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Kinder Morgan Liquids Terminals

Remedial Action Report – B and D Yards

Harbor Island Terminal

2720 13th Avenue Southwest
Seattle, Washington

Consent Decree 00-2-07760-2SEA

ARCADIS

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Remedial Action Report – B and D Yards

Harbor Island Terminal
2720 13th Avenue Southwest
Seattle, Washington

Prepared for:
Kinder Morgan Liquids Terminals

Prepared by:
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Our Ref.:
WA000804.2013

Date:
FINAL

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Appendices

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1. Introduction

On behalf of Kinder Morgan Liquid Terminals, LLC (KMLT), ARCADIS U.S., Inc. (ARCADIS) has prepared this Remedial Action Report in accordance with the Consent Decree 00-2-07760-2SEA (CD) for the KMLT Harbor Island Terminal in Seattle, Washington (site). The CD was entered between the Washington State Department of Ecology (Ecology) and GATX Terminals Corporation (GATX) on April 4, 2000. KMLT assumed the obligations of the CD with the purchase of GATX Harbor Island Terminal in 2001. The site and surrounding area is displayed on Figure 1. The site consists of five yards referred to as A, B, C, D, and E yards. Each yard is described below and a site plan is included as Figure 2.

The purpose of this Remedial Action Report (RAP) is to document remedial activities performed in the B and D Yards between June 17 and June 28, 2013 in accordance with the Sulfate Application Remediation Work Plan Addendum (Addendum) submitted by Antea Group on February 24, 2012 and the Engineering Design Report (EDR) submitted by ARCADIS on October 15, 2012 submitted by ARCADIS on October 16, 2012 and approved by Ecology on November 20, 2012 Remedial activities included focused enhanced anaerobic biological oxidation (ABOX) by application of sulfate. The sulfate was applied in the B and D Yard to reduce constituents of concern (COCs) in the smear zone and the shallow groundwater beneath the B and D yards.

2. Site Background

The following section describes the site history and the site-specific geologic and hydrogeologic conditions.

2.1 Site Description

The site is an active 14-acre bulk petroleum storage facility located east of 13th Avenue on Harbor Island in Seattle, King County, Washington. The site has operated as a bulk petroleum storage terminal since 1944. The site and surrounding area is displayed on Figure 1.

The site currently stores unleaded gasoline, marine fuel oil, heavy cycle gas oil, and ethanol. The site consists of five yards referred to as A, B, C, D, and E yards. Each yard is described below and a site plan is included as Figure 2.

- A Yard, located at the southern end of the property, consists of the terminal administrative office, a truck loading rack, and maintenance building.

- B Yard, located north of A Yard, includes 15 aboveground storage tanks (ASTs) and associated piping and is enclosed by a 15-foot high concrete wall.

- C Yard, located north of D Yard, contains six ASTs and associated piping and is surrounded by a 15-foot high concrete wall.

- D Yard, located north of B Yard, is composed of a driveway, barrel storage, a maintenance building, is the primary corridor for on-site utilities, and is surrounded by a 15-foot high concrete wall.

- E Yard, located at the north end of the property, is leased and consists of an office building and vehicle storage facilities.

2.2 Geology

The Harbor Island area was historically tidal flats at the mouth of the Duwamish River. Construction of the current form of Harbor Island started in 1903 and was mostly completed by 1910; with ground surface at the site brought above water level by 1906. Dredged material from the West Waterway was placed into wooden cribs and allowed to drain through the slats in the crib walls. Based on available linear footage records from bulkhead construction, the filling cells may have measured 700 by 1,000 feet. Cells were filled to an average depth of 16 feet, resulting in a ground surface elevations ranging between 9 and 17 feet above mean sea level.

Surficial soil on Harbor Island consists of sandy gravel and cobble fill material to depths ranging from 1 to 6 feet below ground surface (bgs). Dredge spoils consisting of fine- to coarse-grained sand and silty sand underlie the surface layer to thicknesses ranging from 5 to 15 feet (Figure 3). Native sediments consisting of sand interbedded with silt and clay are found beneath the dredged materials (Hart Crowser 1992).

2.3 Hydrogeology

The hydrogeology of Harbor Island consists of an unconfined water-bearing zone composed of primarily coarse-grained fill and dredged spoils. Groundwater depths at the site generally range from 3 to 10 feet bgs. Groundwater mounding occurs in the vicinity of the tank farms located in the central portion of Harbor Island. Mounding is

caused by infiltration of precipitation, the primary groundwater recharge mechanism (PEG 1994). The groundwater discharge is to the Duwamish Waterway. Based on the results of a 1992 tidal study, site groundwater elevations are tidally influenced (PEG 1994).

Results of falling and rising head aquifer testing indicate hydraulic conductivity ranges from 3 X 10^{-3} centimeter per second (cm/sec) to 1 X 10^{-2} cm/sec. Estimated transmissivity based on the use of a 10-foot screen length as a substitute for aquifer thickness yielded values ranging from 636 gallons per day per foot (gpd/ft) to 2,121 gpd/ft (PEG 1994). Groundwater flow directions at the site are to south and southeast, with a horizontal hydraulic gradient of 0.005 feet per foot (Antea 2011).

2.4 Contaminants of Concern and Remediation History Overview

The primary source of COCs in groundwater at the site are the historical releases of petroleum hydrocarbons from ASTs and associated product piping throughout over 68 years of terminal operations. Approximately 44,000 tons of petroleum impacted soil was removed from the C Yard where product piping had failed (KHM 2002). In addition, active and passive separate-phase hydrocarbon removal has been performed at two wells in the A Yard and three wells in the B Yard at the site (Antea 2011) and an air sparge/soil vapor extraction system was operated in the A Yard (Delta 2007).

The groundwater treatment area was selected based on recent groundwater and soil analytical results. These data provided a basis to estimate the hydrocarbon mass remaining in soils. The results of the recent soil investigation indicate residual petroleum hydrocarbons in the B and D yards do not exceed site specific soil Cleanup Levels (CLs). Groundwater COC concentrations in the B and D yards are above CLs and are the focus of the recently completed ABOx sulfate application work.

Groundwater cleanup levels for the Site were determined by Ecology to be surface water standards that are protective of aquatic organisms in Elliott Bay and also determined by no current or future use of the groundwater for drinking water purposes. However, surface water standards are not established for total petroleum hydrocarbons (TPH); therefore, the groundwater cleanup levels of gasoline-range (TPH-GRO), diesel-range (TPH-DRO), and heavy oil-range (TPH-HO) were selected as the cleanup goals. The cleanup levels for the COCs in groundwater are:

Constituent	Cleanup Level
Benzene	0.071 mg/L
Ethylbenzene	29.0 mg/L
Lead	0.0058 mg/L
Toluene	200 mg/L
TPH-GRO	1.0 mg/L
TPH-DRO	10 mg/L
TPH-HO	10 mg/L
Product	No sheen

mg/L = milligrams per liter

During the baseline performance monitoring event, groundwater samples collected from seven of twelve performance monitoring wells exceeded the CL for TPH-GRO (1.0 milligrams per liter [mg/L]) and samples from two of twelve wells exceeded the CL for benzene (0.071 mg/L). TPH-DRO did not exceed the CL (10 mg/L) in groundwater samples from the twelve performance monitoring wells. Toluene and ethylbenzene concentrations did not exceed site CLs (200 mg/L and 29 mg/L, respectively) in groundwater samples from the twelve performance monitoring wells.

TPH as GRO concentrations in B and D yards ranged from below laboratory reporting limits (RLs) in wells 11 and TMW-1 to 4.9 mg/L in well TMW-4. During the same baseline event, benzene concentrations ranged from below RLs in wells 11, TMW-1, and TMW-3 to 0.170 mg/L in well TMW-4.

3. Remedial Implementation

3.1 Design Parameters

In accordance with the approved Addendum (Antea 2012) and EDR (ARCADIS 2012a), ABOX by land application was implemented to address groundwater impacts in the B and D yards. Sulfate was selected because it can be delivered and distributed effectively in the subsurface to the target groundwater remediation area. Sulfate is a high solubility electron donor capable of anaerobic biological oxidation of target constituents in the dissolved phase and any residual source mass sorbed to soils.

Land application of gypsum and Epsom salt provides a source of sulfate to the shallow groundwater encountered at the site and it serves as a terminal electron acceptor for

indigenous bacteria capable of biodegrading petroleum hydrocarbons. The gypsum and Epsom salts were distributed on ground surface directly over the footprint of the targeted groundwater treatment area. The infiltration and percolation of rainwater and irrigation water over the applied material dissolves the sulfate from the source salts (i.e., gypsum and Epsom salt) in to shallow groundwater containing petroleum hydrocarbons. This placement of gypsum and Epsom salts is a long-term source of sulfate to groundwater. Through broad ground surface application, delivery is effective over the target treatment areas with the exception of the footprints of site fixtures (e.g., ASTs) which prevent direct access to the ground surface. Once sulfate concentrations are maintained in groundwater, advective movement will provide treatment to the areas beneath the ASTs.

The solubility differences between Epsom salt and gypsum provide both a relatively short- and long-term sulfate source. Epsom salt has a relatively high solubility (approximately 250 grams per liter [g/L] at 20^{o} C) and dissolves more rapidly than gypsum after placement. The relatively low solubility of gypsum (approximately 2 g/L at 20^{o} C) provides a longer-term source of sulfate. As the gypsum and Epsom salt dissolve, they will travel downward through vadose zone soils to groundwater through infiltration of rainwater and engineered irrigation. The relative density of the gypsum and Epsom salt solution promotes mixing and continued downward vertical migration in the shallow impacted groundwater. This sulfate leachate will be seasonally (rainy season in winter) and mechanically (installed irrigation system) flushed down into groundwater containing petroleum hydrocarbons, providing ongoing treatment to constituents of concern.

The primary design element of the remedy is the amount of applied gypsum and Epsom salt. As presented in detail in the EDR, the following data and assumptions were used to estimate the material quantities, based on the treatment footprint outlined on Figure 4:

- A treatment area of approximately 30,000 square feet with a smear zone thickness of 8 feet;
- Average total TPH concentration of 1,500 milligrams per kilogram (mg/kg) in soil (conservative estimate);
- Assumed soil density of 100 pounds (lbs)/cubic foot;

- An average TPH as GRO groundwater concentration of 2.4 mg/L from the third quarter 2012 groundwater monitoring event; and

- A stoichiometric demand of 4 lbs of sulfate to treat a pound of TPH as GRO mass.

Based on these values, 264,000 lbs of gypsum and 42,000 lbs of Epsom salt were imported to the site for remedial activities.

3.2 Remedial Action

This section describes the construction activities that were conducted between June 17 and June 28, 2013 in the B and D Yards. Anderson Environmental Contracting (Anderson) of Kelso, Washington was subcontracted to perform the remedial action activities described below.

3.2.1 Irrigation System Installation

One June 17 and 18, 2013, Anderson installed an automatic irrigation system to supplement precipitation as a means to transport sulfate to groundwater. This irrigation system allows control of infiltration rates and frequency to assist in the delivery rate of sulfate by managing the amount of water applied. As shown on Figure 4, the irrigation system consists of four sprinkler heads connected to the site's existing high pressure fire suppression system using one-inch diameter above-ground steel piping and one-inch diameter polyvinyl chloride (PVC) below-ground piping. The single sprinkler head in the D Yard was installed on an existing overhead pipe rack. The three sprinkler heads in the B yard were connected to the fire suppression system using PVC piping in a one-foot deep by one-foot wide trench backfilled with native material.

In addition to the sprinkler heads and associated piping, the B and D Yards irrigation systems also included pressure reducers and irrigation timing systems. The timing system consists of a control module and solenoid valves, which allow the sprinklers to activate automatically at a predetermined time for a set duration.

The irrigation system is set to operate for a period of time that will achieve the necessary infiltration volume of 0.02 feet per day (ft/day) based on the expected need to supplement monthly rainfall to provide sufficient sulfate loading to shallow groundwater, as outlined in the EDR (ARCADIS 2012). The monthly irrigation schedule based on average monthly precipitation is as follows:

Month	Average Precipitation (inches)	Irrigation Required (feet/day)	B Yard Runtime (hours/day)	D Yard Runtime (hours/day)
January	5.13	0.0068	0.34	0.88
February	4.18	0.0104	0.52	1.34
March	3.75	0.0105	0.53	1.36
April	2.59	0.0141	0.71	1.82
May	1.78	0.0158	0.80	2.05
June	1.49	0.0172	0.86	2.22
July	0.79	0.0185	0.93	2.39
August	1.02	0.0179	0.90	2.31
September	1.63	0.0168	0.84	2.17
October	3.19	0.0120	0.61	1.56
November	5.90	0.0049	0.25	0.63
December	5.62	0.0055	0.28	0.71

Irrigation will continue until analytical data indicate that concentrations of sulfate have reached approximately 500 mg/L in groundwater. Once this concentration is achieved, irrigation will be applied as needed to sustain approximately 500 mg/L.

3.2.2 Sulfate Land Application

In preparation for sulfate placement on ground surface, a total of 132 cubic yards of gypsum, 21 cubic yards of Epsom salt, and 374 cubic yards of two-inch minus crushed rock were delivered to the site. Planned drawings were used in the field to mark the limits of land application by ARCADIS oversight personnel. The limits of land application were measured from existing site features and fixed surveyed locations represented in the planned drawings.

3.2.2.1 Material Mixing

The mixing of the gypsum, Epsom salt, and crushed rock was done at a ratio of six tons of gypsum, one ton of Epsom salt, to 21 cubic yards of crushed rock. The material was mixed by creating a pile of 21 cubic yards of crushed rock, or one truck load, then adding six tons of gypsum and one ton of Epsom salt onto the pile. The material was thoroughly combined in mixing cells using an excavator until the material appeared homogenous. This process was conducted concurrently with the material application.

In each mixing cell, the quantity of gypsum, Epsom salt, and crushed rock was verified prior to mixing and application for construction quality assurance purposes.

3.2.2.2 Material Application

Sulfate materials were applied using a conveyor truck and by backhoe. The conveyor truck consisted of a 12 cubic yard capacity hopper and a conveyor belt that spread the material over the open target area which included application beneath aboveground terminal piping.

During the sulfate land application event, 132 tons of agricultural gypsum, 21 tons of Epsom salt, and 524 tons of crushed rock were applied to an area of approximately 30,000 square feet (Figure 4). This quantity of material formed a two-inch thick layer of sulfate material across the application area. The total material thickness over the application area was six to eight inches with the incorporation of the crushed rock. A photograph log of field activities is included as Appendix A.

4. Performance Monitoring

Performance monitoring will be conducted in accordance with the Response to Comments letter dated December 20, 2012. The Response to Comments (ARCADIS 2012b) was a letter addressing Ecology's comments regarding the EDR. The purpose of the performance monitoring program is to evaluate the effectiveness of land application to sustain elevated sulfate concentrations in shallow groundwater. The specific objectives of the performance monitoring plan are to evaluate the following:

- Distribution of sulfate to groundwater;
- Biogeochemical environment necessary for anaerobic bio-oxidation;
- Infiltration and irrigation rates; and
- Degradation of COCs in groundwater.

To achieve this performance evaluation objective, the following activities were completed:

- Performance monitoring wells were installed in order to evaluate performance over time.

- Baseline sampling was conducted prior to implementation of the remedial action.
- A performance monitoring plan was designed.

4.1 Performance Monitoring Well Installation and Selection

ARCADIS subcontracted Environmental Services Network (ESN) of Olympia, Washington to install six performance monitoring wells (TMW-1 through TMW-6) on June 19 and 20, 2013. The monitoring wells were constructed of two-inch diameter schedule 40 PVC with ten feet of 0.020-inch slotted screen. The screen interval is from 5 feet bgs to the total depth of approximately 15 feet bgs. The initial scope included installing eight new performance monitoring wells; however, two monitoring well locations were inaccessible by a drill rig. The two inaccessible well locations were abandoned after an attempt to install the wells by hand auger failed because of heaving sand conditions. Existing monitoring well 11 was determined to be a viable replacement performance monitoring location for the eastern land application extent. Monitoring wells 12, MW-7, MW-19, and TMW-1 through TMW-4 will be used to evaluate performance in the target groundwater treatment area, while wells A-27, MW-9, TMW-5 and TMW-6 will be used as downgradient monitoring points.

Upon completion of the six new performance monitoring wells, ESN developed the wells by purging using a submersible pump until the extracted groundwater appeared free of dissolved solids. The performance monitoring well locations are shown on Figures 2 and 4. Soil samples were not collected for laboratory analysis during well installation activities. Boring and well construction logs for TMW-1 through TMW-6 are included as Appendix B.

4.2 Baseline Performance Monitoring

ARCADIS conducted the baseline groundwater monitoring event at the site on June 21 and 24, 2013. During this event, performance monitoring wells 11, 12, A-27, and TMW-1 through TMW-6 were gauged using an electronic oil-water interface level meter. These wells were then sampled using low-flow following the methodology defined in the Technical Revisions Request - Low-Flow Groundwater Sampling (Delta 2008). Groundwater parameters were measured with a multi parameter water meter connected to a flow-through cell prior to the collection of the sample. Groundwater samples were analyzed for the following analytes:

- TPH as GRO according to Northwest Method NWTPH-Gx;
- TPH as DRO and the heavy oil range organics (HO), with silica gel cleanup, according to Northwest Method NWTPH-Dx
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) according to Environmental Protection Agency (EPA) Method 8260B;
- Sulfate according to EPA Method 300.0;
- Sulfide according to EPA Method 376.1; and
- Nitrate according to EPA Method 300.0.

Samples were collected in laboratory provided bottles and stored in an iced cooler. Samples were submitted to Alpha Analytical, Inc. of Sparks, Nevada under standard chain-of-custody protocol. Groundwater monitoring field forms are included as Appendix C.

Analytical results from the baseline performance monitoring event indicated that wells 12, A-27, MW-7, MW-19, TMW-4, TMW-5, and TMW-6 had concentrations of TPH as GRO that exceeded the site specific CL of 1.0 mg/L. Additionally, TMW-4 and TMW-5 exceed the site specific CL for benzene of 0.071 mg/L. Analytical results from baseline monitoring are summarized in Table 1 and laboratory analytical reports are included as Appendix D.

4.3 Continued Performance Monitoring

An ongoing performance monitoring program will be conducted to evaluate distribution and persistence of sulfate in the shallow aquifer, as well as COC concentrations trends over time. Groundwater performance monitoring will be conducted at one month, two months, and three months post-application. Further groundwater performance monitoring will be conducted on an as needed basis (e.g. quarterly or semi-annually). Performance monitoring groundwater samples will be collected from the six new performance monitoring wells (TMW-1 through TMW-6) and existing monitoring wells 11, 12, A-27, MW-7, MW-9, and MW-19. Performance monitoring groundwater samples will be collected using methods described in section 4.2 and will be analyzed for:

- TPH as GRO according to Northwest Method NWTPH-Gx;
- BTEX according to EPA Method 8260B;
- Sulfate according to EPA Method 300.0;
- Sulfide according to EPA Method 376.1; and
- Nitrate according to EPA Method 300.0.

At the request of Ecology, groundwater biological activity reaction testing (BART) will also be performed at select wells using a field test kit following sulfate application and again once groundwater performance monitoring results demonstrate active microbial sulfate reduction. BART results will indicate the presence or absence of sulfate-reducing microorganisms. BART field samples were collected during the 60-day performance monitoring sampling. BART results will be reported in the 4th Quarter 2013 Groundwater Monitoring Report.

5. Summary

On June 17 through June 28, 2013, remedial implementation activities were completed at the KMLT Harbor Island Terminal. Prior to the remedial implementation, performance monitoring wells were installed and baseline groundwater samples were collected from the performance monitoring well network. Irrigation lines were installed in the B and D yards to complement rainfall to achieve the design infiltration rate.

During the sulfate land application, a total of 264,000 lbs of gypsum, 42,000 lbs of Epsom salt, and 374 cubic yards of crushed rock were mixed into homogenous stockpiles and distributed across the B and D yards. Effectiveness of the sulfate land application will be evaluated through the performance monitoring plan and well network identified in Table 2. Effectiveness will be based on the presence of sulfate in groundwater, other biogeochemical parameters, and degradation of COCs in groundwater.

ARCADIS will review the initial performance monitoring events to evaluate the sulfate levels and trends in COCs remediation at the site. After review, further performance monitoring events will be conducted as needed to gauge sulfate levels in the target treatment area.

The results of performance monitoring including COC trends, an evaluation of biogeochemical data, summary of infiltration and irrigation rates, and a discussion regarding groundwater quality will be included in the 4th Quarter 2013 Groundwater Monitoring Report and submitted to Ecology in accordance with the Site-Wide Groundwater Compliance Monitoring Plan (Delta 2007).

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6. References

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Appendix A

Photograph Log

ARCADIS
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Project No.: WA000809.2013
Project Name: KMLT - Harbor Island
City/State: Seattle, WA

Photo No.: 1

Date: June 17, 2013

Description:
Trenching for irrigation piping in B-Yard

Photo No.: 2

Date: June 17, 2013

Description:
Pressure testing irrigation piping

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Project No.: WA000809.2013
Project Name: KMLT - Harbor Island
City/State: Seattle, WA

Photo No.: 3

Date: June 18, 2013

Description:
Unloading gypsum from delivery trucks

Photo No.: 4

Date: June 18, 2013

Description:
Unloading gypsum from delivery trucks

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Project No.: WA000809.2013
Project Name: KMLT - Harbor Island
City/State: Seattle, WA

Photo No.: 5

Date: June 18, 2013

Description:
Removing asphalt surface from D-Yard

Photo No.: 6

Date: July 18, 2013

Description:
Removing asphalt surface from D-Yard

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Project No.: WA000809.2013
Project Name: KMLT - Harbor Island
City/State: Seattle, WA

Photo No.: 7

Date: June 24, 2013

Description:
Irrigation connection for D-Yard

Photo No.: 8

Date: June 24, 2013

Description:
Installing aboveground irrigation piping in D-Yard

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Project No.: WA000809.2013
Project Name: KMLT - Harbor Island
City/State: Seattle, WA

Photo No.: 9

Date: June 24, 2013

Description:
Preparing to mix Epsom and gypsum with the crushed rock

Photo No.: 10

Date: June 24, 2013

Description:
Preparing to mix Epsom and gypsum with the crushed rock

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Project No.: WA000809.2013
Project Name: KMLT - Harbor Island
City/State: Seattle, WA

Photo No.: 11

Date: June 26, 2013

Description:
Mixing Epsom and gypsum with the crushed rock

Photo No.: 12

Date: June 26, 2013

Description:
Mixing Epsom and gypsum with the crushed rock

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Project No.: WA000809.2013
Project Name: KMLT - Harbor Island
City/State: Seattle, WA

Photo No.: 13

Date: June 25, 2013

Description:
Spreading crushed rock and sulfate mixture in B-Yard

Photo No.: 14

Date: June 25, 2013

Description:
Spreading crushed rock and sulfate mixture in B-Yard

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Project No.: WA000809.2013
Project Name: KMLT - Harbor Island
City/State: Seattle, WA

Photo No.: 15

Date: June 26, 2013

Description:
Application in the B-Yard

Photo No.: 16

Date: June 27, 2013

Description:
Application in the D-Yard

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Appendix B

Boring and Well Construction Logs

Date Start/Finish: 6/19/2013
Drilling Company: ESN Northwest
Driller's Name: Marty
Drilling Method: Direct-push
Sampling Method:
Rig Type: Truck-mounted

Northing: NE
Easting: NE
Casing Elevation: NE

Borehole Depth: 15 feet bgs
Surface Elevation: NE

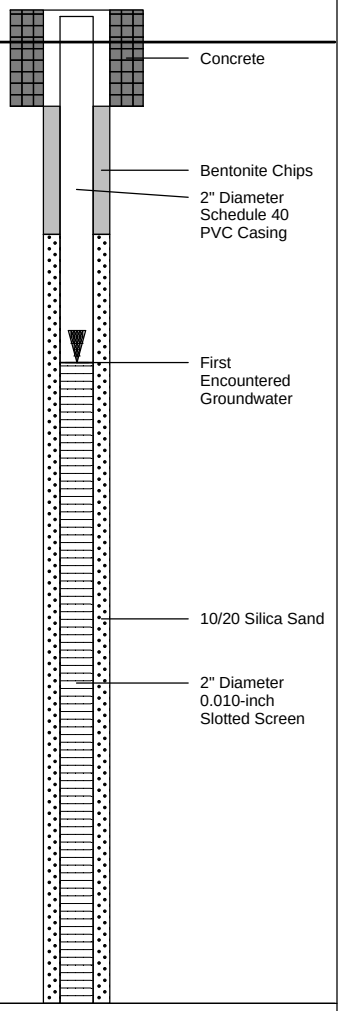
Descriptions By: Rory Henneck

Well/Boring ID: **TMW-1**

Client: Kinder Morgan Energy Partners, L.P.

Location: KMLT - Harbor Island

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	USCS Code	Geologic Column	Stratigraphic Description
0	0							
		AK	0'-6'		0.1	SP		SAND, fine to medium grain, trace silt, brown to black, wet.
5	-5							
		1	6'-10'					
10	-10							
		2	10'-15'					
15	-15							End of boring @ 15' bgs.



Remarks: AK = Air Knife
bgs = Below Ground Surface
NE = Not Established
ppm = Parts Per Million

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Project: WA000804.2013 Template:
Data File:

Date: 7/26/2013

Created/Edited by: KDH

Date Start/Finish: 6/19/2013
Drilling Company: ESN Northwest
Driller's Name: Marty
Drilling Method: Direct-push
Sampling Method:
Rig Type: Truck-mounted

Northing: NE
Easting: NE
Casing Elevation: NE

Borehole Depth: 15 feet bgs
Surface Elevation: NE

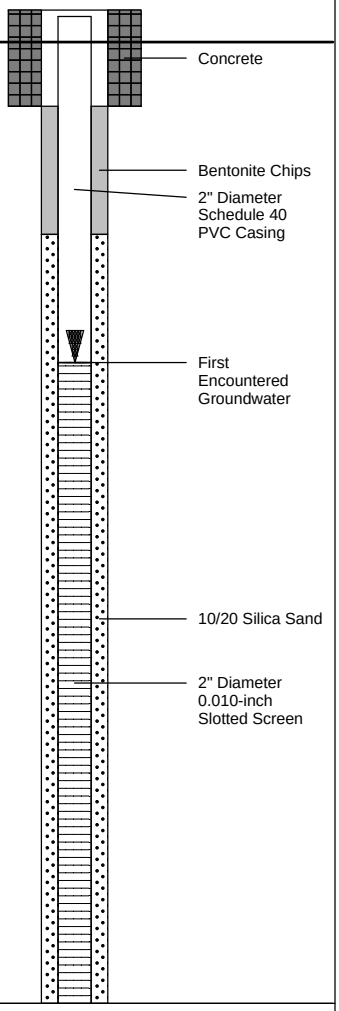
Descriptions By: Rory Henneck

Well/Boring ID: **TMW-2**

Client: Kinder Morgan Energy Partners, L.P.

Location: KMLT - Harbor Island

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	USCS Code	Geologic Column	Stratigraphic Description
0	0	AK	0'-6'		0.1	SM		SAND with silt, fine to medium grain, dark brown to black, wet.
5	-5	1	6'-10'					
10	-10	2	10'-15'					
15	-15							End of boring @ 15' bgs.



Remarks: AK = Air Knife
bgs = Below Ground Surface
NE = Not Established
ppm = Parts Per Million

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Project: WA000804.2013 Template:
Data File:

Date: 7/26/2013

Created/Edited by: KDH

Date Start/Finish: 6/19/2013
Drilling Company: ESN Northwest
Driller's Name: Marty
Drilling Method: Direct-push
Sampling Method:
Rig Type: Truck-mounted

Northing: NE
Easting: NE
Casing Elevation: NE

Borehole Depth: 15 feet bgs
Surface Elevation: NE

Descriptions By: Rory Henneck

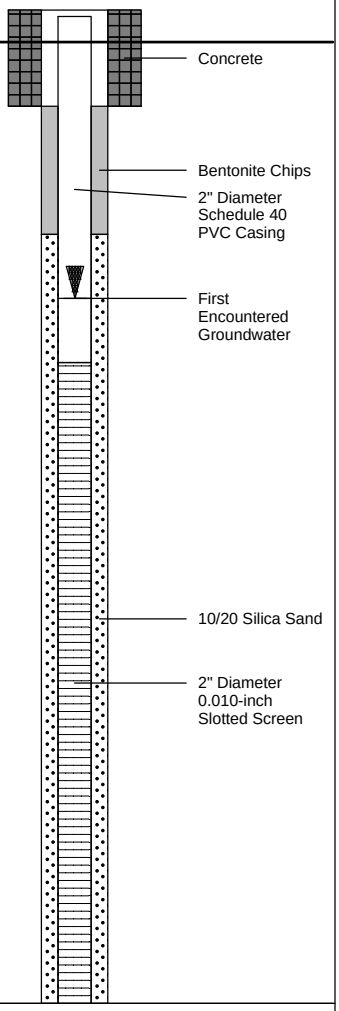
Well/Boring ID: **TMW-3**

Client: Kinder Morgan Energy Partners, L.P.

Location: KMLT - Harbor Island

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	USCS Code	Geologic Column	Stratigraphic Description
0	0							
		AK	0'-6'			SW		SAND with gravel and trace silt, fine to medium grain, gravel 0.5" to 1" diameter and subrounded to subangular, trace concrete debris, brown, dry.
5	-5				25.9	SP		SAND with silt, fine to medium grain, trace coarse grains, trace shell fragments, wet.
		1	6'-10'					
10	-10							
		2	10'-15'					
15	-15							End of boring @ 15' bgs.

Well/Boring Construction



ARCADIS
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Remarks: AK = Air Knife
bgs = Below Ground Surface
NE = Not Established
ppm = Parts Per Million

Project: WA000804.2013 Template:
Data File:

Date: 7/26/2013

Created/Edited by: KDH

Date Start/Finish: 6/19/2013 - 6/20/2013
Drilling Company: ESN Northwest
Driller's Name: Marty
Drilling Method: Direct-push
Sampling Method:
Rig Type: Truck-mounted

Northing: NE
Easting: NE
Casing Elevation: NE

Borehole Depth: 15 feet bgs
Surface Elevation: NE

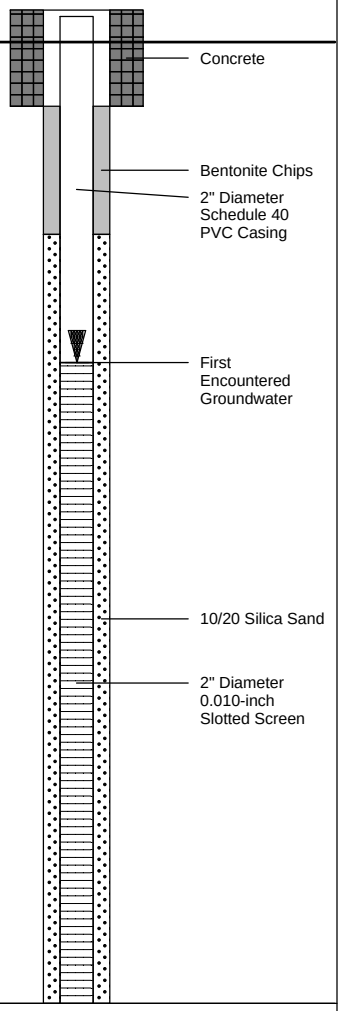
Descriptions By: Rory Henneck

Well/Boring ID: **TMW-4**

Client: Kinder Morgan Energy Partners, L.P.

Location: KMLT - Harbor Island

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	USCS Code	Geologic Column	Stratigraphic Description
0	0	AK	0'-6'		458.3	SM		SAND with silt, fine to medium grain, black, moist.
5	-5	1	6'-10'					
10	-10	2	10'-15'					
15	-15							End of boring @ 15' bgs.



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Remarks: AK = Air Knife
bgs = Below Ground Surface
NE = Not Established
ppm = Parts Per Million

Date Start/Finish: 6/19/2013
Drilling Company: ESN Northwest
Driller's Name: Marty
Drilling Method: Direct-push
Sampling Method:
Rig Type: Truck-mounted

Northing: NE
Easting: NE
Casing Elevation: NE

Borehole Depth: 15 feet bgs
Surface Elevation: NE

Descriptions By: Rory Henneck

Well/Boring ID: **TMW-5**

Client: Kinder Morgan Energy Partners, L.P.

Location: KMLT - Harbor Island

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0 / 0	AK	0'-6'			SP			Concrete; Bentonite Chips; 2" Diameter Schedule 40 PVC Casing
5 / -5				101			SAND, fine to medium grain, trace shell fragments, dark brown to black, wet.	First Encountered Groundwater
	1	6'-10'						10/20 Silica Sand
10 / -10	2	10'-15'						2" Diameter 0.010-inch Slotted Screen
15 / -15							End of boring @ 15' bgs.	

Remarks: AK = Air Knife
bgs = Below Ground Surface
NE = Not Established
ppm = Parts Per Million

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Project: WA000804.2013 Template:
Data File:

Date: 7/26/2013

Created/Edited by: KDH

Date Start/Finish: 6/19/2013
Drilling Company: ESN Northwest
Driller's Name: Marty
Drilling Method: Direct-push
Sampling Method:
Rig Type: Truck-mounted

Northing: NE
Easting: NE
Casing Elevation: NE

Borehole Depth: 15 feet bgs
Surface Elevation: NE

Descriptions By: Rory Henneck

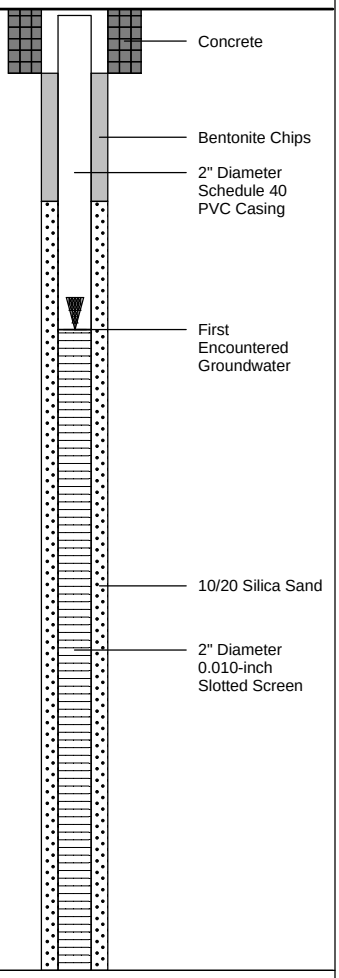
Well/Boring ID: **TMW-6**

Client: Kinder Morgan Energy Partners, L.P.

Location: KMLT - Harbor Island

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	USCS Code	Geologic Column	Stratigraphic Description
0	0	AK	0'-5'			SP		
5	-5				184			SAND with trace silt, fine to medium grain, dark brown, wet.
		1	5'-10'					
10	-10							
		2	10'-15'					
15	-15							End of boring @ 15' bgs.

Well/Boring Construction



Remarks: AK = Air Knife
bgs = Below Ground Surface
NE = Not Established
ppm = Parts Per Million

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Project: WA000804.2013 Template:
Data File:

Date: 7/26/2013

Created/Edited by: KDH

ARCADIS

Appendix C

Groundwater Monitoring Field Forms

ARCADIS

Site ID: **KMLT - Harbor Island** Project #: **WA000804.0000.00003**

Site Address: **2720 13th Ave SW, Seattle, WA** Date: 6/21/13

Well ID	Time	Sheen/ Odor	LNAPL Depth	LNAPL Thickness	DTW	TD	Notes
A-4	--	NA	NA	NA	NA	NA	NA
A-5	--						
A-6	--						
A-8	--						
A-10	--						
A-11	--						
A-12	--						
A-14R	--						
A-16	--						
A-18	--						
A-19	--						
A-20	--						
A-21	--						
A-22R	--						
A-23R	--						
A-25	--						
A-26R	--						
A-27	9:40	No /425	10.68	0	10.68	18.18	PID: 535.4 4" diam. 6" steel cased stickup

ARCADIS

Site ID: **KMLT - Harbor Island** Project #: **WA000804.0000.00003**

Site Address: **2720 13th Ave SW, Seattle, WA** Date: 6/21/13

Well ID	Time	Sheen/ Odor	LNAPL Depth	LNAPL Thickness	DTW	TD	Notes
~~TMW-1 A-28R~~	8:13	No / No	3.44	0	3.44	15.31	PID: 3.8 ppm, w.I.V. 3/3 bolts.
12	8:47	- / ~~Yes~~ No AM	2.84	0	2.84	7.49	PID: 6.0 ppm. Absorbent sock in well. 24"x24" hinge vault lid ok, 4" diam.
~~TMW-2 MW-07R~~	8:20	No / No	3.83	0	3.83	15.63	PID: 9.0 ppm 3/3 bolts, w.I.V.
~~TMW-5 MW-1~~	8:31	No / Yes	3.24	0	3.24	14.64	PID: 403.0 ppm 3/3 bolts
~~TMW-3 MW-2~~	8:44	- / Yes	3.81	0	3.81	15.72	PID: 6.4 ppm 3/3 bolts
~~MW-3~~	9:00	- / No	4.57	0	4.57	10.67	PID: 0.0 ppm No bolts; 4" diam stickup
TMW-4	9:07	- / Yes	3.50	0	3.50	15.50	PID: 51.1 ppm 3/3 bolts
MW-5	-	-	-	-	-	-	-
TMW-6	9:17	- / Yes	2.93	0	2.93	14.60	PID: 227.2 ppm 3/3 bolts
MW-7	8:40	No / Yes	3.10	0	3.10	13.07	PID: 17.4 ppm, 4" diam. 3/3 bolts, absorbent sock in well
MW-8	-	-	-	-	-	-	-
MW-9	9:12	- / Yes	3.01	0	3.01	12.93	PID: 6.0 ppm, 4" diam. 2'x2' hinged lid ok, abs. sock in well.
MW-12R	-	-	-	-	-	-	-
MW-13R	-	-	-	-	-	-	-
MW-14	-	-	-	-	-	-	-
MW-16	-	-	-	-	-	-	-
MW-18	-	-	-	-	-	-	-
MW-19	8:02	No / Yes	3.05	0	3.05	13.02	PID: 22.5 ppm 3/3 bolts, w.I.V.

ARCADIS Groundwater Sampling Form

Page 1 of 1

Project No. WA000804.0000 | Well ID MW 11 | Date 6/24/13

Project Name/Location KMLT Harbor Island 2720 13th Ave SW, Seattle, WA | Weather partly sunny, 60°F

Measuring Pt. Description TOC | Screen Setting (ft-bmp) NA | Casing Diameter (in.) 4 | Well Material X PVC ___ SS

Static Water Level (ft-btoc) 4.60 | Total Depth (ft-btoc) 10.86 | Water Column/ Gallons in Well 6.26 / 4.1 | Initial PID Reading (ppm) 0.1

TOC Elevation NA | Pump Intake (ft-btoc) 7 | Purge Method: Low-flow / Centrifugal / Submersible / Other | Sample Method Peristaltic Pump

Pump On/Off 1001 | Volumes Purged < 1

Sample Time: Label 1030 | Start 1030 | End 1037 | Replicate/ Code No. NA | Sampled by RH

Stabilized Range: ~.5 ft | 0.1 | 3% | 10% | 10% | 3%

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox ORP (mV)	Appearance Color	Appearance Odor
10:02	1	330	4.72	0.1	6.65	49	13.8	2.63	19.42	-27.1	clear	yes
1005	4	330	4.81	0.3	6.75	49	17.3	1.10	19.50	-26.0	slight yellow	"
1008	7	330	4.82	0.5	6.77	46	13.3	0.81	19.41	-27.5	"	"
10:11	10	330	4.85	0.7	6.80	47	9.49	0.61	19.46	-29.8	"	"
10:14	13	330	4.82	0.9	6.80	46	11.6	0.47	19.52	-30.6	"	"
1017	16	330	4.83	1.1	6.79	46	12.7	0.48	19.48	-29.3	"	"
1020	19	330	4.84	1.4	6.80	46	9.93	0.51	19.51	-31.3	"	"
1023	22	330	4.84	1.6	6.80	45	10.6	0.46	19.52	-31.9	"	"
1026	25	330	4.84	1.9	6.81	45	10.4	0.46	19.62	-32.7	"	"
1029	28	330	4.87	2.2	6.81	45	11.6	0.50	19.67	-33.1	"	"

Constituents Sampled	Container	Number	Preservative
GRO	VOA	3	HCl
BTEX	VOA	3	"
Sulfate / Nitrate	Poly	1	none
Nitrate	Poly	1	H_2SO_4
Sulfide	Glass	1	Zn Acetate

Well Casing Volumes

Gallons/Foot: 1" = 0.04 | 1.25" = 0.06 | 1.5" = 0.09 | 2" = 0.162 | 2.5" = 0.26 | 3" = 0.37 | 3.5" = 0.50 | 4" = 0.653 | 6" = 1.47

Well Information

Well Location: SSW side of T-21

Condition of Well: good

Well Completion: Flush Mount / Stick Up

Well Locked at Arrival: Yes / No

Well Locked at Departure: Yes / No

Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Project No. WA005504.2013 Well ID 12 Date 6/24/00

Project Name/Location KMLT Harbor Island 1272D 13th Ave SW, Seattle, WA Weather overcast, 65°F

Measuring Pt. Description N side TOC Screen Setting (ft-bmp) NA Casing Diameter (in.) 4 Well Material ✓ PVC ___ SS

Static Water Level (ft-btoc) 2.25 Total Depth (ft-btoc) 7.53 Water Column/ Gallons in Well 5.28 / 3.4 Initial PID Reading (ppm) 2.9

TOC Elevation NA Pump Intake (ft-btoc) 5 Purge Method: peristaltic / LFP Centrifugal ___ Submersible ___ Other ___ Sample Method grab

Pump On/Off 1105 Volumes Purged <1

Sample Time: Label 1125 Start 1125 End 1133 Replicate/ Code No. NA Sampled by RH

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance Color	Appearance Odor
1106	1	300	2.53	0.1	7.17	217	17.4	4.38	15.01	-71.0	yellowish sheen	yes
1109	4	300	2.85	0.3	7.17	216	11.8	1.15	15.01	-66.5	↓	↓
1112	7	300	3.01	0.5	7.14	216	17.5	0.73	15.00	-66.4	↓	↓
1115	10	300	3.30	0.7	7.13	215	12.6	0.61	15.16	-65.7	↓	↓
1118	13	300	3.74	1.0	7.14	213	13.5	0.52	15.35	-65.8	↓	↓
1121	16	300	3.40	1.3	7.13	212	22.7	0.49	15.46	-65.3	↓	↓
1124	19	300	3.44	1.5	7.14	210	16.4	0.46	15.66	-67.0	↓	↓

Constituents Sampled	Container	Number	Preservative
GRO	VOA	3	HCl
BTEX	"	3	"
Nitrate	Poly	1	H_2SO_4
Sulfate / Nitrate	"	1	none
Sulfide	250 mL glass	1	Zn Acetate

Well Casing Volumes

Gallons/Foot 1" = 0.04 1.25" = 0.06 1.5" = 0.09 2" = 0.16 2.5" = 0.26 3" = 0.37 3.5" = 0.50 4" = 0.65 6" = 1.47

Well Information

Well Location: SE of T-25, NW of T-32

Condition of Well: good, abs. sock in well

Well Completion: Flush Mount / Stick Up

Well Locked at Arrival: Yes / No N/A

Well Locked at Departure: Yes / No

Key Number To Well: NA

GW Sampling Form 6/1/2010

ARCADIS Groundwater Sampling Form

Page 1 of 1

Project No. WA000804.0000 | Well ID A-27 | Date 6/21/13

Project Name/Locatior 2720 13th Ave SW, Seattle, WA | Weather overcast, 60's F

Measuring Pt. Description: TOC | Screen Setting (ft-bmp): NA | Casing Diameter (in.): 4 | Well Material: X PVC / SS

Static Water Level (ft-btoc): 10.69 | Total Depth (ft-btoc): 18.18 | Water Column/ Gallons in Well: 7.5 / 4.9 | Initial PID Reading (ppm): 535.4

TOC Elevation: NA | Pump Intake (ft-btoc): 15 | Purge Method: Low-flow / Centrifugal / Submersible / Other peristaltic | Sample Method: Peristaltic Pump

Pump On/Off: 956 / 1024 | Volumes Purged: <1

Sample Time: Label 1015, Start 1016, End 1024 | Replicate/ Code No.: NA | Sampled by: RH

Stabilized Range: ~.5 ft | 0.1 | 3% (10°) | 10% | 10% | 3%

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox ORP (mV)	Appearance Color	Appearance Odor
9:58	2	350	10.71	0.2	6.88	232	8.05	3.69	14.45	-84.6	clear	yes
10:01	5	350	10.76	0.3	6.92	215	9.65	1.93	14.32	-78.2	↓	↓
10:04	8	350	10.80	0.5	7.00	213	10.5	1.35	13.96	-80.1		
10:07	11	350	10.80	0.8	7.03	214	10.1	1.23	13.86	-81.8		
10:11	14	350	10.80	1.0	7.01	215	10.4	1.27	13.76	-78.0	↓	↓

Constituents Sampled	Container	Number	Preservative
GRO	VOA	3	HCl
BTEX	VOA	3	↓
Nitrate	Poly	1	H_2SO_4
Sulfate	"	1	none
Sulfide	Glass	1	Zn Acetate

Well Casing Volumes

Gallons/Foot: 1" = 0.04; 1.25" = 0.06; 1.5" = 0.09; 2" = 0.162; 2.5" = 0.26; 3" = 0.37; 3.5" = 0.50; 4" = 0.653; 6" = 1.47

Well Information

Well Location: NW corner of A yard outside entrance at NW

Condition of Well: good

Well Completion: Flush Mount / Stick Up

Well Locked at Arrival: Yes / No

Well Locked at Departure: Yes / No

Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Page 1 of 1

Project No. WA000804.0000 | Well ID TMW-1 | Date 6/21/13

Project Name/Location 2720 13th Ave SW, Seattle, WA | Weather Sunny, 65°F

Measuring Pt. Description: TOC | Screen Setting (ft-bmp): 5-15 | Casing Diameter (in.): 2 | Well Material: X PVC / SS

Static Water Level (ft-btoc): 3.44 | Total Depth (ft-btoc): 15.31 | Water Column/ Gallons in Well: 11.87 / 1.9 | Initial PID Reading (ppm): 3.8

TOC Elevation: NA | Pump Intake (ft-btoc): 10 | Purge Method: Low-flow; Centrifugal; Submersible: NA; Other | Sample Method: Peristaltic Pump

Pump On/Off: 1233 / | Volumes Purged: 1

Sample Time: Label 1255 | Start 1255 | End 1305 | Replicate/ Code No.: NA | Sampled by: RH

Stabilized Range: ~.5 ft | 0.1 | ~~3%~~ 1-2% | 10% | 10-20% | 3%

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox ORP (mV)	Appearance Color	Appearance Odor
1235	2	350	3.49	0.3	7.20	127	11.9	6.22	17.31	-54.6	clear	slight
1238	5	350	3.49	0.5	7.27	133	7.14	3.62	17.15	-60.7		
1241	8	350	3.49	0.8	7.28	137	5.46	2.74	17.10	-62.2		
1244	11	350	3.49	1.0	7.34	140	4.71	2.18	17.03	-69.7		
1247	14	350	3.49	1.3	7.36	140	4.45	1.94	16.94	-73.0		
1250	17	350	3.49	1.5	7.36	141	4.46	1.92	16.95	-72.6		
1253	20	350	3.49	1.8	7.36	142	4.42	1.90	16.95	-75.3		

Constituents Sampled	Container	Number	Preservative
GRO			
BTEX			

Well Casing Volumes

Gallons/Foot: 1" = 0.04 | 1.25" = 0.06 | 1.5" = 0.09 | 2" = 0.162 | 2.5" = 0.26 | 3" = 0.37 | 3.5" = 0.50 | 4" = 0.653 | 6" = 1.47

Well Information

Well Location: South side of D Yard, 1mm W of overhead pipes

Condition of Well: good

Well Completion: Flush Mount / Stick Up

Well Locked at Arrival: Yes / No

Well Locked at Departure: Yes / No

Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Page 1 of 1

Project No. WA000804.0000 | Well ID TMW-2 | Date 6/21/13

Project Name/Location 2720 13th Ave SW, Seattle, WA | Weather Sunny, 70°F

Measuring Pt. Description TOC | Screen Setting (ft-bmp) 5-15 | Casing Diameter (in.) 2 | Well Material X PVC ___ SS

Static Water Level (ft-btoc) 3.83 | Total Depth (ft-btoc) 15.63 | Water Column/ Gallons in Well 11.8 / 1.9 | Initial PID Reading (ppm) 9.0

TOC Elevation NA | Pump Intake (ft-btoc) 9 | Purge Method: Low-flow / Centrifugal / Submersible / Other | Sample Method Peristaltic Pump

Pump On/Off 1511 / 1532 | Volumes Purged <1

Sample Time: Label 1530 | Start 1525 | End 1530 | Replicate/ Code No. NA | Sampled by RH

Stabilized Range: ~.5 ft | 0.1 | 3% (10%) | 10% | 10% | 3%

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox ORP (mV)	Appearance Color	Appearance Odor
1512	1	350	3.89	0.2	7.60	504	3.60	2.31	17.02	-124.6	clear	no
1515	4	350	3.90	0.5	7.63	508	2.56	1.12	17.19	-126.2		
1518	7	350	3.89	0.8	7.66	521	1.95	0.91	17.31	-130.5		
1521	10	350	3.90	1.0	7.66	515	1.78	0.87	17.01	-131.4		
1524	13	350	3.90	1.3	7.66	514	1.90	0.86	16.96	-132.1		

Constituents Sampled	Container	Number	Preservative
GRO	VOA	3	HCl
BTEX	"	3	"
Sulfide	Poly	1	None
Sulfide	Glass	1	Zn Acetate
Nitrate	Poly	1	H_2SO_4

Well Casing Volumes

Gallons/Foot: 1" = 0.04 | 1.25" = 0.06 | 1.5" = 0.09 | 2" = 0.162 | 2.5" = 0.26 | 3" = 0.37 | 3.5" = 0.50 | 4" = 0.653 | 6" = 1.47

Well Information

Well Location: E of overhead piping, S side D Yard

Condition of Well: good

Well Completion: Flush Mount / Stick Up

Well Locked at Arrival: Yes / No

Well Locked at Departure: Yes / No

Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Project No. GP09BPNA.WA | Well ID TMW-3 | Date 6/24/13

Project Name/Location ARCO# KMEP KMLT, 2724 13th Ave SW Washington Seattle, WA | Weather Rainy, 55°F

Measuring Pt. Description N side TOC | Screen Setting (ft-bmp) ~~10~~ RH 5-15 | Casing Diameter (in.) 2 | Well Material ✓ PVC ___ SS

Static Water Level (ft-btoc) 3.88 | Total Depth (ft-btoc) 15.72 | Water Column/ Gallons in Well 11.84 / 1.9 | Initial PID Reading (ppm) 3.6

TOC Elevation NA | Pump Intake (ft-btoc) 10 | Purge Method: LFP ___ Centrifugal ___ Submersible ___ Other | Sample Method GRAB

Pump On/Off 8:20 / 8:43 | Volumes Purged <1

Sample Time: Label 8:35 | Start 8:33 | End 8:33 | Replicate/ Code No. NA | Sampled by RH

10" 10"

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance Color	Appearance Odor
8:21	1	330	3.88	~~0.2~~	7.14	264	11.6	2.19	16.17	-95.0	slight	yes
8:24	4	330	3.88	0.3	7.13	209	10.8	0.49	16.20	-82.6	↓	↓
8:27	7	330	3.86	0.5	7.11	210	9.14	0.43	16.25	-80.2		
8:30	10	330	3.88	0.7	7.13	221	7.69	0.32	16.23	-76.6		
8:33	13	330	3.86	1.0	7.15	217	5.81	0.33	16.20	-75.7		
8:36	16	330	3.88	1.2	7.17	216	5.35	0.34	16.19	-74.3		

Constituents Sampled	Container	Number	Preservative
GRO	40 ml voa	3	HCL
BTEX/MTBE	40 ml voa	3	HCL
~~Total Lead~~ Nitrate	250 ml Poly	~~1~~	~~HNO3~~ H_2SO_4
~~Dissolved Lead~~ Sulfide / Nitrate	250 ml Poly	1	Unpreserved
~~DRO/RRO~~ Sulfide	~~1 L Amber x2~~		

Well Casing Volumes

Gallons/Foot: 1" = 0.04 | 1.25" = 0.06 | 1.5" = 0.09 | 2" = 0.16 | 2.5" = 0.26 | 3" = 0.37 | 3.5" = 0.50 | 4" = 0.65 | 6" = 1.47

Well Information

Well Location: W side of TI-21 | Well Locked at Arrival: Yes / No

Condition of Well: good | Well Locked at Departure: Yes / No

Well Completion: Flush Mount / Stick Up | Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Project No. GP09BPNA.W/ | Well ID TMW-4 | Date 6/24/13

Project Name/Location ARCO# KMLT Harbor Is. 2720 Ala Ave SW Seattle Washington, WA | Weather overcast, 65°F

Measuring Pt. Description N side TOC | Screen Setting (ft-bmp) 5-15 | Casing Diameter (in.) 2 | Well Material: X PVC ___ SS

Static Water Level (ft-btoc) 4.48 | Total Depth (ft-btoc) 15.50 | Water Column/ Gallons in Well 11.02 / 1.8 | Initial PID Reading (ppm) 74.5

TOC Elevation NA | Pump Intake (ft-btoc) 10 | Purge Method: LFP / Centrifugal / Submersible / Other | Sample Method GRAB

Pump On/Off 9:05 | Volumes Purged < 1

Sample Time: Label 0925 | Start 0924 | End 0930 | Replicate/ Code No. NA | Sampled by RH

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance Color	Appearance Odor
905	1	~~330~~ 250 mL/min	4.58	0.1	6.83	311	5.87	3.44	16.41	-60.6	slight yellow	yes
908	4	330	4.58	0.3	6.88	308	4.62	1.79	16.37	-64.3		
911	7	330	4.58	0.5	6.91	307	4.64	1.31	16.33	-72.5		
914	10	330	4.58	0.7	6.96	291	5.05	0.99	16.27	-77.0		
917	13	330	4.58	1.0	6.99	296	4.87	0.73	16.25	-80.6		
920	17	330	4.58	1.2	7.01	267	4.67	0.69	16.21	-82.6		
923	20	330	4.58	1.5	7.02	294	5.50	0.66	16.27	-82.2		

Constituents Sampled	Container	Number	Preservative
GRO	40 ml voa	3	HCL
BTEX/MTBE	40 ml voa	3	HCL
~~Total Lead~~ Nitrate	250 ml Poly	1	~~HNO3~~ H_2SO_4
~~Dissolved Lead~~ Nitrate / Sulfate	250 ml Poly	1	Unpreserved
~~DRO/RRO~~ Sulfide	1 ~~L~~ Amber x2 250 ml glass	1	Zn Acetate

Well Casing Volumes

Gallons/Foot: 1" = 0.04 | 1.25" = 0.06 | 1.5" = 0.09 | 2" = 0.16 | 2.5" = 0.26 | 3" = 0.37 | 3.5" = 0.50 | 4" = 0.65 | 6" = 1.47

Well Information

Well Location: SW of T-21, N of T-32 | Well Locked at Arrival: Yes / No

Condition of Well: good | Well Locked at Departure: Yes / No

Well Completion: Flush Mount / Stick Up | Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Project No. WA000804.0000 | Well ID TMW-5 | Date 6/21/13

Project Name/Location 2720 13th Ave SW, Seattle, WA | Weather sunny, 65°F

Measuring Pt. Description: TOC | Screen Setting (ft-bmp): 5-15 | Casing Diameter (in.): 2 | Well Material: X PVC / SS

Static Water Level (ft-btoc): 3.24 | Total Depth (ft-btoc): 14.64 | Water Column/ Gallons in Well: 11.4 | Initial PID Reading (ppm): 403.0

TOC Elevation: NA | Pump Intake (ft-btoc): 8 | Purge Method: Low-flow / Centrifugal / Submersible / Other | Sample Method: Peristaltic Pump

Pump On/Off: 1330 / 1350 | Volumes Purged: <1

Sample Time: Label 1350, Start 1346, End 1356 | Replicate/ Code No.: NA | Sampled by: RH

Stabilized Range:		~.5 ft			0.1	3%	10%	10%	3%			
Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox ORP (mV)	Appearance Color	Appearance Odor
1332	2	350	3.33	0.3	7.56	311	15.4	2.62	16.73	-84.0	yellowish	yes
1335	5	350	3.33	0.5	7.54	372	16.0	1.86	16.51	-95.3		
1338	8	350	3.33	0.8	7.55	380	15.8	1.20	16.44	-96.9		
1341	11	350	3.33	1.0	7.53	385	15.7	1.06	16.34	-97.6		
1344	14	350	3.33	1.3	7.51	388	16.1	0.76	16.22	-97.1		
1347	17	350	3.33	1.5	7.51	390	15.7	0.78	16.14	-98.0		

Constituents Sampled	Container	Number	Preservative
GRO	VOA	3	HCl
BTEX	"	3	"
Nitrate	Poly	1	H_2SO_4
Sulfate	"	1	—
Sulfide	Glass	1	Zn Acetate

Well Casing Volumes

Gallons/Foot: 1" = 0.04 | 1.25" = 0.06 | 1.5" = 0.09 | 2" = 0.162 | 2.5" = 0.26 | 3" = 0.37 | 3.5" = 0.50 | 4" = 0.653 | 6" = 1.47

Well Information

Well Location: S of T-25, W side of B Yard | Well Locked at Arrival: Yes / No

Condition of Well: good | Well Locked at Departure: Yes / No

Well Completion: Flush Mount / Stick Up | Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Project No. WA006604.2013 | Well ID TMW-6 | Date 6/24/13

Project Name/Location KMLT Harbor Is | 2720 13th Ave SW, Seattle, WA | Weather overcast, 65°F

Measuring Pt. Description N side TOC | Screen Setting (ft-bmp) 5-15 | Casing Diameter (in.) 2 | Well Material ✓ PVC ___ SS

Static Water Level (ft-btoc) 2.75 | Total Depth (ft-btoc) 14.61 | Water Column/ Gallons in Well 11.86 / 1.9 | Initial PID Reading (ppm) 109.4

TOC Elevation NA | Pump Intake (ft-btoc) 9 | Purge Method: peristaltic (LFP) / Centrifugal / Submersible / Other | Sample Method LFP grab

Pump On/Off 1320 | Volumes Purged ~1

Sample Time: Label 1345 | Start 1342 | End 1349 | Replicate/ Code No. NA | Sampled by RH

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance Color	Appearance Odor
1321	1	330	2.98	0.1	6.99	119	21.0	2.72	15.47	-62.4	yellowish	yes
1324	4	330	3.01	0.3	7.03	118	19.4	1.23	15.17	-64.6		
1327	7	330	3.01	0.5	7.05	124	17.9	0.71	15.04	-65.9		
1330	10	330	3.01	0.8	7.07	128	17.6	0.59	14.89	-66.9		
1333	13	330	3.01	1.0	7.08	132	16.0	0.53	14.83	-68.5		
1336	16	330	3.01	1.3	7.14	140	15.0	0.44	14.84	-71.8		
1339	19	330	3.01	1.5	7.15	147	14.1	0.42	14.80	-72.5		
1342	22	330	3.01	1.8	7.17	153	13.7	0.41	14.76	-73.3		

Constituents Sampled	Container	Number	Preservative
GRO	VOA	3	HCl
BTEX	"	3	"
Sulfate / Nitrate	Poly	1	~~H_2S~~ none
Nitrate	"	1	H_2SO_4
Sulfide	Glass	1	Zn Acetate

Well Casing Volumes

Gallons/Foot: 1" = 0.04 | 1.25" = 0.06 | 1.5" = 0.09 | 2" = 0.16 | 2.5" = 0.26 | 3" = 0.37 | 3.5" = 0.50 | 4" = 0.65 | 6" = 1.47

Well Information

Well Location: E of T-33, W of T-32 | Well Locked at Arrival: Yes / NO

Condition of Well: | Well Locked at Departure: Yes / NO

Well Completion: Flush Mount / Stick Up | Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Page 1 of 1

Project No. WA000804.0000 | Well ID MW-7 | Date 6/26/13

Project Name/Location 2720 13th Ave SW, Seattle, WA | Weather overcast, 65°F

Measuring Pt. Description: TOC | Screen Setting (ft-bmp): NA | Casing Diameter (in.): 4 | Well Material: X PVC / SS

Static Water Level (ft-btoc): 3.10 | Total Depth (ft-btoc): 13.07 | Water Column/ Gallons in Well: 9.97 / 1.6 | Initial PID Reading (ppm): 17.4

TOC Elevation: NA | Pump Intake (ft-btoc): 8 | Purge Method: Low-flow / Centrifugal / Submersible / Other | Sample Method: Peristaltic Pump

Pump On/Off: 1426 / 1455 | Volumes Purged: 1.3

Sample Time: Label 1450, Start 1447, End 1455 | Replicate/ Code No.: NA | Sampled by: RH

Stabilized Range:		~.5 ft		0.1	3% (10%)	10%	10%	3%		Appearance	
Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox ORP (mV)	Color	Odor
1427	1	350	3.07	0.8	7.76	141	5.87	2.33	16.45	-132.1	slight yellow	yes
1430	4	350	3.13	0.4	7.74	140	6.13	1.58	16.54	-130.7		
1433	7	350	3.18	0.7	7.68	142	7.34	0.70	16.66	-127.1		
1437	11	350	3.25	1.1	7.66	144	6.07	0.56	16.73	-125.2		
1440	14	350	3.29	1.4	7.64	145	7.01	0.49	16.87	-123.9		
1443	17	350	3.29	1.7	7.63	146	6.41	0.44	16.91	-124.3		
1446	20	350	3.29	2.1	7.61	148	7.19	0.42	16.79	-125.2		

Constituents Sampled	Container	Number	Preservative
GRO			HCl
BTEX			
			Poly H_2SO_4
			Zn Acetate

Well Casing Volumes

Gallons/Foot: 1" = 0.04; 1.25" = 0.06; 1.5" = 0.09; 2" = 0.162; 2.5" = 0.26; 3" = 0.37; 3.5" = 0.50; 4" = 0.653; 6" = 1.47

Well Information

Well Location: E side of T-25

Condition of Well: good

Well Completion: Flush Mount / Stick Up

Well Locked at Arrival: Yes / No

Well Locked at Departure: Yes / No

Key Number To Well: NA

ARCADIS Groundwater Sampling Form

Project No. WA000804.2013 | Well ID MW-9 | Date 6/24/13

Project Name/Location KMLT Harbor Island / 2720 13th Ave SW, Seattle, WA | Weather partly sunny, 65°F

Measuring Pt. Description N side TOC | Screen Setting (ft-bmp) NA | Casing Diameter (in.) 4 | Well Material ✓ PVC ___ SS

Static Water Level (ft-btoc) 3.01 | Total Depth (ft-btoc) 13.02 | Water Column/ Gallons in Well 10.01 / 6.4 | Initial PID Reading (ppm) 9.9

TOC Elevation NA | Pump Intake (ft-btoc) 8 | Purge Method: peristaltic (LFP) / Centrifugal / Submersible / Other | Sample Method grab

Pump On/Off 1205 | Volumes Purged <1

Sample Time: Label 1225 | Start 1219 | End 1227 | Replicate/ Code No. NA | Sampled by RH

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance Color	Appearance Odor
1206	1	330	3.05	0.1	6.93	101	9.80	3.67	15.33	-41.0	yellowish	slight
1209	4	330	3.10	0.4	6.95	100	6.94	1.37	15.17	-47.0	w/ floating matter	↓
1212	7	330	3.10	0.6	6.94	100	8.04	0.71	15.10	-46.8	↓	
1215	10	330	3.10	0.8	6.98	99	8.04	0.70	15.32	-52.7		
1218	13	330	3.10	1.0	6.99	100	8.71	0.64	15.26	-53.7		

Constituents Sampled	Container	Number	Preservative
GRO	VOA	3	HCl
BTEX	"	3	"
Nitrate	Poly	1	H_2SO_4
Sulfate / Nitrate	"	1	none
Sulfide	Glass	1	Zn Acetate

Well Casing Volumes

Gallons/Foot					
	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

Well Information

Well Location:	S of T-33	Well Locked at Arrival:	Yes / No
Condition of Well:	good, obs. rock in well	Well Locked at Departure:	Yes / No
Well Completion:	Flush Mount / Stick Up	Key Number To Well:	NA

ARCADIS Groundwater Sampling Form

Page 1 of 1

Project No. WA000804.0000 | Well ID MW-19 | Date 6/21/13

Project Name/Locatior 2720 13th Ave SW Seattle, WA | Weather overcast, 60°F

Measuring Pt. Description TOC | Screen Setting (ft-bmp) NA | Casing Diameter (in.) 2 | Well Material X PVC ___ SS

Static Water Level (ft-btoc) 3.05 | Total Depth (ft-btoc) 13.02 | Water Column/ Gallons in Well 9.98 / 1.6 | Initial PID Reading (ppm) 22.5

TOC Elevation NA | Pump Intake (ft-btoc) 8 | Purge Method: Low-flow / Centrifugal / Submersible / Other peristaltic | Sample Method Peristaltic Pump

Pump On/Off 1057 | Volumes Purged 1

Sample Time: Label 1115 | Start 1115 | End 1125 | Replicate/ Code No. NA | Sampled by RH

Stabilized Range:			~.5 ft		0.1	3% (10%)	10%	10%	3%			
Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (µMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox ORP (mV)	Appearance Color	Appearance Odor
1059	2	350	3.14	0.3	7.20	114	13.8	2.91	16.67	-88.6	clear, slight	yes
1102	5	350	3.17	0.5	7.27	109	14.3	1.09	16.07	-90.5	yellowish		
1105	8	350	3.17	0.6	7.32	107	14.3	0.65	15.65	-94.5			
1108	11	350	3.17	1.0	7.36	109	13.5	0.55	15.73	-100.1			
1111	14	350	3.17	1.3	7.38	112	13.3	0.53	15.62	-103.6			
1114	17	350	3.17	1.5	7.40	115	13.8	0.51	15.70	-104.8			

Constituents Sampled	Container	Number	Preservative
GRO	VOA	3	HCl
BTEX	"	3	"
Sulfate	Poly	1	~~H_2SO_4~~ none
Nitrate	"	1	H_2SO_4
Sulfide	Glass	1	Zn acetate

Well Casing Volumes

Gallons/Foot: 1" = 0.04 | 1.25" = 0.06 | 1.5" = 0.09 | 2" = 0.162 | 2.5" = 0.26 | 3" = 0.37 | 3.5" = 0.50 | 4" = 0.653 | 6" = 1.47

Well Information

Well Location: NW part of D Yard, NW of overhead piping

Condition of Well: good

Well Completion: Flush Mount / Stick Up

Well Locked at Arrival: Yes / No

Well Locked at Departure: Yes / No

Key Number To Well: NA

ARCADIS

Appendix D

Laboratory Reports and Chain of Custody Documentation

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101

Attn: Jonathan Flomerfelt
Phone: (206) 726-4712
Fax:
Date Received : 06/22/13

Job: WA000804.2013/KMEP KMLT Harbor Island

Anions by IC
EPA Method 300.0

Parameter		Concentration		Reporting Limit	Date Extracted	Date Analyzed
Client ID: **A-27**						
Lab ID : ARC13062420-01A	Nitrate (NO3) - N	ND	*	0.25 mg/L	06/24/13 10:44	06/24/13 14:47
Date Sampled 06/21/13 10:15	Sulfate (SO4)	2.7		0.50 mg/L	06/24/13 10:44	06/24/13 12:56
Client ID: **MW-7**						
Lab ID : ARC13062420-02A	Nitrate (NO3) - N	ND	*	0.25 mg/L	06/24/13 10:44	06/24/13 15:05
Date Sampled 06/21/13 14:50	Sulfate (SO4)	3.2		0.50 mg/L	06/24/13 10:44	06/24/13 13:14
Client ID: **MW-19**						
Lab ID : ARC13062420-03A	Nitrate (NO3) - N	ND	*	0.25 mg/L	06/24/13 10:44	06/24/13 15:24
Date Sampled 06/21/13 11:15	Sulfate (SO4)	ND		0.50 mg/L	06/24/13 10:44	06/24/13 13:33
Client ID: **TMW-1**						
Lab ID : ARC13062420-04A	Nitrate (NO3) - N	0.41	*	0.25 mg/L	06/24/13 10:44	06/24/13 15:42
Date Sampled 06/21/13 12:55	Sulfate (SO4)	11		0.50 mg/L	06/24/13 10:44	06/24/13 13:51
Client ID: **TMW-2**						
Lab ID : ARC13062420-05A	Nitrate (NO3) - N	ND	*	0.25 mg/L	06/24/13 10:44	06/24/13 16:01
Date Sampled 06/21/13 15:30	Sulfate (SO4)	0.83		0.50 mg/L	06/24/13 10:44	06/24/13 14:10
Client ID: **TMW-5**						
Lab ID : ARC13062420-06A	Nitrate (NO3) - N	ND	*	0.25 mg/L	06/24/13 10:44	06/24/13 16:19
Date Sampled 06/21/13 13:50	Sulfate (SO4)	4.3		0.50 mg/L	06/24/13 10:44	06/24/13 14:28

*Nitrate was analyzed on a preserved sample. The accuracy of Nitrate may be biased high due to the possible oxidation of Nitrite to Nitrate.
This replaces the report signed 7/8/13 due to a change in the concentrations for -02A and -03A, due to lab error.

ND = Not Detected

ACCREDITED DoD ELAP

Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / Carson, CA • (714) 386-2901 / info@alpha-analytical.com
Alpha Analytical, Inc. certifies that the test results meet all requirements of NELAC unless footnoted otherwise.
Statement of Data Authenticity : Alpha Analytical, Inc. attests that the data reported has not been altered an any way.

NELAP ACCREDITED LABORATORY

7/10/13
Report Date

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101

Attn: Jonathan Flomerfelt
Phone: (206) 726-4712
Fax:
Date Received : 06/22/13

Job: WA000804.2013/KMEP KMLT Harbor Island

Sulfide
SM4500-S D

Parameter	Concentration	Reporting Limit	Date Extracted	Date Analyzed
Client ID: **A-27**				
Lab ID : ARC13062420-01A Sulfide	ND	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/21/13 10:15				
Client ID: **MW-7**				
Lab ID : ARC13062420-02A Sulfide	ND	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/21/13 14:50				
Client ID: **MW-19**				
Lab ID : ARC13062420-03A Sulfide	0.13	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/21/13 11:15				
Client ID: **TMW-1**				
Lab ID : ARC13062420-04A Sulfide	ND	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/21/13 12:55				
Client ID: **TMW-2**				
Lab ID : ARC13062420-05A Sulfide	ND	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/21/13 15:30				
Client ID: **TMW-5**				
Lab ID : ARC13062420-06A Sulfide	ND	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/21/13 13:50				

ND = Not Detected

ACLASS ACCREDITED DoD ELAP

Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / Carson, CA • (714) 386-2901 / info@alpha-analytical.com
Alpha Analytical, Inc. certifies that the test results meet all requirements of NELAC unless footnoted otherwise.
Statement of Data Authenticity : Alpha Analytical, Inc. attests that the data reported has not been altered an any way.

NELAP ACCREDITED TNI LABORATORY

7/8/13
Report Date

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101
Job: WA000804.2013/KMEP KMLT Harbor Island

Attn: Jonathan Flomerfelt
Phone: (206) 726-4712
Fax:

Northwest Total Petroleum Hydrocarbons - Diesel Extended (NWTPH-Dx)
Northwest Total Petroleum Hydrocarbons - Gasoline Extended (NWTPH-Gx)

		Parameter	Concentration		Reporting Limit	Date Extracted	Date Analyzed
Client ID :	**A-27**						
Lab ID :	ARC13062420-01A	TPH-E (DRO)	0.40	K	0.25 mg/L	06/24/13	06/24/13
Date Sampled	06/21/13 10:15	Surr: Nonane	102		(53-145) %REC	06/24/13	06/24/13
		TPH-P (GRO)	1.0		0.25 mg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	83		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	111		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	120		(70-130) %REC	06/25/13	06/25/13
Client ID :	**MW-7**						
Lab ID :	ARC13062420-02A	TPH-E (DRO)	0.27	K	0.25 mg/L	06/24/13	06/24/13
Date Sampled	06/21/13 14:50	Surr: Nonane	99		(53-145) %REC	06/24/13	06/24/13
		TPH-P (GRO)	4.0		1.0 mg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	69	S54	(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	125		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	111		(70-130) %REC	06/25/13	06/25/13
Client ID :	**MW-19**						
Lab ID :	ARC13062420-03A	TPH-E (DRO)	1.1	K	0.25 mg/L	06/24/13	06/24/13
Date Sampled	06/21/13 11:15	Surr: Nonane	104		(53-145) %REC	06/24/13	06/24/13
		TPH-P (GRO)	2.8		0.40 mg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	70		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	117		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	109		(70-130) %REC	06/25/13	06/25/13
Client ID :	**TMW-1**						
Lab ID :	ARC13062420-04A	TPH-E (DRO)	ND		0.25 mg/L	06/24/13	06/24/13
Date Sampled	06/21/13 12:55	Surr: Nonane	108		(53-145) %REC	06/24/13	06/24/13
		TPH-P (GRO)	ND		0.25 mg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	82		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	122		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	118		(70-130) %REC	06/25/13	06/25/13
Client ID :	**TMW-2**						
Lab ID :	ARC13062420-05A	TPH-E (DRO)	0.28		0.25 mg/L	06/24/13	06/24/13
Date Sampled	06/21/13 15:30	Surr: Nonane	100		(53-145) %REC	06/24/13	06/24/13
		TPH-P (GRO)	0.25		0.25 mg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	78		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	122		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	106		(70-130) %REC	06/25/13	06/25/13
Client ID :	**TMW-5**						
Lab ID :	ARC13062420-06A	TPH-E (DRO)	0.65	K	0.25 mg/L	06/24/13	06/24/13
Date Sampled	06/21/13 13:50	Surr: Nonane	95		(53-145) %REC	06/24/13	06/24/13
		TPH-P (GRO)	1.3		0.25 mg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	73		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	116		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	115		(70-130) %REC	06/25/13	06/25/13

Alpha Analytical, Inc.

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ANALYTICAL REPORT

Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101

Attn: Chris Angier
Phone: (503) 220-8201
Fax: (503) 220-8209
Date Received : 06/25/13

Job: WA000804.2013/KMEP LT Harbor Island

Anions by IC
EPA Method 300.0

Parameter	Concentration	Reporting Limit	Date Extracted	Date Analyzed
Client ID: 11				
Lab ID : ARC13062521-01A Nitrate (NO3) - N	ND	0.25 mg/L	06/25/13 11:34	06/25/13 13:06
Date Sampled 06/24/13 10:30 Sulfate (SO4)	2.5	0.50 mg/L	06/25/13 11:34	06/25/13 13:06
Client ID: 12				
Lab ID : ARC13062521-02A Nitrate (NO3) - N	ND	0.25 mg/L	06/25/13 11:34	06/25/13 14:02
Date Sampled 06/24/13 11:25 Sulfate (SO4)	ND	0.50 mg/L	06/25/13 11:34	06/25/13 14:02
Client ID: MW-9				
Lab ID : ARC13062521-03A Nitrate (NO3) - N	ND	0.25 mg/L	06/25/13 11:34	06/25/13 14:20
Date Sampled 06/24/13 12:25 Sulfate (SO4)	5.3	0.50 mg/L	06/25/13 11:34	06/25/13 14:20
Client ID: TMW-3				
Lab ID : ARC13062521-04A Nitrate (NO3) - N	ND	0.25 mg/L	06/25/13 11:34	06/25/13 14:39
Date Sampled 06/24/13 08:35 Sulfate (SO4)	4.4	0.50 mg/L	06/25/13 11:34	06/25/13 14:39
Client ID: TMW-4				
Lab ID : ARC13062521-05A Nitrate (NO3) - N	ND	0.25 mg/L	06/25/13 11:34	06/25/13 14:57
Date Sampled 06/24/13 09:25 Sulfate (SO4)	32	0.50 mg/L	06/25/13 11:34	06/25/13 14:57
Client ID: TMW-6				
Lab ID : ARC13062521-06A Nitrate (NO3) - N	ND	0.25 mg/L	06/25/13 11:34	06/25/13 15:16
Date Sampled 06/24/13 13:45 Sulfate (SO4)	16	0.50 mg/L	06/25/13 11:34	06/25/13 15:16

ND = Not Detected

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Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / Carson, CA • (714) 386-2901 / info@alpha-analytical.com
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Statement of Data Authenticity : Alpha Analytical, Inc. attests that the data reported has not been altered an any way.

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7/9/13
Report Date

Alpha Analytical, Inc.

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ANALYTICAL REPORT

Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101

Attn: Chris Angier
Phone: (503) 220-8201
Fax: (503) 220-8209
Date Received : 06/25/13

Job: WA000804.2013/KMEP LT Harbor Island

Sulfide
SM4500-S D

Parameter	Concentration	Reporting Limit	Date Extracted	Date Analyzed
Client ID: **11**				
Lab ID : ARC13062521-01A Sulfide	ND	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/24/13 10:30				
Client ID: **12**				
Lab ID : ARC13062521-02A Sulfide	ND	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/24/13 11:25				
Client ID: **MW-9**				
Lab ID : ARC13062521-03A Sulfide	0.11	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/24/13 12:25				
Client ID: **TMW-3**				
Lab ID : ARC13062521-04A Sulfide	ND	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/24/13 08:35				
Client ID: **TMW-4**				
Lab ID : ARC13062521-05A Sulfide	0.11	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/24/13 09:25				
Client ID: **TMW-6**				
Lab ID : ARC13062521-06A Sulfide	0.14	0.10 mg/L	06/27/13	06/27/13
Date Sampled 06/24/13 13:45				

ND = Not Detected

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NELAP ACCREDITED TNI LABORATORY

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7/9/13
Report Date

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ANALYTICAL REPORT

Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101

Attn: Chris Angier
Phone: (503) 220-8201
Fax: (503) 220-8209

Job: WA000804.2013/KMEP LT Harbor Island

Northwest Total Petroleum Hydrocarbons - Diesel Extended (NWTPH-Dx)
Northwest Total Petroleum Hydrocarbons - Gasoline Extended (NWTPH-Gx)

		Parameter	Concentration		Reporting Limit	Date Extracted	Date Analyzed
Client ID :	**11**						
Lab ID :	ARC13062521-01A	TPH-E (DRO)	0.30		0.25 mg/L	06/26/13	06/26/13
Date Sampled	06/24/13 10:30	Surr: Nonane	95		(53-145) %REC	06/26/13	06/26/13
		TPH-P (GRO)	ND		0.25 mg/L	06/28/13	06/28/13
		Surr: 1,2-Dichloroethane-d4	110		(70-130) %REC	06/28/13	06/28/13
		Surr: Toluene-d8	108		(70-130) %REC	06/28/13	06/28/13
		Surr: 4-Bromofluorobenzene	98		(70-130) %REC	06/28/13	06/28/13
Client ID :	**12**						
Lab ID :	ARC13062521-02A	TPH-E (DRO)	5.3	K	0.25 mg/L	06/26/13	06/26/13
Date Sampled	06/24/13 11:25	Surr: Nonane	133		(53-145) %REC	06/26/13	06/26/13
		TPH-P (GRO)	4.1		0.80 mg/L	06/29/13	06/29/13
		Surr: 1,2-Dichloroethane-d4	104		(70-130) %REC	06/29/13	06/29/13
		Surr: Toluene-d8	95		(70-130) %REC	06/29/13	06/29/13
		Surr: 4-Bromofluorobenzene	99		(70-130) %REC	06/29/13	06/29/13
Client ID :	**MW-9**						
Lab ID :	ARC13062521-03A	TPH-E (DRO)	0.37		0.25 mg/L	06/26/13	06/26/13
Date Sampled	06/24/13 12:25	Surr: Nonane	103		(53-145) %REC	06/26/13	06/26/13
		TPH-P (GRO)	0.33		0.25 mg/L	06/28/13	06/28/13
		Surr: 1,2-Dichloroethane-d4	109		(70-130) %REC	06/28/13	06/28/13
		Surr: Toluene-d8	105		(70-130) %REC	06/28/13	06/28/13
		Surr: 4-Bromofluorobenzene	102		(70-130) %REC	06/28/13	06/28/13
Client ID :	**TMW-3**						
Lab ID :	ARC13062521-04A	TPH-E (DRO)	0.85		0.25 mg/L	06/26/13	06/26/13
Date Sampled	06/24/13 08:35	Surr: Nonane	94		(53-145) %REC	06/26/13	06/26/13
		TPH-P (GRO)	0.86		0.25 mg/L	06/28/13	06/28/13
		Surr: 1,2-Dichloroethane-d4	109		(70-130) %REC	06/28/13	06/28/13
		Surr: Toluene-d8	105		(70-130) %REC	06/28/13	06/28/13
		Surr: 4-Bromofluorobenzene	96		(70-130) %REC	06/28/13	06/28/13
Client ID :	**TMW-4**						
Lab ID :	ARC13062521-05A	TPH-E (DRO)	2.5	Z	0.25 mg/L	06/26/13	06/26/13
Date Sampled	06/24/13 09:25	Surr: Nonane	104		(53-145) %REC	06/26/13	06/26/13
		TPH-P (GRO)	4.9		1.0 mg/L	06/29/13	06/29/13
		Surr: 1,2-Dichloroethane-d4	99		(70-130) %REC	06/29/13	06/29/13
		Surr: Toluene-d8	98		(70-130) %REC	06/29/13	06/29/13
		Surr: 4-Bromofluorobenzene	101		(70-130) %REC	06/29/13	06/29/13
Client ID :	**TMW-6**						
Lab ID :	ARC13062521-06A	TPH-E (DRO)	1.8	Z	0.25 mg/L	06/26/13	06/26/13
Date Sampled	06/24/13 13:45	Surr: Nonane	101		(53-145) %REC	06/26/13	06/26/13
		TPH-P (GRO)	4.9		0.50 mg/L	06/28/13	06/28/13
		Surr: 1,2-Dichloroethane-d4	107		(70-130) %REC	06/28/13	06/28/13
		Surr: Toluene-d8	99		(70-130) %REC	06/28/13	06/28/13
		Surr: 4-Bromofluorobenzene	100		(70-130) %REC	06/28/13	06/28/13

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Client ID : **DRUM-2**

Lab ID : ARC13062521-07A

Date Sampled 06/24/13 14:20

TPH-E (DRO)	0.39	0.25 mg/L	06/26/13	06/26/13
Surr: Nonane	102	(53-145) %REC	06/26/13	06/26/13
TPH-P (GRO)	0.60	0.25 mg/L	06/28/13	06/28/13
Surr: 1,2-Dichloroethane-d4	103	(70-130) %REC	06/28/13	06/28/13
Surr: Toluene-d8	92	(70-130) %REC	06/28/13	06/28/13
Surr: 4-Bromofluorobenzene	107	(70-130) %REC	06/28/13	06/28/13

Diesel Range Organics (DRO) C13-C22

Gasoline Range Organics (GRO) C4-C13

K = DRO concentration may include contributions from lighter-end hydrocarbons that elute in the DRO range.

Z = DRO concentration may include contributions from lighter-end and heavier-end hydrocarbons that elute in the DRO range.

ND = Not Detected

ACLASS ACCREDITED DoD ELAP

Roger Scholl Randy Gardner Walter Hinchman

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7/9/13

Report Date

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ANALYTICAL REPORT

Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101

Attn: Chris Angier
Phone: (503) 220-8201
Fax: (503) 220-8209
Date Received : 06/25/13

Job: WA000804.2013/KMEP LT Harbor Island

Volatile Organics by GC/MS
EPA Method SW8260B

Parameter	Concentration	Reporting Limit	Date Extracted	Date Analyzed
Client ID: 11				
Lab ID : ARC13062521-01A Benzene	ND	0.50 µg/L	06/28/13	06/28/13
Date Sampled 06/24/13 10:30 Toluene	ND	0.50 µg/L	06/28/13	06/28/13
Ethylbenzene	ND	0.50 µg/L	06/28/13	06/28/13
Xylenes, Total	ND	0.50 µg/L	06/28/13	06/28/13
Surr: 1,2-Dichloroethane-d4	110	(70-130) %REC	06/28/13	06/28/13
Surr: Toluene-d8	108	(70-130) %REC	06/28/13	06/28/13
Surr: 4-Bromofluorobenzene	98	(70-130) %REC	06/28/13	06/28/13
Client ID: 12				
Lab ID : ARC13062521-02A Benzene	37	4.0 µg/L	06/29/13	06/29/13
Date Sampled 06/24/13 11:25 Toluene	45	4.0 µg/L	06/29/13	06/29/13
Ethylbenzene	130	4.0 µg/L	06/29/13	06/29/13
Xylenes, Total	530	4.0 µg/L	06/29/13	06/29/13
Surr: 1,2-Dichloroethane-d4	104	(70-130) %REC	06/29/13	06/29/13
Surr: Toluene-d8	95	(70-130) %REC	06/29/13	06/29/13
Surr: 4-Bromofluorobenzene	99	(70-130) %REC	06/29/13	06/29/13
Client ID: MW-9				
Lab ID : ARC13062521-03A Benzene	14	0.50 µg/L	06/28/13	06/28/13
Date Sampled 06/24/13 12:25 Toluene	ND	0.50 µg/L	06/28/13	06/28/13
Ethylbenzene	ND	0.50 µg/L	06/28/13	06/28/13
Xylenes, Total	3.5	0.50 µg/L	06/28/13	06/28/13
Surr: 1,2-Dichloroethane-d4	109	(70-130) %REC	06/28/13	06/28/13
Surr: Toluene-d8	105	(70-130) %REC	06/28/13	06/28/13
Surr: 4-Bromofluorobenzene	102	(70-130) %REC	06/28/13	06/28/13
Client ID: TMW-3				
Lab ID : ARC13062521-04A Benzene	ND	0.50 µg/L	06/28/13	06/28/13
Date Sampled 06/24/13 08:35 Toluene	0.52	0.50 µg/L	06/28/13	06/28/13
Ethylbenzene	ND	0.50 µg/L	06/28/13	06/28/13
Xylenes, Total	0.87	0.50 µg/L	06/28/13	06/28/13
Surr: 1,2-Dichloroethane-d4	109	(70-130) %REC	06/28/13	06/28/13
Surr: Toluene-d8	105	(70-130) %REC	06/28/13	06/28/13
Surr: 4-Bromofluorobenzene	96	(70-130) %REC	06/28/13	06/28/13
Client ID: TMW-4				
Lab ID : ARC13062521-05A Benzene	170	5.0 µg/L	06/29/13	06/29/13
Date Sampled 06/24/13 09:25 Toluene	84	5.0 µg/L	06/29/13	06/29/13
Ethylbenzene	230	5.0 µg/L	06/29/13	06/29/13
Xylenes, Total	950	5.0 µg/L	06/29/13	06/29/13
Surr: 1,2-Dichloroethane-d4	99	(70-130) %REC	06/29/13	06/29/13
Surr: Toluene-d8	98	(70-130) %REC	06/29/13	06/29/13
Surr: 4-Bromofluorobenzene	101	(70-130) %REC	06/29/13	06/29/13

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Client ID: **TMW-6**					
Lab ID : ARC13062521-06A	Benzene	67	2.5 µg/L	06/28/13	06/28/13
Date Sampled 06/24/13 13:45	Toluene	9.9	2.5 µg/L	06/28/13	06/28/13
	Ethylbenzene	150	2.5 µg/L	06/28/13	06/28/13
	Xylenes, Total	550	2.5 µg/L	06/28/13	06/28/13
	Surr: 1,2-Dichloroethane-d4	107	(70-130) %REC	06/28/13	06/28/13
	Surr: Toluene-d8	99	(70-130) %REC	06/28/13	06/28/13
	Surr: 4-Bromofluorobenzene	100	(70-130) %REC	06/28/13	06/28/13
Client ID: **DRUM-2**					
Lab ID : ARC13062521-07A	Benzene	6.0	0.50 µg/L	06/28/13	06/28/13
Date Sampled 06/24/13 14:20	Toluene	1.4	0.50 µg/L	06/28/13	06/28/13
	Ethylbenzene	ND	0.50 µg/L	06/28/13	06/28/13
	Xylenes, Total	77	0.50 µg/L	06/28/13	06/28/13
	Surr: 1,2-Dichloroethane-d4	103	(70-130) %REC	06/28/13	06/28/13
	Surr: Toluene-d8	92	(70-130) %REC	06/28/13	06/28/13
	Surr: 4-Bromofluorobenzene	107	(70-130) %REC	06/28/13	06/28/13

ND = Not Detected

ACLASS ACCREDITED DoD ELAP

Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

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7/9/13

Report Date

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VOC Sample Preservation Report

Work Order: ARC13062521 **Job:** WA000804.2013/KMEP LT Harbor Island

Alpha's Sample ID	Client's Sample ID	Matrix	pH
13062521-01A	11	Aqueous	2
13062521-02A	12	Aqueous	2
13062521-03A	MW-9	Aqueous	2
13062521-04A	TMW-3	Aqueous	2
13062521-05A	TMW-4	Aqueous	2
13062521-06A	TMW-6	Aqueous	2
13062521-07A	DRUM-2	Aqueous	2

7/9/13

Report Date

Alpha Analytical, Inc.

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Date: *27-Jun-13*

QC Summary Report

Work Order: 13062521

Method Blank

Type: **MBLK** Test Code: **EPA Method 300.0**

File ID: **26** Batch ID: **31154** Analysis Date: **06/25/2013 12:11**

Sample ID: **MB-31154** Units : **mg/L** Run ID: **IC_1_130625A** Prep Date: **06/25/2013 11:34**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Nitrate (NO3) - N	ND	0.25								
Sulfate (SO4)	ND	0.5								

Laboratory Fortified Blank

Type: **LFB** Test Code: **EPA Method 300.0**

File ID: **27** Batch ID: **31154** Analysis Date: **06/25/2013 12:29**

Sample ID: **LFB-31154** Units : **mg/L** Run ID: **IC_1_130625A** Prep Date: **06/25/2013 11:34**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Nitrate (NO3) - N	5.47	0.25	5		109	90	110			
Sulfate (SO4)	99.7	0.5	100		99.7	90	110			

Sample Matrix Spike

Type: **LFM** Test Code: **EPA Method 300.0**

File ID: **30** Batch ID: **31154** Analysis Date: **06/25/2013 13:25**

Sample ID: **13062521-01ALFM** Units : **mg/L** Run ID: **IC_1_130625A** Prep Date: **06/25/2013 11:34**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Nitrate (NO3) - N	27.1	0.63	25	0	108	80	120			
Sulfate (SO4)	498	1.3	500	2.548	99	80	120			

Sample Matrix Spike Duplicate

Type: **LFMD** Test Code: **EPA Method 300.0**

File ID: **31** Batch ID: **31154** Analysis Date: **06/25/2013 13:43**

Sample ID: **13062521-01ALFMD** Units : **mg/L** Run ID: **IC_1_130625A** Prep Date: **06/25/2013 11:34**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Nitrate (NO3) - N	26.9	0.63	25	0	108	80	120	27.11	0.7(15)	
Sulfate (SO4)	492	1.3	500	2.548	98	80	120	498.4	1.2(15)	

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

Alpha Analytical, Inc.

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Date: *03-Jul-13*

QC Summary Report

Work Order: 13062521

Method Blank

Type: **MBLK** Test Code: **SM4500-S D**

File ID: Batch ID: **W0627SU** Analysis Date: **06/27/2013 00:00**

Sample ID: **MBLK-W0627SU** Units : **mg/L** Run ID: **WETLAB_130627A** Prep Date: **06/27/2013 00:00**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Sulfide	ND	0.1								

Laboratory Control Spike

Type: **LCS** Test Code: **SM4500-S D**

File ID: Batch ID: **W0627SU** Analysis Date: **06/27/2013 00:00**

Sample ID: **LCS-W0627SU** Units : **mg/L** Run ID: **WETLAB_130627A** Prep Date: **06/27/2013 00:00**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Sulfide	0.99	0.1	1		99	60	140			

Sample Matrix Spike

Type: **MS** Test Code: **SM4500-S D**

File ID: Batch ID: **W0627SU** Analysis Date: **06/27/2013 00:00**

Sample ID: **13062521-01AMS** Units : **mg/L** Run ID: **WETLAB_130627A** Prep Date: **06/27/2013 00:00**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Sulfide	0.957	0.1	1	0	96	51	144			

Sample Matrix Spike Duplicate

Type: **MSD** Test Code: **SM4500-S D**

File ID: Batch ID: **W0627SU** Analysis Date: **06/27/2013 00:00**

Sample ID: **13062521-01AMSD** Units : **mg/L** Run ID: **WETLAB_130627A** Prep Date: **06/27/2013 00:00**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Sulfide	0.985	0.1	1	0	99	51	144	0.957	2.9(20)	

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

Alpha Analytical, Inc.

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Date: *01-Jul-13*

QC Summary Report

Work Order: 13062521

Method Blank

Type: **MBLK** Test Code: **EPA Method SW8015B/C Ext**

File ID: **7A06071459.D** Batch ID: **31160** Analysis Date: **06/26/2013 11:56**

Sample ID: **MBLK-31160** Units : **mg/L** Run ID: **FID_7_130626A** Prep Date: **06/26/2013 10:58**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-E (DRO)	ND	0.25								
Surr: Nonane	0.153		0.15		102	53	145			

Laboratory Control Spike

Type: **LCS** Test Code: **EPA Method SW8015B/C Ext**

File ID: **7A06071460.D** Batch ID: **31160** Analysis Date: **06/26/2013 12:23**

Sample ID: **LCS-31160** Units : **mg/L** Run ID: **FID_7_130626A** Prep Date: **06/26/2013 10:58**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-E (DRO)	2.53	0.05	2.5		101	70	130			
Surr: Nonane	0.152		0.15		101	53	145			

Sample Matrix Spike

Type: **MS** Test Code: **EPA Method SW8015B/C Ext**

File ID: **7A06071478.D** Batch ID: **31160** Analysis Date: **06/26/2013 20:24**

Sample ID: **13062521-06AMS** Units : **mg/L** Run ID: **FID_7_130626A** Prep Date: **06/26/2013 10:58**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-E (DRO)	4.11	0.05	2.5	1.763	94	51	151			
Surr: Nonane	0		0.15		0	53	145			S51

Sample Matrix Spike Duplicate

Type: **MSD** Test Code: **EPA Method SW8015B/C Ext**

File ID: **7A06071479.D** Batch ID: **31160** Analysis Date: **06/26/2013 20:50**

Sample ID: **13062521-06AMSD** Units : **mg/L** Run ID: **FID_7_130626A** Prep Date: **06/26/2013 10:58**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-E (DRO)	4.37	0.05	2.5	1.763	104	51	151	4.111	6.1(40)	
Surr: Nonane	0		0.15		0	53	145			S51

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

S51 = Surrogate recovery could not be determined due to the presence of co-eluting hydrocarbons.

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Date: 01-Jul-13

QC Summary Report

Work Order: 13062521

Method Blank

Type: **MBLK** Test Code: **EPA Method SW8015B/C / SW8260B**

File ID: **C:\HPCHEM\MS10\DATA\130628\13062805.D** Batch ID: **MS10W0628B** Analysis Date: **06/28/2013 17:04**

Sample ID: **MBLK MS10W0628B** Units : **mg/L** Run ID: **MSD_10_130628A** Prep Date: **06/28/2013 17:04**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-P (GRO)	ND	0.25								
Surr: 1,2-Dichloroethane-d4	0.0163		0.01		163	70	130			S55
Surr: Toluene-d8	0.01		0.01		100	70	130			
Surr: 4-Bromofluorobenzene	0.00983		0.01		98	70	130			

Laboratory Control Spike

Type: **LCS** Test Code: **EPA Method SW8015B/C / SW8260B**

File ID: **C:\HPCHEM\MS10\DATA\130628\13062804.D** Batch ID: **MS10W0628B** Analysis Date: **06/28/2013 16:25**

Sample ID: **GLCS MS10W0628B** Units : **mg/L** Run ID: **MSD_10_130628A** Prep Date: **06/28/2013 16:25**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-P (GRO)	0.4	0.05	0.4		100	70	130			
Surr: 1,2-Dichloroethane-d4	0.0115		0.01		115	70	130			
Surr: Toluene-d8	0.0106		0.01		106	70	130			
Surr: 4-Bromofluorobenzene	0.00999		0.01		99.9	70	130			

Sample Matrix Spike

Type: **MS** Test Code: **EPA Method SW8015B/C / SW8260B**

File ID: **C:\HPCHEM\MS10\DATA\130628\13062819.D** Batch ID: **MS10W0628B** Analysis Date: **06/28/2013 22:02**

Sample ID: **13062521-03AGS** Units : **mg/L** Run ID: **MSD_10_130628A** Prep Date: **06/28/2013 22:02**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-P (GRO)	2.25	0.25	2	0.3295	96	54	143			
Surr: 1,2-Dichloroethane-d4	0.0573		0.05		115	70	130			
Surr: Toluene-d8	0.0496		0.05		99	70	130			
Surr: 4-Bromofluorobenzene	0.0478		0.05		96	70	130			

Sample Matrix Spike Duplicate

Type: **MSD** Test Code: **EPA Method SW8015B/C / SW8260B**

File ID: **C:\HPCHEM\MS10\DATA\130628\13062820.D** Batch ID: **MS10W0628B** Analysis Date: **06/28/2013 22:23**

Sample ID: **13062521-03AGSD** Units : **mg/L** Run ID: **MSD_10_130628A** Prep Date: **06/28/2013 22:23**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-P (GRO)	2.25	0.25	2	0.3295	96	54	143	2.247	0.3(23)	
Surr: 1,2-Dichloroethane-d4	0.0561		0.05		112	70	130			
Surr: Toluene-d8	0.0488		0.05		98	70	130			
Surr: 4-Bromofluorobenzene	0.0483		0.05		97	70	130			

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

S55 = Surrogate recovery was above laboratory acceptance limits.

Alpha Analytical, Inc.

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(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

Date: 01-Jul-13

QC Summary Report

Work Order: 13062521

Method Blank

Type: **MBLK** Test Code: **EPA Method SW8260B**

File ID: **C:\HPCHEM\MS10\DATA\130628\13062805.D** Batch ID: **MS10W0628A** Analysis Date: **06/28/2013 17:04**

Sample ID: **MBLK MS10W0628A** Units : **µg/L** Run ID: **MSD_10_130628A** Prep Date: **06/28/2013 17:04**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Benzene	ND	0.5								
Toluene	ND	0.5								
Ethylbenzene	ND	0.5								
Xylenes, Total	ND	0.5								
Surr: 1,2-Dichloroethane-d4	16.3		10		163	70	130			S55
Surr: Toluene-d8	10		10		100	70	130			
Surr: 4-Bromofluorobenzene	9.83		10		98	70	130			

Laboratory Control Spike

Type: **LCS** Test Code: **EPA Method SW8260B**

File ID: **C:\HPCHEM\MS10\DATA\130628\13062803.D** Batch ID: **MS10W0628A** Analysis Date: **06/28/2013 16:04**

Sample ID: **LCS MS10W0628A** Units : **µg/L** Run ID: **MSD_10_130628A** Prep Date: **06/28/2013 16:04**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Benzene	11.1	0.5	10		111	70	130			
Toluene	11.7	0.5	10		117	80	120			
Ethylbenzene	10.3	0.5	10		103	80	120			
Xylenes, Total	21.5	0.5	20		107	70	130			
Surr: 1,2-Dichloroethane-d4	11.6		10		116	70	130			
Surr: Toluene-d8	10.8		10		108	70	130			
Surr: 4-Bromofluorobenzene	10		10		100	70	130			

Sample Matrix Spike

Type: **MS** Test Code: **EPA Method SW8260B**

File ID: **C:\HPCHEM\MS10\DATA\130628\13062817.D** Batch ID: **MS10W0628A** Analysis Date: **06/28/2013 21:20**

Sample ID: **13062521-03AMS** Units : **µg/L** Run ID: **MSD_10_130628A** Prep Date: **06/28/2013 21:20**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Benzene	61.6	1.3	50	13.67	96	67	134			
Toluene	54.4	1.3	50	0	109	38	130			
Ethylbenzene	49.9	1.3	50	0	99.8	70	130			
Xylenes, Total	107	1.3	100	3.47	103	70	130			
Surr: 1,2-Dichloroethane-d4	55.1		50		110	70	130			
Surr: Toluene-d8	53.8		50		108	70	130			
Surr: 4-Bromofluorobenzene	49.4		50		99	70	130			

Sample Matrix Spike Duplicate

Type: **MSD** Test Code: **EPA Method SW8260B**

File ID: **C:\HPCHEM\MS10\DATA\130628\13062818.D** Batch ID: **MS10W0628A** Analysis Date: **06/28/2013 21:41**

Sample ID: **13062521-03AMSD** Units : **µg/L** Run ID: **MSD_10_130628A** Prep Date: **06/28/2013 21:41**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Benzene	62	1.3	50	13.67	97	67	134	61.64	0.6(21)	
Toluene	51.6	1.3	50	0	103	38	130	54.37	5.2(20)	
Ethylbenzene	50.5	1.3	50	0	101	70	130	49.89	1.3(20)	
Xylenes, Total	107	1.3	100	3.47	104	70	130	106.6	0.5(22)	
Surr: 1,2-Dichloroethane-d4	57		50		114	70	130			
Surr: Toluene-d8	51.6		50		103	70	130			
Surr: 4-Bromofluorobenzene	49.3		50		99	70	130			

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

S55 = Surrogate recovery was above laboratory acceptance limits.

Billing Information :

CHAIN-OF-CUSTODY RECORD

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WA

WorkOrder : ARCW13062521

Report Due By : 5:00 PM On : 10-Jul-13

Client:
Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101

Report Attention	Phone Number	EMail Address
Chris Angier	(503) 220-8201 x 1115	chris.angier@arcadis-us.com
Jonathan Flomerfelt	(206) 726-4712 x	jonathan.flomerfelt@arcadis-us.com

EDD Required : **No**

Sampled by : Rory Henneck

PO : WA000804.2013

Client's COC # : 13582 Job : WA000804.2013/KMEP LT Harbor Island

Cooler Temp	Samples Received	Date Printed
2 °C	25-Jun-13	**25-Jun-13**

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles Alpha	Sub	TAT	Requested Tests 300_0_W	SULFIDE_W	TPH/E_W	TPH/P_W	VOC_W				Sample Remarks
ARC13062521-01A	11	AQ	06/24/13 10:30	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				No ID or sampling date and time listed on H2SO4 poly, matched up by process of elimination.
ARC13062521-02A	12	AQ	06/24/13 11:25	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062521-03A	MW-9	AQ	06/24/13 12:25	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062521-04A	TMW-3	AQ	06/24/13 08:35	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062521-05A	TMW-4	AQ	06/24/13 09:25	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062521-06A	TMW-6	AQ	06/24/13 13:45	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062521-07A	DRUM-2	AQ	06/24/13 14:20	6	0	10			NWTPH-Dx	NWTPH-Gx	BTXE_C				

Comments: Security seals intact. Frozen ice. Total Xylenes. Per phone conversation with Jonathon on 6/24/13, add TPH/DRO to all samples. :

	Signature	Print Name	Company	Date/Time
Logged in by:	K Murray	K Murray	Alpha Analytical, Inc.	6/25/13 1050

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information:

Company: ARCADIS U.S. Inc.
Attn: Jonathan Flomerfelt
Address: 1100 Olive Way, Ste 800
City, State, Zip: Seattle, WA 98101
Phone Number: 206-726-4712 Fax: 206-325-8218

Alpha Analytical, Inc.

Main Laboratory: 255 Glendale Ave, Suite 21 Sparks, NV 89431 Phone: 775-355-1044 Fax: 775-355-0406

Satellite Service Centers:

Northern CA: 9891 Horn Road, Suite C, Rancho Cordova, CA 95827 Phone: 916-366-9089
Southern NV: 6255 McLeod Ave, Suite 24, Las Vegas, NV 89120 Phone: 702-281-4848
Southern CA: 1007 E. Dominguez St., Suite O, Carson, CA 90746 Phone: 714-386-2901

13582

Page # 1 of 1

Consultant/ Client Info:

Company: ARCADIS
Address: 1100 Olive Way Ste 800
City, State, Zip: Seattle, WA 98101

Job and Purchase Order Info:

Job #: WA000804.2013
Job Name: KMEP LT Harbor Island
P.O. #: WA000804.2013

Report Attention/Project Manager:

Name: Chris Angier / Jonathan Flomerfelt
Email Address: Jonathan.Flomerfelt@arcadis-us.com
Phone #: 206-726-4712
Cell #: 510-684-6899

QC Deliverable Info:

EDD Required? Yes / No
EDF Required? Yes / No
Global ID:
Data Validation Level: III or IV

Samples Collected from which State? (circle one) AZ CA NV (WA) ID OR DOD Site Other

Time Sampled (HHMM)	Date Sampled (MM/DD)	Matrix* (See Key Below)	Lab ID Number (For Lab Use Only)	Sample Description	TAT	Field Filtered?	# Containers** (See Key Below)	Analysis Requested: GRO by NWTPH-Gx	BTEX by 8260	Sulfate by 300.0	Nitrate by 300.0	Sulfide by 376.1	Remarks
1030	06/24	AQ	ARC13062521-01	11	standard	N	9	x	x	x	x	x	
1125			02	12				x	x	x	x	x	
1225			03	MW-9				x	x	x	x	x	
0835			04	TMW-3				x	x	x	x	x	
0925			05	TMW-4				x	x	x	x	x	
1345			06	TMW-6				x	x	x	x	x	
1420			07	DRUM-2			6V	x	x	NO Reg 6/24/13			

ADDITIONAL INSTRUCTIONS: Please run nitrate and sulfate from unpres. poly for all samples, except DRUM-2.

I (field sampler) attest to the validity and authenticity of this sample(s). I am aware that tampering with or intentionally mislabeling the sample location, date or time of collection is considered fraud and may be grounds for legal action. NAC 445.0636 (c) (2).

Sampled By: Rory G Hammill

Relinquished by: (Signature/Affiliation):	Date:	Time:	Received by: (Signature/Affiliation):	Date:	Time:
			K Murray/AAI	6/25/13	1000
Relinquished by: (Signature/Affiliation):	Date:	Time:	Received by: (Signature/Affiliation):	Date:	Time:
Relinquished by: (Signature/Affiliation):	Date:	Time:	Received by: (Signature/Affiliation):	Date:	Time:

* Key: AQ - Aqueous WA - Waste OT - Other **: L - Liter V - VOA S-Soil Jar O - Orbo T - Tedlar B - Brass P - Plastic OT - Other

NOTE: Samples are discarded 60 days after sample receipt unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.

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Diesel Range Organics (DRO) C13-C22

Gasoline Range Organics (GRO) C4-C13

K = DRO concentration may include contributions from lighter-end hydrocarbons that elute in the DRO range.

S54 = Surrogate recovery was below laboratory acceptance limits.

ND = Not Detected

ACLASS ACCREDITED DoD ELAP

Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / Carson, CA • (714) 386-2901 / info@alpha-analytical.com

Alpha Analytical, Inc. certifies that the test results meet all requirements of NELAC unless footnoted otherwise.

Statement of Data Authenticity : Alpha Analytical, Inc. attests that the data reported has not been altered an any way.

NELAP ACCREDITED TNI LABORATORY

7/8/13

Report Date

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Arcadis-US
1100 Olive Way, Suite 800
Seattle, WA 98101

Attn: Jonathan Flomerfelt
Phone: (206) 726-4712
Fax:
Date Received : 06/22/13

Job: WA000804.2013/KMEP KMLT Harbor Island

Volatile Organic Compounds (VOCs) EPA Method SW8260B

		Parameter	Concentration		Reporting Limit	Date Extracted	Date Analyzed
Client ID :	**A-27**						
Lab ID :	ARC13062420-01A	Benzene	53		0.50 µg/L	06/25/13	06/25/13
Date Sampled	06/21/13 10:15	Toluene	2.4		0.50 µg/L	06/25/13	06/25/13
		Ethylbenzene	43		0.50 µg/L	06/25/13	06/25/13
		Xylenes, Total	8.3		0.50 µg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	83		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	111		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	120		(70-130) %REC	06/25/13	06/25/13
Client ID :	**MW-7**						
Lab ID :	ARC13062420-02A	Benzene	5.9		5.0 µg/L	06/25/13	06/25/13
Date Sampled	06/21/13 14:50	Toluene	64		5.0 µg/L	06/25/13	06/25/13
		Ethylbenzene	280		5.0 µg/L	06/25/13	06/25/13
		Xylenes, Total	1,100		5.0 µg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	69	S54	(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	125		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	111		(70-130) %REC	06/25/13	06/25/13
Client ID :	**MW-19**						
Lab ID :	ARC13062420-03A	Benzene	19		2.0 µg/L	06/25/13	06/25/13
Date Sampled	06/21/13 11:15	Toluene	17		2.0 µg/L	06/25/13	06/25/13
		Ethylbenzene	310		2.0 µg/L	06/25/13	06/25/13
		Xylenes, Total	81		2.0 µg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	70		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	117		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	109		(70-130) %REC	06/25/13	06/25/13
Client ID :	**TMW-1**						
Lab ID :	ARC13062420-04A	Benzene	ND		0.50 µg/L	06/25/13	06/25/13
Date Sampled	06/21/13 12:55	Toluene	ND		0.50 µg/L	06/25/13	06/25/13
		Ethylbenzene	ND		0.50 µg/L	06/25/13	06/25/13
		Xylenes, Total	ND		0.50 µg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	82		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	122		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	118		(70-130) %REC	06/25/13	06/25/13
Client ID :	**TMW-2**						
Lab ID :	ARC13062420-05A	Benzene	7.5		0.50 µg/L	06/25/13	06/25/13
Date Sampled	06/21/13 15:30	Toluene	0.97		0.50 µg/L	06/25/13	06/25/13
		Ethylbenzene	ND		0.50 µg/L	06/25/13	06/25/13
		Xylenes, Total	0.68		0.50 µg/L	06/25/13	06/25/13
		Surr: 1,2-Dichloroethane-d4	78		(70-130) %REC	06/25/13	06/25/13
		Surr: Toluene-d8	122		(70-130) %REC	06/25/13	06/25/13
		Surr: 4-Bromofluorobenzene	106		(70-130) %REC	06/25/13	06/25/13

Alpha Analytical, Inc.

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Client ID : **TMW-5**

Lab ID : ARC13062420-06A

Date Sampled 06/21/13 13:50

Benzene	100	1.0 µg/L	06/25/13	06/25/13
Toluene	9.7	1.0 µg/L	06/25/13	06/25/13
Ethylbenzene	22	1.0 µg/L	06/25/13	06/25/13
Xylenes, Total	20	1.0 µg/L	06/25/13	06/25/13
Surr: 1,2-Dichloroethane-d4	73	(70-130) %REC	06/25/13	06/25/13
Surr: Toluene-d8	116	(70-130) %REC	06/25/13	06/25/13
Surr: 4-Bromofluorobenzene	115	(70-130) %REC	06/25/13	06/25/13

S54 = Surrogate recovery was below laboratory acceptance limits.

ND = Not Detected

ACCREDITED DoD ELAP

Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / Carson, CA • (714) 386-2901 / info@alpha-analytical.com

Alpha Analytical, Inc. certifies that the test results meet all requirements of NELAC unless footnoted otherwise.

Statement of Data Authenticity : Alpha Analytical, Inc. attests that the data reported has not been altered an any way.

NELAP ACCREDITED TNI LABORATORY

7/8/13

Report Date

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778

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VOC Sample Preservation Report

Work Order: ARC13062420 **Job:** WA000804.2013/KMEP KMLT Harbor Island

Alpha's Sample ID	Client's Sample ID	Matrix	pH
13062420-01A	A-27	Aqueous	2
13062420-02A	MW-7	Aqueous	2
13062420-03A	MW-19	Aqueous	2
13062420-04A	TMW-1	Aqueous	2
13062420-05A	TMW-2	Aqueous	2
13062420-06A	TMW-5	Aqueous	2

7/8/13

Report Date

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

Date: *27-Jun-13*

QC Summary Report

Work Order: 13062420

Method Blank

Type: **MBLK** Test Code: **EPA Method 300.0**

File ID: **26** Batch ID: **31146** Analysis Date: **06/24/2013 12:00**

Sample ID: **MB-31146** Units : **mg/L** Run ID: **IC_1_130624A** Prep Date: **06/24/2013 10:44**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Nitrate (NO3) - N	ND	0.25								
Sulfate (SO4)	ND	0.5								

Laboratory Fortified Blank

Type: **LFB** Test Code: **EPA Method 300.0**

File ID: **27** Batch ID: **31146** Analysis Date: **06/24/2013 12:19**

Sample ID: **LFB-31146** Units : **mg/L** Run ID: **IC_1_130624A** Prep Date: **06/24/2013 10:44**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Nitrate (NO3) - N	5.48	0.25	5		110	90	110			
Sulfate (SO4)	101	0.5	100		101	90	110			

Sample Matrix Spike

Type: **LFM** Test Code: **EPA Method 300.0**

File ID: **44** Batch ID: **31146** Analysis Date: **06/24/2013 21:58**

Sample ID: **13062420-01ALFM** Units : **mg/L** Run ID: **IC_1_130624A** Prep Date: **06/24/2013 10:44**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Nitrate (NO3) - N	27.1	0.63	25	0	108	80	120			
Sulfate (SO4)	493	1.3	500	2.721	98	80	120			

Sample Matrix Spike Duplicate

Type: **LFMD** Test Code: **EPA Method 300.0**

File ID: **45** Batch ID: **31146** Analysis Date: **06/24/2013 22:16**

Sample ID: **13062420-01ALFMD** Units : **mg/L** Run ID: **IC_1_130624A** Prep Date: **06/24/2013 10:44**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Nitrate (NO3) - N	27	0.63	25	0	108	80	120	27.06	0.2(15)	
Sulfate (SO4)	494	1.3	500	2.721	98	80	120	492.7	0.3(15)	

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

Alpha Analytical, Inc.

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Date: *05-Jul-13*

QC Summary Report

Work Order: 13062420

Method Blank

Type: **MBLK** Test Code: **SM4500-S D**

File ID: Batch ID: **W0627SU** Analysis Date: **06/27/2013 00:00**

Sample ID: **MBLK-W0627SU** Units : **mg/L** Run ID: **WETLAB_130627A** Prep Date: **06/27/2013 00:00**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Sulfide	ND	0.1								

Laboratory Control Spike

Type: **LCS** Test Code: **SM4500-S D**

File ID: Batch ID: **W0627SU** Analysis Date: **06/27/2013 00:00**

Sample ID: **LCS-W0627SU** Units : **mg/L** Run ID: **WETLAB_130627A** Prep Date: **06/27/2013 00:00**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Sulfide	0.99	0.1	1		99	60	140			

Sample Matrix Spike

Type: **MS** Test Code: **SM4500-S D**

File ID: Batch ID: **W0627SU** Analysis Date: **06/27/2013 00:00**

Sample ID: **13062521-01AMS** Units : **mg/L** Run ID: **WETLAB_130627A** Prep Date: **06/27/2013 00:00**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Sulfide	0.957	0.1	1	0	96	51	144			

Sample Matrix Spike Duplicate

Type: **MSD** Test Code: **SM4500-S D**

File ID: Batch ID: **W0627SU** Analysis Date: **06/27/2013 00:00**

Sample ID: **13062521-01AMSD** Units : **mg/L** Run ID: **WETLAB_130627A** Prep Date: **06/27/2013 00:00**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Sulfide	0.985	0.1	1	0	99	51	144	0.957	2.9(20)	

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

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Date: *27-Jun-13*

QC Summary Report

Work Order: 13062420

Method Blank

Type: **MBLK** Test Code: **EPA Method SW8015B/C Ext**

File ID: **7A06071390.D** Batch ID: **31148** Analysis Date: **06/24/2013 13:12**

Sample ID: **MBLK-31148** Units : **mg/L** Run ID: **FID_7_130624A** Prep Date: **06/24/2013 12:01**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-E (DRO)	ND	0.25								
Surr: Nonane	0.155		0.15		103	53	145			

Laboratory Control Spike

Type: **LCS** Test Code: **EPA Method SW8015B/C Ext**

File ID: **7A06071389.D** Batch ID: **31148** Analysis Date: **06/24/2013 12:46**

Sample ID: **LCS-31148** Units : **mg/L** Run ID: **FID_7_130624A** Prep Date: **06/24/2013 12:01**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-E (DRO)	2.29	0.05	2.5		91	70	130			
Surr: Nonane	0.189		0.15		126	53	145			

Sample Matrix Spike

Type: **MS** Test Code: **EPA Method SW8015B/C Ext**

File ID: **7A06071396.D** Batch ID: **31148** Analysis Date: **06/24/2013 15:51**

Sample ID: **13062024-25AMS** Units : **mg/L** Run ID: **FID_7_130624A** Prep Date: **06/24/2013 12:01**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-E (DRO)	3.7	0.05	2.5	1.401	92	51	151			
Surr: Nonane	0.174		0.15		116	53	145			

Sample Matrix Spike Duplicate

Type: **MSD** Test Code: **EPA Method SW8015B/C Ext**

File ID: **7A06071397.D** Batch ID: **31148** Analysis Date: **06/24/2013 16:18**

Sample ID: **13062024-25AMSD** Units : **mg/L** Run ID: **FID_7_130624A** Prep Date: **06/24/2013 12:01**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-E (DRO)	4.37	0.05	2.5	1.401	119	51	151	3.702	16.6(40)	
Surr: Nonane	0.115		0.15		77	53	145			

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

Alpha Analytical, Inc.

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Date: *08-Jul-13*

QC Summary Report

Work Order: 13062420

Method Blank

Type **MBLK** Test Code: **EPA Method SW8015B/C / SW8260B**

File ID: **13062512.D** Batch ID: **MS09W0625B** Analysis Date: **06/25/2013 15:36**

Sample ID: **MBLK MS09W0625B** Units : **mg/L** Run ID: **MSD_09_130625A** Prep Date: **06/25/2013 15:36**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-P (GRO)	ND	0.25								
Surr: 1,2-Dichloroethane-d4	0.00776		0.01		78	70	130			
Surr: Toluene-d8	0.0118		0.01		118	70	130			
Surr: 4-Bromofluorobenzene	0.0119		0.01		119	70	130			

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method SW8015B/C / SW8260B**

File ID: **13062508.D** Batch ID: **MS09W0625B** Analysis Date: **06/25/2013 13:51**

Sample ID: **GLCS MS09W0625B** Units : **mg/L** Run ID: **MSD_09_130625A** Prep Date: **06/25/2013 13:51**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-P (GRO)	0.386	0.05	0.4		96	70	130			
Surr: 1,2-Dichloroethane-d4	0.00738		0.01		74	70	130			
Surr: Toluene-d8	0.0112		0.01		112	70	130			
Surr: 4-Bromofluorobenzene	0.0121		0.01		121	70	130			

Sample Matrix Spike

Type **MS** Test Code: **EPA Method SW8015B/C / SW8260B**

File ID: **13062521.D** Batch ID: **MS09W0625B** Analysis Date: **06/25/2013 18:58**

Sample ID: **13062023-02AGS** Units : **mg/L** Run ID: **MSD_09_130625A** Prep Date: **06/25/2013 18:58**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-P (GRO)	1.48	0.25	2	0	74	54	143			
Surr: 1,2-Dichloroethane-d4	0.0366		0.05		73	70	130			
Surr: Toluene-d8	0.0567		0.05		113	70	130			
Surr: 4-Bromofluorobenzene	0.0583		0.05		117	70	130			

Sample Matrix Spike Duplicate

Type **MSD** Test Code: **EPA Method SW8015B/C / SW8260B**

File ID: **13062522.D** Batch ID: **MS09W0625B** Analysis Date: **06/25/2013 19:20**

Sample ID: **13062023-02AGSD** Units : **mg/L** Run ID: **MSD_09_130625A** Prep Date: **06/25/2013 19:20**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
TPH-P (GRO)	2.06	0.25	2	0	103	54	143	1.48	32.9(23)	R5
Surr: 1,2-Dichloroethane-d4	0.0379		0.05		76	70	130			
Surr: Toluene-d8	0.0569		0.05		114	70	130			
Surr: 4-Bromofluorobenzene	0.058		0.05		116	70	130			

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

R5 = MS/MSD RPD exceeded the laboratory control limit. Recovery met acceptance criteria.

Alpha Analytical, Inc.

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Date: *08-Jul-13*

QC Summary Report

Work Order: 13062420

Method Blank

Type **MBLK** Test Code: **EPA Method SW8260B**

File ID: **13062512.D** Batch ID: **MS09W0625A** Analysis Date: **06/25/2013 15:36**

Sample ID: **MBLK MS09W0625A** Units : **µg/L** Run ID: **MSD_09_130625A** Prep Date: **06/25/2013 15:36**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Benzene	ND	0.5								
Toluene	ND	0.5								
Ethylbenzene	ND	0.5								
Xylenes, Total	ND	0.5								
Surr: 1,2-Dichloroethane-d4	7.76		10		78	70	130			
Surr: Toluene-d8	11.8		10		118	70	130			
Surr: 4-Bromofluorobenzene	11.9		10		119	70	130			

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method SW8260B**

File ID: **13062509.D** Batch ID: **MS09W0625A** Analysis Date: **06/25/2013 14:15**

Sample ID: **LCS MS09W0625A** Units : **µg/L** Run ID: **MSD_09_130625A** Prep Date: **06/25/2013 14:15**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Benzene	10.7	0.5	10		107	70	130			
Toluene	12.4	0.5	10		124	80	120			L51
Ethylbenzene	12.6	0.5	10		126	80	120			L51
Xylenes, Total	21.8	0.5	20		109	70	130			
Surr: 1,2-Dichloroethane-d4	7.67		10		77	70	130			
Surr: Toluene-d8	11.3		10		113	70	130			
Surr: 4-Bromofluorobenzene	10.9		10		109	70	130			

Sample Matrix Spike

Type **MS** Test Code: **EPA Method SW8260B**

File ID: **13070205.D** Batch ID: **MS09W0625A** Analysis Date: **07/02/2013 14:17**

Sample ID: **13062023-02AMS** Units : **µg/L** Run ID: **MSD_09_130625A** Prep Date: **07/02/2013 14:17**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Benzene	52.8	1.3	50	0	106	67	134			
Toluene	54.1	1.3	50	0	108	38	130			
Ethylbenzene	57.5	1.3	50	0	115	70	130			
Xylenes, Total	105	1.3	100	0	105	70	130			
Surr: 1,2-Dichloroethane-d4	47		50		94	70	130			
Surr: Toluene-d8	49.6		50		99	70	130			
Surr: 4-Bromofluorobenzene	52.9		50		106	70	130			

Sample Matrix Spike Duplicate

Type **MSD** Test Code: **EPA Method SW8260B**

File ID: **13070206.D** Batch ID: **MS09W0625A** Analysis Date: **07/02/2013 14:40**

Sample ID: **13062023-02AMSD** Units : **µg/L** Run ID: **MSD_09_130625A** Prep Date: **07/02/2013 14:40**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Benzene	50.4	1.3	50	0	101	67	134	52.79	4.6(21)	
Toluene	52.3	1.3	50	0	105	38	130	54.12	3.5(20)	
Ethylbenzene	56.4	1.3	50	0	113	70	130	57.48	1.9(20)	
Xylenes, Total	101	1.3	100	0	101	70	130	104.5	3.2(22)	
Surr: 1,2-Dichloroethane-d4	47.9		50		96	70	130			
Surr: Toluene-d8	48.9		50		98	70	130			
Surr: 4-Bromofluorobenzene	52		50		104	70	130			

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

L51 = Analyte recovery was above acceptance limits for the LCS, but was acceptable in the MS/MSD.

Billing Information :

CHAIN-OF-CUSTODY RECORD

WA

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : ARCW13062420

Report Due By : 5:00 PM On : 09-Jul-13

Client:
Arcadis-US
1100 Olive Way, Suite 800

Seattle, WA 98101

Report Attention	Phone Number	EMail Address
Jonathan Flomerfelt	(206) 726-4712 x	jonathan.flomerfelt@arcadis-us.com
Chris Angier	(503) 220-8201 x 1115	chris.angier@arcadis-us.com

EDD Required : **No**

Sampled by : Rory H.

PO : WA000804.2013

Client's COC # : 13630 Job : WA000804.2013/KMEP KMLT Harbor Island

Cooler Temp	Samples Received	Date Printed
2 °C	22-Jun-13	**24-Jun-13**

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles Alpha	Sub	TAT	Requested Tests 300_0_W	SULFIDE_W	TPH/E_W	TPH/P_W	VOC_W				Sample Remarks
ARC13062420-01A	A-27	AQ	06/21/13 10:15	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062420-02A	MW-7	AQ	06/21/13 14:50	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062420-03A	MW-19	AQ	06/21/13 11:15	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062420-04A	TMW-1	AQ	06/21/13 12:55	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062420-05A	TMW-2	AQ	06/21/13 15:30	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				
ARC13062420-06A	TMW-5	AQ	06/21/13 13:50	9	0	10	SO4, NO3	Sulfide	NWTPH-Dx	NWTPH-Gx	BTXE_C				

Comments: Security seals intact. Frozen ice. Saturday delivery. Samples kept cold and secure until login on Monday. Per phone conversation with Jonathon on 6/24/13, add TPH/DRO to all samples. NO3 logged in outside 48 hour holding time for an unpreserved bottle, : therefore the H2SO4 preserved poly will be used for NO3 analysis.

	Signature	Print Name	Company	Date/Time
Logged in by:	K Murray	K Murray	Alpha Analytical, Inc.	6/24/13 0930

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information:

Company: ARCADIS U.S. Inc.
Attn: Jonathan Flumerfelt
Address: 1100 Olive Way Ste 800
City, State, Zip: Seattle, WA 98101
Phone Number: 206-726-4712 Fax: 206-325-8218

Alpha Analytical, Inc.
Main Laboratory: 255 Glendale Ave, Suite 21 Sparks, NV 89431 Phone: 775-355-1044 Fax: 775-355-0406

Satellite Service Centers:
Northern CA: 9891 Horn Road, Suite C, Rancho Cordova, CA 95827 Phone: 916-366-9089
Southern NV: 6255 McLeod Ave, Suite 24, Las Vegas, NV 89120 Phone: 702-281-4848
Southern CA: 1007 E. Dominguez St., Suite O, Carson, CA 90746 Phone: 714-386-2901

13630

Page # 1 of 1

Consultant/ Client Info:

Company: ARCADIS U.S. Inc.
Address: 1100 Olive Way Ste 800
City, State, Zip: Seattle, WA 98101

Job and Purchase Order Info:

Job #: WA000804.2013
Job Name: KMEP KMLT Harbor Island
P.O. #: WA000804.2013

Report Attention/Project Manager:

Name: Jonathan Flumerfelt & Chris Angier
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Phone #: 206-726-4712
Cell #: 510-684-6678

QC Deliverable Info:

EDD Required? Yes / No EDF Required? Yes / No
Global ID:
Data Validation Level: III or IV

Samples Collected from which State? (circle one) AZ CA NV (WA) ID OR DOD Site Other

Time Sampled (HHMM)	Date Sampled (MM/DD)	Matrix* (See Key Below)	Lab ID Number (For Lab Use Only)	Sample Description	TAT	Field Filtered?	# Containers** (See Key Below)	Analysis Requested: GRO by NWTPH-Gx	BTEX by 8260	Sulfate by EPA 300.0	Sulfide by EPA 376.1	Nitrate by EPA 300.0	Remarks
1015	06/21	AQ	ARC13062420-01	A-27	standard	No	9	x	x	x	x	x	
1450			02	MW-7				x	x	x	x	x	
1115			03	MW-19				x	x	x	x	x	
1255			04	TMW-1				x	x	x	x	x	
1530			05	TMW-2				x	x	x	x	x	
1350	06/21	AQ	06	TMW-5				6	x	x	x	x	

ADDITIONAL INSTRUCTIONS: Please analyze Nitrate from unpres. poly in addition to sulfate.

I (field sampler) attest to the validity and authenticity of this sample(s). I am aware that tampering with or intentionally mislabeling the sample location, date or time of collection is considered fraud and may be grounds for legal action. NAC 445.0636 (c) (2).

Sampled By: Rory Hennessy

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Rory Hennessy / ARCADIS	6/21/13		K Murray / ASI	6/24/13	0900
Relinquished by: (Signature/Affiliation)	Date:	Time:	Received by: (Signature/Affiliation)	Date:	Time:
Relinquished by: (Signature/Affiliation)	Date:	Time:	Received by: (Signature/Affiliation)	Date:	Time:

* Key: AQ - Aqueous WA - Waste OT - Other **: L - Liter V - VOA S-Soil Jar O - Orbo T - Tedlar B - Brass P - Plastic OT - Other

NOTE: Samples are discarded 60 days after sample receipt unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.