

Ms. Maura O'Brien
Washington State Department of Ecology
Northwest Regional Office
3190 – 160th Avenue SE
Bellevue, WA 98008-5452

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www.arcadis-us.com

Subject:

Revised Site Groundwater Monitoring Plan Kinder Morgan Harbor Island Terminal KMLT File No. 29.79.02 (81171) 2720 13th Avenue Southwest Seattle, Washington 98134

Dear Ms. O'Brien:

On behalf of Kinder Morgan Liquids Terminal, LLC (KMLT), ARCADIS US, Inc (ARCADIS) is pleased to submit this Revised Site Groundwater Monitoring Plan (Plan) for the KMLT Harbor Island Terminal located at 2720 13th Avenue Southwest in Seattle, Washington (site). The purpose of this Plan is to request and provide justification to support the reduction of groundwater sampling frequency at the site for the compliance and performance monitoring programs.

Reduced frequency of groundwater monitoring at the site is warranted due to:

- Quarterly groundwater quality data has been collected at the site since 2002
- Current groundwater conditions onsite are stable and not migrating offsite
- There have been no product releases reported at the site since 2010.
- SPH has only been observed in one monitoring well (A-6) in the last 9 quarterly monitoring events.

Cleanup activities at the site are being conducted under a Consent Decree (CD) number 00-2-07760-2SEA between Washington State Department of Ecology (Ecology) and GATX Terminals Corporation (GATX) executed on April 4, 2000. KMLT assumed the obligations of the CD with the purchase of GATX Harbor Island Terminal in 2001. Compliance groundwater monitoring and sampling is currently

ENVIRONMENT

Date:

May 20, 2014

Contact:
Matt Annis

Phone:

206.726.4716

Email:

matt.annis@ arcadis-us.com

Our ref:

WA000804.2014

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performed in accordance with the *Proposed Reduced Monitoring-Site-Wide Groundwater Compliance Monitoring Plan* (Reduced Monitoring Plan [Delta Consultants Inc. (Delta) 2007]). Additionally, low-flow groundwater sampling techniques are used in accordance with the Technical Revision Request (Delta 2008).

In addition, performance monitoring groundwater samples are collected in accordance with the letter Response to Comments - *B and D Yards Groundwater Remediation Engineering Design Report* dated December 12, 2012 (ARCADIS 2012) to evaluate the overall effectiveness of the sulfate land application.

Contaminants of Concern and Cleanup Levels

The approved Reduced Monitoring Plan (Delta 2007) outlines site-specific contaminants of concern (COCs) and applicable cleanup levels for groundwater. These site-specific COCs and their cleanup levels are as follows:

- Total Petroleum Hydrocarbons as Gasoline Range Organics at 1.0 milligrams per liter (mg/L)
- Total Petroleum Hydrocarbons as Diesel Range Organics at 10 mg/L
- Total Petroleum Hydrocarbons as Heavy Oil at 10 mg/L
- Benzene at 0.071 mg/L
- Toluene at 200 mg/L
- Ethylbenzene at 29 mg/L
- Total Lead at 0.0058 mg/L
- No Product Sheen

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Current Groundwater Monitoring Plan

Compliance Monitoring

In accordance with the Reduced Monitoring Plan (Delta 2007) and Technical Revision Request (Delta 2008), the current groundwater compliance plan schedule is presented in Table 1 and Figure 2.

Performance Monitoring

In accordance with the Response to Comments - *B* and *D* Yards Groundwater Remediation Engineering Design Report dated December 12, 2012 (ARCADIS 2012), the current groundwater performance plan schedule is presented in Table 1.

Proposed Groundwater Monitoring Plan

The section below summarizes the proposed changes to the current groundwater monitoring plan. Groundwater gauging and sample collection protocols and procedures will continue to be implemented in accordance with the Ecology-approved plans mentioned above.

Compliance Monitoring

This proposed groundwater monitoring plan was prepared with consideration for the requirements of the Model Toxics Control Act (MTCA) regulations and requirements from Exhibit F of the CD. The achievement of cleanup levels in groundwater is measured at points of performance and compliance located within the hydrocarbon plume area and at the edges of the site in accordance with section 1.2 in Exhibit F of the CD. Points of compliance will not be altered for this plan and consist of the 44 wells presented in Table 2. Hydrograph and COC trend graphs for monitoring wells MW-7, MW-9, MW-14, and MW-19 are presented in Attachment A. The graphs are representative of the compliance points and indicate stable or decreasing groundwater conditions.

Future compliance groundwater monitoring events are proposed to be conducted on a semi-annual basis until the site has achieved compliance with the applicable cleanup levels. The proposed compliance groundwater monitoring plan is summarized in Table 2 and presented in Figure 3.

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Proposed Performance Groundwater Monitoring Plan

In accordance with the Response to Comments letter dated December 20, 2012 and the KMLT *Remedial Action Report – B and D Yards* (RAP) [ARCADIS 2013]), the current groundwater performance monitoring plan will be conducted quarterly through third quarter 2014.

After the completion of the third quarter 2014 monitoring event KMLT proposes to alter the performance monitoring schedule to semi-annual monitoring which will be conducted concurrently with compliance monitoring activities. The proposed performance groundwater monitoring plan is summarized in Table 2 and presented in Figure 4.

Schedule

The proposed Plan would be initiated during the third quarter 2014 sampling event upon Ecology approval; annual sampling will be conducted in the third quarter of each year.

If you have any questions or comments, please contact Matt Annis at 206.726.4716 or by email at matt.annis@arcadis-us.com.

Sincerely,

ARCADIS

Jonathan Flomerfelt Staff Scientist Rebecca Andresen, L.G. Associate Vice President

Copies:

Mr. Dave Rowland, KMLT, Seattle (CD Copy)

Mr. Robert Truedinger, c/o Stephanie Randall, KMLT, Orange, CA (CD copy)

Stephanie Randall, KMLT, Orange, CA (File Copy)

Rebecca K. Andresen

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Tables

Table 1 Current Groundwater Monitoring

Table 2 Proposed Groundwater Monitoring Plan

Figures

Figure 1 Site Location

Figure 2 Current Groundwater Monitoring Plan

Figure 3 Proposed Groundwater Monitoring Plan

Figure 4 Proposed Performance Monitoring Plan

Attachments

Attachment A Hydrographs and Trend Graphs



Tables

Table 2

Proposed Monitoring Schedule 2014 Revised Groundwater Monitoring Plan

Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
A-4	1Q							Х
A-4	3Q							Х
A-5	1Q	Х			Х			Х
A-3	3Q	Х			Х			Х
A-6	1Q							Х
A-0	3Q							Х
A-8	1Q							Х
A-0	3Q	Х	Х	X	X			Х
A-10	1Q							Х
A-10	3Q	Х	Х	X	X			Х
A-11	1Q							Х
A-11	3Q							Х
A-12	1Q							Х
N-12	3Q							Х
A-14R	1Q							Х
A-1410	3Q	Х	Х	X	X	Х		Х
A-16	1Q							Х
A-10	3Q							Х
A-18	1Q							Х
A-10	3Q							Х
A-19	1Q							Х
A-19	3Q							Х
A-20	1Q							Х
A-20	3Q							Х

Table 2

Proposed Monitoring Schedule 2014 Revised Groundwater Monitoring Plan

Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
A-21	1Q	Х			Х		Х	Х
A-21	3Q	Х			Х	Х	Х	Х
A-22R	1Q							Х
A-22K	3Q							Х
A-23R	1Q							Х
A-23K	3Q	Х			Х		Х	Х
A-25	1Q							Х
A-25	3Q							Х
A-26R	1Q							Х
A-20K	3Q							Х
A-27	1Q	Х			Х		Х	Х
R-21	3Q	Х			Х		Х	Х
A-28R	1Q	Х			Х		Х	Х
A-20K	3Q	Х			Х	A 8260B Dissolved Lead by EPA 200.8 X X X X X X X X X X X X X	Х	
11 ²	1Q	Х			Х		Х	Х
11	3Q	Х			Х		Х	Х
12 ²	1Q	Х			Х		Х	Х
12	3Q	Х	Х	X	Х	Х	Х	Х
MW-1	1Q							Х
10100-1	3Q	Х	Х	Х	Х	x x x x x x x x x x x x x x x x x x x		Х
MW-2	1Q							Х
IVI V V - Z	3Q	Х	Х	Х	Х	Х	Х	Х
MW-3	1Q							Х
10100-3	3Q	Х	Х	Х	Х	Х		Х

Table 2

Proposed Monitoring Schedule 2014 Revised Groundwater Monitoring Plan

Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
MW-4	1Q							Х
10100-4	3Q	Х	Х	Х	Х			Х
MW-5	1Q							Х
10100-5	3Q	Х	Х	X	Х	Х		Х
MW-6	1Q							Х
10100-0	3Q	Х			Х	Х	Х	Х
MW-7 ²	1Q	Х			Х		Х	Х
IVIVV-7	3Q	Х			Х	Х	Х	Х
MW-8	1Q							Х
IVIVV-O	3Q	Х	Х	Х	Х	Х		Х
MW-9 ²	1Q	Х			Х		Х	Х
WW-9	3Q	Х			Х	Х	Х	Х
MW-12R	1Q							Х
IVIVV-12K	3Q	Х	Х	X	X X X X X X X X X X X X X X X X X X X	Х		
MW-14	1Q							Х
10100 - 14	3Q	Column C	Х					
MW-16	1Q							Х
10100 - 10	3Q	Х	Х	Х	Х			Х
MW-18	1Q	Х			X			Х
10100 - 10	3Q	Х			Х			Х
MW-19 ²	1Q	Х			X		Х	Х
IVIVV-19	3Q	Х			Х		Х	Х
MW-20	1Q							Х
IVIVV-ZU	3Q	Х	Х	Х	Х			Х

Table 2

Proposed Monitoring Schedule

2014 Revised Groundwater Monitoring Plan Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal

Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
MW-21	1Q	Х	Х	Х	Х		Х	Х
10100-21	3Q	Х	DX DX EPA 8260B by EPA 200.8 Parameters ¹ downh	Х				
MW-22	1Q							Х
10100-22	3Q	Х	Х	X	Х			Х
MW-23	1Q	Х			Х		Х	Х
10100-23	3Q	Х			Х	Х	Х	Х
MW-24	1Q	Х			Х		Х	Х
10100-24	3Q	Х			Х	х х х х	Х	
MW-25	1Q							Х
10100-25	3Q	Х	Х	Х	Х	Х		Х
MW-07R	1Q						X X	Х
IVIVV-U/R	3Q	Х	Х	Х	Х	Х	Х	Х
SH-02R	1Q							Х
3H-UZK	3Q	Х	Х	Х	Х	Х	Х	Х
SH-05R	1Q							Х
SIT-USK	3Q	Х	Х	Х	Х	Х	X X X X X	Х
TMW-B1	1Q							Х
I IVIVV-D I	3Q	Х			Х			

Table 2

Proposed Monitoring Schedule

2014 Revised Groundwater Monitoring Plan Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal

Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
TMW-1 ²	1Q	Х			Х		Х	Х
TIVIVV-1	3Q	Х			Х		Х	Х
TMW-2 ²	1Q	Х			Х		Х	Х
TMVV-2	3Q	Х			Х		Х	Х
TMW-3 ²	1Q	Х			X		Х	Х
110100-3	3Q	Х			Х		Х	Х
TMW-4 ²	1Q	Х			Х		Х	Х
110100-4	3Q	Х			Х		Х	Х
TMW-5 ²	1Q	Х			Х		Х	Х
TIVIVV-5	3Q	Х			Х		Х	Х
TMW-6 ²	1Q	Х			Х		Х	Х
I IVIVV-6	3Q	Х			Х		Х	Х

Notes

GRO = Total Petroleum Hydrocarbons - Gasoline Range Organics by Northwest Method NWTPH-Gx

BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes by Environmental Protection Agency (EPA) Method 8260B.

1Q, 2Q, 3Q, 4Q = Denotes the quarter for each sampling event

-- Not Applicable

¹ Monitored Natural Attenuation (MNA) Geochemical Parameters include dissolved oxygen, methane, ferrous iron, nitrate, sulfate, and sulfide 2 Performance monitoring locations

Table 1

Current Monitoring Schedule

2014 Revised Groundwater Monitoring Plan

Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
Λ-4	1Q, 3Q, 4Q							Х
A-4	2Q							Х
Δ-5	1Q, 3Q, 4Q	Х			Х			Х
A-3	2Q	Х			X			Х
۸-6	1Q, 3Q, 4Q							Х
A-0	2Q							Х
Λ_Q	1Q, 3Q, 4Q							Х
A-0	2Q	Х	Х	X	X			Х
۸-10	1Q, 3Q, 4Q							Х
A-10	2Q	Х	Х	X	X			Х
۸-11	1Q, 3Q, 4Q							Х
A-11	2Q							Х
۸-12	1Q, 3Q, 4Q							Х
A-12	2Q							Х
Λ 14P	1Q, 3Q, 4Q							Х
A-8 A-10 A-11 A-12 A-14R A-16 A-18	2Q	Х	Х	X	X	Х		Х
۸-16	1Q, 3Q, 4Q							Х
A-10	Schedule GX	Х						
Δ-18	1Q, 3Q, 4Q							Х
A-10	2Q							Х
A-19	1Q, 3Q, 4Q							Х
A-19	2Q							Х
A-20	1Q, 3Q, 4Q							Х
A-20	2Q							Х

Table 1 Current Monitoring Schedule 2014 Revised Groundwater Monitoring Plan Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal

Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
A-21	1Q, 3Q, 4Q	Х			X		Х	Х
A-21	2Q	Х			Х	Х	Х	Х
A-22R	1Q, 3Q, 4Q							Х
A-ZZIX	2Q							Х
A-23R	1Q, 3Q, 4Q	Х			X			Х
A-23K	2Q	Х			Х		Х	Х
A-25	1Q, 3Q, 4Q							Х
A-23	2Q							Х
A-26R	1Q, 3Q, 4Q							Х
A-2010	2Q							Х
A-27	1Q, 3Q, 4Q	Х			Х		Х	Х
A-21	2Q	Х			X		Х	Х
A-28R	1Q, 3Q, 4Q	Х			Х		Х	Х
A-2010	2Q	Х			Х	Х	Х	Х
12	1Q, 3Q, 4Q							Х
12	2Q							Х
MW-1	1Q, 3Q, 4Q			X X X X X X X X X X X X X X X X X X X	Х			
10100-1	2Q	Х	Х	X	X	Х		Х
MW-2	1Q, 3Q, 4Q							Х
1V1 V -Z	2Q	Х	Х	Х	X	Х	X	Х
MW-3	1Q, 3Q, 4Q							Х
10100-3	2Q	Х	Х	X	X	Х		Х
MW-4	1Q, 3Q, 4Q							Х
1V1V V - 	2Q	Х	Х	X	Х			Х

Table 1 Current Monitoring Schedule 2014 Revised Groundwater Monitoring Plan Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
MW-5	1Q, 3Q, 4Q							Х
G-AAIAI	2Q	Х	Х	Х	Х	Х		Х
MW-6	1Q, 3Q, 4Q	Х			Х			Х
IVIVV-6	2Q	Х			Х	Х	Х	Х
MW-7	1Q, 3Q, 4Q	Х			Х		Х	Х
10100-7	2Q	Х			Х	Х	Х	Х
MW-8	1Q, 3Q, 4Q							Х
IVIVV-8	2Q	Х	Х	X	Х	Х		Х
MW-9	1Q, 3Q, 4Q	Х			Х		Х	Х
10100-9	2Q	Х			Х	Х	Х	Х
MW-12R	1Q, 3Q, 4Q						X X X	Х
10100-1210	2Q	Х	Х	X	X	Х	Х	Х
MW-14	1Q, 3Q, 4Q	Х			Х		Х	Х
10100-14	2Q	Х			X		Х	Х
MW-16	1Q, 3Q, 4Q						X X X X	Х
10100-10	2Q	Х	Х	X	X			Х
MW-18	1Q, 3Q, 4Q	Х			X		X X X X X X	Х
10100-10	2Q	Х			X			Х
MW-19	1Q, 3Q, 4Q	Х			Х		X	Х
10100-19	2Q	Х			X		Х	Х
MW-20	1Q, 3Q, 4Q							Х
10100-20	2Q	Х	Х	X	Х			Х
MW-21	1Q, 3Q, 4Q	Х	Х	X	Х		Х	Х
1V1 V V - Z 1	2Q	Х	Х	Х	Х		Х	Х

Table 1

Current Monitoring Schedule

2014 Revised Groundwater Monitoring Plan

Kinder Morgan Liquids Terminals, LLC, Harbor Island Terminal Seattle, Washington

Well	Sampling Schedule	GRO by NWTPH- GX	DRO by NWTPH- DX	HO by NWTPH- DX	BTEX by EPA 8260B	Total and Dissolved Lead by EPA 200.8	MNA Geochemical Parameters ¹	Depth to Water/SPH by downhole meter
MW-22	1Q, 3Q, 4Q							Х
10100-22	2Q	Х	Х	X	Х			Х
M/M/ 22	1Q, 3Q, 4Q	Х			Х		Х	Х
MW-23	2Q	Х			Х	Х	Х	Х
MW-24	1Q, 3Q, 4Q	Х			Х		Х	Х
10100-24	2Q	Х			Х	Х	Х	Х
MW-25	1Q, 3Q, 4Q							Х
10100-25	2Q	Х	Х	Х	Х	Х		Х
MW-07R	1Q, 3Q, 4Q							Х
IVIVV-U/R	2Q	Х	Х	Х	Х	Х	X X	Х
SH-02R	1Q, 3Q, 4Q							Х
3H-02K	2Q	Х	Х	Х	Х	Х	Geochemical D.8 Control Cont	Х
SH-05R	1Q, 3Q, 4Q							Х
SH-USK	2Q							Х
TMW-B1	1Q, 3Q, 4Q							Х
I IVIVV-D I	2Q	Х			Х			

Notes

¹ Monitored Natural Attenuation (MNA) Geochemical Parameters include dissolved oxygen, methane, ferrous iron, nitrate, sulfate, and sulfide GRO = Total Petroleum Hydrocarbons - Gasoline Range Organics by Northwest Method NWTPH-Gx

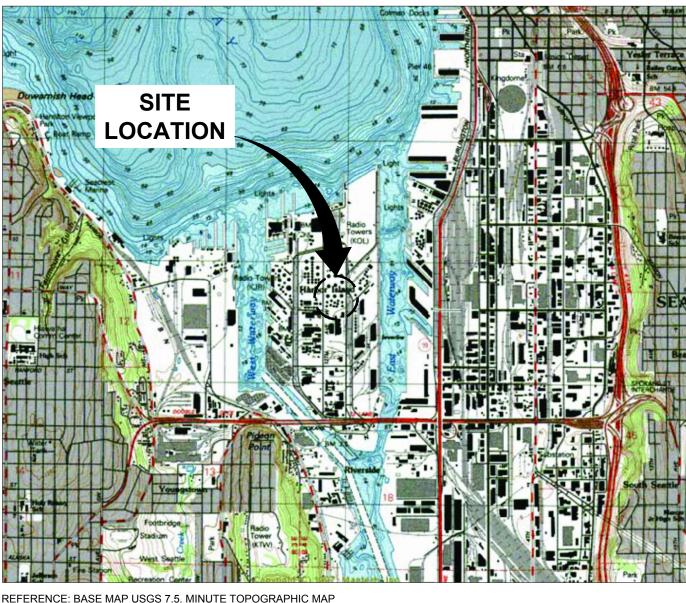
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes by Environmental Protection Agency (EPA) Method 8260B.

¹Q, 2Q, 3Q, 4Q = Denotes the quarter for each sampling event

⁻⁻ Not Applicable

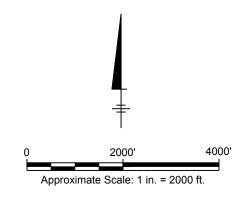


Figures



REFERENCE: BASE MAP USGS 7.5. MINUTE TOPOGRAPHIC MAP SEATTLE SOUTH, WASHINGTON 1083





KINDER MORGAN LIQUID TERMINALS, LLC HARBOR ISLAND TERMINAL 2720 13TH AVENUE SOUTHWEST, SEATTLE, WASHINGTON 2014 REVISED GROUNDWATER MONITORING PLAN

SITE LOCATION MAP



FIGURE

1

IMAGES: PROJECTNAME: WA000804 GoogleAerial.jpg WA000804 USGS.jpg

BY: REYES, ALEC

PLOTTED:

PLOTSTYLETABLE: ARCADIS.CTB

ACADVER: 18.1S (LMS TECH)

4/16/2014 4:42 PM

KINDER MORGAN LIQUID TERMINALS, LLC HARBOR ISLAND TERMINAL 2720 13TH AVENUE SOUTHWEST, SEATTLE, WASHINGTON **2014 REVISED GROUNDWATER MONITORING PLAN**

CURRENT QUARTERLY AND ANNUAL GROUNDWATER MONITORING LOCATIONS



FIGURE 2

KINDER MORGAN LIQUID TERMINALS, LLC HARBOR ISLAND TERMINAL 2720 13TH AVENUE SOUTHWEST, SEATTLE, WASHINGTON 2014 REVISED GROUNDWATER MONITORING PLAN

PROPOSED SEMI-ANNUAL AND ANNUAL GROUNDWATER MONITORING LOCATIONS



FIGURE 3

KINDER MORGAN LIQUID TERMINALS, LLC HARBOR ISLAND TERMINAL 2720 13TH AVENUE SOUTHWEST, SEATTLE, WASHINGTON **2014 REVISED GROUNDWATER MONITORING PLAN**

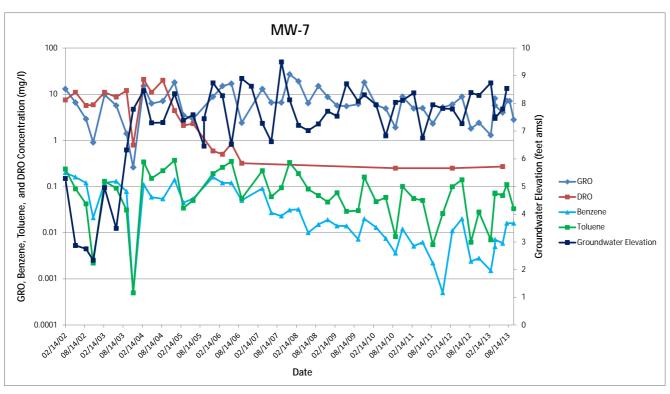
PROPOSED PERFORMANCE MONITORING LOCATIONS

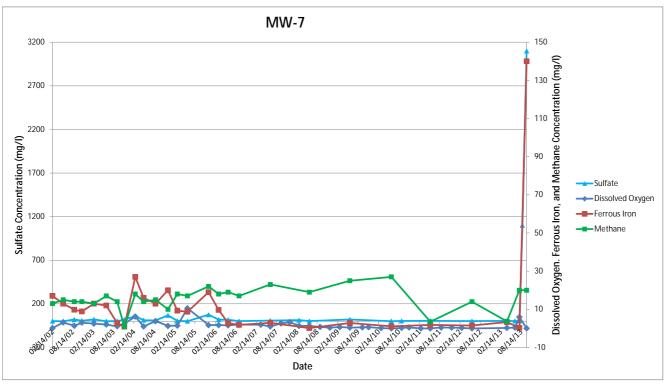


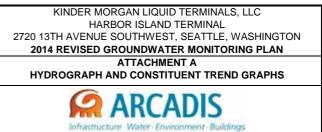
FIGURE 4

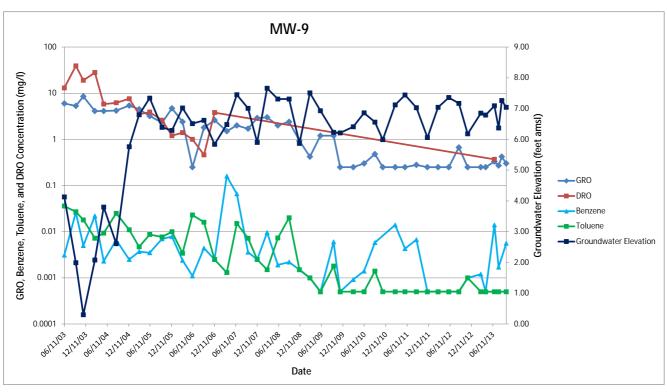


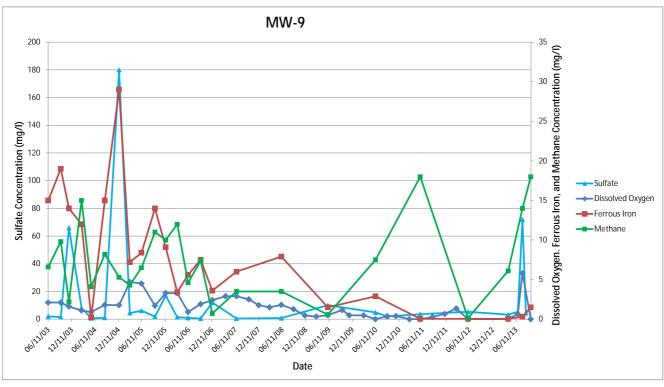
Attachment A

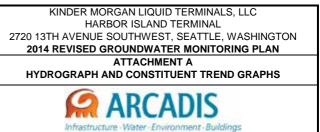


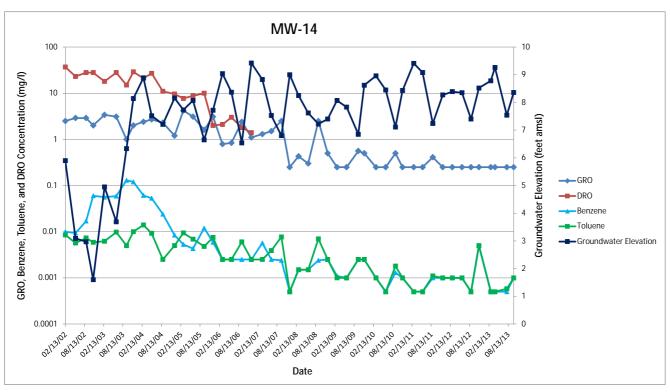


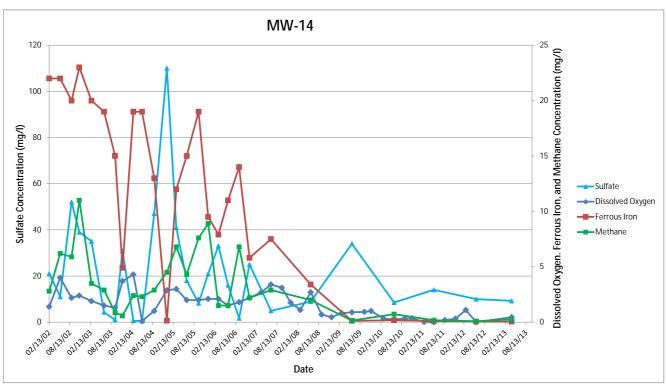






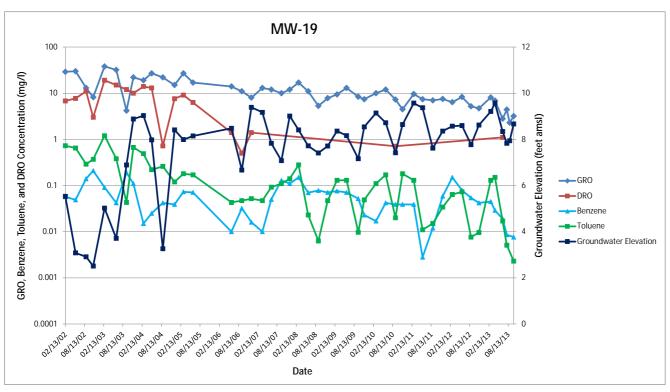


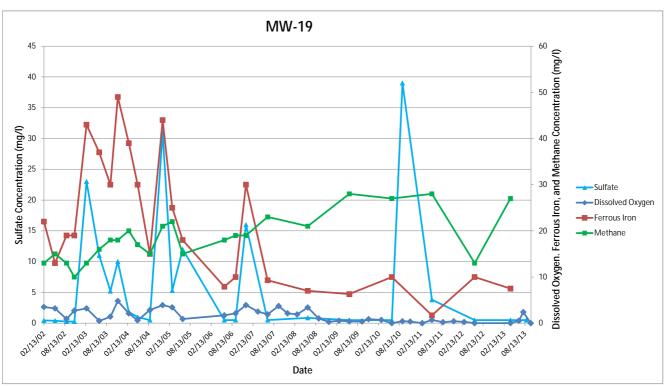




KINDER MORGAN LIQUID TERMINALS, LLC
HARBOR ISLAND TERMINAL
2720 13TH AVENUE SOUTHWEST, SEATTLE, WASHINGTON
2014 REVISED GROUNDWATER MONITORING PLAN
ATTACHMENT A
HYDROGRAPH AND CONSTITUENT TREND GRAPHS







KINDER MORGAN LIQUID TERMINALS, LLC
HARBOR ISLAND TERMINAL
2720 13TH AVENUE SOUTHWEST, SEATTLE, WASHINGTON
2014 REVISED GROUNDWATER MONITORING PLAN
ATTACHMENT A
HYDROGRAPH AND CONSTITUENT TREND GRAPHS

ARCADIS
Infrastructure Water - Environment - Buildings