	1,752	-	-	-

Notes:
Test America = Test America Laboratories, Inc.
Euforins = Eurofins Lancaster Laboratories Environmental
SDG = sample delivery group
cPAHs = carcinogenic polynuclear aromatic hydrocarbons
GRO = gasoline diesel range organics
DRO = diesel range organics
HO = heavy oil range organics
TPH = total petroleum hydrocarbons
RL = reporting limit
MDL = method detection limit
NA = not available
ND = not detected

[1] = cPAHs concentration calculated by summing the concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene and adjusted for toxicity using toxic equivalency factors to represent a total benzo(a)pyrene concentration (WAC 173-340-900). If one or more cPAHs constituents were reported at concentrations less than the laboratory RL, then one-half of the RL was used to calculate cPAHs concentrations.

[2] = TPH concentration calculated by summing the concentrations of GRO, DRO and HO. If one or more TPH constituents were reported at concentrations less than the laboratory RL, then one-half of the RL was used to calculate TPH concentrations.

APPENDIX P

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71163-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 21, 2017		

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 water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was 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) 580-71163-1 for 1 water sample and 1 trip blank collected on September 11, 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 were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- 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).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

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

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested 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.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-255886/1-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	Blank Result	Sample Result	Validation Qualifier
OUTFALL#002-091117	MB	Ecology NWTPH-Dx	DRO	0.0241	0.028	U

Notes:
MB: method blank
DRO: reported as #2 diesel (C10-C24)
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 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx 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
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 580-71163-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71163-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71163-1.

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) 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#002-091117	580-71163-1	09/11/2017	11:30	Regular
TB-09112017	580-71163-2	09/11/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71163-1	OUTFALL#002-091117	REG	580-71163-1	Ecology NWTPH-Dx	DRO	0.028	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: reporting limit but greater than or equal to the method detection limit and 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

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71291-2
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 21, 2017		

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 water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007 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) 580-71291-2 for 1 water sample and 1 trip blank collected on September 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 were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- 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).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

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 580-71291-2 contains results for the water samples recorded in the chain-of-custody documentations (COC). The soil sample results recorded in the COC are reported under separate cover in the SDG 580-71291-1. Water sample analyses were performed as requested on the COC. The laboratory reported all requested 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.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-256280/1-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	Blank Result	Sample Result	Validation Qualifier
Outfall#002-091417	MB	Ecology NWTPH-Dx	DRO	0.0479	0.050	U

Notes:
MB: method blank
DRO: reported as #2 diesel (C10-C24)
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 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx 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
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 580-71291-2.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71291-2.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71291-2.

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#002-091417	580-71291-3	09/14/2017	16:30	Regular
TB-091417 (water)	580-71291-5	09/14/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71291-3	Outfall#002-091417	REG	58071291-2	Ecology NWTPH-Dx	DRO	0.050	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: reporting limit but greater than or equal to the method detection limit and 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

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71420-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 21, 2017		

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 water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was 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) 580-71420-1 for 1 water sample and 1 trip blank collected on September 19, 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 were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- 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).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

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

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested 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.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-256726/1-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	Blank Result	Sample Result	Validation Qualifier
OUTFALL#002-091917	MB	Ecology NWTPH-Dx	DRO	0.0242	0.040	U

Notes:
MB: method blank
DRO: reported as #2 diesel (C10-C24)
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 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx 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
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 580-71420-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71420-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71420-1.

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) 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#002-091917	580-71420-1	09/19/2017	14:50	Regular
TB-091917	580-71420-2	09/19/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71420-1	OUTFALL#002-091917	REG	580-71420-1	Ecology NWTPH-Dx	DRO	0.040	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: reporting limit but greater than or equal to the method detection limit and 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

APPENDIX P

Data Validation Memorandum

TO:	Ophélie Encelle	**SDG:**	580-71583-1
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 21, 2017		

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 water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was 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) 580-71583-1 for 1 water sample and 1 trip blank collected on September 26, 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 were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- 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).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

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

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested 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.

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:

APPENDIX P						
Field Sample ID	**Blank Type**	**Method**	**Parameter**	**Blank Result**	**Sample Result**	**Validation Qualifier**
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 samples 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 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx 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
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 580-71583-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71583-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71583-1.

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 laboratory method blank and trip blank samples were free of contamination with no qualification required and met QA requirements.
- 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#002-092617	580-71583-1	09/26/2017	08:45	Regular
TB-09262017	580-71583-2	09/26/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
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:**	580-71756-1 & 580-71754-2
FROM:	Dilip Kumar	**SITE**:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington
DATE:	November 21, 2017		

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 water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was 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 groups (SDGs) 580-71756-1 and 580-71754-2 for 1 water sample and 1 trip blank collected on October 02, 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 were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- 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).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

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

All analyses were performed as requested on the chain-of-custody records (COC). The trip blank results were reported in SDG 580-71754-2. The laboratory reported all requested 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.

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	Blank Result	Sample Result	Validation Qualifier
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 samples 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 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx 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
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 580-71756-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71756-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71756-1.

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 laboratory method blank and trip blank samples were free of contamination with no qualification required and met QA requirements.
- 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#002-100217	580-71756-1	10/02/2017	12:15	Regular
TB-100217	580-71754-8	10/02/2017	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	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:
NE: not encountered
SDG: sample delivery group