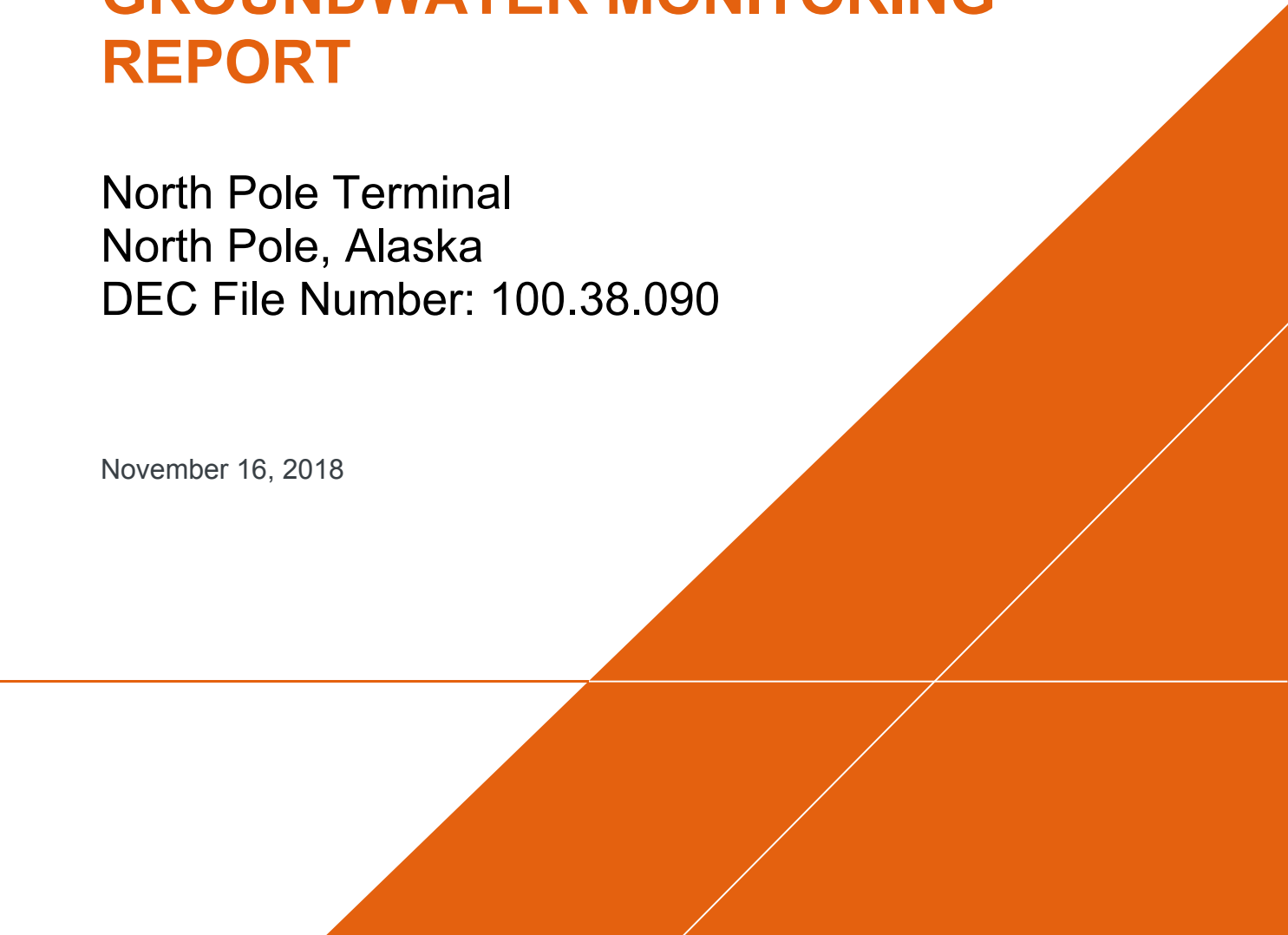


Flint Hills Resources Alaska, LLC

ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

North Pole Terminal
North Pole, Alaska
DEC File Number: 100.38.090

November 16, 2018



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ACRONYMS AND ABBREVIATIONS

2017 LTM Plan	Long-Term Monitoring Plan – 2017 Update
3Q2018 Update	Long-Term Monitoring Plan – Third Quarter 2018 Update
AAC	Alaska Administrative Code
AC	assimilative capacity
ADEC	Alaska Department of Environmental Conservation
Arcadis	Arcadis U.S., Inc.
BTEX	benzene, toluene, ethylbenzene, and xylenes
bwt	below the water table
C _d	average groundwater concentration
CF	conversion factor
COC	constituent of concern
DO	dissolved oxygen
DRO	diesel-range organics
FHRA	Flint Hills Resources Alaska, LLC
g/day	grams per day
GAC West	expanded groundwater recovery and treatment system
GRO	gasoline-range organics
GRTS	groundwater remediation and treatment system
h	thickness of submerged source zone
ITRC	Interstate Technology & Regulatory Council
kg	kilogram
lb/day	pound per day
LNAPL	light nonaqueous phase liquid
m ³ H ₂ O/m ² /sec	cubic meters of water per square meter per second
mg/L	milligrams per liter
NSZD	natural source zone depletion
Onsite RSAP	Revised Onsite Sampling and Analysis Plan
Onsite SCR – 2013	Onsite Site Characterization Report – 2013 Addendum
PFC	perfluorinated compound

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POC	point of compliance
q_d	groundwater-specific discharge
R_{BioSat}	rate of LNAPL biodegradation in the submerged source zone
R_{Dis}	rate of source zone mass loss by dissolution to groundwater
report	Annual 2018 Onsite Groundwater Monitoring Report
reporting period	first, second, and third quarters of 2018
ROCP	Revised Onsite Cleanup Plan
site	Flint Hills Resources Alaska, LLC North Pole Terminal, located on H and H Lane in North Pole, Alaska
SOP	standard operating procedure
SWI	Shannon & Wilson, Inc.
TPH	total petroleum hydrocarbons
VPT	vertical profile transect
w	width of submerged source zone
$\mu\text{g/L}$	micrograms per liter

1 INTRODUCTION

On behalf of Flint Hills Resources Alaska, LLC (FHRA), Arcadis U.S., Inc. (Arcadis) prepared this Annual 2018 Onsite Groundwater Monitoring Report (report) for the FHRA North Pole Terminal, located on H and H Lane in North Pole, Alaska (site). This report summarizes onsite field activities completed during the first, second, and third quarters of 2018 (reporting period) as described in Section 3 and in Table 1-1.

The data, analyses, and conclusions presented in this report are the product of a collaborative effort among FHRA's consulting team members. The team includes qualified professionals in a variety of technical disciplines from three environmental consulting firms: Arcadis, Shannon & Wilson, Inc. (SWI), and Barr Engineering Co. FHRA engaged these consulting firms to perform various tasks for the project. Pursuant to 18 Alaska Administrative Code (AAC) 75.335(c)(1), this report was prepared and submitted by Qualified Environmental Professionals. Samples were collected and analyzed in accordance with 18 AAC 75.355(a). The sampling and analyses for this reporting period were completed in accordance with the following documents, which were prepared by Qualified Environmental Professionals and approved by the Alaska Department of Environmental Conservation (ADEC):

- Revised Onsite Cleanup Plan (ROCP; Arcadis 2017b).
- Long-Term Monitoring Plan – 2017 Update (2017 LTM Plan; provided as Appendix A to the ROCP [Arcadis 2017b]). The 2017 LTM Plan was followed during the first and second quarters of 2018.
- Long-Term Monitoring Plan – Third Quarter 2018 Update (3Q2018 Update; ADEC 2018). The 3Q2018 Update was implemented during the third quarter of 2018.
- Revised Onsite Sampling and Analysis Plan (Onsite RSAP; provided as Appendix A to the Second Semiannual 2016 Onsite Groundwater Monitoring Report [Arcadis 2017a])

The site, offsite area, and the site's physical setting are described in the conceptual site model, which was presented as Appendix A of the Onsite Site Characterization Report – 2013 Addendum (Onsite SCR – 2013; Arcadis 2013). The site is shown on Figure 1-1. Current site features are shown on Figure 1-2 and an onsite site plan is presented on Figure 1-3.

2 CURRENT GROUNDWATER MONITORING PROGRAM AND METHODS

Monitoring conducted during the reporting period was based on the following networks included in the 2017 LTM Plan and the 3Q2018 Update (Arcadis 2017b; ADEC 2018):

- Groundwater elevation
- Light nonaqueous phase liquid (LNAPL) migration monitoring.
- Groundwater sampling and analysis of sulfolane
- Groundwater sampling and analysis of other constituents of concern (COCs) (benzene, toluene, ethylbenzene, and xylenes [BTEX]; gasoline-range organics [GRO]; and diesel-range organics [DRO]).

The ROCP (Arcadis 2017b) was submitted and approved by ADEC in February 2017. In accordance with the ROCP, in third quarter 2017 the groundwater remediation and treatment system (GRTS) was shut down and the updated sampling program defined under the ROCP was implemented. An enhanced sampling program was used in third quarter 2018 to further document the short-term effects of GRTS shutdown (ADEC 2018).

Table 1-1 summarizes the field activities completed during the reporting period. Monitoring methods and well construction details are summarized in the Onsite RSAP (Arcadis 2017a). The following deviations from the 2017 LTM Plan and the 3Q2018 Update (Arcadis 2017b; ADEC 2018) were noted during the reporting period:

- LNAPL was encountered in MW-176A-15, MW-334-15, O-2, R-21, and R-40 during planned monitoring events in the reporting period; therefore, groundwater samples were not collected from these wells for BTEX, GRO, and DRO analyses.

3 GROUNDWATER MONITORING RESULTS

Groundwater impacts have been characterized and continue to be monitored through the analysis of water-level gauging data and groundwater samples collected from onsite monitoring wells. This section presents the results of water-level gauging and groundwater analyses of onsite well samples. Data are summarized in Tables 3-1 through 3-9.

Historical groundwater elevation and LNAPL thickness measurements, and BTEX, GRO, DRO, sulfolane, perfluorinated compound (PFC), and geochemical analytical results are included as Appendix A. Analytical laboratory reports are included as Appendix B. A data quality evaluation, including ADEC quality assurance/quality control checklists, is included as Appendix C. Field data sheets are included as Appendix D.

3.1 Groundwater Elevation

Depth to water measurements were collected from monitoring wells during the first and third quarters of 2018 on March 12, 13, and 15; and on September 10. Potentiometric maps are included for each monitoring zone: water table, 10 to 55, 55 to 90, and 90 to 160 feet below the water table (bwt) for each monitoring event (Figures 3-1 through 3-8). During the reporting period, the general direction of the horizontal hydraulic gradient was interpreted to be to the north-northwest, which is consistent with historical groundwater data. Groundwater elevations and horizontal hydraulic gradients were within the range of historical groundwater data.

Groundwater well field parameters for the reporting period are summarized in Tables 3-1a, 3-1b, and 3-1c. Groundwater elevations for the reporting period are summarized in Tables 3-2a and 3-2b.

In addition to manual water-level measurements, automated measurements were collected with transducers from selected onsite wells and well nests. Data from the well nests were used to calculate horizontal hydraulic gradients and differences in groundwater elevations between wells screened at various depths within the suprapermafrost aquifer. Groundwater elevation hydrographs were prepared in accordance with the standard operating procedure (SOP; SWI 2013) using the most recent survey data. Error ranges, calculated in accordance with the method outlined in the SOP (SWI 2013), are shown on the well nest hydrographs presented in Appendix E. A detailed evaluation of transducer data and hydraulic gradients through 2013 is provided in Appendix 6-B of the Onsite SCR – 2013 (Arcadis 2013) and updated in Appendix F.

In 2017, the GRTS recovery wells were shut down. Post shut-down monitoring indicates that in some areas near the former GRTS recovery wells, local flow directions will be somewhat different in the future; additionally, upward gradients induced by the GRTS recovery wells have been reduced, or possibly reversed, in the case of wells S-43 and MW-175-90. Overall, flow patterns in the aquifer beyond the vicinity of the GRTS recovery wells are expected to vary within similar ranges as those recorded in the past.

Measurements were recorded from gauging points located at the North Gravel Pit on September 10, 2018. Data are summarized in Tables 3-2a and 3-2b and on Figures 3-1 through 3-8. Historical gauging data are summarized in Appendix A.

3.2 Light Nonaqueous Phase Liquid Monitoring Results

LNAPL migration observations were collected from a network of monitoring, observation, and recovery wells screened across the water table according to the 2017 LTM Plan (Arcadis 2017b; first and second quarters of 2018) and the 3Q2018 Update (ADEC 2018; third quarter 2018). Additionally, LNAPL was gauged throughout the reporting period during monitoring events at wells outside of the LNAPL migration networks. A comprehensive LNAPL gauging table is presented in Appendix G.

A qualitative evaluation of the chemical composition of groundwater to determine LNAPL depletion rates is included in Section 4.

3.2.1 Light Nonaqueous Phase Liquid Extent

Per the 2017 LTM Plan and the 3Q2018 Update (Arcadis 2017b; ADEC 2018), LNAPL migration observations were made from wells along the perimeter of the LNAPL plume. During the first quarter 2018, LNAPL was observed in LNAPL migration wells MW-176A-15, MW-186A-15, MW-334-15, MW-366-15, O-2, O-13, O-27, O-31, O-34, R-21, and S-51; and sheen was observed in LNAPL migration wells MW-135-20, O-19, O-34, R-35R, and R-40. During the third quarter 2018, LNAPL was observed in LNAPL migration wells MW-176A-15, MW-334-15, O-27, and S-51; and sheen was observed in LNAPL migration wells MW-176A-15, MW-334-15, and O-2. Results are summarized in Table 3-3, and maximum thickness data measured during the reporting period are presented on Figures 3-9, 3-10, and 3-11. Additionally, LNAPL was gauged during the following monitoring events throughout the reporting period: groundwater elevation monitoring, groundwater sampling and field parameter collection, vertical gradient monitoring, and hydraulic capture monitoring. A comprehensive table including gauging data from each monitoring event conducted at the site during the reporting period is included in Appendix G.

LNAPL thickness measurements were similar to historical results; significant changes in LNAPL thicknesses resulting from shutdown of the GRTS system were not observed during the reporting period. Some LNAPL thickness increases were noted during this reporting period, although LNAPL thicknesses are still within the range of historical measurements at the site. Similarly, decreases from the second quarter 2017 to the second quarter 2018 were noted in wells R-21 and R-44, which may be due to seasonality, and were within the historical range. LNAPL was not detected in any new wells during this reporting period (that is, in wells that have not previously had a detection).

3.2.2 Natural Source Zone Depletion Assessment Results

Thirteen monitoring wells were sampled for natural source zone depletion (NSZD) parameters to evaluate the potential for NSZD to occur at the site. Sample locations are defined in the 2017 LTM Plan (Arcadis 2017b). LNAPL was not present in any of the NSZD monitoring wells. Field parameters were collected from 13 monitoring wells and are presented in Tables 3-1a, 3-1b, and 3-1c. Natural attenuation parameters (iron, manganese, sulfate, and methane), GRO, and DRO are presented in Tables 3-4a, 3-4b, and 3-4c; and on Figures 3-12, 3-13, and 3-14.

The NSZD assessment methodology is discussed and results are provided in Section 4.

3.3 Monitoring Well Sampling

Monitoring wells included in the other COCs monitoring network in the 2017 LTM Plan and the 3Q2018 Update (Arcadis 2017b; ADEC 2018) were sampled for BTEX. Additionally, select monitoring wells were sampled for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and 1-methylnaphthalene during the reporting period. Results are summarized in Tables 3-5a and 3-5b. Figures 3-15 and 3-16 present analytical results for benzene.

Nine monitoring wells were sampled for PFCs in accordance with the 2017 LTM Plan and the 3Q2018 Update (Arcadis 2017b; ADEC 2018). Results are summarized in Table 3-6 and on Figure 3-17.

Analyses for sulfolane were completed on groundwater samples collected from the wells identified in the 2017 LTM Plan and the 3Q2018 Update (Arcadis 2017b; ADEC 2018), including wells where performance monitoring was conducted monthly for the post-GRTS shutoff, as described in the ROCP (Arcadis 2017b). Sulfolane analytical results are summarized in Tables 3-7a, 3-7b, and 3-7c; and on Figures 3-18 through 3-26. In accordance with the updated sampling schedule (Arcadis 2017b; ADEC 2018), no data were collected during the second and third quarters of 2018 at the interval from 90 to 160 feet bwt.

Groundwater samples were collected from the point of compliance (POC) wells to evaluate the vertical distribution of sulfolane concentrations. Sulfolane concentrations for the POC, which includes well nests MW-358, MW-359, MW-360, MW-362, MW-364, and MW-149A-15, are summarized in Table 3-8. Groundwater samples were also collected from wells along the vertical profile transect (VPT), which is located between 250 and 950 feet upgradient of the POC wells. Sulfolane concentrations across the VPT are shown on Figures 3-27, 3-28, and 3-29. Sulfolane concentrations along the VPT are generally stable and do not exceed the cleanup objective for groundwater of 400 µg/L sulfolane at the POC.

Sulfolane trends (post-GRTS shutdown) are further discussed in Section 5.

3.4 Sulfolane Mass Flux

Sulfolane mass flux has historically been calculated using wells along the VPT. For this reporting period, mass flux was calculated using second quarter 2018 results. The second quarter 2018 dataset was the final quarter of the 12-month post shutdown monitoring plan, and so is larger at the VPT than the third quarter 2018 dataset. Methods to calculate mass flux and site-specific geologic input data are included as Appendix H. The Mass Flux Toolkit developed by GSI Environmental for the Department of Defense Environmental Security Technology Certification Program (Farhat, Newell, and Nichols 2006) was used to calculate sulfolane mass flux across the VPT.

Sulfolane mass flux across the VPT was first calculated with this method from data collected in November 2011 and was estimated at approximately 86 grams per day (g/day; or 0.19 pound per day [lb/day]). A sulfolane mass flux of approximately 30 g/day (0.065 lb/day) was calculated for second quarter 2018 (Figure 3-30). The second quarter 2018 dataset contains fewer wells than datasets used to calculate historical mass flux rates. The calculated mass flux at the VPT was higher in second quarter 2018 than the previous calculated flux in third quarter 2016. The increase in flux was expected due to the shutdown of the GRTS system and remains less than rates observed prior to system enhancements conducted in 2014. By comparison, the maximum groundwater concentration at the VPT in second and third quarters

of 2014 were less than 400 micrograms per liter ($\mu\text{g/L}$) and 124 samples out of 127 had concentrations less than 100 $\mu\text{g/L}$. Mass flux rates across the VPT are presented on Figure 3-31. The zones exhibiting the majority of mass flux are summarized in Table 3-9.

3.5 Statistical Analysis of Benzene and Sulfolane Data

A statistical and graphical evaluation of benzene and sulfolane concentration trends using a Mann-Kendall trend analysis is conducted annually during the third quarter at monitoring and observation wells to evaluate plume migration and stability, and remedial action effectiveness; and to identify relationships between concentrations, groundwater elevations, and flow directions. Use of the Monitoring and Remediation Optimization System for Mann-Kendall trend analysis was applied to groundwater monitoring data collected since 2006 from monitoring and observation wells. Wells with LNAPL were excluded from evaluation of the benzene statistical trend.

The analysis trends are expressed as probably increasing, increasing, probably decreasing, decreasing, stable, or no trend. Results of the Mann-Kendall trend analysis for the reporting period are presented in Tables 1 and 2, and on Figures 1A, 1B, and 2C in Appendix I; and in the table below.

Parameter Trend	Third Quarter	
	Benzene	Sulfolane
Number of wells	33	78
All results nondetect ¹	5	4
Insufficient data points ¹	4	0
Probably decreasing	1	2
Decreasing	3	48
Probably increasing	3	1
Increasing	1	6
Stable	4	9
No trend	12	8

Note:

¹Wells with insufficient data points for the statistical analysis (less than four points), but with all results less than detection limits, are listed under "all results nondetect."

The results of the Mann-Kendall trend analyses were evaluated and compared against visual evaluation of the trend charts; this evaluation is discussed below. Further review of the trends, is discussed in Section 5.

3.5.1 Benzene Statistical Evaluation

The Mann-Kendall trend analysis indicated an increasing or probably increasing benzene concentration trend in wells MW-130-25, MW-321-15, MW-345-15, and O-24 during the reporting period, as seen on the benzene time series plots included as Attachment 1 in Appendix I.

Monitoring well MW-130-25 is within the detectable benzene plume at the site, near the downgradient extent. Although the Mann-Kendall analysis indicates a trend that is probably increasing in this well, concentrations have generally been decreasing since first quarter 2016; current concentrations are less than historical levels observed in this well. MW-321-15 is within the detectable benzene plume at the site at the western extent and has exhibited seasonal variation since 2016. Although the analysis indicates an overall increasing trend, concentrations have generally been decreasing since first quarter 2016. No notable change in concentration trend since shutdown of the GRTS system is observed in this well. Monitoring well MW-345-15 is within the detectable benzene plume at the site, near the former GRTS treatment zone. Concentrations had been stable until concentrations increased during the second half of 2017, likely due to GRTS shutdown. Concentrations have been decreasing since first quarter 2018. Well O-24 is within the detectable benzene plume at the site, near the downgradient extent. Some seasonal variation is evident in this well and concentrations decreased in the second half of 2018.

Benzene concentration trends are further discussed in Section 5.1.

3.5.2 Sulfolane Statistical Evaluation

The Mann-Kendall trend analysis indicates that the majority of onsite wells exhibit decreasing trends. The wells with decreasing trends are located throughout the site and reflect the combined effects of source controls and past GRTS operation. The onsite wells exhibiting an increasing or probably increasing sulfolane concentration trend (MW-330-20, MW-334-65, MW-345-15, MW-345-55, MW-345-75, O-2, and O-27-65) during the reporting period are shown on the sulfolane time series plots included as Attachment 1 in Appendix I and summarized below:

- Monitoring well MW-330-20 is within the detectable sulfolane plume onsite, near the western extent, and downgradient of the soil excavation performed in the Southwest Former Wash Area. As noted in Section 5.2, sulfolane concentrations in MW-330-20 peaked in 2016 but remained less than 1,000 µg/L and have been decreasing since 2016. The other wells with increasing trends are located near or just downgradient from the former GRTS recovery wells; since GRTS shutdown, the greatest concentration in any of these wells (288 µg/L) was detected in monitoring well O-2.
- MW-334-65 is within the detectable sulfolane plume onsite, near the eastern extent. Concentrations had been stable until the second half of 2017 and decreased in the second quarter 2018.
- Monitoring wells MW-345-15 and MW-345-55 are within the detectable sulfolane plume onsite, near the downgradient extent. Although the analyses indicate overall trends that are probably increasing, concentrations decreased during 2018.
- Monitoring well MW-345-75 is within the detectable sulfolane plume onsite and concentrations have remained less than 60 µg/L.

- Monitoring well O-2 is within the detectable sulfolane plume onsite, near the eastern extent, and concentrations have remained less than 300 µg/L, with a decrease in concentrations noted during third quarter 2018.

Well O-27-65 is within the detectable sulfolane plume at the site, near the center, and concentrations have remained less than 60 µg/L.

As noted in Section 1, the cleanup objective for sulfolane is that the concentration in groundwater will not exceed 400 µg/L sulfolane at the POC. Sulfolane concentration trends are further discussed in Section 5.2.

3.6 Nonroutine Activities

No nonroutine activities were conducted during the reporting period.

4 NATURAL SOURCE ZONE DEPLETION ASSESSMENT AND ASSIMILATIVE CAPACITY EVALUATION

The potential efficacy of NSZD as a means of reducing LNAPL mass, which through time will further reduce LNAPL mobility, was evaluated following protocols outlined in the Interstate Technology & Regulatory Council (ITRC) guidance for LNAPL site characterization and management (ITRC 2009, 2018). As a component of this evaluation, assimilative capacity (AC) was estimated and sensitivity testing of this estimate was conducted. AC is the mass of hydrocarbon constituents that may be biodegraded based on the available concentrations of other biodegradation reaction components in groundwater.

4.1 Methodology

NSZD is a combination of natural processes that reduce the mass of LNAPL in the subsurface through time. NSZD occurs when processes act to physically redistribute LNAPL components to the aqueous phase via dissolution, or to the gaseous phase via volatilization. NSZD preferentially depletes the most soluble and volatile constituents of the LNAPL. As LNAPL constituents migrate away from the source zone in vapor and groundwater, these constituents are biologically degraded (ITRC 2018).

Biodegradation rates of LNAPL constituents dissolved in groundwater depends, in part, on the type and availability of electron acceptors. Hydrocarbon constituents may be degraded by aerobic and anaerobic oxidation. Aerobic oxidation occurs under oxygen-rich conditions, and anaerobic biodegradation occurs under oxygen-poor conditions. The use of available electron acceptors during biodegradation typically occurs in the following order, from greater energy availability to lesser energy availability: oxygen, nitrate, manganese oxides, ferric iron hydroxides, sulfate, and fermentation of organics/carbon dioxide reduction to methane (methanogenesis). Aerobic degradation and nitrate reduction result in decreased concentrations of dissolved oxygen (DO) and nitrate (respectively) in groundwater, relative to background concentrations. Reduction of iron and manganese hydroxides and oxides results in increased concentrations of dissolved iron and manganese in groundwater. Sulfate reduction results in decreased sulfate concentrations in groundwater, relative to background. Methanogenesis results in increased concentrations of methane in groundwater.

The rate of depletion of LNAPL constituents dissolved and biodegraded in groundwater can be determined through inspection of upgradient and downgradient hydrocarbon and electron acceptor concentrations, and understanding the volumetric flow rate of groundwater through the LNAPL source zone. An observation of increased dissolved-phase petroleum hydrocarbon constituent concentrations between upgradient and downgradient groundwater monitoring locations provides evidence that LNAPL dissolution is occurring. Depletion of electron acceptors (oxygen, nitrate, sulfate), production of biodegradation reaction products (ferrous iron, manganese, methane), and generation of hydrocarbon fermentation byproducts (acetate, methane) demonstrate that microbial metabolism of hydrocarbons is ongoing. Differences in concentrations of electron acceptors and biodegradation reaction products upgradient and downgradient of LNAPL can be used to estimate the magnitude of biodegradation.

4.1.1 Source Zone Mass Depletion by Dissolution to Groundwater in the Saturated Zone

As groundwater moves through the subsurface it will contact LNAPL-impacted soil within the saturated zone, and infiltrating precipitation may contact LNAPL-impacted soil within the vadose zone. In both cases, petroleum hydrocarbons will partition into the water and result in a loss of mass from the LNAPL body. When infiltration of precipitation is insignificant and clean groundwater enters the LNAPL source zone, the rate of LNAPL source mass loss by dissolution can be simplified to consider only dissolved hydrocarbons exiting the submerged portion of the source zone. The rate of source zone mass loss by dissolution to groundwater (R_{Dis}) can thus be determined by Equation 1 (ITRC 2009):

Equation 1:

$$R_{Dis} = q_d * h * w * (C_d * CF)$$

Where:

q_d = groundwater-specific discharge (cubic meters of water per square meter per second [$m^3 H_2O/m^2/sec$])

h = thickness of submerged source zone (meters)

w = width of submerged source zone (meters)

C_d = average groundwater concentration (milligrams per liter [mg/L])

CF = conversion factor (1,000 mg/L per kilograms per cubic meter of water).

4.1.2 Source Zone Mass Depletion by Biodegradation in the Saturated Zone

Biodegradation of LNAPL in the saturated zone results in decreasing concentrations of dissolved electron acceptors (oxygen, nitrate, sulfate) from influent groundwater and precipitation recharge, and increasing concentrations of biodegradation transformation products (dissolved manganese, iron and methane). Comparison of the loss of electron acceptors and formation of transformation products supports estimation of the rate of LNAPL biodegradation in the submerged source zone (R_{BioSat}). An estimate of the biodegradation rate was completed using Equation 2 (ITRC 2009).

Equation 2:

$$R_{BioSat} = q_d * h * w * AC$$

Where:

q_d = groundwater-specific discharge ($m^3 H_2O/m^2/sec$)

h = thickness of submerged source zone (meters)

w = width of submerged source zone (meters)

AC = assimilative capacity, the difference between upgradient and downgradient concentrations of each natural attenuation indicator species multiplied by a representative stoichiometric coefficient.

4.2 Data Evaluation

Data presented in the following sections were used to evaluate NSZD processes and to calculate rates of LNAPL mass reduction at the site.

4.2.1 Data for Dissolution Rate in Saturated Zone

A significant portion of the LNAPL-impacted area of the site is covered with low-permeability surfaces. Based on that observation, infiltration of precipitation was not considered a significant contribution of DO to the subsurface. This assumption simplifies the dissolution rate equation used in the NSZD evaluation. Another assumption in the dissolution calculations is that groundwater entering the LNAPL source zone is unimpacted by upgradient contaminant sources. Monitoring wells MW-192A-15 and O-15 were selected as the representative background wells for the NSZD evaluation. Both wells are outside of and upgradient from the LNAPL and dissolved-phase plumes. Table 1 in Appendix J presents dissolved-phase petroleum hydrocarbon constituent concentrations in groundwater samples collected from wells MW-192A-15 and O-15 in February, April, and August 2018. In each of these samples, GRO and DRO were nondetect, indicating that influent groundwater contains (at most) only trace amounts of petroleum hydrocarbons. Therefore, the LNAPL mass loss rate by dissolution can be simplified to consider only dissolved hydrocarbons exiting the submerged portion of the source zone.

A change in dissolved-phase petroleum hydrocarbon constituent concentrations between groundwater monitoring locations upgradient and within or downgradient from the LNAPL source zone provides evidence that LNAPL dissolution is occurring. Source zone monitoring wells MW-116-15, MW-125-25, MW-130-25, MW-135-20, MW-321-15, and MW-336-20 were selected to represent groundwater quality within the LNAPL-influenced dissolved phase plume because the wells are distributed throughout an area of the site where the majority of LNAPL has been observed. Average dissolved-phase GRO and DRO concentrations of 22.3 and 4.5 mg/L, respectively, were calculated based on concentrations in groundwater samples collected in February, April, and August 2018 (Table 1 in Appendix J). The overall concentration of dissolved-phase total petroleum hydrocarbons (TPH), interpreted as the sum of the GRO and DRO values, is 26.8 mg/L. Results are presented in Table 2 in Appendix J. The slightly greater TPH concentrations relative to 2013 (overall concentration of dissolved-phase TPH in 2013 was 9.9 mg/L in MW-176A), have been consistently observed across multiple sampling events and reflect an apparent increase in the rate of LNAPL depletion by dissolution.

4.2.2 Data for Biodegradation Rate in Saturated Zone

Quantification of biodegradation in the saturated zone uses biogeochemical parameters (oxygen, nitrate, sulfate, dissolved iron and manganese, and methane). Monitoring wells MW-116-15, MW-125-25, MW-130-25, MW-135-20, MW-321-15, and MW-336-20 were selected to represent the source zone and downgradient conditions for the NSZD evaluation. Monitoring wells MW-192A-15 and O-15 were used as background monitoring wells. Biogeochemical data for the reporting period at these wells are provided in Table 3 in Appendix J. In addition, sensitivity testing was conducted to determine the estimated value for AC used to calculate the rate of LNAPL biodegradation in the submerged source zone. For this sensitivity testing, the AC was estimated using data collected during August 2018 for two separate groups of downgradient monitoring wells relative to upgradient monitoring well MW-192A-15. AC was estimated in

Downgradient Area A using data from monitoring wells MW-116-15 and MW-336-20, and in Downgradient Area B using data from monitoring wells MW-135-20, MW-130-25, and MW-125-25. Additionally, for sensitivity testing, stoichiometric coefficients were used for decane (ITRC 2009) and BTEX. Appropriate stoichiometric coefficients for BTEX were determined by Wiedemeier et al. (1994), Suarez and Rifai (2004), and based on derivation using the methods described by Wiedemeier et al. (1994) in cases where the stoichiometric coefficients were not available (manganese reduction and methanogenesis).

4.3 Natural Source Zone Depletion Assessment

4.3.1 Qualitative Assessment of Natural Source Zone Depletion

Biodegradation and dissolution of the submerged portion of the LNAPL can be assessed by comparing the chemical composition of groundwater upgradient from the source zone with groundwater immediately downgradient. Biodegradation of petroleum hydrocarbons results in a decrease in electron acceptor concentrations and a corresponding increase in biodegradation transformation products between upgradient and within and/or downgradient from the LNAPL plume. The relevant biogeochemical data (oxygen, nitrate, sulfate, dissolved iron, dissolved manganese, and methane) are presented in Table 3 in Appendix J. A comparison of the upgradient (MW-192A-15 and O-15) and source zone/downgradient (MW-116-15, MW-125-25, MW-130-25, MW-135-20, MW-321-15, and MW-336-20) data is summarized below (note that all concentrations referenced are average concentrations across the set of upgradient and downgradient wells, and nondetect concentrations were excluded from averages):

- Oxygen decreased from 1.2 mg/L at the upgradient monitoring locations to an average of 0.6 mg/L in the source zone monitoring locations, indicating oxygen reduction from anaerobic degradation.
- Sulfate decreased from 37 mg/L at the upgradient monitoring locations to an average of 2.8 mg/L in the source zone monitoring locations, indicating sulfate reduction from anaerobic degradation.
- Dissolved iron increased from nondetect at the upgradient monitoring locations to an average of 32 mg/L in the source zone monitoring locations, indicating iron reduction from anaerobic degradation.
- Dissolved manganese increased from 0.62 mg/L at the upgradient monitoring locations to 7.9 mg/L in the source zone monitoring locations, indicating manganese reduction from anaerobic degradation.
- The methane concentration increased from 0.02 mg/L at the upgradient locations to 4.4 mg/L in the source zone monitoring locations, indicating carbon dioxide reduction or organic acid fermentation from anaerobic degradation.
- Nitrate monitoring was not conducted in 2018 as a result of the observation from earlier sampling that naturally occurring nitrate levels in the aquifer are low; therefore, nitrate is not readily available as an electron acceptor at the site.

The above spatial comparison of upgradient and source zone/downgradient natural attenuation parameters shows a clear decrease in electron acceptor concentrations and an increase in biodegradation transformation product concentrations, which demonstrates that biodegradation of LNAPL constituents is occurring.

4.3.2 Estimate of Source Zone Mass Depletion by Dissolution to Groundwater in the Saturated Zone

LNAPL mass loss occurs via dissolution of hydrocarbons into water as groundwater moves through the subsurface and contacts LNAPL-impacted soil within the saturated zone. The flux of groundwater exiting the LNAPL source area and the concentrations of hydrocarbons that dissolve into groundwater dictates the mass loss. Based on the average hydraulic conductivity, site groundwater gradient, and cross-sectional area of the impacted groundwater, approximately 280 cubic meters of groundwater exits the source area every day. The average 2018 dissolved-phase concentration of petroleum compounds in the wells immediately downgradient from the source areas (but upgradient from the groundwater recovery system) is 26.8 mg/L.

Using Equation 1 and the plume parameters presented in Table 2 in Appendix J, the LNAPL mass depletion rate as a result of dissolution is estimated to be between 900 and 4,700 kilograms (kg) TPH per year based on the range of water hydraulic conductivities presented in the Onsite SCR – 2013 (Arcadis 2013). This equates to between 300 and 1,500 gallons of LNAPL depleted per year. LNAPL mass depletion rates as a result of dissolution are presented in Table 2 in Appendix J.

4.3.3 Estimate of Source Zone Mass Depletion Rate by Biodegradation in the Saturated Zone

Mass loss of LNAPL via biodegradation of hydrocarbons is controlled by groundwater flux into the LNAPL source zone, as discussed above, and the AC of the aquifer. AC is a measure of the extent to which hydrocarbon constituents may be biodegraded in a specified volume of water based on the availability of electron acceptors to couple with their oxidation. For the purpose of sensitivity testing, six estimates of AC were made. AC was estimated based on three datasets using two sets of stoichiometric coefficients, for decane and for BTEX. The three datasets used include:

- Average concentrations measured in February, April, and August 2018 between upgradient monitoring wells MW-192A-15 and O-15, and downgradient monitoring wells MW-116-15, MW-125-25, MW-130-25, MW-135-20, MW-321-15, and MW-336-20.
- Concentrations measured during August 2018 between upgradient monitoring well MW-192A-15 and downgradient monitoring wells MW-116-15 and MW-336-20 (Downgradient Area A).
- Concentrations measured during August 2018 between upgradient monitoring well MW-192A-15 and downgradient monitoring wells MW-135-20, MW-130-25, and MW-125-25 (Downgradient Area B).

Calculations of AC are presented in Table 4 in Appendix J and are between 9.06×10^{-3} kg TPH per cubic meter of groundwater (between upgradient monitoring well MW-192A-15 and Downgradient Area B using the stoichiometric coefficients for decane) and 2.27×10^{-2} kg TPH per cubic meter of groundwater (between upgradient monitoring well MW-192A-15 and Downgradient Area A using the stoichiometric coefficients for BTEX). Based on average concentrations measured during 2018 monitoring events, including O-15 as an upgradient monitoring well, averaging results from each downgradient monitoring well, and using the stoichiometric coefficients for decane, the AC of the aquifer is approximately 1.36×10^{-2} kg TPH per cubic meter of groundwater.

As shown in Table 4 in Appendix J, approximately 1 to 4 percent of the AC is attributed to aerobic biodegradation, approximately 2 to 7 percent is attributed to manganese reduction, approximately 10 percent is attributed to iron reduction, approximately 28 to 65 percent is attributed to sulfate reduction, and approximately 14 to 58 percent is attributed to methanogenesis.

Maximum biodegradation of petroleum hydrocarbon constituents is interpreted to occur in the area surrounding monitoring wells MW-116-15 and MW-336-20 based on elevated concentrations of dissolved iron and manganese, depleted concentrations of sulfate, and elevated concentrations of methane. Substantial biodegradation is also interpreted further downgradient in the area surrounding monitoring wells MW-135-20, MW-130-25, and MW-125-25. Evidence of biodegradation is evident at the furthest downgradient monitoring wells in the NSZD area (monitoring wells MW-369-16 and MW-101A-25). However, concentrations of electron acceptors at these monitoring wells reflect a return to background conditions, with:

- Dissolved iron and manganese concentrations that are slightly elevated relative to upgradient monitoring well MW-192A-15, but less than those at impacted wells.
- Sulfate concentrations that are slightly depleted relative to upgradient monitoring well MW-192A-15, but greater than those at impacted wells.
- Methane concentrations that are slightly elevated relative to upgradient monitoring well MW-192A-15, but less than those at impacted wells.

The greater AC observed between background monitoring well MW-192A-15 and Downgradient Area A relative to Downgradient Area B suggests additional input of electron acceptors between the two downgradient areas. Additionally, the apparent recovery to near background conditions at the furthest downgradient monitoring wells in the NSZD area suggests that electron acceptors are generally available in the aquifer and support AC on a long-term basis.

Using Equation 2 and the plume parameters presented in Tables 5, 6, and 7 in Appendix J the LNAPL mass depletion rate due to biodegradation in the saturated zone is estimated to be between 300 and 4,000 kg TPH per year based on the range of water hydraulic conductivities presented in the Onsite SCR – 2013 (Arcadis 2013) and the range in AC estimates presented in Table 4 in Appendix J. This equates to between 100 and 1,300 gallons of LNAPL depleted per year. LNAPL mass depletion rates as a result of biodegradation are presented in Tables 5, 6, and 7 in Appendix J.

4.4 Natural Source Zone Depletion Evaluation Summary

A qualitative evaluation of the chemical composition of groundwater indicates that LNAPL is being depleted through natural processes, including dissolution and biodegradation in the saturated zones. NSZD rates were quantified and the estimated total mass loss rate in the saturated zone by dissolution is 300 to 1,500 gallons per year, while the mass loss rate by biodegradation in the saturated zone is 100 to 1,300 gallons per year. These rates are comparable to those presented in the Onsite SCR – 2013 (Arcadis 2013; 100 to 300 and 200 to 900 gallons per year, respectively) and thus are within the expected range. The depletion rates may be biased high due to seasonal changes in soil diffusivity and biological activity. However, at a minimum, the natural LNAPL depletion rate in the saturated zone at the site is on

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the order of hundreds to thousands of gallons per year. LNAPL depletion rates have remained robust following GRTS shutdown and support the assumptions of the ROCP (Arcadis 2017b).

5 CONCENTRATION TRENDS AND SHORT-TERM MONITORING EVALUATION

The monitoring results presented in this section are based on sulfolane and benzene data gathered in accordance with the 2017 LTM Plan and 3Q2018 Update (Arcadis 2017b; ADEC 2018). The objectives of the monitoring are to:

- Monitor the nature and extent of COCs onsite.
- Evaluate the potential exposure to COCs.
- Evaluate contaminant trends and groundwater modeling predictions.

In addition, this section evaluates short-term monitoring results following shutdown of the groundwater remediation system in 2017 prepared in accordance with the ROCP (Arcadis 2017b). Objectives of the short-term monitoring evaluation, in addition to those listed above, include evaluations of:

- Contaminant rebound (discussed below)
- Horizontal and vertical groundwater gradients (Section 3)
- Updated benzene and sulfolane trends (Sections 3.5, 5.1, and 5.2)
- BTEX AC (Section 4)
- Sulfolane mass flux at the VPT (Section 3.4).

As discussed in the Second Semiannual 2016 Onsite Groundwater Monitoring Report (Arcadis 2017a), the expanded groundwater recovery and treatment system (GAC West) and recovery wells R-47 and R-48 were shut down on August 31, 2016. The GRTS was shut down on July 10, 2017, pursuant to ADEC approvals in the ROCP (Arcadis 2017b).

This section reviews the short-term monitoring program and discusses contaminant rebound, horizontal and vertical gradients, and updated analysis of benzene and sulfolane trends.

5.1 Benzene

This section summarizes FHRA's interpretation of benzene concentration trends since 2010 in individual monitoring wells identified in the 2017 LTM Plan and 3Q2018 Update (Arcadis 2017b; ADEC 2018) to determine the effects of enhanced groundwater remediation prior to GRTS shutdown and rebound effects since shutdown. The monitoring results continue to support the cleanup objectives presented in the ROCP (Arcadis 2017b). The monitoring wells are categorized based on location relative to the former treatment zone; each area is summarized below:

- *Upgradient.* Benzene concentration trends for monitoring wells located upgradient from the former GRTS treatment zone are generally decreasing or stable. It is likely that the upgradient locations were minimally influenced by operation of the GRTS; these trends are believed to primarily be the result of a decreasing stored benzene mass in upgradient source areas.

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- *Within the treatment zone.* Benzene concentration trends for monitoring wells located within the treatment zone are decreasing or stable, with the following exceptions:
 - Benzene concentrations in wells MW-137-20 and R-35R had been stable or decreasing until they increased during 2017 and the current reporting period.
 - Benzene concentrations in wells MW-125-25, MW-345-15, and O-3 had been stable or decreasing until they increased in 2017, likely due to GRTS shutdown. The stable or decreasing trends subsequently resumed during the reporting period.

These results are trends that were anticipated when making the determinations to shut down the GRTS.

- *Downgradient of the former treatment zone.* Benzene concentration trends for monitoring wells located downgradient of the treatment zone are decreasing or stable, with the following exceptions:
 - Benzene concentrations in wells MW-371-15, MW-154B-95, and O-4 were nondetect prior to the reporting period; detections were reported in all three wells in 2018. Based on the BTEX AC described in Section 4, the rebound in concentrations observed do not indicate an increased likelihood of exceeding the Table C cleanup value (18 AAC 75.345) for benzene at the POC.
 - Benzene concentrations in well MW-139-25 decreased prior to GRTS shutdown, but increased slightly following GRTS shutdown. Based on the BTEX AC described in Section 4, the rebound in concentrations observed does not indicate an increased likelihood of exceeding the Table C cleanup value (18 AAC 75.345) for benzene at the POC.

These results are trends that were anticipated when making the determinations to shut down the GRTS.

- *VPT.* Benzene concentrations in monitoring wells located along the VPT are decreasing or stable, with the following exceptions:
 - Benzene concentrations in well MW-143-20 were nondetect from 2010 through 2017; benzene was detected at a concentration of 4.3 µg/L during the reporting period. The concentration detected does not indicate an increased likelihood of exceeding the Table C cleanup value (18 AAC 75.345) for benzene at the POC.
 - Benzene was detected at a concentration of 7.01 µg/L in the sample from MW-303-CMT-39; this is the first sample collected from this well that was analyzed for benzene. Based on the BTEX AC described in Section 4, the concentration detected does not indicate an increased likelihood of exceeding the Table C cleanup value (18 AAC 75.345) for benzene at the POC.

These results are trends that were anticipated when making the determinations to shut down the GRTS.

- *Downgradient of the VPT.* No wells were sampled for BTEX. Sampling scheduled for every 2 years is planned for completion in third quarter 2019.

5.2 Sulfolane

This section summarizes FHRA's interpretation of sulfolane concentration trends since 2010 at individual network monitoring wells identified in the 2017 LTM Plan and the 3Q2018 Update (Arcadis 2017b; ADEC 2018) to determine the effects of source controls, enhanced groundwater remediation prior to the shutdown of GAC West and GRTS, and rebound effects since the shutdowns. The charts of sulfolane concentrations through time in Attachment 1 in Appendix I are presented with both linear and logarithmic concentration scales to facilitate the discussion of concentration trends since the shutdowns. The time since GRTS shutdown is relatively short compared to the periods of record of most of the monitoring wells; therefore, stabilization of sulfolane concentrations in many wells is apparent in the charts with the logarithmic concentration scales, whereas this stabilization is not as apparent in the charts with linear concentration scales.

The results are consistent with expected ranges that were the basis of the ROCP determination to shut down the GRTS (which was informed by historical monitoring data and groundwater modeling results), and support the cleanup objective presented in the ROCP (Arcadis 2017b) that sulfolane concentrations at the VPT, upgradient of the POC wells, and at the POC wells themselves, will not exceed 400 µg/L.

The monitoring wells are categorized below based on location relative to the former treatment zone; each area is summarized below:

- *Upgradient.* Sulfolane concentration trends for monitoring wells located upgradient from the former GRTS treatment zone are generally decreasing or stable. It is likely that the upgradient locations were minimally influenced by operation of the GRTS; these trends are believed to primarily be the result of a decreasing stored sulfolane mass in upgradient source areas due to natural processes (for example, see Attachment 1 in Appendix I for O-19, O-34, S-51) and the soil excavation performed in the Southwest Former Wash Area during 2015 (for example, see Attachment 1 in Appendix I for MW-330-20 and MW-372-15).
- *Within the former treatment zone.* Sulfolane concentration trends for monitoring wells located within the treatment zone are decreasing or stable, with the following exceptions:
 - MW-186A-15, MW-186B-60, MW-185E-75, MW-334-15, MW-334-65, MW-345-15, and O-2 were stable until concentrations increased during the second half of 2017. The concentration data for samples collected in 2018 are similar to, or less than the concentrations measured after GRTS shutdown in 2017, which suggests that the concentrations may be stabilizing or are now decreasing.
 - MW-309-15 was decreasing until the concentration increased from 31.2 µg/L in August 2017 to 63.7 µg/L in August 2018. The maximum historical concentration of any sample from this well is 88.5 µg/L; therefore, the observed rebound is not outside of the expected range.
 - Concentrations in R-21 and R-40 were decreasing prior to shutdown, likely due to dilution as the recovery wells were drawing groundwater from deeper zones with lower sulfolane concentrations. Concentrations increased during the second half of 2017, as this diluting effect ceased with GRTS shutdown. The concentration data for samples collected at the end of the reporting period are similar to the concentrations measured earlier in the reporting period and during 2017, which suggests that the concentration may be stabilizing. The maximum concentrations in R-21 and R-

40 during the reporting period were 337 J* µg/L and 125 µg/L, respectively. Concentrations in samples from R-21 that were not flagged as estimates have been less than 400 µg/L since September 2012. The maximum concentration in samples from R-40 prior to the decline observed from 2012 through to the GRTS shutdown was 69.2 µg/L. The rebound noted at R-40 may have begun to stabilize.

- MW-345-55 showed seasonal variation with an overall increase from 19.3 µg/L in January 2014 to 49.6 µg/L in 2017. The concentration increased to 67.5 µg/L in January 2018 before resuming the pattern of seasonal variation through the reporting period.
- MW-345-75 showed seasonal variation with an overall increase from 7.03 µg/L in November 2013 to 22.2 µg/L in October 2016. The well has been sampled once since GRTS shutdown, in accordance with the 2017 LTM Plan and 3Q2018 Update (Arcadis 2017b; 2018 ADEC), and the concentration increased to 46.8 µg/L in July 2018, which is the greatest concentration measured in any sample from this well. The concentration is less in MW-345-75 than in the shallower wells in the nest.

These results are consistent with predictions that were the basis of the ROCP (Arcadis 2017b) determination to shut down the GRTS.

- *Between the former treatment zone and VPT.* Sulfolane concentration trends for monitoring wells located downgradient from the former treatment zone are decreasing or stable in wells O-13, O-24, and O-31. As expected, concentrations in many of the wells in this area increased following GRTS shutdown but in general are not outside of expected ranges, as discussed below:
 - Concentrations in wells MW-154B-95, O-26-65, and O-27 were stable or decreasing until they increased during the reporting period. The maximum concentrations for these three wells during the reporting period were 144, 19.8, and 193 µg/L, respectively. These results are the highest concentrations measured in any samples collected from these wells; however, the trend in MW-154B-95 suggests that the peak of the rebound may be nearing and the concentrations may begin to stabilize or decrease. Wells O-26-65 and O-27 are monitored annually and semiannually, respectively. Concentrations in these wells may be peaking, which will be evaluated during future monitoring events.
 - Concentrations in wells MW-127-25, MW-139-25, MW-142-20, O-12, and O-26 were stable or decreasing until they increased during the reporting period. The maximum concentrations for these five wells during the reporting period were 34.5, 157, 74.4, and 55.1 µg/L; and 55.3 J* µg/L, respectively. The trends at these locations suggest that the peak of rebound may be nearing, and all of these results are less than the maximum concentrations previously measured in samples from these wells.
 - Concentrations in well MW-371-15 had declined from the previous maximum concentration of 71 µg/L in July 2014, then increased and subsequently stabilized during 2017. The result from MW-371-15 during the reporting period increased to 146 µg/L, the greatest concentration measured in any sample from this well. Because this well is monitored annually, future monitoring will indicate if the rebound effect has peaked or started to decline.

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- Concentrations had been fluctuating (exhibiting seasonal variation) in O-27-65, which may have been due to the location of the well screen near the base of the plume. During the reporting period, concentrations increased to 46.2J* µg/L, the greatest concentration measured in any sample from this well. Because this well is monitored annually, future monitoring will indicate if the rebound effect has peaked or started to decline.
- Concentrations continue to fluctuate in O-11. The results from the reporting period varied from 141 µg/L to 234 J* µg/L. The maximum concentration in O-11 is 252 J * µg/L in August 2013. The concentration trend in O-11 indicates that the rebound may have peaked and the concentration is beginning to decrease.

These results are consistent with predictions that were the basis of the ROCP (Arcadis 2017b) determination to shut down the GRTS.

- *VPT.* The maximum concentration in any VPT well during the reporting period was 102 µg/L. The monitoring data indicate that the sulfolane plume is not deepening significantly at the VPT, as summarized below:
 - Concentrations in well MW-302-CMT-20 increased in 2017. Concentrations rose again in 2018 to a maximum value of 18.1 µg/L. Concentrations in well MW-302-CMT-50 rose slightly in 2018 to 6.71 J µg/L. The maximum historical concentration any well in the MW-302 nest was 76.2 µg/L in November 2011.
 - Concentrations in wells MW-303-CMT-19, MW-303-CMT-39, and MW-303-CMT-59 had been decreasing, but increased during the reporting period. The maximum concentrations measured in these wells during the reporting period were 96, 102, and 49.5 µg/L, respectively. The maximum historical concentration in any well in the MW-303 nest was 123 µg/L in November 2011. The trends at these locations suggest that the peak of rebound may be nearing.
 - Concentrations in well MW-304-CMT-40 increased to a maximum of 41.3 µg/L; in well MW-304-CMT-60, concentrations increased from nondetect to a maximum of 7.47J µg/L. The maximum historical concentration any well in the MW-304 nest was 412 µg/L in April 2012. The trend at this location suggests that the peak of rebound may be nearing.
 - Concentrations in well MW-305-CMT-28 increased to a maximum of 10.4 µg/L. The maximum historical concentration in any well in the MW-305 nest was 53.8 µg/L in November 2011.

These results are consistent with predictions that were the basis of the ROCP (Arcadis 2017b) determination to shut down the GRTS.

- *Downgradient of the VPT.* The maximum sulfolane concentration in any well downgradient of the VPT during the reporting period was 41.6 µg/L. Sulfolane concentrations in monitoring wells located between the VPT and the site boundary are generally decreasing or stable, most at concentrations less than the limit of detection, with exceptions noted below (including the western portion of the POC which is likely due to shutdown of GAC West in 2016):
 - Concentrations in wells MW-358-20 and MW-358-40 had been decreasing, but increased during the reporting period. The maximum concentration in either of these wells during the reporting

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period was 38 µg/L. The maximum historical concentration in the MW-358 nest was 39 µg/L in MW-358-40 in October 2013.

- Concentrations in wells MW-359-15, MW-359-35, and MW-359-60 had been decreasing, but increased during the reporting period. The maximum concentration in these wells during the reporting period was 41.6 µg/L. The maximum historical concentration in the MW-358 nest was 54.7 µg/L in MW-359-35 in January 2014.
- Concentrations in wells MW-360-35 and MW-360-50 had been decreasing, but increased slightly during the reporting period. The maximum concentration in either of these wells during the reporting period was 13 µg/L. The maximum historical concentration in the MW-360 nest was 92.7 µg/L in MW-360-50 in November 2013.
- Concentrations in wells MW-148C-55 and MW-148-80 had been decreasing or stable, but increased slightly during the reporting period. The maximum concentration in either of these wells during the reporting period was 14.9 µg/L. The maximum historical concentration in the MW-148 nest was 501 µg/L in MW-148B-30 in March 2011.

The maximum sulfolane concentrations during the reporting period in the zones described above that were influenced by the GRTS are summarized below:

- Former treatment zone: 337 J* µg/L
- Between the former treatment zone and the VPT: 234 J* µg/L
- VPT: 102 µg/L
- Downgradient of the VPT (including the POC wells): 41.6 µg/L.

These results are consistent with predictions that were the basis of the ROCP (Arcadis 2017b) determination to shut down the GRTS.

6 CONCLUSIONS

Groundwater monitoring and sampling events were conducted during the reporting period in accordance with the 2017 LTM Plan (Arcadis 2017b), 3Q2018 Update (ADEC 2018), and Onsite RSAP (Arcadis 2017a).

The cleanup objectives for groundwater established in the ROCP (Arcadis 2017b) are that sulfolane will not exceed 400 µg/L at the POC and that cleanup objectives for other COCs listed in 18 AAC 75.345 Table C will be met at the POC.

The conclusions based on results of the onsite field activities conducted during the reporting period are summarized below:

- Groundwater monitoring data collected during the reporting period are within expected ranges and support the cleanup objective presented in the ROCP (Arcadis 2017b).
- Sulfolane concentrations in the source areas are decreasing in most cases. Increases in sulfolane and benzene concentrations were noted in wells downgradient of the former treatment systems. These concentration increases were expected and support the cleanup objectives presented in the ROCP (Arcadis 2017b).
- The statistical analyses included in Appendix I show that sulfolane concentrations in 50 wells and benzene concentrations in four wells across the plume are decreasing or probably decreasing, while sulfolane concentrations in seven wells and benzene concentrations in four wells across the plume are increasing or probably increasing.
- As expected, sulfolane concentration rebound has occurred at many wells near and downgradient from the GAC West and GRTS recovery systems. In most cases, concentrations have stabilized or the rate of increase in concentration with time is decreasing.
- Horizontal and vertical hydraulic gradients have changed in areas near the recovery wells, as expected. The overall flow patterns in the aquifer beyond the vicinity of the GRTS recovery wells have remained within historical ranges and are expected to continue to vary within similar ranges as those recorded in the past.
- Sulfolane mass flux at the VPT has increased, as was expected. However, the highest concentration in any well in the VPT during the reporting period was 102 µg/L.

The current nature and extent of the COCs is supportive of the cleanup objectives, and the current monitoring network is appropriate for ongoing evaluation of the LNAPL and dissolved-phase plumes.

7 REFERENCES

- ADEC. 2018. Summary of Wells. Email correspondence between ADEC and FHR. June 26.
- Arcadis. 2013. Onsite Site Characterization Report – 2013 Addendum. North Pole Terminal, North Pole, Alaska. DEC File No. 100.38.090. December 20.
- Arcadis. 2017a. Second Semiannual 2016 Onsite Groundwater Monitoring Report. North Pole Terminal, North Pole, Alaska. DEC File No. 100.38.090. January.
- Arcadis. 2017b. Revised Onsite Cleanup Plan. North Pole Terminal, North Pole, Alaska. DEC File No. 100.38.090. February.
- Farhat, S., C. Newell, and E. Nichols. 2006. Mass Flux Toolkit to Evaluate Groundwater Impacts, Attenuation, and Remediation Alternatives. User's Manual. Version 1.0. March.
- ITRC. 2009. Technology Overview Evaluating Natural Source Zone Depletion at Sites with LNAPL. Washington, D.C.: Interstate Technology & Regulatory Council, LNAPLs Team. April.
- ITRC. 2018. LNAPL Update. <https://lnapl-3.itrcweb.org/>. Accessed October 2018.
- Suarez, M., and H. Rifai. 2004. Modeling Natural Attenuation of Total BTEX and Benzene Plumes with Different Kinetics. Ground Water Monitoring & Remediation 24(3):53-68. Summer.
- SWI. 2013. Standard Operating Procedure for Groundwater Elevation Monitoring.
- Wiedemeier, T.H., J.T. Wilson, R.N. Miller, and D.H. Kampbell. 1994. United States Air Force Guidelines for Successfully Supporting Intrinsic Remediation with an Example from Hill Air Force Base. Engineering-Science Inc. Atlanta, GA.

TABLES



**Table 1-1
Field Activities**

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Glint Hills Resource Alaska, LLC
North Pole Terminal, North Pole, Alaska**

Onsite Activity	Frequency during 2018 Q1 and Q3
Groundwater Elevation Monitoring	Semiannual (March and September)
Data Loggers	Downloaded in Q1 and Q2; removed in July 2018.
LNAPL Migration Monitoring	Measurements in Q1 and Q2.
LNAPL Transmissivity Testing	Not conducted.
Sulfolane Network Sampling	Throughout Q1 - Q3
Constituents of Concern (BTEX, GRO, and DRO) Monitoring Network Sampling	Throughout Q1 - Q3
Perfluorinated Compound Monitoring Network Sampling	Throughout Q3
Natural Source Zone Depletion Monitoring Network Sampling	Throughout Q1 - Q3
Hydraulic Capture Performance Monitoring Network GWEs	Not conducted; recovery wells no longer active.
Interim Recovery Well Rehabilitation Services	Not conducted; recovery wells no longer active.
Monitoring Well Repair and Maintenance	No major well repairs in Q1-Q3.
Wells Installed	0 monitoring or observation wells installed
Wells Developed	No wells were developed in Q1-Q3.

General Notes:

Q1 = Represents field activities associated with the sample results received January 1, 2018 through March 31, 2018.

Q2 = Represents field activities associated with the sample results received April 1, 2018 through June 30, 2018.

Q3 = Represents field activities associated with the sample results received July 1, 2018 through September 30, 2018.

Acronyms and Abbreviations:

BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

LNAPL = Light Non-Aqueous Phase Liquid

Table 3-1a
First Quarter 2018 Groundwater Well Field Parameters

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Sample Name	Date	Analysis	Depth to Ice (feet)	Depth to Water (feet)	Depth to LNAPL (feet)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Sample Collection Notes
MW-101A-25	MW-101A-25	2/15/2018	NSZD	--	11.82	--	4.3	1.31	223.5	7.00	-26.1	Clear	> 3 Well Volumes
MW-116-15	MW-116-15	2/14/2018	NSZD	--	10.63	--	2.9	0.14	435.6	6.81	-89.6	Clear	Parameters Stabilized
MW-125-25	MW-125-25	2/14/2018	NSZD	--	12.05	--	4.5	0.12	359.4	7.20	-101.9	Clear	Parameters Stabilized
MW-127-25	MW-127-25	1/15/2018	S	--	12.8	--	5.0	0.13	249.4	7.10	-67.3	Clear	Parameters Stabilized
MW-130-25	MW-130-25	2/14/2018	S, NSZD, COC	--	12.62	--	3.9	0.13	271.3	6.70	-74.1	Clear	Parameters Stabilized
MW-135-20	MW-135-20	2/13/2018	NSZD, COC	--	12.76	--	2.7	0.37	332.4	6.38	-19.1	Clear	> 3 Well Volumes
MW-139-25	MW-139-25	1/19/2018	S, COC	--	13.22	--	4.8	0.06	279.2	6.71	-70.6	Clear	Parameters Stabilized
MW-140-25	MW-140-25	1/19/2018	COC	--	10.96	--	2.8	0.25	265.4	6.74	51.2	Clear	Parameters Stabilized
MW-142-20	MW-142-20	2/13/2018	S, NSZD, COC	--	12.34	--	3.9	0.10	273.9	7.03	-85.0	Clear	Parameters Stabilized
MW-145-20	MW-145-20	2/15/2018	NSZD	--	11.5	--	3.8	0.18	431.7	6.79	31.0	Clear	Parameters Stabilized
MW-148A-15	MW-148A-15	1/16/2018	S	--	10.03	--	2.4	0.92	158.6	6.17	65.1	Clear	Parameters Stabilized
MW-148B-30	MW-148B-30	1/16/2018	S	--	10.33	--	3.1	0.07	231.0	6.79	-32.5	Clear	Parameters Stabilized
MW-148C-55	MW-148C-55	1/18/2018	S	--	10.45	--	3.6	0.07	368.0	6.83	-1.1	Clear	Parameters Stabilized
MW-148-80	MW-148-80	1/18/2018	S	--	10.58	--	4.3	0.04	325.8	7.02	-25.6	Clear	Parameters Stabilized
MW-154B-95	MW-154B-95	2/13/2018	S	--	14.2	--	4.4	0.09	232.2	7.14	-62.3	Clear	Parameters Stabilized
MW-176A-15	MW-176A-15	1/19/2018	S	--	13.13	11.33	Product present, no parameters recorded.						> 1 Well Volumes
MW-180A-15	MW-180A-15	2/14/2018	NSZD	--	11.77	--	1.8	0.16	168.5	6.96	-6.2	Clear	Parameters Stabilized
MW-186A-15	MW-186A-15	2/13/2018	S	--	12.32	11.9	Product well, no parameters collected						> 1 Well Volumes
MW-186E-75	MW-186E-75	1/18/2018	S	--	11.43	--	4.0	0.04	326.4	6.97	42.4	Clear	Parameters Stabilized
MW-192A-15	MW-192A-15	2/15/2018	NSZD	--	10.21	--	5.9	0.17	232.9	6.90	244.6	Clear	Parameters Stabilized
MW-301-CMT-20	MW-301-CMT-20	1/18/2018	S	--	8.97	--	6.6	0.12	231.6	7.23	-60.0	Clear	Parameters Stabilized
MW-301-60	MW-301-60	1/16/2018	S	--	9.12	--	6.3	0.07	217.5	7.19	151.6	Clear	> 3 Well Volumes
MW-302-CMT-20	MW-302-CMT-20	2/12/2018	S	--	10.9	--	4.0	0.12	227.1	7.04	19.5	Clear	> 3 Well Volumes
MW-302-CMT-50	MW-302-CMT-50	2/12/2018	S	--	10.91	--	4.4	0.17	213.3	7.15	-35.6	Clear	Parameters Stabilized
MW-302-80	MW-302-80	2/13/2018	S	--	10.15	--	5.1	0.12	212.5	7.09	105.4	Clear	Parameters Stabilized
MW-303-CMT-19	MW-303-CMT-19	2/12/2018	S	--	12.55	--	3.4	0.12	230.2	7.14	-49.6	Clear	> 3 Well Volumes
MW-303-CMT-39	MW-303-CMT-39	2/12/2018	S	--	12.55	--	3.7	0.13	224.6	7.24	-76.8	Clear	Parameters Stabilized
MW-303-CMT-59	MW-303-CMT-59	2/12/2018	S	--	12.55	--	3.9	0.17	196.3	7.26	-65.2	Clear	Parameters Stabilized
MW-303-80	MW-303-80	2/15/2018	S	--	8.29	--	4.7	1.15	199.5	7.16	101.3	Clear	Parameters Stabilized
MW-304-CMT-20	MW-304-CMT-20	2/12/2018	S	--	14.14	--	3.8	0.11	313.2	6.82	-32.5	Clear	Parameters Stabilized
MW-304-CMT-40	MW-304-CMT-40	2/13/2018	S	--	14.15	--	3.8	0.20	219.9	7.14	2.4	Clear	Parameters Stabilized
MW-304-CMT-60	MW-304-CMT-60	2/13/2018	S	--	14.15	--	3.7	0.21	202.0	7.21	-6.2	Clear	> 3 Well Volumes
MW-304-80	MW-304-80	2/13/2018	S	--	13.27	--	4.3	0.07	203.7	7.09	147.9	Clear	Parameters Stabilized
MW-305-CMT-28	MW-305-CMT-28	1/18/2018	S	--	12.65	--	4.1	0.12	223.7	7.13	67.4	Clear	Parameters Stabilized
MW-305-CMT-48	MW-305-CMT-48	1/18/2018	S	--	12.62	--	3.8	0.13	205.6	7.19	32.8	Clear	Parameters Stabilized
MW-321-15	MW-321-15	2/15/2018	NSZD	--	10.8	--	3.6	0.11	240.0	7.01	-84.2	Clear	Parameters Stabilized
MW-330-20	MW-330-20	1/16/2018	S	--	15.1	--	5.4	0.13	288.9	6.66	89.8	Clear	Parameters Stabilized
MW-334-15	MW-334-15	2/13/2018	S	--	13.3	12.88	Product present, no parameters recorded.						> 1 Well Volumes
MW-334-65	MW-334-65	1/18/2018	S	--	11.36	--	3.9	0.05	337.5	6.95	77.2	Clear	Parameters Stabilized
MW-336-20	MW-336-20	2/15/2018	S, NSZD	--	7.75	--	3.3	1.24	374.6	6.60	-60.9	Clear	Parameters Stabilized
MW-344-15	MW-344-15	1/18/2018	S, COC	--	9.17	--	3.0	0.24	253.2	6.51	37.7	Clear	> 3 Well Volumes
MW-345-15	MW-345-15	2/12/2018	COC, S	--	11.54	--	2.5	0.16	313.7	6.99	-84.2	Clear	Parameters Stabilized
MW-345-55	MW-345-55	1/16/2018	S	--	11.65	--	4.1	0.08	212.8	7.20	-6.0	Clear	Parameters Stabilized
MW-354-35	MW-354-35	1/16/2018	S	--	11.6	--	4.7	0.08	223.5	6.87	-31.9	Clear	Parameters Stabilized
MW-369-16	MW-369-16	2/15/2018	NSZD	--	14.05	--	4.5	0.10	291.0	6.82	-10.5	Clear	Parameters Stabilized
MW-372-15	MW-372-15	1/16/2018	S	--	15.4	--	4.2	0.28	605	6.57	131.7	Clear	> 3 Well Volumes
O-1	O-1	1/16/2018	S	--	11.48	--	2.2	0.15	257.0	6.98	-78.9	Clear	Parameters Stabilized
O-2	O-2	1/19/2018	S	--	12.99	12.78	Product present, no parameters recorded. COC not collected.						> 1 Well Volumes

Table 3-1a
First Quarter 2018 Groundwater Well Field Parameters

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Sample Name	Date	Analysis	Depth to Ice (feet)	Depth to Water (feet)	Depth to LNAPL (feet)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Sample Collection Notes
O-11	O-11	1/15/2018	S	--	13.8	--	4.2	0.19	338.2	6.79	-93.0	Clear	Parameters Stabilized
O-12	O-12	1/15/2018	S	--	12.21	--	4.6	0.09	233.5	7.05	-102.5	Clear	Parameters Stabilized
O-13	O-13	1/19/2018	S	--	11.17	11.14	Product present, no parameters recorded.						> 1 Well Volumes
O-15	O-15	2/15/2018	NSZD	--	12.54	--	3.3	0.20	239.1	6.62	76.7	Clear	Parameters Stabilized
O-19	O-19	1/19/2018	S	--	11.93	--	Strong odor, no parameters collected						> 1 Well Volumes
O-19-90	O-19-90	1/18/2018	S	--	11.48	--	4.3	0.05	199.0	7.01	92.2	Clear	Parameters Stabilized
O-24	O-24	1/15/2018	S	--	12.87	--	4.1	0.21	298.9	6.67	-89.0	Clear	> 3 Well Volumes
O-26	O-26	1/15/2018	S	--	12.9	--	4.1	0.22	353.0	7.09	-90.7	Clear	Parameters Stabilized
O-27	O-27	2/13/2018	S	--	13.77	12.97	Subproduct sample, no parameters collected						> 1 Well Volumes
O-31	O-31	1/19/2018	S	--	12.15	11.8	Product well, no parameters collected						> 1 Well Volumes
O-34	O-34	1/19/2018	S	--	11.23	11.21	Product well, no parameters collected						> 1 Well Volumes
R-21	R-21	2/13/2018	S	--	11.42	11.4							> 1 Well Volumes
R-35R	R-35R	2/13/2018	S, COC	--	9.72	--	Subproduct sample, no parameters collected						> 1 Well Volumes
R-39	R-39	2/12/2018	COC	--	10.86	--	4.3	0.17	285.7	6.86	-27.0	Clear	Parameters Stabilized
R-40	R-40	1/19/2018	S	--	10	--	Subproduct sample, no parameters collected						> 1 Well Volumes
S-9	S-9	2/12/2018	COC	--	11.36	--	4.2	0.13	245.2	6.91	-52.6	Clear	Parameters Stabilized
S-51	S-51	1/19/2018	S	--	11.53	11.26	Product present, no parameters recorded.						> 1 Well Volumes

Acronyms and Abbreviations:
-- = not applicable
> = greater than
°C = degrees Celsius
BTEX = benzene, toluene, ethylbenzene, xylenes
COC = contaminants of concern (BTEX, GRO, and DRO)
CMT = continuous multichannel tubing
DRO = diesel range organics
ft. = feet
GRO = gasoline range organics
LNAPL = light-nonaqueous-phase liquid
mg/L = milligrams per liter
mV = millivolts
MW = Monitoring Well
NZSD = natural source zone depletion (BTEX, GRO, DRO, oxygen, sulfate, dissolved iron and manganese, and methane)
ORP = oxidation-reduction potential
PFC = perfluorinated compounds (perfluorooctane sulfonate and perfluorooctanoic acid)
S = sulfolane
µS/cm = microsiemens per centimeter

Table 3-1b
Second Quarter 2018 Groundwater Well Field Parameters

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Sample Name	Date	Analysis	Depth to Ice (feet)	Depth to Water (feet)	Depth to LNAPL (feet)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Sample Collection Notes
MW-101A-25	MW-101A-25	4/10/2018	NSZD	--	11.75	--	4.2	1.31	231.8	7.16	-45.5	Clear	Parameters Stabilized
MW-116-15	MW-116-15	4/10/2018	NSZD	--	10.62	--	2.1	1.44	414.6	6.71	-86.3	Clear	Parameters Stabilized
MW-125-25	MW-125-25	4/5/2018	NSZD	--	12.06	--	4.0	1.54	352.9	7.18	-100.6	Clear	Parameters Stabilized
MW-127-25	MW-127-25	4/5/2018	S	--	13.11	--	3.7	1.89	240.9	6.97	-57.4	Clear	Parameters Stabilized
MW-130-25	MW-130-25	4/10/2018	S, COC, NSZD	--	12.61	--	3.0	1.48	268.6	6.66	-75.5	Clear	Parameters Stabilized
MW-135-20	MW-135-20	4/4/2018	COC, NSZD	--	12.68	--	2.0	0.36	327.2	6.59	-47.3	Clear	Parameters Stabilized
MW-139-25	MW-139-25	4/4/2018	S, COC	--	13.4	--	3.3	0.11	272.6	7.06	-85.9	Clear	Parameters Stabilized
MW-142-20	MW-142-20	4/26/2018	NSZD	--	11.99	--	3.2	0.7	273.9	7.01	-82.9	Clear	Parameters Stabilized
MW-145-20	MW-145-20	4/5/2018	NSZD	--	11.48	--	3.4	1.40	422.0	6.72	2.2	Clear	Parameters Stabilized
MW-154B-95	MW-154B-95	4/6/2018	S	--	14.19	--	4.5	0.14	229.1	7.34	-84.2	Clear	Parameters Stabilized
MW-180A-15	MW-180A-15	4/11/2018	NSZD	--	11.79	--	1.5	1.92	199.5	6.73	-1.1	Clear	Parameters Stabilized
MW-186A-15	MW-186A-15	4/3/2018	S	--	12.15	11.81	Product present - no parameters recorded.						> 1 Well Volume
MW-186E-75	MW-186E-75	4/5/2018	S	--	11.72	--	4.3	0.12	212.4	7.33	40.8	Clear	Parameters Stabilized
MW-192A-15	MW-192A-15	4/10/2018	NSZD	--	10.17	--	5.6	1.40	237.0	6.85	88.2	Clear	Parameters Stabilized
MW-301-CMT-20	MW-301-CMT-20	4/4/2018	S	--	9.45	--	5.3	0.12	238.4	7.34	-60.9	Clear	Parameters Stabilized
MW-301-60	MW-301-60	4/6/2018	S	--	9.41	--	6.6	0.15	229.0	7.30	-13.7	Clear	Parameters Stabilized
MW-302-CMT-20	MW-302-CMT-20	4/5/2018	S	--	10.86	--	3.9	0.20	236.5	7.27	-16.0	Clear	Parameters Stabilized
MW-302-CMT-50	MW-302-CMT-50	4/5/2018	S	--	10.87	--	4.6	0.13	223.1	7.32	-56.0	Clear	Parameters Stabilized
MW-302-80	MW-302-80	4/5/2018	S	--	10.1	--	5.2	0.08	222.6	7.31	-28.1	Clear	Parameters Stabilized
MW-303-CMT-19	MW-303-CMT-19	4/5/2018	S	--	12.56	--	3.3	0.17	246.6	7.28	-60.6	Clear	Parameters Stabilized
MW-303-CMT-39	MW-303-CMT-39	4/5/2018	S	--	12.57	--	4.1	0.10	240.4	7.37	-89.4	Clear	Parameters Stabilized
MW-303-CMT-59	MW-303-CMT-59	4/5/2018	S	--	12.58	--	4.3	0.12	231.0	7.38	-95.3	Clear	Parameters Stabilized
MW-303-80	MW-303-80	4/5/2018	S	--	8.25	--	5.1	0.06	212.3	7.36	-43.5	Clear	Parameters Stabilized
MW-304-CMT-20	MW-304-CMT-20	4/11/2018	S	--	14.1	--	4.0	1.78	393.6	6.73	-14.5	Clear	Parameters Stabilized
MW-304-CMT-40	MW-304-CMT-40	4/11/2018	S	--	14.12	--	4.3	1.67	226.0	7.17	-47.5	Clear	Parameters Stabilized
MW-304-CMT-60	MW-304-CMT-60	4/11/2018	S	--	14.09	--	4.2	1.59	207.8	7.14	-27.8	Clear	Parameters Stabilized
MW-304-80	MW-304-80	4/6/2018	S	--	13.25	--	4.4	0.07	214.8	7.3	122.5	Clear	Parameters Stabilized
MW-305-CMT-28	MW-305-CMT-28	4/11/2018	S	--	12.94	--	4.0	9.21	230.1	7.08	-14.7	Clear	Parameters Stabilized
MW-305-CMT-48	MW-305-CMT-48	4/11/2018	S	--	12.93	--	4.2	1.77	215.1	7.12	-18.0	Clear	Parameters Stabilized
MW-321-15	MW-321-15	4/10/2018	NSZD	--	10.79	--	3.2	1.57	296.3	6.96	-82.5	Clear	Parameters Stabilized
MW-334-15	MW-334-15	4/3/2018	S	--	13.34	12.78	Product present - no parameters recorded. No COC sample collected.						> 1 Well Volume
MW-334-65	MW-334-65	4/6/2018	S	--	11.69	--	4.0	0.08	214.0	7.18	134.3	Clear	Parameters Stabilized
MW-336-20	MW-336-20	4/11/2018	NSZD	--	9.66	--	2.8	1.67	389.5	6.57	-49.1	Clear	Parameters Stabilized
MW-344-15	MW-344-15	4/4/2018	S	--	9.5	--	2.5	0.34	263.7	7	-9.3	Clear	Parameters Stabilized
MW-345-15	MW-345-15	4/4/2018	S, COC	--	11.55	--	1.5	0.35	307.7	7.24	-106.8	Clear	Parameters Stabilized
MW-345-55	MW-345-55	4/4/2018	S	--	11.94	--	4.2	0.08	223.4	7.32	-46.4	Clear	Parameters Stabilized
MW-345-55	MW-345-55	4/6/2018	S	--	11.95	--	4.4	0.06	224.6	7.32	-45.7	Clear	Parameters Stabilized
MW-369-16	MW-369-16	4/11/2018	NSZD	--	14.04	--	4.1	2.16	264.5	6.66	-19.3	Clear	> 3 Well Volumes
O-2	O-2	4/3/2018	S	--	13.28	13.10	Product present - no parameters recorded. No COC sample collected.						> 1 Well Volume
O-11	O-11	4/3/2018	S	--	14.28	13.89	Product present - no parameters recorded						> 1 Well Volume
O-12	O-12	4/5/2018	S	--	12.52	--	3.5	1.47	232.3	7.02	-83.1	Clear	Parameters Stabilized
O-13	O-13	4/3/2018	S	--	11.7	11.35	Product present - no parameters recorded.						> 1 Well Volume
O-15	O-15	4/11/2018	NSZD	--	12.55	--	2.4	1.61	229.5	6.49	49.8	Clear	> 3 Well Volumes
O-19	O-19	4/3/2018	S	--	12.6	12.15	Product present - no parameters recorded.						> 1 Well Volume
O-19-90	O-19-90	4/5/2018	S	--	11.78	--	4.4	0.09	208.6	7.34	29.3	Clear	Parameters Stabilized
O-27	O-27	4/3/2018	S	--	13.7	12.88	Product present - no parameters recorded.						> 1 Well Volume
O-31	O-31	4/3/2018	S	--	12.71	12.00	Product present - no parameters recorded.						> 1 Well Volume
R-21	R-21	4/4/2018	S	--	11.39	11.36	Product present - no parameters recorded. No COC sample collected.						> 1 Well Volume

Table 3-1b
Second Quarter 2018 Groundwater Well Field Parameters

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Sample Name	Date	Analysis	Depth to Ice (feet)	Depth to Water (feet)	Depth to LNAPL (feet)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)	Water Clarity	Sample Collection Notes
R-35R	R-35R	4/4/2018	S	--	9.69	9.69	Product present - no parameters recorded. No COC sample collected.						> 1 Well Volume
R-40	R-40	4/4/2018	S	--	10.29	10.29	Product present - no parameters recorded. No COC sample collected.						> 1 Well Volume
R-39	R-39	4/10/2018	COC	--	10.82	--	4.0	1.89	281.0	6.90	-60.4	Clear	Parameters Stabilized
S-51	S-51	4/3/2018	S	--	12.51	11.45	Product present - no parameters recorded.						> 1 Well Volume

Acronyms and Abbreviations:

-- = not applicable
> = greater than
°C = degrees Celsius
BTEX = benzene, toluene, ethylbenzene, xylenes
COC = contaminants of concern (BTEX, GRO, and DRO)
CMT = continuous multichannel tubing
DRO = diesel range organics
ft. = feet
GRO = gasoline range organics
LNAPL = light-nonaqueous-phase liquid
mg/L = milligrams per liter
mV = millivolts
MW = Monitoring Well
NZSD = natural source zone depletion (BTEX, GRO, DRO, oxygen, sulfate, dissolved iron and manganese, and methane)
ORP = oxidation-reduction potential
PFC = perfluorinated compounds (perfluorooctane sulfonate and perfluorooctanoic acid)
S = sulfolane
µS/cm = microsiemens per centimeter

Table 3-1c
Third Quarter 2018 Groundwater Well Field Parameters

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Sample Name	Date	Analysis	Depth to Water (feet)	Depth to LNAPL (feet)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	ORP (mV)	Water Clarity	Sample Collection Notes
MW-101A-25	MW-101A-25	8/2/2018	COC, NSZD	10.15	—	4.4	0.15	231.8	6.70	62.2	Clear	> 3 Well Volumes
MW-116-15	MW-116-15	8/8/2018	NSZD	8.3	—	6.3	0.12	562	6.55	-69.6	Clear	> 3 Well Volumes
MW-125-25	MW-125-25	8/7/2018	NSZD	10.04	—	4.1	1.95	344.7	6.95	-112.3	Clear	Parameters Stabilized
MW-127-25	MW-127-25	7/10/2018	S	11.25	—	3.6	0.21	240.6	6.69	8.3	Clear	> 3 Well Volumes
MW-130-25	MW-130-25	8/8/2018	NSZD	10.45	—	4.5	0.07	278.7	6.46	-50.4	Clear	> 3 Well Volumes
MW-131-25	MW-131-25	7/19/2018	BTEX, GRO,DRO	10.87	—	4.1	0.05	276.6	6.23	109.6	Clear	Parameters Stabilized
MW-135-20	MW-135-20	8/8/2018	NSZD	10.65	—	7.1	0.07	132.1	6.58	-36.3	Clear	Parameters Stabilized
MW-137-20	MW-137-20	7/19/2018	BTEX,GRO,DRO	11.51	—	3.5	0.04	390.5	6.58	-14.4	Clear	> 3 Well Volumes
MW-139-25	MW-139-25	8/8/2018	S, COC	11.44	—	3.4	0.07	260.2	6.57	-27.1	Clear	> 3 Well Volumes
MW-140-25	MW-140-25	8/8/2018	COC	9.28	—	3.3	0.21	257.4	6.59	161.6	Clear	> 3 Well Volumes
MW-142-20	MW-142-20	8/3/2018	S, COC, NSZD	11.73	—	4.0	0.06	257.9	6.91	-89.3	Clear	Parameters Stabilized
MW-143-20	MW-143-20	8/3/2018	COC	9.96	—	5.0	0.19	254.9	6.83	8.0	Clear	> 3 Well Volumes
MW-145-20	MW-145-20	8/3/2018	COC, NSZD	9.92	—	4.8	0.05	460.9	6.59	35.8	Clear	> 3 Well Volumes
MW-148-80	MW-148-80	7/16/2018	S	9.23	—	4.5	0.12	212.5	7.40	-48.8	Clear	Parameters Stabilized
MW-148A-15	MW-148A-15	7/16/2018	S	9.17	—	4.8	0.90	209.1	6.56	72.7	Clear	Parameters Stabilized
MW-148B-30	MW-148B-30	7/16/2018	S	9.01	—	2.9	0.07	251.9	7.10	-27.9	Clear	Parameters Stabilized
MW-148C-55	MW-148C-55	7/16/2018	S	9.23	—	4.0	0.09	234.0	7.28	-53.5	Clear	Parameters Stabilized
MW-154B-95	MW-154B-95	8/7/2018	S, COC	12.12	—	4.6	1.72	242.5	7.04	-89.3	Clear	Parameters Stabilized
MW-176A-15	MW-176A-15	8/8/2018	S	9.71	9.71	Product Present - no parameters collected					Clear	> 3 Well Volumes
MW-180A-15	MW-180A-15	8/8/2018	NSZD	9.56	—	9.3	0.08	266.5	6.69	-15.9	Clear	Parameters Stabilized
MW-186A-15	MW-186A-15	7/17/2018	S	10.24	—	5.6	0.08	337.0	6.99	-53.4	Clear	Parameters Stabilized
MW-186B-60	MW-186B-60	7/18/2018	S	10.13	—	4.7	0.10	201.9	6.87	62.1	Clear	Parameters Stabilized
MW-192A-15	MW-192A-15	8/7/2018	NSZD	7.75	—	7.3	2.01	240.1	6.71	92.9	Clear	Parameters Stabilized
MW-302-CMT-20	MW-302-CMT-20	7/11/2018	S	8.96	—	4.4	0.16	230.4	6.71	111.4	Clear	Parameters Stabilized
MW-303-CMT-19	MW-303-CMT-19	7/11/2018	S	10.5	—	4.2	1.98	253.4	6.78	53.3	Clear	> 3 Well Volumes
MW-303-CMT-39	MW-303-CMT-39	8/2/2018	S, COC	10.79	—	5.1	0.10	242.8	6.96	-1.7	Clear	> 3 Well Volumes
MW-303-CMT-59	MW-303-CMT-59	7/11/2018	S	10.51	—	5.2	0.18	225.7	7.01	18.1	Clear	Parameters Stabilized
MW-304-CMT-20	MW-304-CMT-20	7/13/2018	S	12.47	—	5.4	0.05	399.4	6.60	43.5	Clear	Parameters Stabilized
MW-304-CMT-40	MW-304-CMT-40	7/17/2018	S	12.51	—	4.5	0.18	227.4	6.51	119.8	Clear	Parameters Stabilized
MW-304-CMT-60	MW-304-CMT-60	7/17/2018	S	12.47	—	4.8	0.09	208.7	6.4	102.1	Clear	Parameters Stabilized
MW-305-CMT-28	MW-305-CMT-28	7/18/2018	S	11.33	—	6.1	0.09	246.1	6.95	48.6	Clear	Parameters Stabilized
MW-309-15	MW-309-15	8/7/2018	S, PFCs	8.73	—	3.7	0.08	262.7	6.73	-10.2	Clear	> 3 Well Volumes
MW-310-15	MW-310-15	7/10/2018	S	8.53	—	6.0	0.26	312.9	6.20	69.4	Clear	> 3 Well Volumes
MW-321-15	MW-321-15	8/7/2018	NSZD, PFCs	8.64	—	5.8	0.16	334.3	6.32	-2.8	Clear	> 3 Well Volumes
MW-330-20	MW-330-20	7/10/2018	S	13.49	—	6.1	1.22	269.0	6.55	58.6	Clear	> 3 Well Volumes
MW-334-15	MW-334-15	7/10/2018	S	11.03	—	4.5	1.31	358.1	6.63	-29.6	Clear	> 3 Well Volumes
MW-336-20	MW-336-20	8/8/2018	S, NSZD	5.42	—	9.0	0.13	449.5	6.45	-23.7	Clear	Parameters Stabilized
MW-345-15	MW-345-15	7/19/2018	S, BTEX, GRO, DRO	9.91	—	5.2	0.22	319.2	6.49	-18.9	Clear	> 3 Well Volumes
MW-345-55	MW-345-55	7/13/2018	S	10.05	—	5.2	0.02	217.4	6.74	75.8	Clear	Parameters Stabilized
MW-345-75	MW-345-75	7/13/2018	S	9.71	—	4.8	0.03	214.7	6.92	60.5	Clear	Parameters Stabilized
MW-354-35	MW-354-35	7/18/2018	S	10.21	—	4.2	0.03	228.6	7.00	-17.1	Clear	> 3 Well Volumes
MW-358-20	MW-358-20	8/7/2018	S, PFCs	10.45	—	5.7	0.03	266.8	6.85	35.6	Clear	Parameters Stabilized
MW-358-40	MW-358-40	7/11/2018	S	10.26	—	4.7	0.10	241.2	6.94	23.2	Clear	Parameters Stabilized
MW-358-60	MW-358-60	8/2/2018	S	9.81	—	5.5	0.07	215.8	6.91	78.4	Clear	Parameters Stabilized
MW-359-15	MW-359-15	8/7/2018	S, PFCs	10.15	—	7.3	0.67	290.4	6.41	70.9	Clear	Parameters Stabilized
MW-359-35	MW-359-35	8/7/2018	S, PFCs	9.98	—	3.9	0.03	239.1	6.81	50.8	Clear	Parameters Stabilized
MW-359-60	MW-359-60	8/2/2018	S	10.37	—	4.8	0.06	216.0	6.88	53.0	Clear	Parameters Stabilized
MW-360-15	MW-360-15	7/11/2018	S	10.29	—	4.9	0.40	357.1	6.47	17.8	Clear	Parameters Stabilized

Table 3-1c
Third Quarter 2018 Groundwater Well Field Parameters

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Sample Name	Date	Analysis	Depth to Water (feet)	Depth to LNAPL (feet)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	ORP (mV)	Water Clarity	Sample Collection Notes
MW-360-35	MW-360-35	7/11/2018	S	10.26	—	3.8	0.09	256.7	6.90	-15.8	Clear	Parameters Stabilized
MW-360-50	MW-360-50	7/11/2018	S	10.19	—	4.2	0.07	258.9	6.91	-10.0	Clear	Parameters Stabilized
MW-362-15	MW-362-15	8/7/2018	PFCs	9.84	—	9.1	0.06	264.8	6.89	63.3	Clear	Parameters Stabilized
MW-362-25	MW-362-25	8/7/2018	PFCs	10.42	—	6.3	0.05	235.0	7.04	42.3	Clear	Parameters Stabilized
MW-364-15	MW-364-15	8/7/2018	PFCs	9.63	—	5.7	0.08	203.5	6.62	23.8	Clear	Parameters Stabilized
MW-364-30	MW-364-30	8/7/2018	PFCs	9.97	—	3.3	0.05	204.3	6.95	4.4	Clear	Parameters Stabilized
MW-369-16	MW-369-16	8/8/2018	NSZD	11.78	—	5.7	1.53	276.1	6.71	-13.3	Clear	> 3 Well Volumes
MW-371-15	MW-371-15	8/3/2018	S, COC	10.83	—	6.2	0.07	296.6	6.61	10.0	Clear	> 3 Well Volumes
MW-372-15	MW-372-15	8/8/2018	S	13.35	—	6.6	1.75	421	6.44	97.4	Clear	> 3 Well Volumes
O-1	O-1	7/18/2018	S	10.12	—	7.0	0.36	272.9	6.23	94.1	Clear	> 3 Well Volumes
O-2	O-2	7/10/2018	S	11.34	—	6.3	0.14	312.0	6.44	-10.1	Clear	Parameters Stabilized
O-3	O-3	8/7/2018	COC	11.79	—	6.4	2.44	594	6.72	-59.3	Clear	Parameters Stabilized
O-4	O-4	7/19/2018	BTEX, GRO, DRO	11.02	—	5.9	0.05	302.3	6.46	62.9	Clear	> 3 Well Volumes
O-11	O-11	7/10/2018	S	12.14	—	6.6	0.26	433.9	6.21	-4.2	Clear	Parameters Stabilized
O-15	O-15	8/7/2018	NSZD	10.4	—	5.7	1.87	239.9	6.52	37.7	Clear	Parameters Stabilized
O-24	O-24	7/19/2018	S, BTEX, GRO, DRO	11.49	—	12.5	0.52	436.5	6.50	12.6	Clear	> 3 Well Volumes
O-26	O-26	7/10/2018	S	11.36	—	4.0	0.18	354.0	6.87	-66.2	Clear	Parameters Stabilized
O-26-65	O-26-65	7/18/2018	S	11.17	—	4.5	0.06	207.9	6.91	61.4	Clear	Parameters Stabilized
O-27	O-27	7/17/2018	S	11.4	11.39	3.9	0.10	338.4	6.48	58.9	Clear	Parameters Stabilized
O-27-65	O-27-65	7/13/2018	S	11.71	—	5.2	0.03	216.9	7.00	69.5	Clear	Parameters Stabilized
O-34	O-34	7/17/2018	S	9.89	—	5.1	0.11	349.4	6.58	6.1	Clear	> 3 Well Volumes
S-9	S-9	8/3/2018	COC	9.75	—	4.4	0.06	248.7	6.77	-42.3	Clear	> 3 Well Volumes
S-51	S-51	7/17/2018	S	9.97	9.96	7.4	1.59	455.1	6.48	-50.6	Clear	Parameters Stabilized

Acronyms and Abbreviations:

- = not applicable
- > = greater than
- °C = degrees Celsius
- BTEX = benzene, toluene, ethylbenzene, xylenes
- COC = contaminants of concern (BTEX, GRO, and DRO)
- CMT = continuous multichannel tubing
- DRO = diesel range organics
- ft. = feet
- GRO = gasoline range organics
- LNAPL = light-nonaqueous-phase liquid
- mg/L = milligrams per liter
- mV = millivolts
- MW = Monitoring Well
- NZSD = natural source zone depletion (BTEX, GRO, DRO, oxygen, sulfate, dissolved iron and manganese, and methane)
- ORP = oxidation-reduction potential
- PFC = perfluorinated compounds (perfluorooctane sulfonate and perfluorooctanoic acid)
- S = sulfolane
- µS/cm = microsiemens per centimeter

Table 3-2a
First Quarter 2018 Groundwater Elevation, Surface Water Elevation, and Depth to LNAPL Monitoring Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Date	Riser Elevation † (MSL feet)	Depth to LNAPL (feet)	Depth to Water (feet)	Corrected Water Table Elevation ‡ (MSL feet)
MW-104-65	10-55	3/12/2018	496.03	--	12.56	483.47
MW-142-20	Water Table	3/12/2018	495.89	--	12.29	483.60
MW-144BR-90	55-90	3/12/2018	495.02	--	11.09	483.93
MW-145-20	Water Table	3/12/2018	495.64	--	11.45	484.19
MW-149A-15	Water Table	3/13/2018	493.22	--	10.59	482.63
MW-173B-150	90-160	3/12/2018	496.41	--	12.40	484.01
MW-174-15	Water Table	3/12/2018	494.51	--	9.95	484.56
MW-174A-50	10-55	3/12/2018	493.67	--	9.10	484.57
MW-174B-90	55-90	3/12/2018	493.58	--	9.05	484.53
MW-176A-15	Water Table	3/12/2018	497.22	11.52	14.10	485.22
MW-176B-50	10-55	3/12/2018	497.03	--	11.76	485.27
MW-186A-15	Water Table	3/12/2018	495.98	11.81	12.22	484.09
MW-186B-60	10-55	3/12/2018	495.95	--	11.80	484.15
MW-192A-15	Water Table	3/12/2018	496.34	--	10.14	486.20
MW-192B-55	10-55	3/12/2018	495.65	--	9.44	486.21
MW-300-150	90-160	3/12/2018	496.03	--	10.58	485.45
MW-301-60	10-55	3/12/2018	492.87	--	9.37	483.50
MW-302-80	55-90	3/13/2018	493.67	--	10.04	483.63
MW-302-CMT-50	10-55	3/13/2018	494.16	--	10.74	483.42
MW-303-80	55-90	3/13/2018	491.62	--	8.17	483.45
MW-303-CMT-59	10-55	3/13/2018	495.70	--	12.54	483.16
MW-306-80	55-90	3/12/2018	496.54	--	13.24	483.30
MW-309-15	Water Table	3/12/2018	494.77	--	10.74	484.03
MW-310-110	90-160	3/12/2018	493.83	--	9.81	484.02
MW-310-15	Water Table	3/12/2018	494.26	--	10.38	483.88
MW-321-15	Water Table	3/12/2018	495.54	--	10.74	484.80
MW-321-151	90-160	3/15/2018	495.27	--	10.44	484.83
MW-334-15	Water Table	3/12/2018	497.01	12.78	13.32	484.12
MW-336-20	Water Table	3/12/2018	493.33	--	7.69	485.64
MW-358-20	Water Table	3/13/2018	495.58	--	12.44	483.14
MW-358-40	10-55	3/13/2018	495.25	--	12.12	483.13
MW-358-60	10-55	3/13/2018	495.52	--	12.39	483.13
MW-359-15	Water Table	3/13/2018	495.20	--	12.05	483.15
MW-359-60	10-55	3/13/2018	495.06	--	11.86	483.20
MW-359-80	55-90	3/13/2018	495.06	--	11.95	483.11
MW-360-15	Water Table	3/13/2018	495.02	--	12.30	482.72
MW-360-150	90-160	3/13/2018	494.66	--	11.60	483.06
MW-360-50	10-55	3/13/2018	494.94	--	11.93	483.01

Table 3-2a
First Quarter 2018 Groundwater Elevation, Surface Water Elevation, and Depth to LNAPL Monitoring Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Date	Riser Elevation † (MSL feet)	Depth to LNAPL (feet)	Depth to Water (feet)	Corrected Water Table Elevation ‡ (MSL feet)
MW-360-80	55-90	3/13/2018	494.53	--	11.52	483.01
MW-362-15	Water Table	3/13/2018	495.24	--	11.90	483.34
MW-362-150	90-160	3/13/2018	495.43	--	12.10	483.33
MW-362-50	10-55	3/13/2018	495.16	--	11.79	483.37
MW-364-15	Water Table	3/13/2018	494.16	--	11.42	482.74
MW-364-65	10-55	3/13/2018	494.07	--	11.26	482.81
MW-364-90	55-160	3/13/2018	494.25	--	11.48	482.77
MW-366-15	Water Table	3/12/2018	493.59	7.83	7.90	485.75
North Gravel Pit	Surface Water	3/12/2018	492.78	--	9.00	483.78
O-34	Water Table	3/12/2018	496.52	11.57	11.58	484.95

General Notes:

If LNAPL is present, the water table elevation is corrected according to the following formula (riser elevation - depth to water) + (0.8 x LNAPL thickness)

-- = A water sounder was used to measure the depth to water.

† = Wells may have been surveyed multiple times in the reporting period. The corrected groundwater elevation values were calculated using the most recent surveyed elevations relative to the date of gauging.

‡ = At locations where the LNAPL specific gravity has not been determined, a specific gravity of 0.8 is used to calculate corrected groundwater elevation.

Acronyms and Abbreviations:

CMT = continuous multichannel tubing

LNAPL = Light Non-Aqueous Phase Liquid

MSL = mean sea level

MW = Monitoring Well

Sheen = LNAPL thickness was less than 0.01 feet and was not detected with an air/product/water interface probe; product was detected visually.

Table 3-2b
Third Quarter 2018 Groundwater Elevation, Surface Water Elevation, and Depth to LNAPL Monitoring Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Date	Riser Elevation (MSL feet)	Depth to LNAPL (feet)	Depth to Water (feet)	Corrected Water Table Elevation (MSL feet)
MW-104-65	10-55	9/10/2018	496.03	--	10.74	485.29
MW-142-20	Water Table	9/10/2018	495.83	--	10.54	485.29
MW-144BR-90	55-90	9/10/2018	495.03	--	9.26	485.77
MW-145-20	Water Table	9/10/2018	495.63	--	9.63	486.00
MW-149A-15	Water Table	9/10/2018	493.20	--	8.89	484.31
MW-173B-150	90-160	9/10/2018	496.33	--	10.49	485.84
MW-174-15	Water Table	9/10/2018	494.43	--	8.19	486.24
MW-174A-50	10-55	9/10/2018	493.59	--	7.35	486.24
MW-174B-90	55-90	9/10/2018	493.49	--	7.32	486.17
MW-176A-15	Water Table	9/10/2018	497.11	10.12	10.13	486.99
MW-176B-50	10-55	9/10/2018	496.93	--	9.95	486.98
MW-186A-15	Water Table	9/10/2018	495.98	No LNAPL	10.07	485.91
MW-186B-60	10-55	9/10/2018	495.97	--	10.00	485.97
MW-192A-15	Water Table	9/10/2018	496.28	--	8.35	487.93
MW-192B-55	10-55	9/10/2018	495.59	--	7.63	487.96
MW-198-150	90-160	9/10/2018	493.16	--	5.97	487.19
MW-300-150	90-160	9/10/2018	495.94	--	8.77	487.17
MW-301-60	10-55	9/10/2018	492.70	--	7.67	485.03
MW-302-80	55-90	9/10/2018	493.41	--	8.35	485.06
MW-302-CMT-50	10-55	9/10/2018	494.21	--	9.11	485.10
MW-303-80	55-90	9/10/2018	491.56	--	6.45	485.11
MW-303-CMT-59	10-55	9/10/2018	495.73	--	10.61	485.12
MW-306-80	55-90	9/10/2018	496.47	--	11.49	484.98
MW-309-15	Water Table	9/10/2018	494.77	--	9.01	485.76
MW-310-110	90-160	9/10/2018	493.85	--	8.10	485.75
MW-310-15	Water Table	9/10/2018	494.26	--	8.67	485.59
MW-321-15	Water Table	9/10/2018	495.59	--	8.99	486.60
MW-334-15	Water Table	9/10/2018	497.06	11.02	11.27	485.99
MW-336-20	Water Table	9/10/2018	493.26	--	5.80	487.46
MW-358-20	Water Table	9/10/2018	495.53	--	10.77	484.76
MW-358-40	10-55	9/10/2018	495.19	--	10.44	484.75
MW-358-60	10-55	9/10/2018	495.46	--	10.70	484.76
MW-359-15	Water Table	9/10/2018	495.16	--	10.37	484.79
MW-359-60	10-55	9/10/2018	495.02	--	10.18	484.84
MW-359-80	55-90	9/10/2018	495.02	--	10.26	484.76
MW-360-15	Water Table	9/10/2018	494.96	--	10.35	484.61
MW-360-150	90-160	9/10/2018	494.57	--	9.94	484.63
MW-360-50	10-55	9/10/2018	494.86	--	10.25	484.61
MW-360-80	55-90	9/10/2018	494.46	--	9.88	484.58
MW-362-15	Water Table	9/10/2018	495.09	--	10.22	484.87
MW-362-150	90-160	9/10/2018	495.27	--	10.46	484.81
MW-362-50	10-55	9/10/2018	494.99	--	10.11	484.88
MW-364-15	Water Table	9/10/2018	494.23	--	9.76	484.47

Table 3-2b
Third Quarter 2018 Groundwater Elevation, Surface Water Elevation, and Depth to LNAPL Monitoring Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Date	Riser Elevation (MSL feet)	Depth to LNAPL (feet)	Depth to Water (feet)	Corrected Water Table Elevation (MSL feet)
MW-364-65	10-55	9/10/2018	494.09	--	9.60	484.49
MW-364-90	55-160	9/10/2018	494.28	--	9.81	484.47
MW-366-15	Water Table	9/10/2018	493.51	No LNAPL	6.02	487.49
North Gravel Pit	Surface Water	9/10/2018	492.78	--	7.24	485.54
O-34	Water Table	9/10/2018	496.56	No LNAPL	9.74	486.82

General Notes:

If LNAPL is present, the water table elevation is corrected according to the following formula (riser elevation - depth to water) + (0.8 x LNAPL thickness)

-- = A water sounder was used. The well was not checked with an interface probe for the presence of LNAPL.

Acronyms and Abbreviations:

CMT = continuous multichannel tubing

LNAPL = Light Non-Aqueous Phase Liquid

MSL = mean sea level

MW = Monitoring Well

**Table 3-3
LNAPL Migration Monitoring**

**Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska**

Well ID	Date	Event	Top of Riser Elevation (MSL feet)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Corrected Water Table Elevation (MSL feet)
MW-139-25	11/6/2018	Annual	497.24	No LNAPL	13.20	0.00	484.04
MW-142-20	11/6/2018	Annual	495.83	No LNAPL	12.02	0.00	483.81
MW-145-20	11/6/2018	Annual	495.63	No LNAPL	11.18	0.00	484.45
MW-334-15	3/12/2018	Quarterly	497.01	12.78	13.32	0.54	484.12
MW-334-15	6/8/2018	Quarterly	497.01	No LNAPL	12.03	0.00	484.98
MW-345-15	3/12/2018	Quarterly	495.55	No LNAPL	11.51	0.00	484.04
MW-345-15	6/8/2018	Quarterly	495.55	No LNAPL	11.69	0.00	483.86
O-2	3/12/2018	Quarterly	497.15	13.10	13.27	0.17	484.02
O-2	6/8/2018	Quarterly	497.15	12.25	12.35	0.10	484.88
O-4	11/6/2018	Annual	496.58	No LNAPL	12.37	0.00	484.21
O-5	11/6/2018	Annual	495.83	No LNAPL	11.43	0.00	484.40
O-7	11/6/2018	Annual	496.47	No LNAPL	11.52	0.00	484.95
O-11	11/6/2018	Annual	497.91	13.69	13.73	0.04	484.21
O-12	11/6/2018	Annual	496.44	No LNAPL	12.21	0.00	484.23
O-24	11/6/2018	Annual	497.15	No LNAPL	12.84	0.00	484.31
O-25	11/6/2018	Annual	497.86	No LNAPL	13.70	0.00	484.16
O-26	11/6/2018	Annual	497.00	No LNAPL	12.91	0.00	484.09
O-27	11/6/2018	Annual	496.91	12.74	12.88	0.14	484.15
O-31	3/12/2018	Quarterly	496.15	12.20	12.70	0.50	483.85
O-31	6/8/2018	Quarterly	496.15	11.21	11.70	0.49	484.84
O-31	11/6/2018	Annual	496.14	11.82	11.92	0.10	484.30
R-21	3/12/2018	Quarterly	495.55	11.32	11.35	0.03	484.22
R-21	6/8/2018	Quarterly	495.55	10.48	10.50	0.02	485.07
R-35R	3/12/2018	Quarterly	494.12	Sheen	9.65	Sheen	484.47
R-35R	6/8/2018	Quarterly	494.12	No LNAPL	8.79	0.00	485.33
R-40	3/12/2018	Quarterly	494.47	No LNAPL	10.26	0.00	484.21
R-40	6/8/2018	Quarterly	494.47	No LNAPL	9.41	0.00	485.06

General Notes:

If LNAPL is present, the water table elevation is corrected according to the following formula (riser elevation - depth to water) + (0.8 x LNAPL thickness)

Only monitoring wells scheduled for gauging per Table 3-2 of the Long-Term Monitoring Plan - 2017 Update are shown here (Arcadis. 2017. Long-Term Monitoring Plan – 2017 Update. February). A comprehensive LNAPL gauging table is included in Appendix G.

Acronyms and Abbreviations:

LNAPL = Light Non-Aqueous Phase Liquid

MSL = Mean sea level

MW = Monitoring Well

No LNAPL = An interface probe was used to measure depth to water. LNAPL was not observed.

Table 3-4a
First Quarter 2018 NSZD Monitoring Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	o-Xylene (µg/L)	P & M - Xylene (µg/L)	Total Xylenes (µg/L)	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (mg/L)	Sulfate (mg/L)	Methane (mg/L)
MW-101A-25	10-55	MW-101A-25		2/15/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.300	0.672	2.03	30.8	0.0342
MW-116-15	Water Table	MW-116-15		2/14/2018	7700	<50.0	656	74.0J	4280	4350	20.1	5.77	60.7	6.68	8.88	12.8JL*
MW-125-25	10-55	MW-125-25		2/14/2018	447	1.83	318	38.0	1590	1630	7.78	0.774	10.0	7.49	0.103J	1.24JL*
MW-130-25	10-55	MW-130-25		2/14/2018	97.5	140	100	209	522	730	2.79JH*	1.51	32.1	7.43	6.36	2.09JL*
MW-130-25	10-55	MW-230-25	DUP	2/14/2018	84.3	117	88.0	179	457	636	2.62JH*	1.48	31.5	7.68	6.18	2.24JL*
MW-135-20	Water Table	MW-135-20		2/13/2018	917	6870	1660	4550	9510	14100	45.3	4.69	58.7	16.3	0.148J	0.0661
MW-142-20	Water Table	MW-142-20		2/13/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.335J	12.8	8.16	20.7	0.604
MW-145-20	Water Table	MW-145-20		2/15/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288	1.70	2.60	25.0	0.0705
MW-180A-15	Water Table	MW-180A-15		2/14/2018	3.24	<0.500	2.76	0.850J	<1.00B*	5.55JH*	<0.0500	<0.300	1.03	1.28	36.3	0.0099JH*
MW-192A-15	Water Table	MW-192A-15		2/15/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.278	<0.125	0.607	35.4	0.0225
MW-321-15	Water Table	MW-321-15		2/15/2018	142	<0.500	<0.500	<0.500	1.11J	1.11J	0.219	0.435J	16.7	7.16	0.592	0.918
MW-336-20	Water Table	MW-336-20		2/15/2018	14800	<50.0	284	1580	5250	6830	30.1	7.38	21.5	4.37	0.0570J	8.75
MW-369-16	Water Table	MW-369-16		2/15/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.186J	3.83	3.03	32.7	0.0591
MW-369-16	Water Table	MW-469-16	DUP	2/15/2018	0.120J	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.203J	3.86	3.00	33.0	0.0593
O-15	Water Table	O-15		2/15/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.283	<0.125	0.739	38.4	0.0088

Acronyms and Abbreviations:

< = Not detected; limit of detection (LOD) listed. Flag applied by laboratory.

B* = Result is considered not detected due to quality control failures; see checklist for details. Flag applied by Shannon & Wilson, Inc.

BTEX = benzene, toluene, ethylbenzene, and xylenes

CMT = Continuous Multichannel Tubing

DRO = diesel range organics

DUP = field duplicate sample

EPA = Environmental Protection Agency

GRO = gasoline range organics

J = Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ). Flag applied by laboratory.

JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.

JL* = Estimated concentration, biased low due to quality control failures. Flag applied by Shannon & Wilson, Inc.

mg/L = milligrams per liter

MW = Monitoring Well

NSZD = GRO, DRO, BTEX, sulfate, dissolved iron, dissolved manganese, methane

µg/L = micrograms per liter

Table 3-4b
Second Quarter 2018 NSZD Monitoring Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	o-Xylene (µg/L)	P & M -Xylene (µg/L)	Total Xylenes (µg/L)	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (mg/L)	Sulfate (mg/L)	Methane (mg/L)
MW-101A-25	10-55	MW-101A-25		4/10/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.180J	0.630	2.02	30.6	0.0358
MW-116-15	Water Table	MW-116-15		4/10/2018	5880	<50.0	547	104	3980	4090	17.3	6.51	57.7	7.59	2.43	10.2
MW-125-25	10-55	MW-125-25		4/5/2018	406	<5.00	265	18.6	1690	1710	8.06JH*	0.845	9.21	7.65	<0.100	1.73
MW-130-25	10-55	MW-130-25		4/10/2018	89.6	84.2	60.5	121	321	443	1.70JH*	1.47	32.7	8.05	7.09	2.10
MW-130-25	10-55	MW-230-25	DUP	4/10/2018	92.2	84.3	59.6	121	322	443	1.76JH*	1.61	32.4	7.86	7.16	2.40
MW-135-20	Water Table	MW-135-20		4/4/2018	2650	14000	2580	5360	11700	17100	70.3	3.64	53.5	17.1	0.258	0.121
MW-142-20	Water Table	MW-142-20		4/26/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.367J	13.7	7.61	18.4	0.762
MW-145-20	Water Table	MW-145-20		4/5/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.294	1.57	2.56	26.7	0.0678
MW-180A-15	Water Table	MW-180A-15		4/11/2018	<0.400B*	<0.500	1.81JH*	<1.00B*	<3.41B*	<4.03B*	0.0904J	0.195J	0.990	0.997	36.8	0.00930JH*
MW-192A-15	Water Table	MW-192A-15		4/10/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.318	<0.125	0.834	34.9	0.0302
MW-321-15	Water Table	MW-321-15		4/10/2018	151	<0.500	<0.500	<0.500	<2.00B*	<1.50	0.255	0.467J	15.9	6.21	0.514	0.880
MW-336-20	Water Table	MW-336-20		4/11/2018	18600	182	563	2510	6690	9200	40.0	12.8	22.6	4.33	0.134J	12.9
MW-369-16	Water Table	MW-369-16		4/11/2018	<0.400B*	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.232J	3.42	2.74	32.5	0.0600
MW-369-16	Water Table	MW-469-16	DUP	4/11/2018	<0.400B*	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.221J	3.49	2.87	32.7	0.0590
O-15	Water Table	O-15		4/11/2018	<0.400B*	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.283	<0.125	0.623	39.5	0.0114JH*

Acronyms and Abbreviations:

< = Not detected; limit of detection (LOD) listed. Flag applied by laboratory.
B* = Result is considered not detected due to quality control failures; see checklist for details. Flag applied by Shannon & Wilson, Inc.
BTEX = benzene, toluene, ethylbenzene, and xylenes
CMT = Continuous Multichannel Tubing
DRO = diesel range organics
DUP = field duplicate sample
EPA = Environmental Protection Agency
GRO = gasoline range organics
J = Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ). Flag applied by laboratory.
JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.
mg/L = milligrams per liter
MW = Monitoring Well
NSZD = GRO, DRO, BTEX, sulfate, dissolved iron, dissolved manganese, methane
µg/L = micrograms per liter

Table 3-4c
Third Quarter 2018 NSZD Monitoring Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Benzene	Toluene	Ethylbenzene	o-Xylene	P & M - Xylene	Total Xylenes	Gasoline Range Organics	Diesel Range Organics	Dissolved Iron	Dissolved Manganese	Sulfate	Methane
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-101A-25	10-55	MW-101A-25		8/2/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288	0.697	2.13	28.8	0.0392
MW-116-15	Water Table	MW-116-15		8/8/2018	8050	<5.00	708	66.2	3380	3450	28.9	10.2	69.6	6.64	7.49	10.8J*
MW-116-15	Water Table	MW-216-15	DUP	8/8/2018	9470	<5.00	707	61.5	3510	3570	27.9	9.63	68.7	6.52	8.25	15.3J*
MW-125-25	10-55	MW-125-25		8/7/2018	450	<1.21B*	157	0.900J	1770	1770	10.8	0.936	11.8	9.37	0.0740J	1.49
MW-130-25	10-55	MW-130-25		8/8/2018	123	107	107	225	579	805	3.68	2.37	32.4	7.81	8.34	1.87
MW-135-20	Water Table	MW-135-20		8/8/2018	236	2700	794	5380	10700	16100	43.1	2.56	22.5	6.21	0.620	0.0293
MW-142-20	Water Table	MW-142-20		8/3/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.510J	12.4	7.99	16.8	0.725
MW-145-20	Water Table	MW-145-20		8/3/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.247J	1.35	2.60	22.8	0.0416
MW-180A-15	Water Table	MW-180A-15		8/8/2018	0.150J	<0.500	2.00J*	0.500J*	3.36J*	3.86J*	0.0440J	0.341J*	2.19	2.07	34.7	0.0111
MW-180A-15	Water Table	MW-280A-15	DUP	8/8/2018	0.180J	<0.500	1.42J*	0.310J*	2.20J*	2.51J*	0.0384J	0.227J*	2.22	2.10	35.9	0.0131
MW-192A-15	Water Table	MW-192A-15		8/7/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288	<0.125	0.267	33.7	0.0129
MW-321-15	Water Table	MW-321-15		8/7/2018	127	2.96JH*	1.78	1.35	1.14J	2.49J	0.317	0.374J	23.8	7.64	1.45	0.492
MW-336-20	Water Table	MW-336-20		8/8/2018	23800	108J	920	4030	9010	13000	70.6	17.9	25.1	4.60	<0.100	9.75
MW-369-16	Water Table	MW-369-16		8/8/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.294	4.15	3.34	31.9	0.0536
O-15	Water Table	O-15		8/7/2018	0.210J	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288	<0.125	0.650	39.6	0.0131

Acronyms and Abbreviations:
< = Not detected; limit of detection (LOD) listed. Flag applied by laboratory.
B* = Result is considered not detected due to quality control failures; see checklist for details. Flag applied by Shannon & Wilson, Inc.
BTEX = benzene, toluene, ethylbenzene, and xylenes
CMT = Continuous Multichannel Tubing
DRO = diesel range organics
DUP = field duplicate sample
EPA = Environmental Protection Agency
GRO = gasoline range organics
J = Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ). Flag applied by laboratory.
JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.
mg/L = milligrams per liter
MW = Monitoring Well
NSZD = GRO, DRO, BTEX, sulfate, dissolved iron, dissolved manganese, methane
µg/L = micrograms per liter

Table 3-5a
First Quarter 2018 Constituents of Concern Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	o-Xylene (µg/L)	P & M -Xylene (µg/L)	Total Xylenes (µg/L)	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)
MW-130-25	10-55	MW-130-25		2/14/2018	97.5	140	100	209	522	730	2.79JH*	1.51
MW-135-20	Water Table	MW-135-20		2/13/2018	917	6870	1660	4550	9510	14100	45.3	4.69
MW-139-25	10-55	MW-139-25		1/19/2018	12.7	0.310	48.9	0.520	395	396	1.40JH*	1.02
MW-140-25	10-55	MW-140-25		1/19/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288
MW-140-25	10-55	MW-240-25	DUP	2/15/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.283
MW-142-20	Water Table	MW-142-20		2/13/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.335J
MW-142-20	Water Table	MW-242-20	DUP	2/15/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.318J
MW-334-15	Water Table			2/13/2018	No petroleum samples collected; product present.							
MW-344-15	Water Table	MW-344-15		1/19/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.291
MW-345-15	Water Table	MW-345-15		2/12/2018	626	0.470J	102	96.5	436	532	2.50JH*	1.34
O-2	Water Table			1/19/2018	No petroleum samples collected; product present.							
R-21	Water Table			2/13/2018	No petroleum samples collected; product present.							
R-35R	Water Table	R-35R		2/13/2018	178	1.20	47.6	1.13	137	138	1.69JH*	3.69
R-39	Water Table	R-39		2/12/2018	44.0	<0.500	<0.500	<0.500	5.80	5.80	<0.0500B*	0.697
R-40	Water Table			1/19/2018	No petroleum samples collected; product present.							
S-9	Water Table	S-9		2/12/2018	0.240J	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.194J

Acronyms and Abbreviations:

< = not detected; limit of detection (LOD) listed

B* = Result is considered not detected at the LOQ or reported concentration (higher value), due to contamination identified in a blank QC sample. Flag is reported as <...B*. Flag applied by Shannon & Wilson, Inc.

BTEX = benzene, ethylbenzene, toluene, xylenes

CMT = Continuous Multichannel Tubing

DRO = diesel range organics

DUP = duplicate sample

GRO = gasoline range organics

J = Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ). Flag applied by laboratory.

JH* = Result is considered estimated, biased high, due to QC failures. Flag applied by Shannon & Wilson, Inc.

mg/L = milligrams per liter

MW = Monitoring Well

µg/L = micrograms per liter

Table 3-5b
Third Quarter 2018 Constituents of Concern Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	o-Xylene (µg/L)	P & M -Xylene (µg/L)	Total Xylenes (µg/L)	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)
MW-101A-25	10-55	MW-101A-25		8/2/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288
MW-116-15	Water Table	MW-116-15		8/8/2018	8050	<5.00	708	66.2	3380	3450	28.9	10.2
MW-116-15	Water Table	MW-216-15	DUP	8/8/2018	9470	<5.00	707	61.5	3510	3570	27.9	9.63
MW-125-25	10-55	MW-125-25		8/7/2018	450	<1.21B*	157	0.900J	1770	1770	10.8	0.936
MW-130-25	10-55	MW-130-25		8/8/2018	123	107	107	225	579	805	3.68	2.37
MW-131-25	10-55	MW-131-25		7/19/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.588B*
MW-135-20	Water Table	MW-135-20		8/8/2018	236	2700	794	5380	10700	16100	43.1	2.56
MW-137-20	Water Table	MW-137-20		7/19/2018	732	1910	1100	2210	4930	7140	22.7	2.49
MW-139-25	10-55	MW-139-25		8/8/2018	14.4	<1.00B*	25.0	0.470J	193	193	0.984JH*	1.29
MW-139-25	10-55	MW-239-25	DUP	8/8/2018	14.9	<1.00B*	27.0	0.490J	206	207	1.02JH*	1.08
MW-140-25	10-55	MW-140-25		8/8/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288
MW-142-20	Water Table	MW-142-20		8/3/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.510J
MW-143-20	Water Table	MW-143-20		8/3/2018	4.30	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.330J
MW-145-20	Water Table	MW-145-20		8/3/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.247J
MW-154B-95	55-90	MW-154B-95		8/7/2018	11.0	<0.500	3.65	<0.500	<1.00	<1.50	0.0646J	0.622
MW-176A-15	Water Table	MW-176A-15		8/8/2018	Product Present - COC Analytes Not Collected							
MW-180A-15	Water Table	MW-180A-15		8/8/2018	0.150J	<0.500	2.00J*	0.500J*	3.36J*	3.86J*	0.0440J	0.341J*
MW-180A-15	Water Table	MW-280A-15	DUP	8/8/2018	0.180J	<0.500	1.42J*	0.310J*	2.20J*	2.51J*	0.0384J	0.227J*
MW-192A-15	Water Table	MW-192A-15		8/7/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288
MW-303-CMT-39	10-55	MW-303-CMT-39		8/2/2018	7.01	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.428J
MW-321-15	Water Table	MW-321-15		8/7/2018	127	2.96JH*	1.78	1.35	1.14J	2.49J	0.317	0.374J
MW-336-20	Water Table	MW-336-20		8/8/2018	23800	108J	920	4030	9010	13000	70.6	17.9
MW-345-15	Water Table	MW-345-15		7/19/2018	501	<0.500	67.9	60.3	301	361	2.13	1.55JH*
MW-345-15	Water Table	MW-345-115	DUP	7/19/2018	490	<0.500	65.4	58.7	288	347	2.08	1.64JH*
MW-369-16	Water Table	MW-369-16		8/8/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.294
MW-371-15	Water Table	MW-371-15		8/3/2018	4.98	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.607
O-3	Water Table	O-3		8/7/2018	1.28	<1.00B*	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.283
O-4	Water Table	O-4		7/19/2018	86.0	<0.500	<0.500	<0.500	<1.00	<1.50	0.168	<0.732B*
O-15	Water Table	O-15		8/7/2018	0.210J	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	<0.288
O-24	Water Table	O-24		7/19/2018	4.89	0.360J	<0.500	<0.500	0.790J	<1.50	<0.0500	<0.577B*
S-9	Water Table	S-9		8/3/2018	<0.200	<0.500	<0.500	<0.500	<1.00	<1.50	<0.0500	0.319J

Acronyms and Abbreviations:

< = not detected; limit of detection (LOD) listed

B* = Result is considered not detected at the LOQ or reported concentration (higher value), due to contamination identified in a blank QC sample. Flag is reported as <...B*. Flag applied by Shannon & Wilson, Inc.

BTEX = benzene, ethylbenzene, toluene, xylenes

CMT = Continuous Multichannel Tubing

COC = contaminants of potential concern (BTEX, GRO, DRO)

DRO = diesel range organics

DUP = duplicate sample

GRO = gasoline range organics

J = Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ). Flag applied by laboratory.

JH* = Result is considered estimated, biased high, due to QC failures. Flag applied by Shannon & Wilson, Inc.

mg/L = milligrams per liter

MW = Monitoring Well

µg/L = micrograms per liter

Table 3-6
PFC Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Perfluorooctane Sulfonate (ng/L)	Perfluorooctanoic Acid (ng/L)
MW-309-15	Water Table	MW-309-15		8/7/2018	106	80.6
MW-321-15	Water Table	MW-321-15		8/7/2018	2040	647
MW-358-20	Water Table	MW-358-20		8/7/2018	47.3	52.7
MW-359-15	Water Table	MW-359-15		8/7/2018	17	19.5
MW-359-15	Water Table	MW-459-15	DUP	8/7/2018	17.9	19
MW-359-35	10-55	MW-359-35		8/7/2018	22.2	21.3
MW-362-15	Water Table	MW-362-15		8/7/2018	37.1	31.8
MW-362-25	10-55	MW-362-25		8/7/2018	35.7	34.9
MW-364-15	Water Table	MW-364-15		8/7/2018	1.45	2.27JH*
MW-364-30	10-55	MW-364-30		8/7/2018	5.38	6.03

Acronyms and Abbreviations:

DUP = Field duplicate sample

JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.

MW = Monitoring Well

ng/L = nanograms per liter

Table 3-7a
First Quarter 2018 Onsite Sulfolane Analytical Results
Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Sulfolane (µg/L)
MW-127-25	10-55	MW-127-25		1/15/2018	26.8
MW-127-25	10-55	MW-227-25	DUP	1/15/2018	25.3
MW-130-25	10-55	MW-130-25		2/14/2018	79.1
MW-139-25	10-55	MW-139-25		1/19/2018	97.1
MW-142-20	Water Table	MW-142-20		2/13/2018	32.4
MW-148-80	Water Table	MW-148-80		1/18/2018	3.77
MW-148A-15	Water Table	MW-148A-15		1/16/2018	13.4
MW-148A-15	Water Table	MW-248A-15	DUP	1/16/2018	12.9
MW-148B-30	Water Table	MW-148B-30		1/16/2018	9.73
MW-148C-55	Water Table	MW-148C-55		1/18/2018	8.48
MW-154B-95	55-90	MW-154B-95		2/13/2018	119
MW-176A-15	Water Table	MW-176A-15		1/19/2018	689
MW-186A-15	Water Table	MW-186A-15		2/13/2018	286
MW-186E-75	Water Table	MW-186E-75		1/18/2018	15.0
MW-301-60	10-55	MW-301-60		1/16/2018	<5.25
MW-301-CMT-20	Water Table	MW-301-CMT-20		1/18/2018	<5.30
MW-301-CMT-20	Water Table	MW-401-CMT-20	DUP	1/18/2018	<5.20
MW-302-80	55-90	MW-302-80		2/13/2018	3.40J
MW-302-CMT-20	Water Table	MW-302-CMT-20		2/12/2018	13.2
MW-302-CMT-50	Water Table	MW-302-CMT-50		2/12/2018	6.71J
MW-303-80	55-90	MW-303-80		2/15/2018	<5.35
MW-303-CMT-19	Water Table	MW-303-CMT-19		2/12/2018	31.9
MW-303-CMT-39	Water Table	MW-303-CMT-39		2/12/2018	64.8
MW-303-CMT-59	Water Table	MW-303-CMT-59		2/12/2018	38.7
MW-304-80	55-90	MW-304-80		2/13/2018	5.00J
MW-304-CMT-20	Water Table	MW-304-CMT-20		2/12/2018	6.76J
MW-304-CMT-40	Water Table	MW-304-CMT-40		2/13/2018	22.4
MW-304-CMT-60	Water Table	MW-304-CMT-60		2/13/2018	4.02J
MW-305-CMT-28	Water Table	MW-305-CMT-28		1/18/2018	7.08
MW-305-CMT-48	Water Table	MW-305-CMT-48		1/18/2018	<5.25
MW-305-CMT-48	Water Table	MW-405-CMT-48	DUP	1/18/2018	<5.30
MW-330-20	Water Table	MW-330-20		1/16/2018	356
MW-334-15	Water Table	MW-334-15		2/13/2018	148
MW-334-65	Water Table	MW-334-65		1/18/2018	9.86
MW-336-20	Water Table	MW-336-20		2/15/2018	24,500JL*
MW-344-15	Water Table	MW-344-15		1/19/2018	44.8

Table 3-7a
First Quarter 2018 Onsite Sulfolane Analytical Results
Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Sulfolane (µg/L)
MW-345-15	Water Table	MW-345-15		2/12/2018	238
MW-345-55	Water Table	MW-345-55		1/16/2018	67.5
MW-354-35	Water Table	MW-354-35		1/16/2018	408
MW-372-15	Water Table	MW-372-15		1/16/2018	407
O-1	Water Table	O-1		1/16/2018	2340
O-2	Water Table	O-2		1/19/2018	272
O-11	Water Table	O-11		1/15/2018	203JL*
O-12	Water Table	O-12		1/15/2018	31.8
O-13	Water Table	O-13		1/19/2018	21.5
O-19	Water Table	O-19		1/19/2018	251
O-19-90	Water Table	O-19-90		1/18/2018	<5.15
O-19-90	Water Table	O-119-90	DUP	1/18/2018	<5.20
O-24	Water Table	O-24		1/15/2018	<5.10
O-24	Water Table	O-124	DUP	1/15/2018	<5.50
O-26	Water Table	O-26		1/15/2018	22.6
O-27	Water Table	O-27		2/13/2018	147
O-31	Water Table	O-31		1/19/2018	5.51
O-34	Water Table	O-34		1/19/2018	497
R-21	Water Table	R-21		2/13/2018	307
R-35R	Water Table	R-35R		2/13/2018	9.63J
R-40	Water Table	R-40		1/19/2018	125
S-51	Water Table	S-51		1/19/2018	372

Acronyms and Abbreviations:

< = Not detected; limit of detection (LOD) listed.

CMT = Continuous Multichannel Tubing

DUP = Field Duplicate Sample

J = Estimated concentration detected below the laboratory limit of quantitation (LOQ). Flag applied by laboratory.

JL* = Estimated concentration, biased low, due to QC failures. Flag applied by Shannon & Wilson, Inc.

MW = Monitoring Well

µg/L = micrograms per liter

Table 3-7b
Second Quarter 2018 Onsite Sulfolane Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Sulfolane (µg/L)
MW-127-25	10-55	MW-127-25		4/5/2018	27.4
MW-127-25	10-55	MW-227-25	DUP	4/5/2018	28.4
MW-130-25	10-55	MW-130-25		4/10/2018	81.9
MW-139-25	10-55	MW-139-25		4/4/2018	138
MW-154B-95	55-90	MW-154B-95		4/6/2018	112
MW-186A-15	Water Table	MW-186A-15		4/3/2018	287JL*
MW-186E-75	55-90	MW-186E-75		4/5/2018	16.6
MW-301-60	10-55	MW-301-60		4/6/2018	<5.10
MW-301-CMT-20	Water Table	MW-301-CMT-20		4/4/2018	<5.20
MW-301-CMT-20	Water Table	MW-401-CMT-20	DUP	4/4/2018	<5.15
MW-302-80	55-90	MW-302-80		4/5/2018	3.43J
MW-302-CMT-20	Water Table	MW-302-CMT-20		4/5/2018	14.0
MW-302-CMT-50	10-55	MW-302-CMT-50		4/5/2018	6.31J
MW-303-80	55-90	MW-303-80		4/5/2018	<5.25
MW-303-CMT-19	Water Table	MW-303-CMT-19		4/5/2018	47.1
MW-303-CMT-39	10-55	MW-303-CMT-39		4/5/2018	79.1
MW-303-CMT-59	10-55	MW-303-CMT-59		4/5/2018	39.9
MW-304-80	55-90	MW-304-80		4/6/2018	5.67J
MW-304-CMT-20	Water Table	MW-304-CMT-20		4/11/2018	4.29J
MW-304-CMT-40	10-55	MW-304-CMT-40		4/11/2018	33.0
MW-304-CMT-60	10-55	MW-304-CMT-60		4/11/2018	5.91J
MW-305-CMT-28	10-55	MW-305-CMT-28		4/11/2018	8.23J
MW-305-CMT-48	10-55	MW-305-CMT-48		4/11/2018	<5.35
MW-305-CMT-48	10-55	MW-405-CMT-48	DUP	4/11/2018	<5.40
MW-334-15	Water Table	MW-334-15		4/3/2018	161JL*
MW-334-65	10-55	MW-334-65		4/6/2018	8.38J
MW-344-15	Water Table	MW-344-15		4/4/2018	82.2
MW-345-15	Water Table	MW-345-15		4/4/2018	250
MW-345-55	10-55	MW-345-55		4/4/2018	62.8
O-2	Water Table	O-2		4/3/2018	288JL*
O-11	Water Table	O-11		4/3/2018	234JL*
O-12	Water Table	O-12		4/5/2018	55.1
O-13	Water Table	O-13		4/3/2018	22.4JL*
O-19	Water Table	O-19		4/3/2018	243JL*
O-19-90	55-90	O-19-90		4/5/2018	<5.10
O-19-90	55-90	O-119-90	DUP	4/5/2018	<5.10
O-27	Water Table	O-27		4/3/2018	167JL*
O-31	Water Table	O-31		4/3/2018	7.69JL*
R-21	Water Table	R-21		4/4/2018	337JL*
R-35R	Water Table	R-35R		4/4/2018	12.1JL*
R-40	Water Table	R-40		4/4/2018	124JL*
S-51	Water Table	S-51		4/3/2018	320JL*

Acronyms and Abbreviations:

< = Not detected; limit of detection (LOD) listed.

CMT = Continuous Multichannel Tubing

DUP = Field Duplicate Sample

J = Estimated concentration detected below the laboratory limit of quantitation (LOQ). Flag applied by laboratory.

JL* = Estimated concentration, biased low, due to QC failures. Flag applied by Shannon & Wilson, Inc.

MW = Monitoring Well

µg/L = micrograms per liter

Table 3-7c
Third Quarter 2018 Onsite Sulfolane Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	DUP	Date	Sulfolane (µg/L)
MW-127-25	10-55	MW-127-25		7/10/2018	34.5
MW-139-25	10-55	MW-139-25		8/8/2018	155
MW-139-25	10-55	MW-239-25	DUP	8/8/2018	157
MW-142-20	Water Table	MW-142-20		8/3/2018	74.4
MW-148-80	55-90	MW-148-80		7/16/2018	11.4
MW-148A-15	Water Table	MW-148A-15		7/16/2018	12.1
MW-148B-30	10-55	MW-148B-30		7/16/2018	8.19J
MW-148C-55	10-55	MW-148C-55		7/16/2018	14.9
MW-154B-95	55-90	MW-154B-95		8/7/2018	144
MW-176A-15	Water Table	MW-176A-15		8/8/2018	893
MW-186A-15	Water Table	MW-186A-15		7/17/2018	206
MW-186B-60	10-55	MW-186B-60		7/18/2018	31.6
MW-302-CMT-20	Water Table	MW-302-CMT-20		7/11/2018	18.1
MW-303-CMT-19	Water Table	MW-303-CMT-19		7/11/2018	90.6
MW-303-CMT-39	10-55	MW-303-CMT-39		8/2/2018	102
MW-303-CMT-59	10-55	MW-303-CMT-59		7/11/2018	49.5
MW-304-CMT-20	Water Table	MW-304-CMT-20		7/13/2018	4.88J
MW-304-CMT-40	10-55	MW-304-CMT-40		7/17/2018	41.3
MW-304-CMT-60	10-55	MW-304-CMT-60		7/17/2018	7.47J
MW-305-CMT-28	10-55	MW-305-CMT-28		7/18/2018	10.4
MW-309-15	Water Table	MW-309-15		8/7/2018	63.7
MW-310-15	Water Table	MW-310-15		7/10/2018	83.7
MW-330-20	Water Table	MW-330-20		7/10/2018	264
MW-334-15	Water Table	MW-334-15		7/10/2018	115
MW-336-20	Water Table	MW-336-20		8/8/2018	22,200JL*
MW-345-15	Water Table	MW-345-15		7/19/2018	174
MW-345-15	Water Table	MW-345-115	DUP	7/19/2018	182
MW-345-55	10-55	MW-345-55		7/13/2018	61.2
MW-345-75	55-90	MW-345-75		7/13/2018	46.8
MW-354-35	10-55	MW-354-35		7/18/2018	611
MW-358-20	Water Table	MW-358-20		8/7/2018	38.0
MW-358-40	10-55	MW-358-40		7/11/2018	26.8
MW-358-60	10-55	MW-358-60		8/2/2018	6.45J
MW-359-15	Water Table	MW-359-15		8/7/2018	25.7
MW-359-15	Water Table	MW-459-15	DUP	8/7/2018	26.2
MW-359-35	10-55	MW-359-35		8/7/2018	41.6
MW-359-60	10-55	MW-359-60		8/2/2018	41.2
MW-360-15	Water Table	MW-360-15		7/11/2018	<5.15
MW-360-35	10-55	MW-360-35		7/11/2018	9.54J
MW-360-50	10-55	MW-360-50		7/11/2018	13.0
MW-371-15	Water Table	MW-371-15		8/3/2018	146
MW-372-15	Water Table	MW-372-15		8/8/2018	505
O-1	Water Table	O-1		7/18/2018	1420
O-2	Water Table	O-2		7/10/2018	234
O-11	Water Table	O-11		7/10/2018	141
O-11	Water Table	O-111	DUP	7/10/2018	135
O-24	Water Table	O-24		7/19/2018	<5.20
O-26	Water Table	O-26		7/10/2018	55.3J*
O-26-65	10-55	O-26-65		7/18/2018	19.8
O-27	Water Table	O-27		7/17/2018	161
O-27	Water Table	O-127	DUP	7/17/2018	193
O-27-65	10-55	O-27-65		7/13/2018	46.2
O-34	Water Table	O-34		7/17/2018	421
S-51	Water Table	S-51		7/17/2018	271JL*

Acronyms and Abbreviations:

< = Not detected; limit of detection (LOD) listed.

CMT = Continuous Multichannel Tubing

DUP = Field Duplicate Sample

J = Estimated concentration detected below the laboratory limit of quantitation (LOQ). Flag applied by laboratory.

JL* = Estimated concentration, biased low, due to QC failures. Flag applied by Shannon & Wilson, Inc.

MW = Monitoring Well

µg/L = micrograms per liter

Table 3-8
Sulfolane Analytical Results - Point of Compliance

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Zone	Sample Name	Dup	Date	Sulfolane (µg/L)
MW-358-20	Water Table	MW-358-20		8/7/2018	38.0
MW-358-40	10-55	MW-358-40		7/11/2018	26.8
MW-358-60	10-55	MW-358-60		8/2/2018	6.45J
MW-359-15	Water Table	MW-359-15		8/7/2018	25.7
MW-359-15	Water Table	MW-459-15	DUP	8/7/2018	26.2
MW-359-35	10-55	MW-359-35		8/7/2018	41.6
MW-359-60	Water Table	MW-359-60		8/2/2018	41.2
MW-360-15	Water Table	MW-360-15		7/11/2018	<5.15
MW-360-35	10-55	MW-360-35		7/11/2018	9.54J
MW-360-50	10-55	MW-360-50		7/11/2018	13.0

General Notes:

Samples were analyzed by EPA1625B with isotope dilution.

Only monitoring wells identified as Point of Compliance Wells per Section 4 of the Long-Term Monitoring Plan - 2017 Update are shown here (Arcadis. 2017. Long-Term Monitoring Plan – 2017 Update. February).

Acronyms and Abbreviations:

< = not detected; limit of detection (LOD) listed

DUP = field duplicate sample

J = estimated concentration detected below the laboratory limit of quantitation (LOQ), flag applied by laboratory.

µg/L = micrograms per liter

**Table 3-9
Sulfolane Mass Flux Results**

**Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska**

VPT Well Cluster	Approximate Depth (feet BGS / feet BWT)	Mass Flux (g/day)	Approximate Percent of Total Mass Flux
November 2011 Total Mass Flux = 86 g/day			
MW-302	8 (Water table) to 60 / 0 to 52	16.8	20%
MW-303	22 to 35 / 13 to 26	7.39	9%
MW-304	11 (Water table) to 60 / 0 to 49	40.63	47%
MW-305	9 (Water table) to 34 / 0 to 25	9.30	11%
First Quarter 2012 Total Mass Flux = 62 g/day			
MW-302	11 (Water table) to 90 / 0 to 79	22.54	36%
MW-303	22 to 35 / 13 to 26	5.29	9%
MW-304	14 (Water table) to 35 / 0 to 11	18.17	29%
MW-305	13 (Water table) to 34 / 0 to 21	5.48	9%
Second Quarter 2012 Total Mass Flux = 83 g/day			
MW-302	10 (Water table) to 90 / 0 to 80	16.36	20%
MW-303	22 to 35 / 13 to 26	5.34	6%
MW-304	13 (Water table) to 60 / 0 to 47	46.99	57%
MW-305	12 (Water table) to 22 / 0 to 10	4.63	6%
Third Quarter 2012 Total Mass Flux = 73 g/day			
MW-302	9 (Water table) to 90 / 0 to 81	22.11	30%
MW-303	22 to 35 / 13 to 26	3.55	5%
MW-304	12 (Water table) to 60 / 0 to 48	37.21	51%
MW-305	11 (Water table) to 34 / 0 to 23	3.75	5%
First Quarter 2013 Total Mass Flux = 43 g/day			
MW-302	10 (Water table) to 90 / 0 to 80	16.70	39%
MW-303	18 to 42 / 7 to 31	4.53	11%
MW-304	13 (Water table) to 42 / 0 to 29	14.32	33%
Second Quarter 2013 Total Mass Flux = 34 g/day			
MW-302	10 (Water table) to 90 / 0 to 80	13.08	38%
MW-303	18 to 42 / 7 to 31	3.98	12%
MW-304	13 (Water table) to 42 / 0 to 29	10.79	32%
Third Quarter 2013 Total Mass Flux = 35 g/day			
MW-302	10 (Water table) to 90 / 0 to 80	13.93	40%
MW-303	18 to 42 / 7 to 31	3.46	10%
MW-304	13 (Water table) to 42 / 0 to 29	11.97	34%
Fourth Quarter 2013 Total Mass Flux = 43 g/day			
MW-302	9 (Water table) to 90 / 0 to 79	13.72	32%
MW-303	9 to 70 / 0 to 61	4.91	11%
MW-304	9 (Water table) to 42 / 0 to 33	22.43	52%
First Quarter 2014 Total Mass Flux = 41 g/day			
MW-302	9 (Water table) to 90 / 0 to 79	13.47	33%
MW-303	9 to 70 / 0 to 61	3.58	9%
MW-304	9 (Water table) to 42 / 0 to 33	21.80	53%
Second Quarter 2014 Total Mass Flux = 38 g/day			
MW-302	9 (Water table) to 90 / 0 to 79	12.45	33%
MW-303	9 to 70 / 0 to 61	5.89	15%
MW-304	9 (Water table) to 42 / 0 to 33	15.59	41%
Third Quarter 2014 Total Mass Flux = 23 g/day			
MW-302	9 (Water table) to 90 / 0 to 79	11.59	50%
MW-303	9 to 70 / 0 to 61	3.20	14%
MW-304	9 (Water table) to 42 / 0 to 33	4.92	21%

**Table 3-9
Sulfolane Mass Flux Results**

**Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska**

VPT Well Cluster	Approximate Depth (feet BGS / feet BWT)	Mass Flux (g/day)	Approximate Percent of Total Mass Flux
Fourth Quarter 2014 Total Mass Flux = 22 g/day			
MW-302	9 (Water table) to 90 / 0 to 79	6.88	31%
MW-303	18 to 70 / 9 to 61	2.34	11%
MW-304	9 (Water table) to 42 / 0 to 33	9.48	43%
First Quarter 2015 Total Mass Flux = 16 g/day			
MW-302	9 (Water table) to 30	1.48	9%
MW-303	18 to 42	1.18	7%
MW-304	9 (Water table) to 22	7.54	46%
Second Quarter 2015 Total Mass Flux = 13 g/day			
MW-302	9 (Water table) to 32	0.78	6%
MW-303	18 to 42	1.09	8%
MW-304	9 (Water table) to 27	5.74	44%
Third Quarter 2015 Total Mass Flux = 7 g/day			
MW-302	9 (Water table) to 32	0.87	12%
MW-303	13 to 42	0.93	13%
MW-304	9 (Water table) to 27	3.90	54%
Third Quarter 2016 Total Mass Flux = 4 g/day			
MW-302	9 (Water table) to 32	0.38	10%
MW-303	18 to 42	0.68	19%
MW-304	9 (Water table) to 23	1.53	41%
Second Quarter 2018 Total Mass Flux = 30 g/day			
MW-302	9 (Water table) to 65	3.63	12%
MW-303	9 (Water table) to 65	16.71	56%
MW-304	18 to 65	3.76	13%

Acronyms and Abbreviations:

BGS = below ground surface

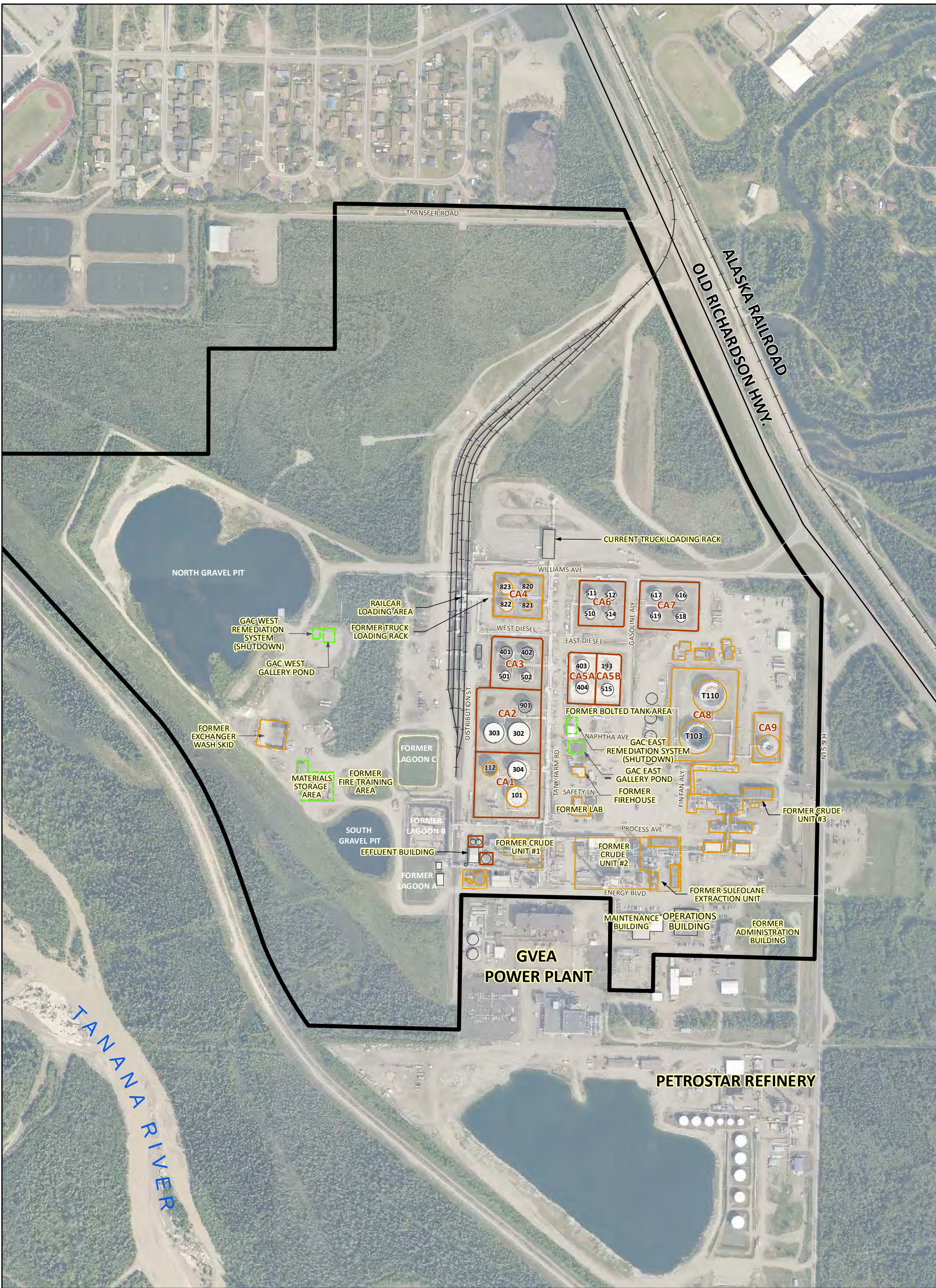
BWT = below water table

g/day = grams per day

VPT = vertical profiling transect

FIGURES





Bermed Containment Areas (CA)

Approximate Area

FHRA Property Boundary

Structure Demolished

Notes:

GAC: Granular Activated Carbon

GVEA: Golden Valley Electrical Authority

-Image provided courtesy of Pictometry International 2012

0

400

800

SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC

NORTH POLE TERMINAL, NORTH POLE, ALASKA

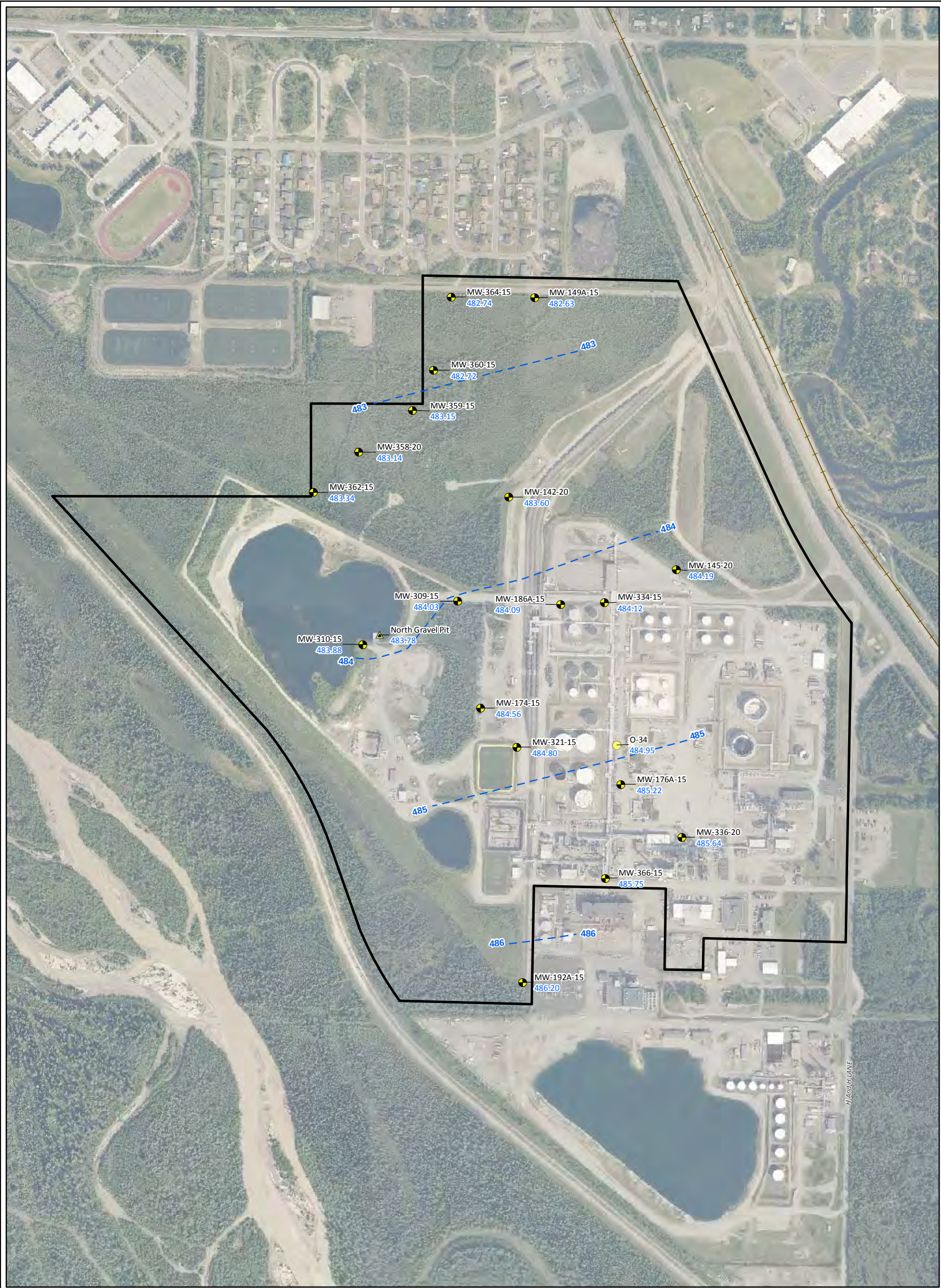
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

SITE FEATURES

ARCADIS

FIGURE 1-2

Notes:
GVEA = Golden Valley Electrical Authority
-Image provided courtesy of Pictometry International 2012



Legend

- Monitoring Well
- Observation Well
- Surface Water
- FHRA Property Boundary
- Groundwater Elevation Contours in Feet Above Mean Sea Level (Dashed where Inferred)

Notes:

- Wells were gauged in March 2018
- Only monitoring wells scheduled for gauging per Table 3-1 of the Long Term Monitoring Plan - 2017 Update are shown on the figure.
- Vertical gradient data are evaluated in more detail in Appendix F of the Annual 2018 Onsite Groundwater Monitoring Report
- Image provided courtesy of Pictometry International 2012

0 500 1,000

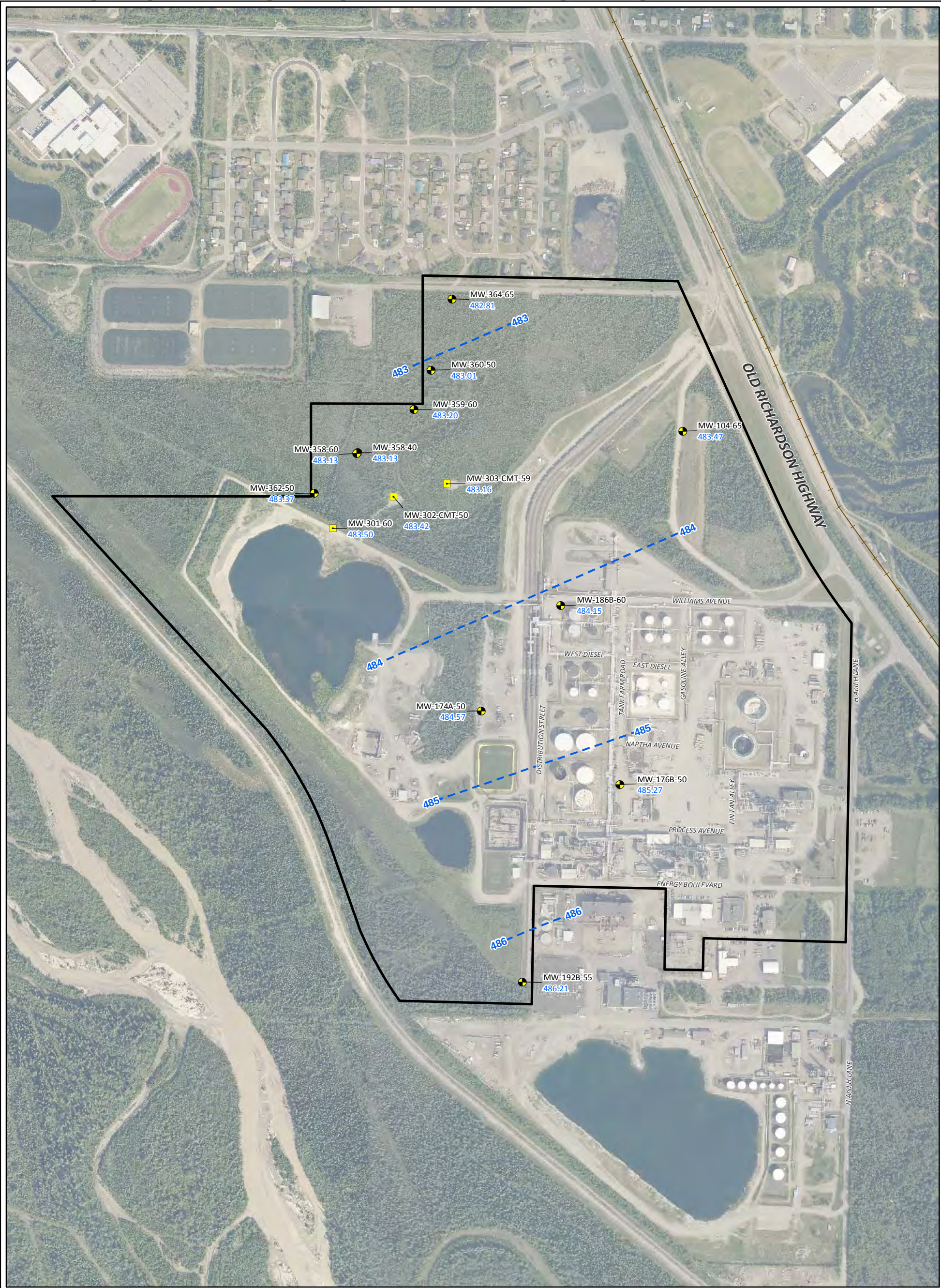
SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

FIRST QUARTER 2018 GROUNDWATER CONTOUR MAP- ONSITE WELLS AT WATER TABLE

FIGURE

3-1



Legend

- Vertical Profile Transect Well
- Monitoring Well
- FHRA Property Boundary

Groundwater Elevation Contours in Feet Above Mean Sea Level (Dashed where Inferred)

0 500 1,000

SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

FIRST QUARTER 2018 GROUNDWATER CONTOUR MAP - ONSITE WELLS 10 TO 55 FEET BELOW WATER TABLE

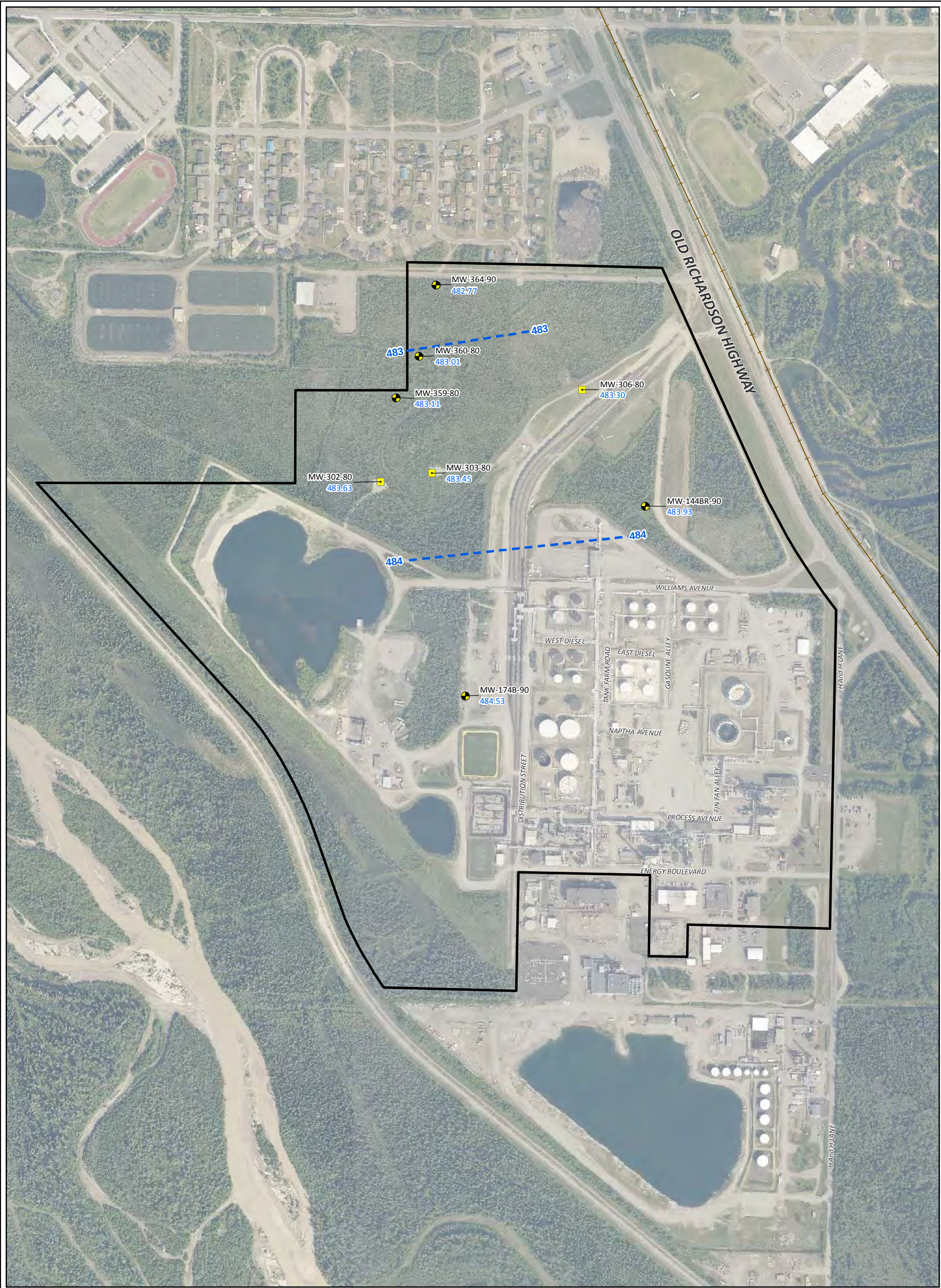
FIGURE

3-2

ARCADIS

Notes:

- Wells were gauged in March 2018
- Only monitoring wells scheduled for gauging per Table 3-1 of the Long Term Monitoring Plan - 2017 Update are shown on the figure.
- Vertical gradient data are evaluated in more detail in Appendix F of the Annual 2018 Onsite Groundwater Monitoring Report
- Image provided courtesy of Pictometry International 2012



Legend

- Vertical Profile Transect Well
- Monitoring Well
- FHRA Property Boundary
- Groundwater Elevation Contours in Feet Above Mean Sea Level (Dashed where Inferred)

Notes:

- Wells were gauged in March 2018
- Only monitoring wells scheduled for gauging per Table 3-1 of the Long Term Monitoring Plan - 2017 Update are shown on the figure.
- Vertical gradient data are evaluated in more detail in Appendix F of the Annual 2018 Onsite Groundwater Monitoring Report
- Image provided courtesy of Pictometry International 2012

0 500 1,000

SCALE IN FEET

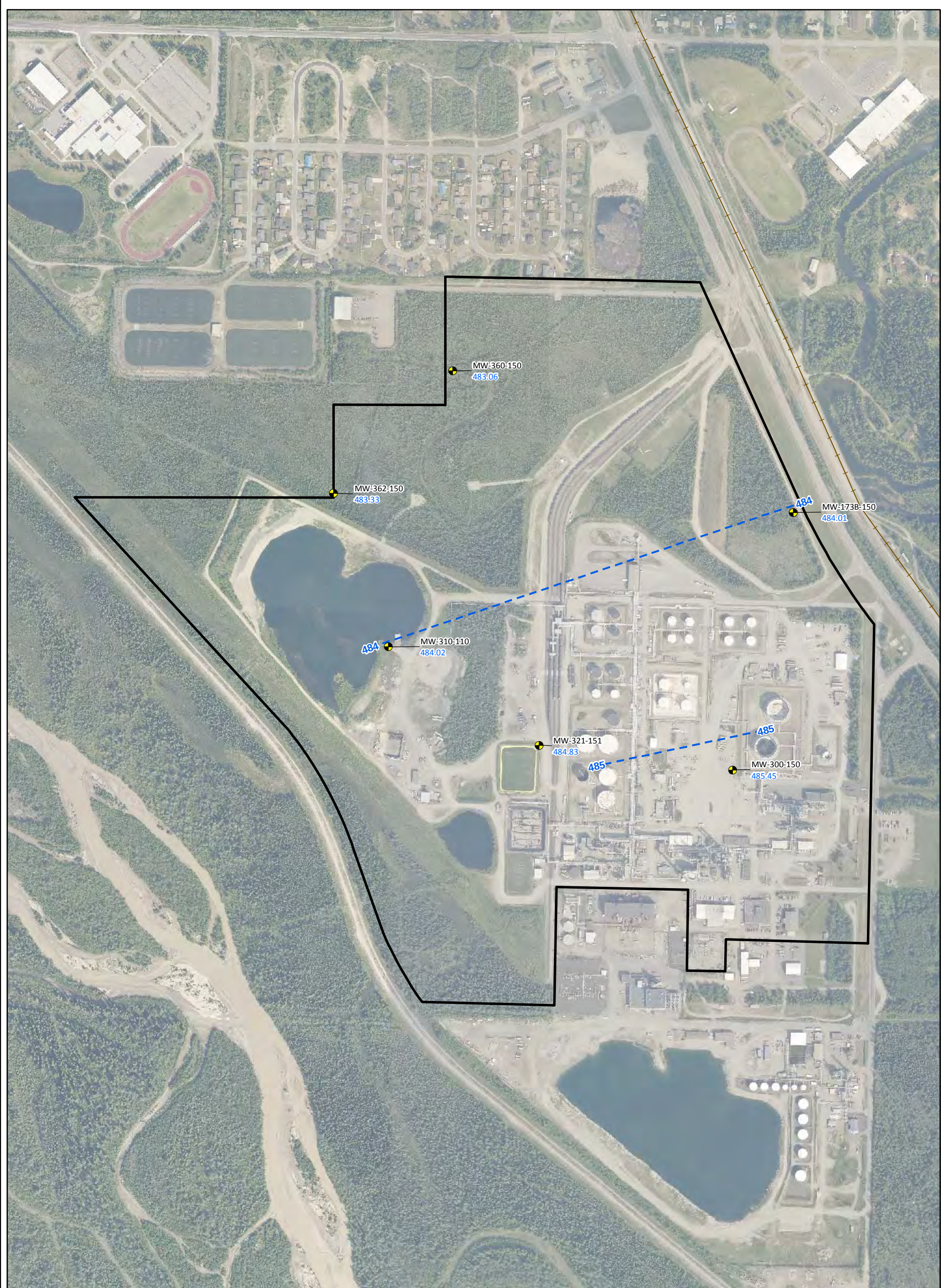
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

FIRST QUARTER 2018 GROUNDWATER CONTOUR MAP - ONSITE WELLS 55 TO 90 FEET BELOW WATER TABLE

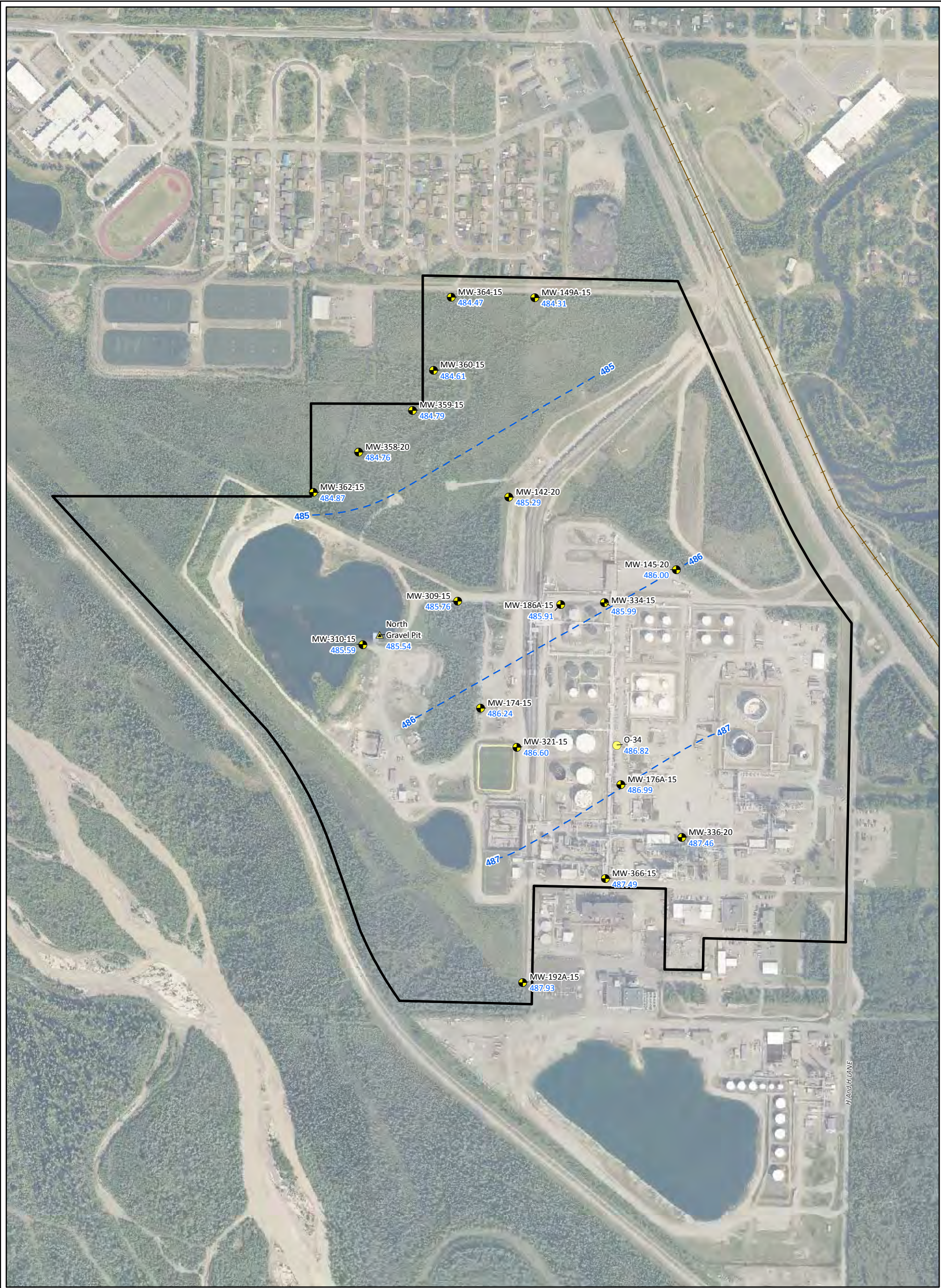
FIGURE

3-3

ARCADIS



Legend Monitoring Well FHRA Property Boundary Groundwater Elevation Contours in Feet Above Mean Sea Level (Dashed where Inferred) Notes: -Wells were gauged in March 2018 -Only monitoring wells scheduled for gauging per Table 3-1 of the Long Term Monitoring Plan - 2017 Update are shown on the figure. -Vertical gradient data are evaluated in more detail in Appendix F of the Annual 2018 Onsite Groundwater Monitoring Report -Image provided courtesy of Pictometry International 2012	FLINT HILLS RESOURCES ALASKA, LLC NORTH POLE TERMINAL, NORTH POLE, ALASKA ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT FIRST QUARTER 2018 GROUNDWATER CONTOUR MAP - ONSITE WELLS 90 TO 160 FEET BELOW WATER TABLE FIGURE 3-4 ARCADIS



Legend

- Monitoring Well
- Observation Well
- Surface Water
- FHRA Property Boundary
- Groundwater Elevation Contours in Feet Above Mean Sea Level (Dashed where Inferred)

Notes:

- Wells were gauged in September 2018
- Only monitoring wells scheduled for gauging per Table 3-1 of the Long Term Monitoring Plan - Q32018 Update are shown on the figure.
- Vertical gradient data are evaluated in more detail in Appendix F of the Annual 2018 Onsite Groundwater Monitoring Report
- Image provided courtesy of Pictometry International 2012

0 500 1,000

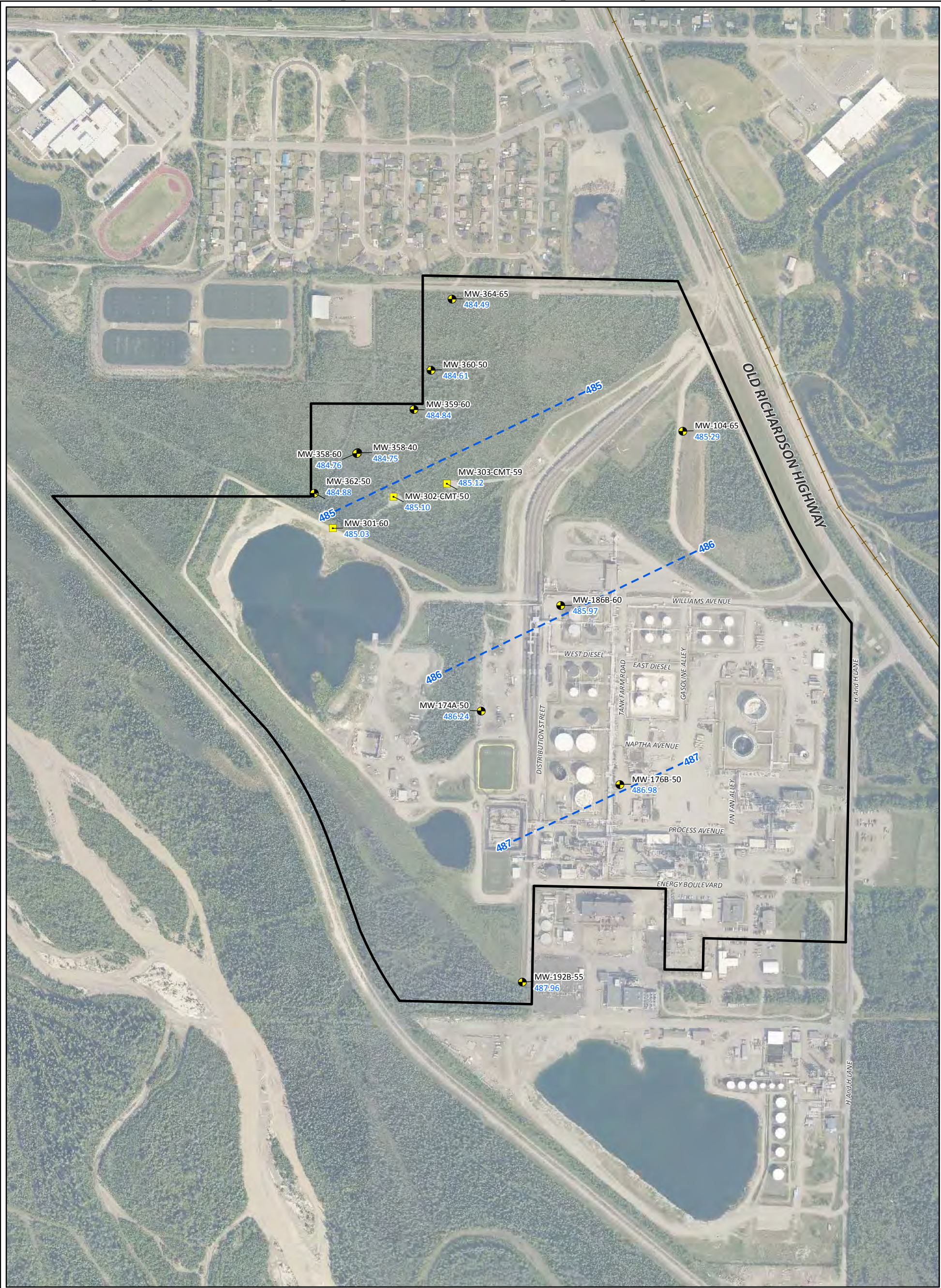
SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

THIRD QUARTER 2018 GROUNDWATER CONTOUR MAP - ONSITE WELLS AT WATER TABLE

FIGURE

3-5



Legend

- Vertical Profile Transect Well
- Monitoring Well
- FHRA Property Boundary

Groundwater Elevation Contours in Feet Above Mean Sea Level (Dashed where Inferred)

0 500 1,000

SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

THIRD QUARTER 2018 GROUNDWATER CONTOUR MAP - ONSITE WELLS 10 TO 55 FEET BELOW WATER TABLE

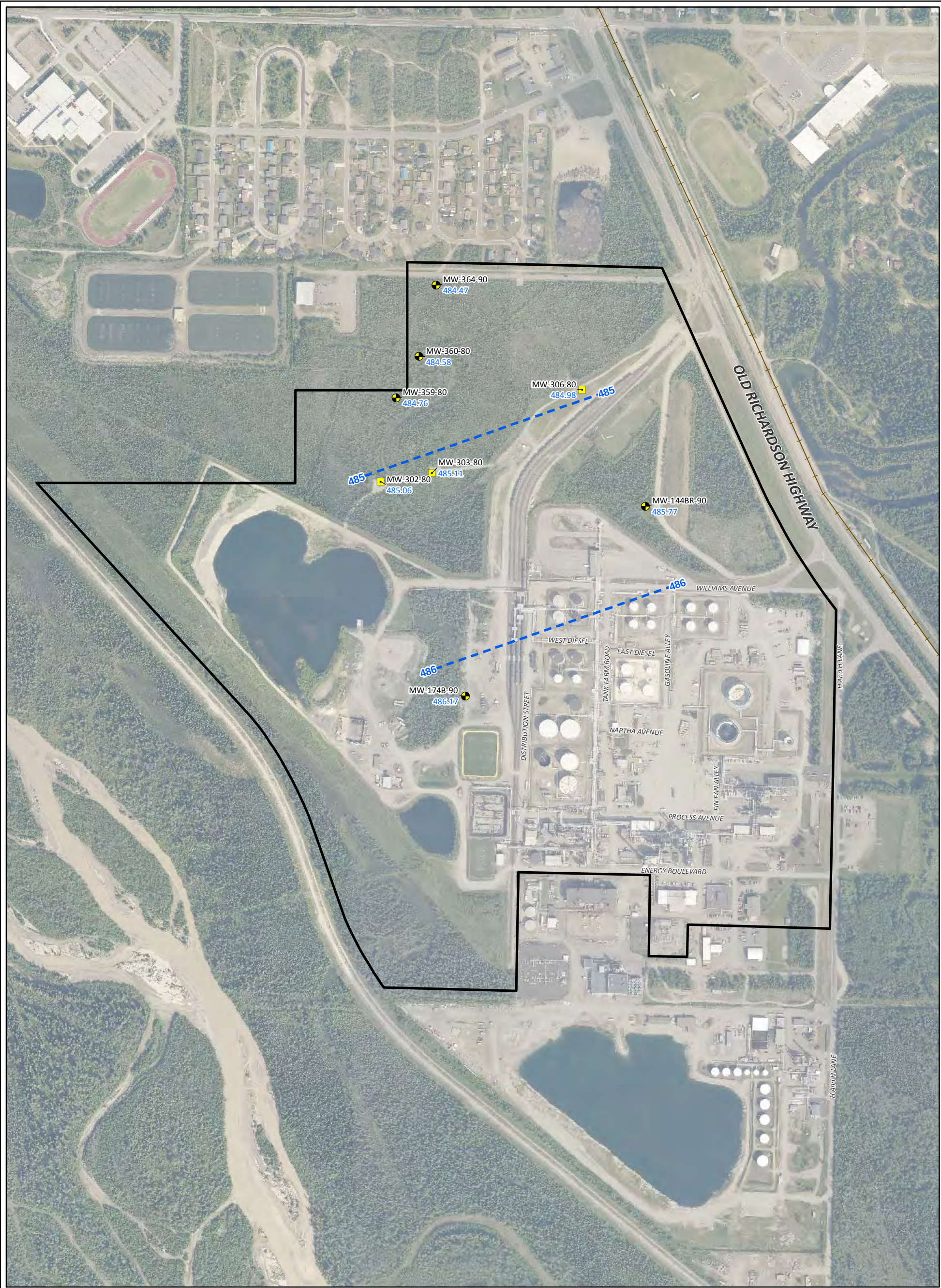
ARCADIS

FIGURE

3-6

Notes:

- Wells were gauged in September 2018
- Only monitoring wells scheduled for gauging per Table 3-1 of the Long Term Monitoring Plan - Q32018 Update are shown on the figure.
- Vertical gradient data are evaluated in more detail in Appendix F of the Annual 2018 Onsite Groundwater Monitoring Report
- Image provided courtesy of Pictometry International 2012



Legend

- Vertical Profile Transect Well
- Monitoring Well
- FHRA Property Boundary

Groundwater Elevation Contours in Feet Above Mean Sea Level (Dashed where Inferred)

484

Notes:

- Wells were gauged in September 2018
- Only monitoring wells scheduled for gauging per Table 3-1 of the Long Term Monitoring Plan - Q32018 Update are shown on the figure.
- Vertical gradient data are evaluated in more detail in Appendix F of the Annual 2018 Onsite Groundwater Monitoring Report
- Image provided courtesy of Pictometry International 2012

0 500 1,000

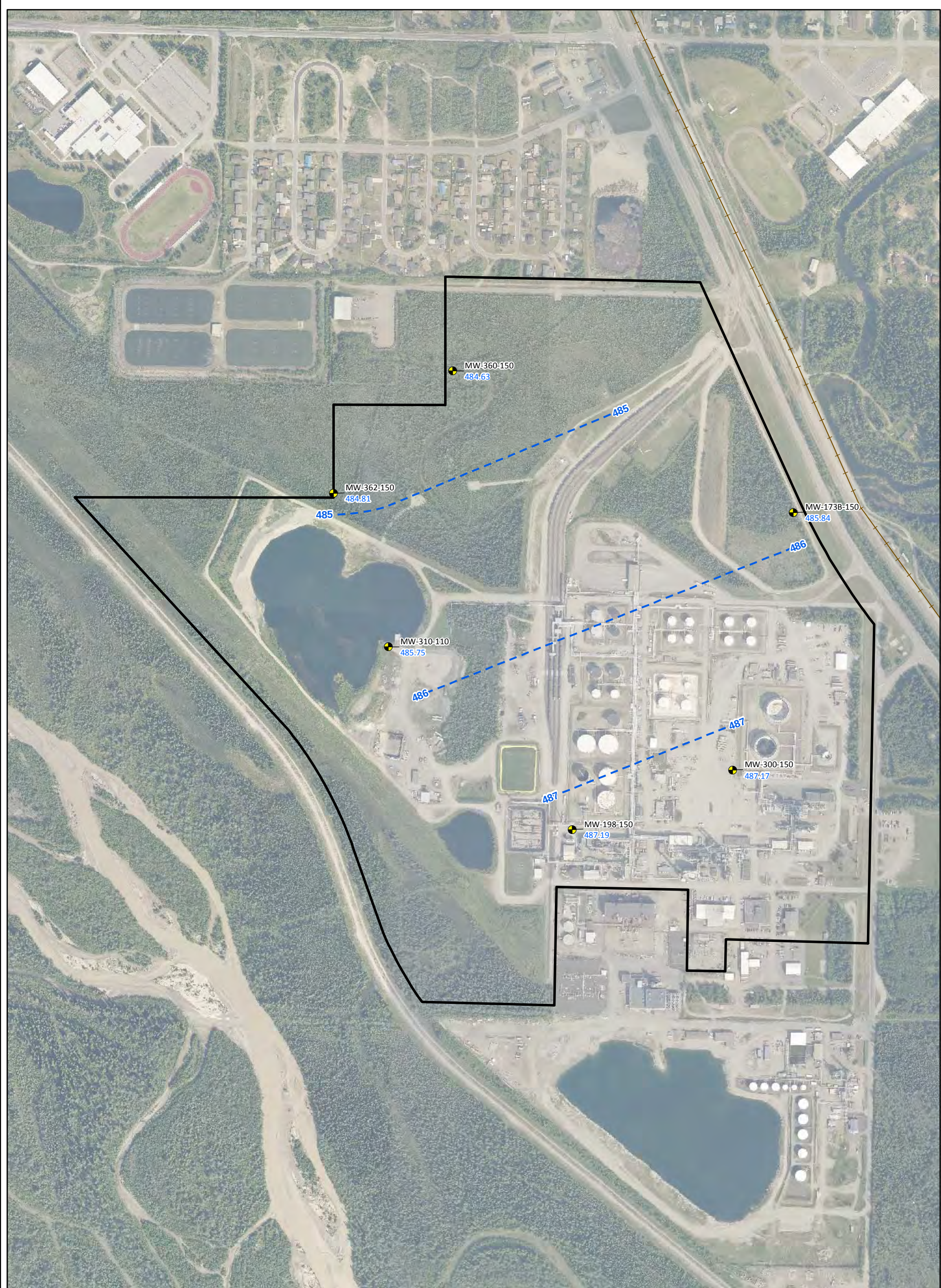
SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

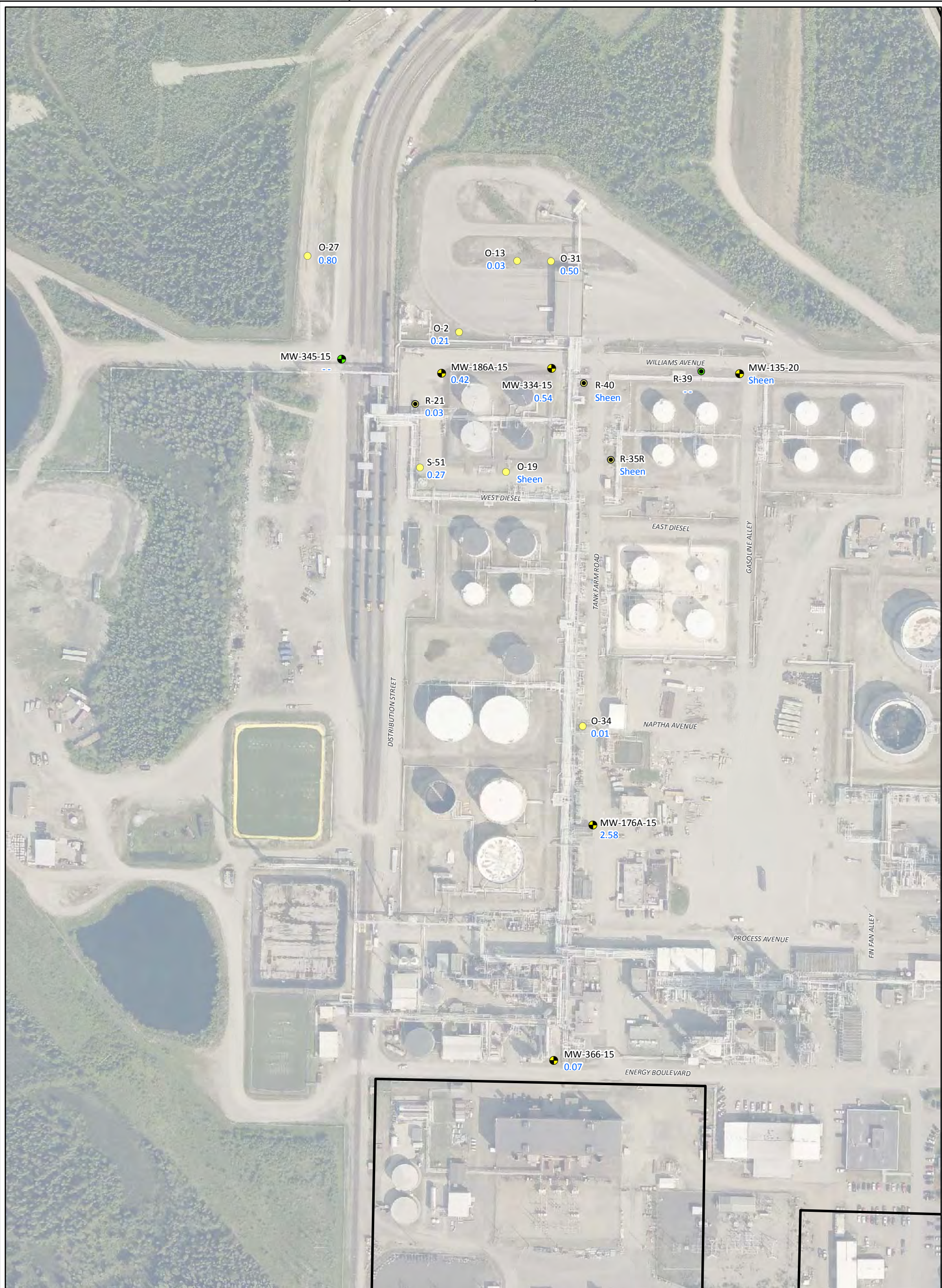
THIRD QUARTER 2018 GROUNDWATER CONTOUR MAP - ONSITE WELLS 55 TO 90 FEET BELOW WATER TABLE

FIGURE

3-7



Legend - Monitoring Well - FHRA Property Boundary - Groundwater Elevation Contours in Feet Above Mean Sea Level (Dashed where Inferred) Notes: -Wells were gauged in September 2018 -Only monitoring wells scheduled for gauging per Table 3-1 of the Long Term Monitoring Plan - Q32018 Update are shown on the figure. -Vertical gradient data are evaluated in more detail in Appendix F of the Annual 2018 Onsite Groundwater Monitoring Report -Image provided courtesy of Pictometry International 2012	FLINT HILLS RESOURCES ALASKA, LLC NORTH POLE TERMINAL, NORTH POLE, ALASKA ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT THIRD QUARTER 2018 GROUNDWATER CONTOUR MAP - ONSITE WELLS 90 TO 160 FEET BELOW WATER TABLE  FIGURE 3-8



Legend

No LNAPL or Sheen Observed

-  Monitoring Well
-  Observation Well
-  Recovery Well (Inactive)

LNAPL or Sheen Observed

-  Monitoring Well
-  Observation Well
-  Recovery Well (Inactive)

	FHRA Property Boundary
2.58	LNAPL Thickness (feet)
Sheen	An interface probe was used. No measurable LNAPL was present, but LNAPL sheen was observed visually.
--	No LNAPL measured or sheen observed

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
**ANNUAL 2018 ONSITE GROUNDWATER
MONITORING REPORT**

**FIRST QUARTER 2018
LNAPL MONITORING DATA**

FIGURE

3-9

Notes:
LNAPL = Light Nonaqueous Phase Liquid
LNAPL results posted on figure are in feet.
-The maximum LNAPL thickness for wells gauged as part of the Long Term Monitoring Plan - 2017 Update are shown on the figure.
-Image provided courtesy of Pictometry International 2012



A horizontal scale bar with alternating black and white segments. It is marked with '0' at the left end, '200' at the midpoint, and '400' at the right end. Below the bar is the text 'SCALE IN FEET'.



Legend

No LNAPL or Sheen Observed	LNAPL or Sheen Observed	Legend
Monitoring Well	Monitoring Well	FHRA Property Boundary
Observation Well	Observation Well	LNAPL Thickness (feet)
Recovery Well (Inactive)	Recovery Well (Inactive)	0.34
		Sheen
		--
		An interface probe was used. No measurable LNAPL was present, but LNAPL sheen was observed visually.
		No LNAPL measured or sheen observed

Notes:

- LNAPL = Light Nonaqueous Phase Liquid
- LNAPL results posted on figure are in feet.
- The maximum LNAPL thickness for wells gauged as part of the Long Term Monitoring Plan - 2017 Update are shown on the figure.
- Image provided courtesy of Pictometry International 2012

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

SECOND QUARTER 2018
LNAPL MONITORING DATA

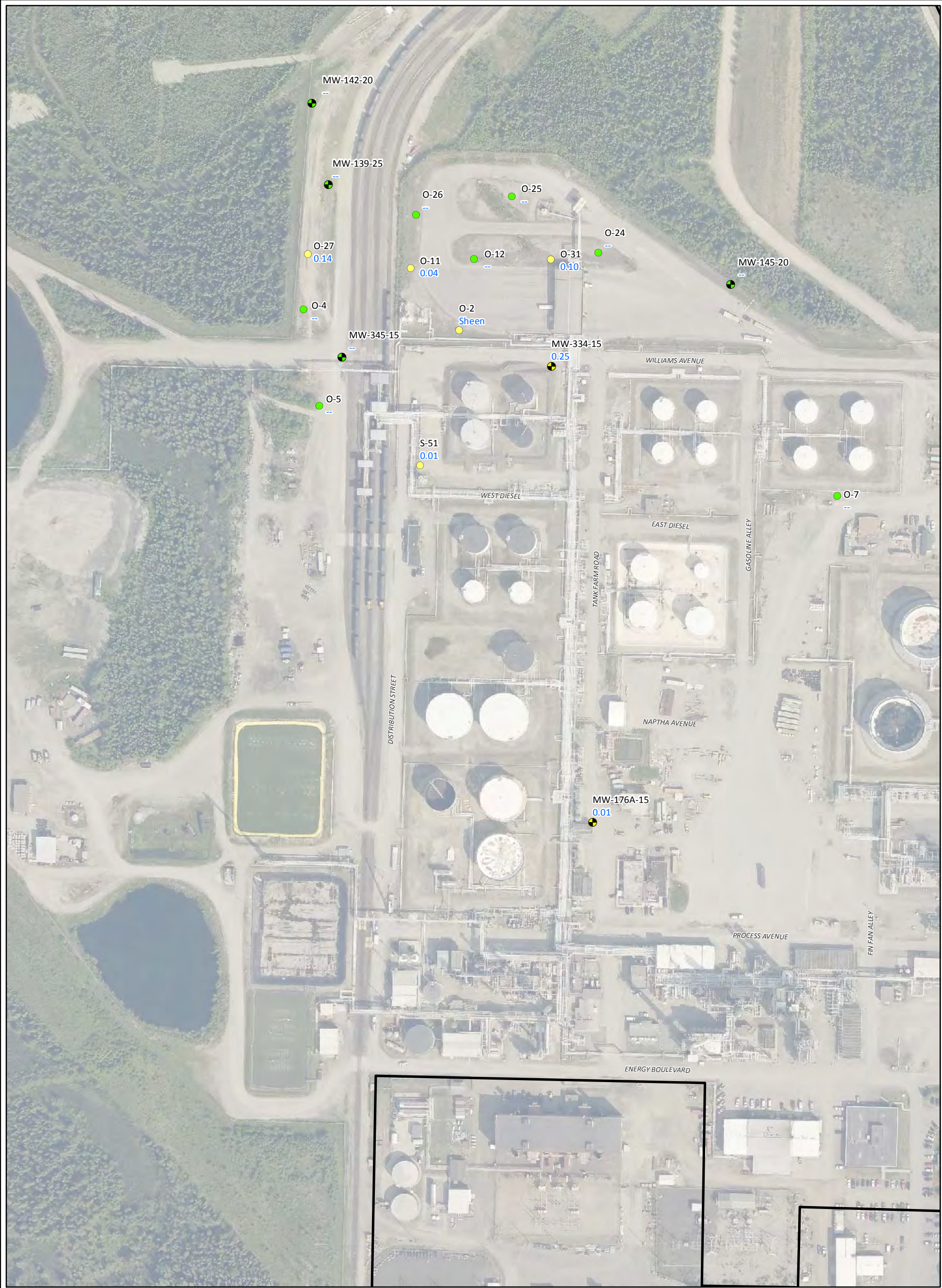
ARCADIS

FIGURE

3-10

0 200 400

SCALE IN FEET



Legend

No LNAPL or Sheen Observed	LNAPL or Sheen Observed	FWRA Property Boundary
Monitoring Well	Monitoring Well	LNAPL Thickness (feet)
Observation Well	Observation Well	An interface probe was used. No measurable LNAPL was present, but LNAPL sheen was observed visually.
Recovery Well (Inactive)	Recovery Well (Inactive)	No LNAPL measured or sheen observed

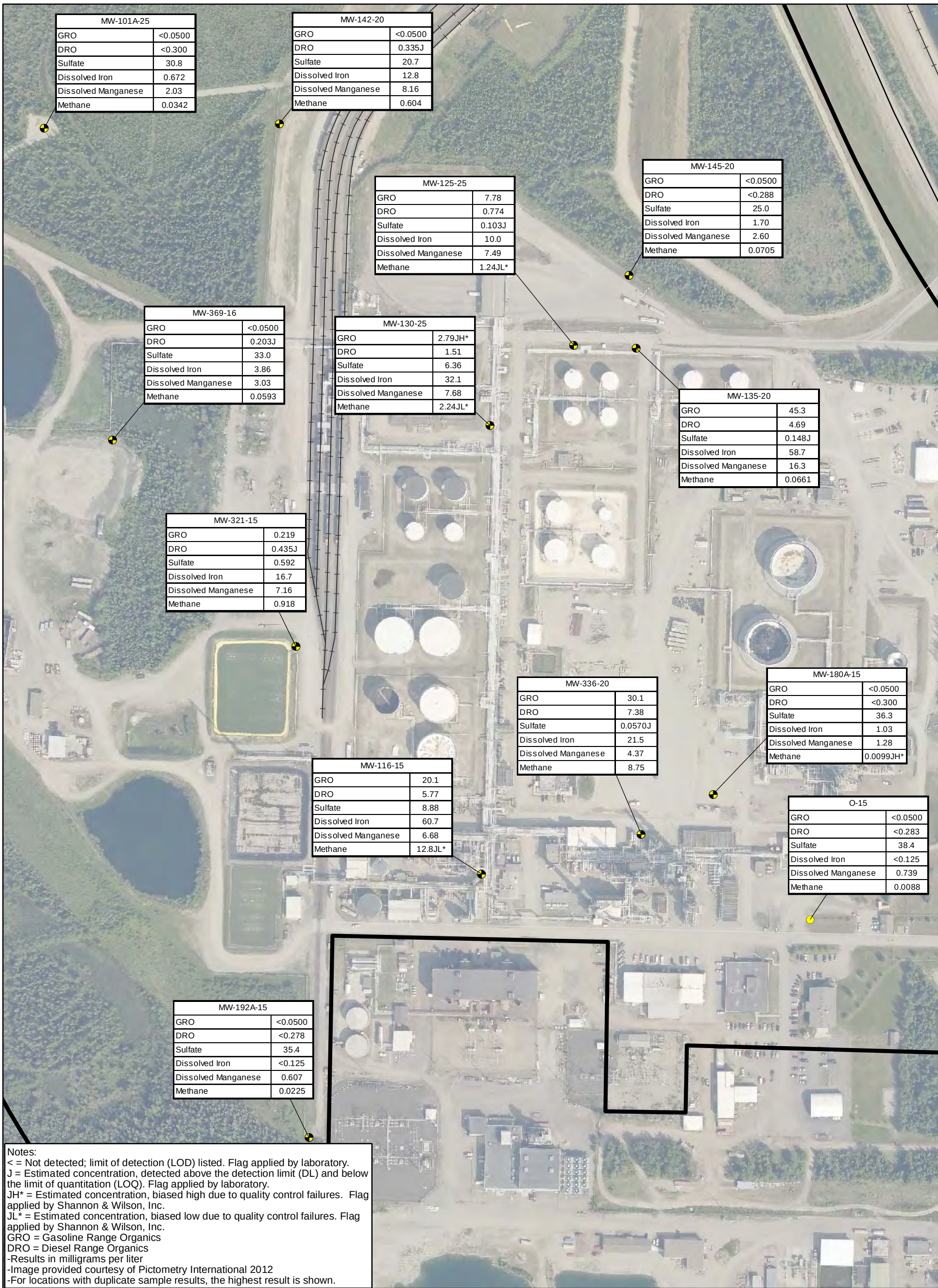
Notes:
LNAPL = Light Nonaqueous Phase Liquid
LNAPL results posted on figure are in feet.
-The maximum LNAPL thickness for wells gauged as part of the Long Term Monitoring Plan - Q32018 Update are shown on the figure.
-Image provided courtesy of Pictometry International 2012
-Annual gauging was conducted in November 2018

**FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT**

**THIRD QUARTER AND ANNUAL
2018 LNAPL MONITORING DATA**

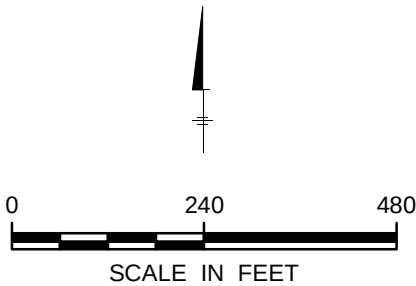
**FIGURE
3-11**

ARCADIS



Legend

- Monitoring Well
- Observation Well
- FHRA Property Boundary



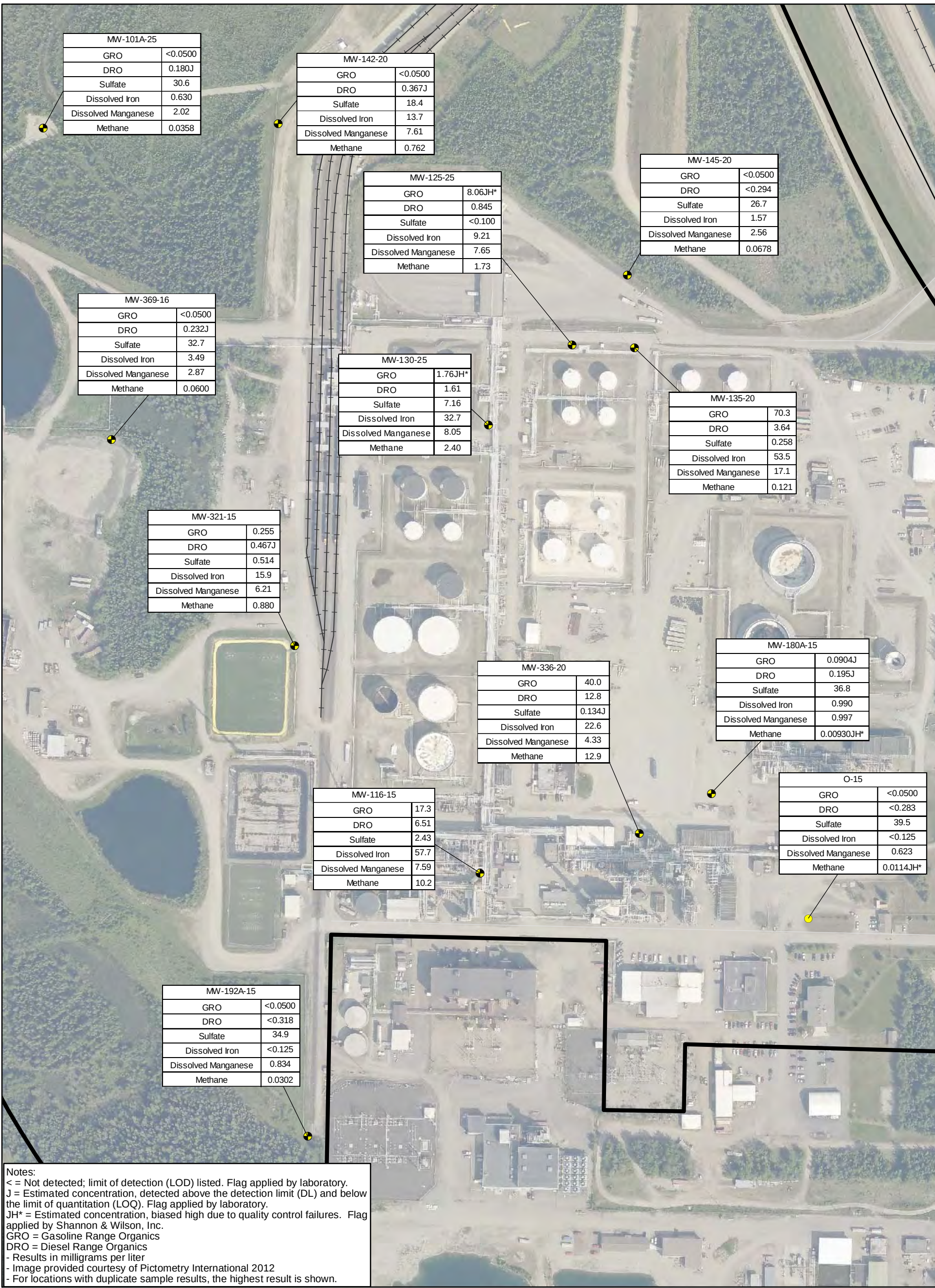
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER
MONITORING REPORT

**FIRST QUARTER 2018
NATURAL SOURCE ZONE DEPLETION
MONITORING RESULTS**



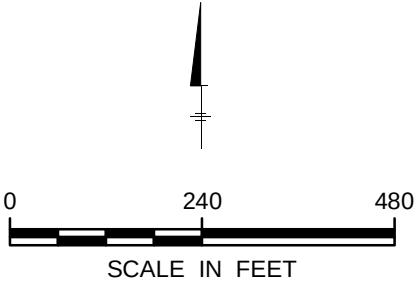
FIGURE

3-12



Legend

- Monitoring Well
- Observation Well
- FHRA Property Boundary



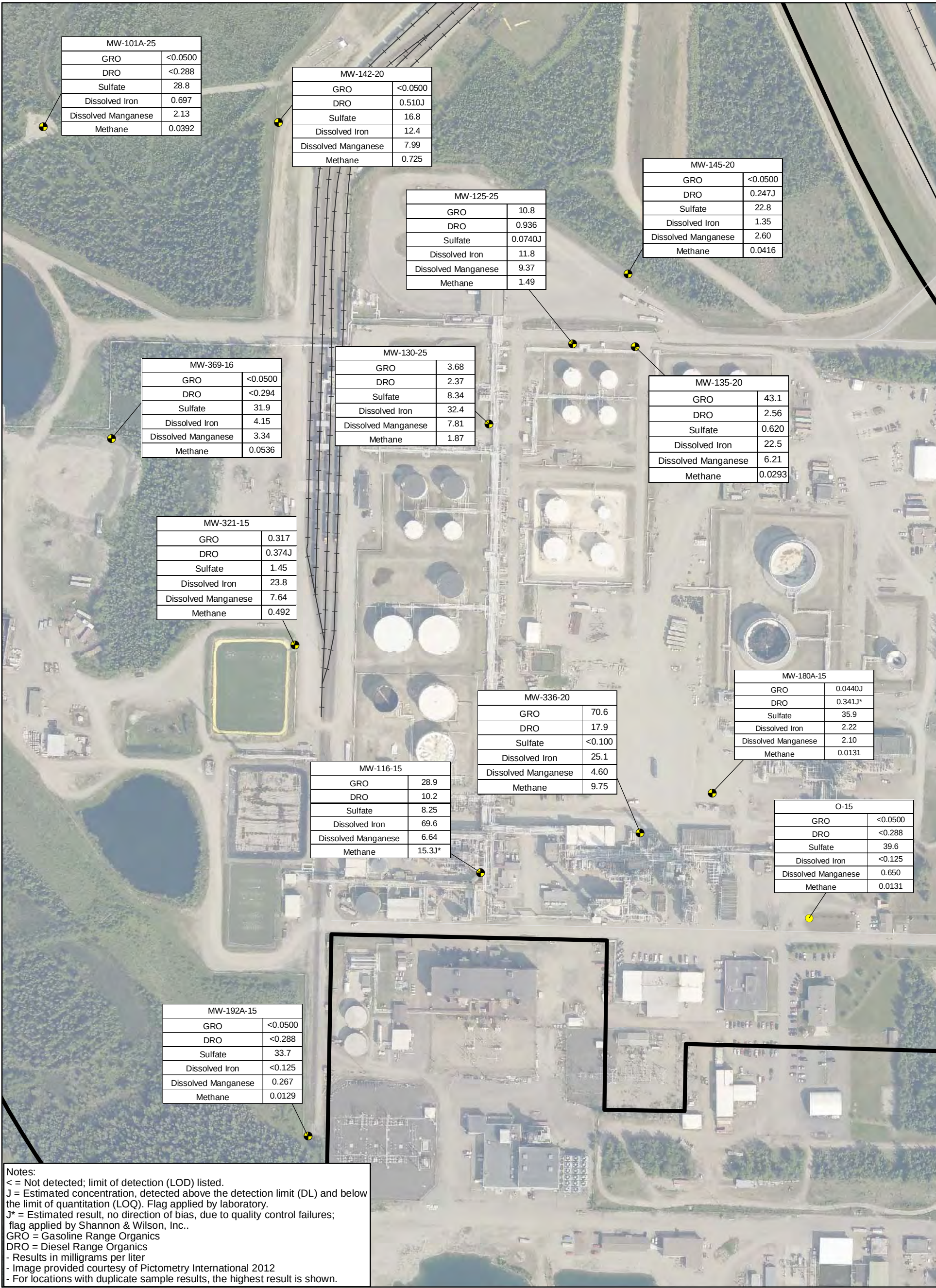
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER
MONITORING REPORT

SECOND QUARTER 2018
NATURAL SOURCE ZONE DEPLETION
MONITORING RESULTS

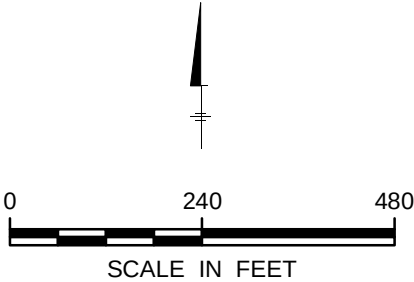


FIGURE

3-13



Legend
Monitoring Well
Observation Well
FHRA Property Boundary



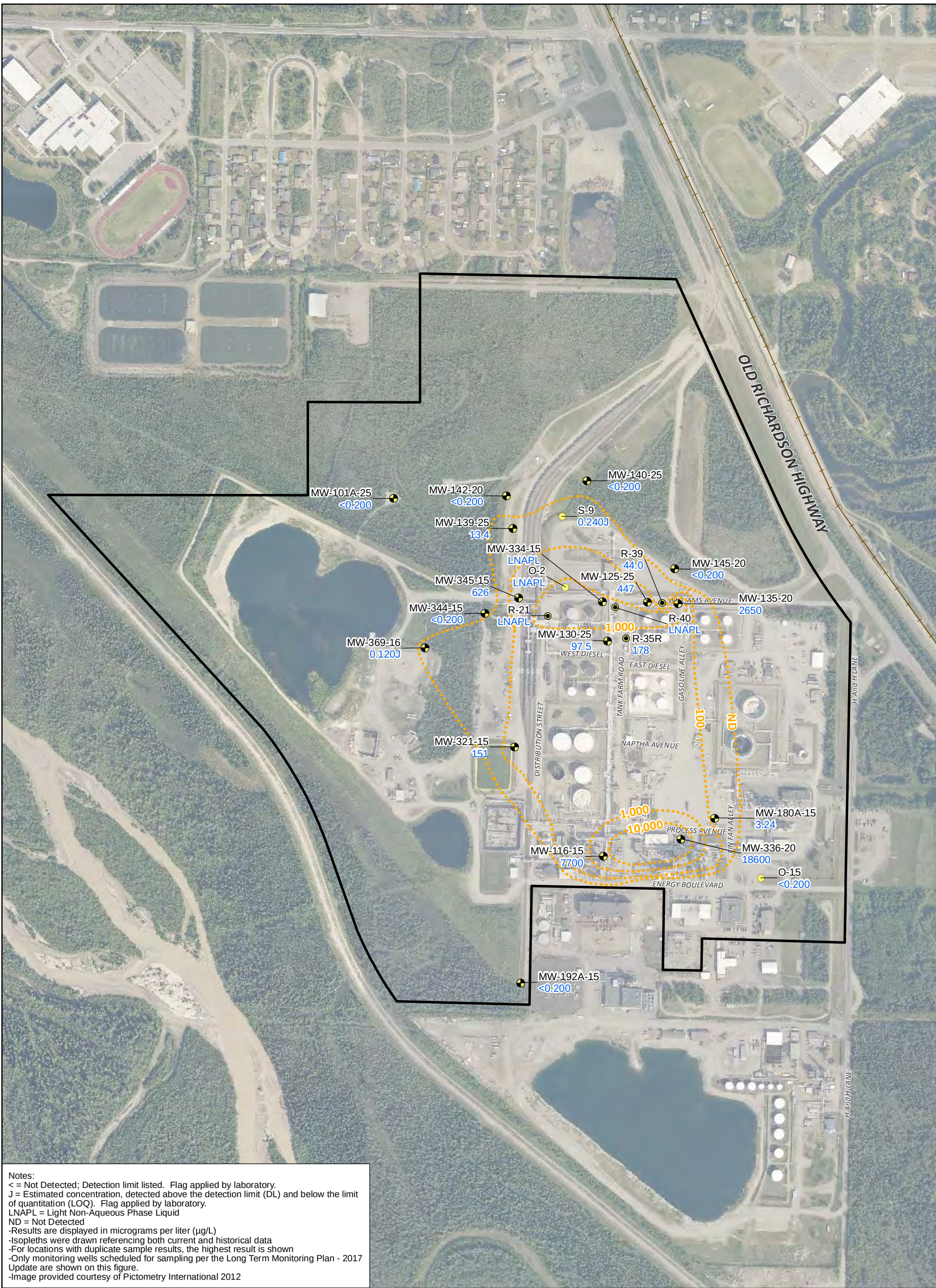
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER
MONITORING REPORT

THIRD QUARTER 2018 NATURAL SOURCE
ZONE DEPLETION MONITORING RESULTS



FIGURE

3-14



Legend:

- Monitoring Well
- Observation Well
- Recovery Well (Inactive)
- Inferred benzene isopleth in µg/L
- FHRA Property Boundary
- LNAPL Well not sampled due to LNAPL presence

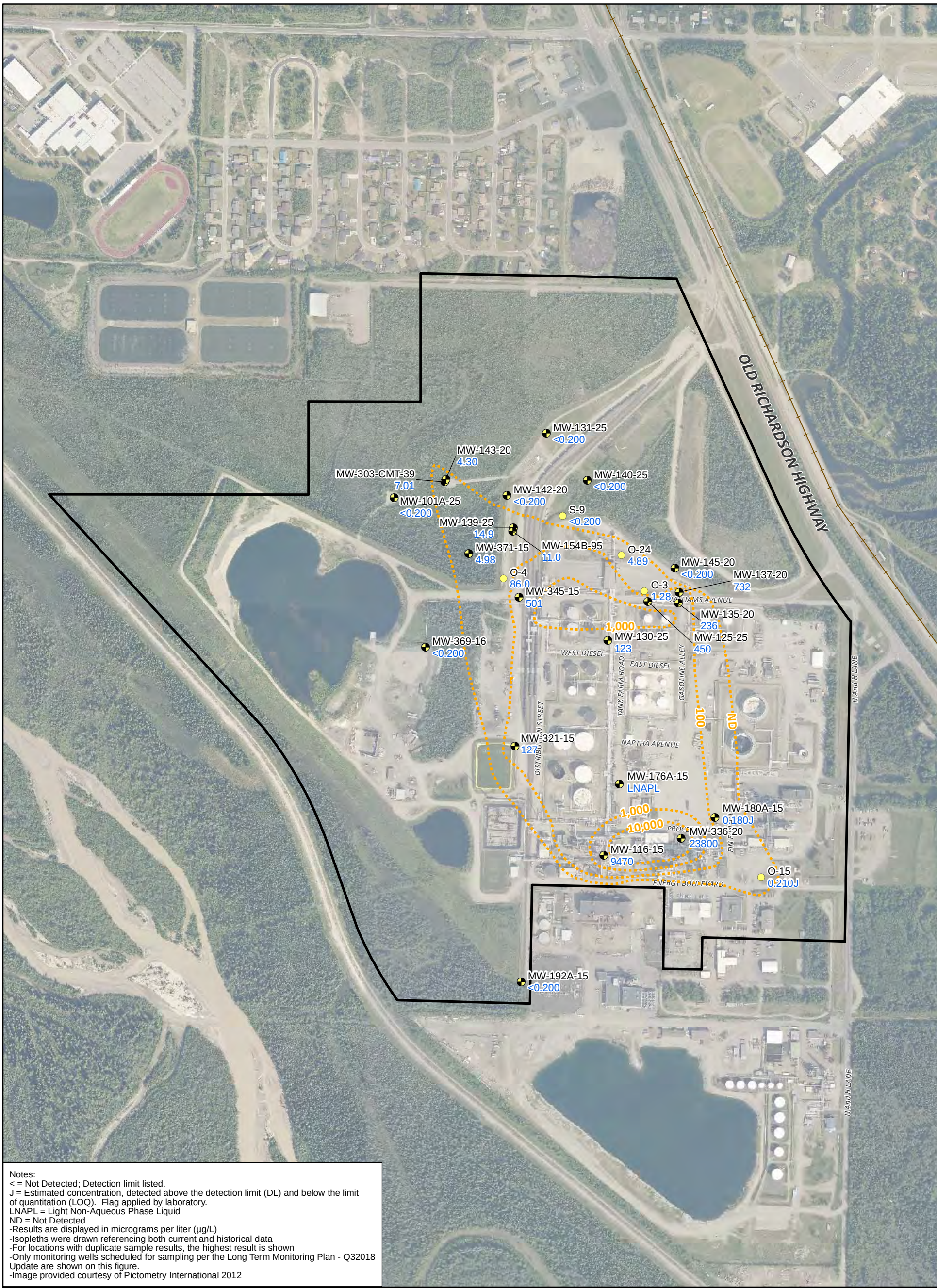
0 500 1,000

SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT
FIRST SEMI-ANNUAL 2018 ONSITE BENZENE GROUNDWATER ANALYTICAL RESULTS

FIGURE
3-15

ARCADIS

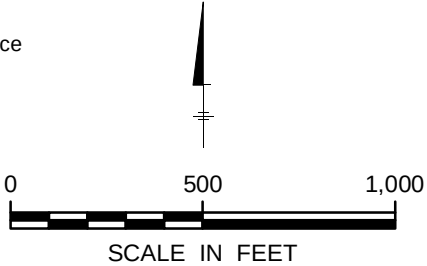


Notes:
< = Not Detected; Detection limit listed.
J = Estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ). Flag applied by laboratory.
LNAPL = Light Non-Aqueous Phase Liquid
ND = Not Detected
-Results are displayed in micrograms per liter (µg/L)
-Isopleths were drawn referencing both current and historical data
-For locations with duplicate sample results, the highest result is shown
-Only monitoring wells scheduled for sampling per the Long Term Monitoring Plan - Q32018 Update are shown on this figure.
-Image provided courtesy of Pictometry International 2012

Legend:

- Monitoring Well
- Observation Well
- Inferred benzene isopleth in µg/L
- FHRA Property Boundary

LNAPL Well not sampled due to LNAPL presence

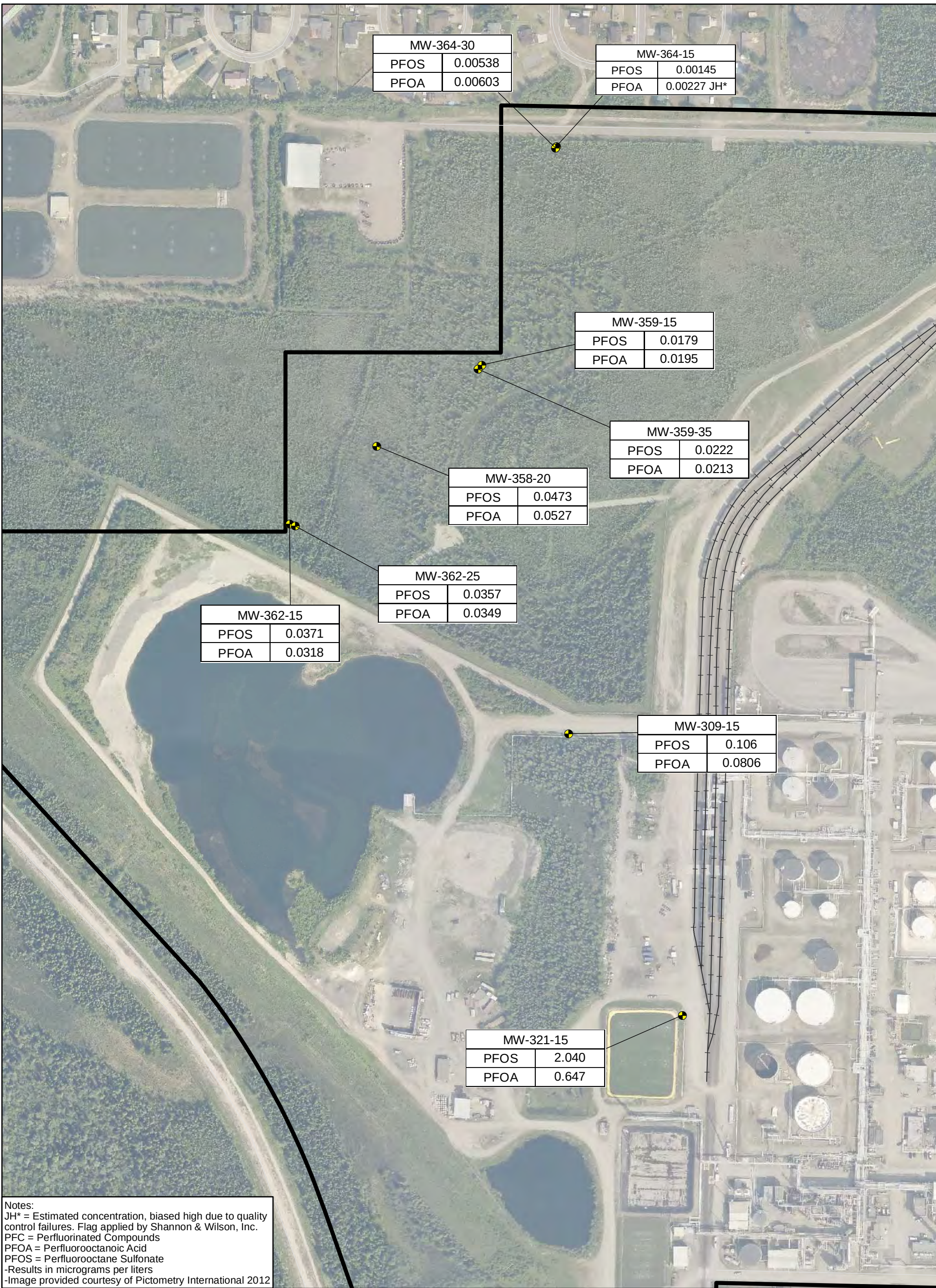


FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER
MONITORING REPORT
THIRD QUARTER 2018
ONSITE BENZENE GROUNDWATER
ANALYTICAL RESULTS



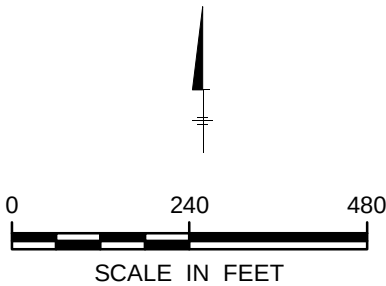
FIGURE

3-16



Notes:
JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.
PFC = Perfluorinated Compounds
PFOA = Perfluorooctanoic Acid
PFOS = Perfluorooctane Sulfonate
-Results in micrograms per liters
-Image provided courtesy of Pictometry International 2012

Legend
 Monitoring Well
 FHRA Property Boundary



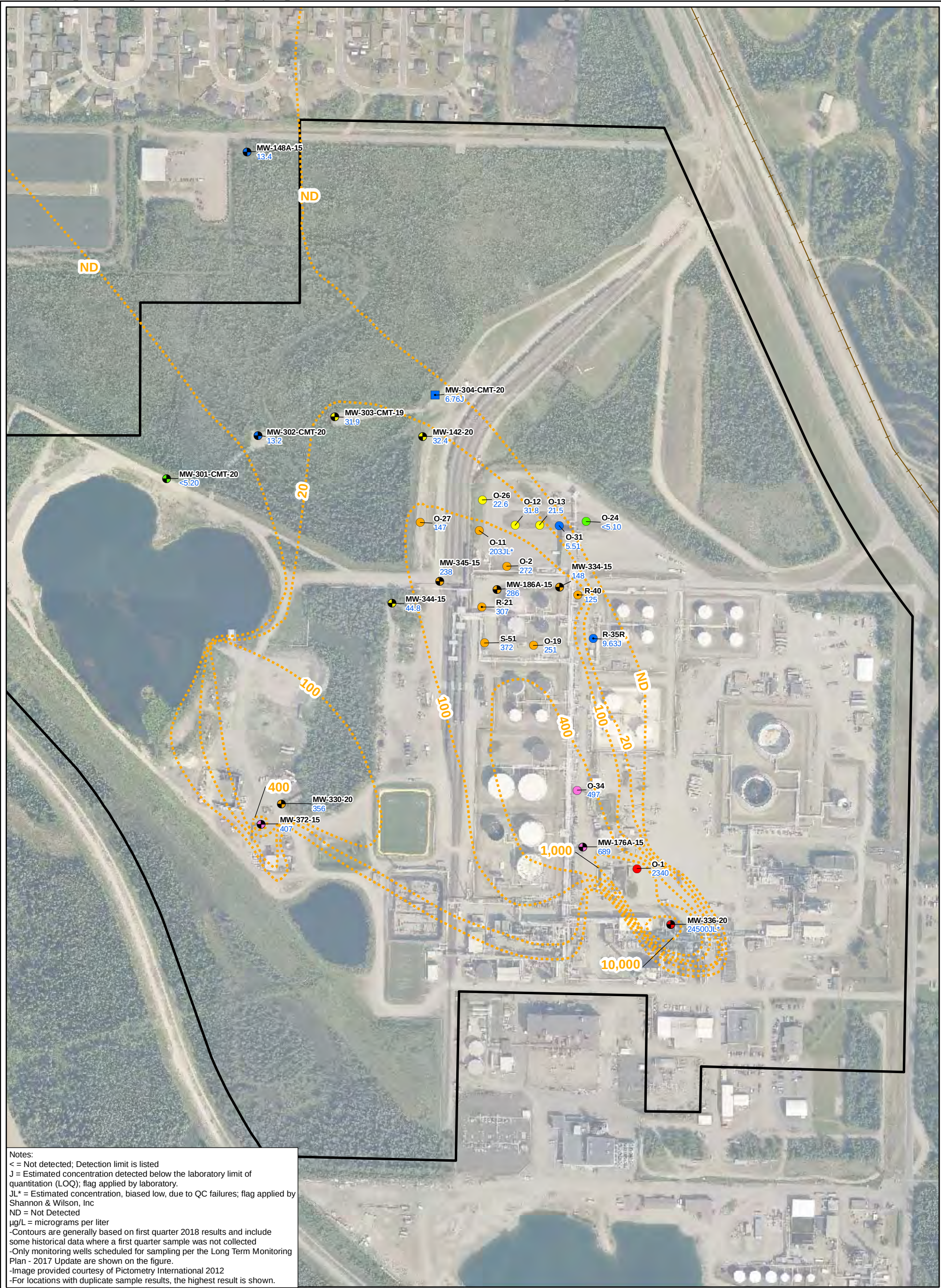
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

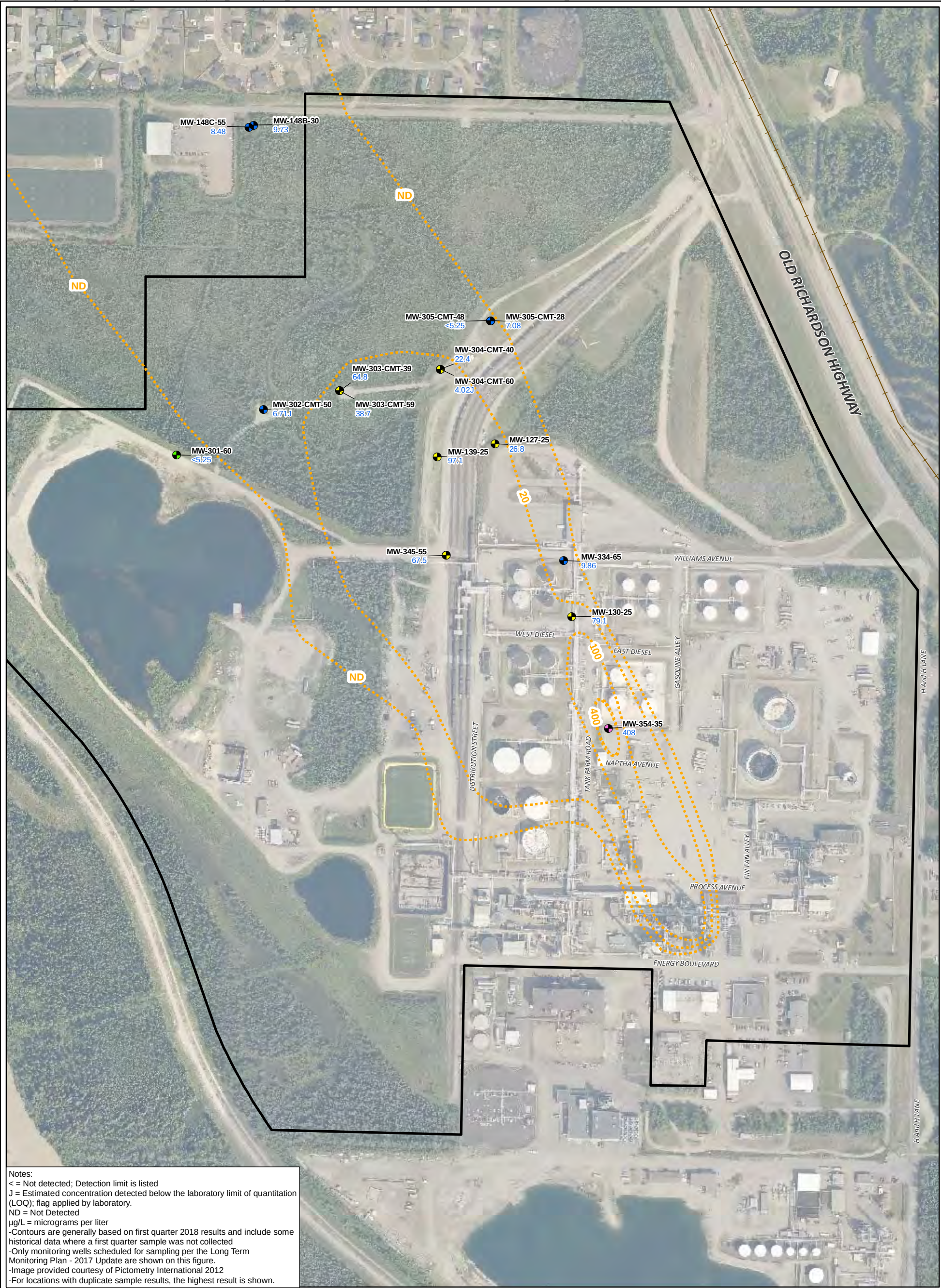
THIRD QUARTER 2018 ONSITE PFC GROUNDWATER ANALYTICAL RESULTS



FIGURE

3-17





Legend

- Monitoring Well
- Approximate Sulfolane Isopleth in µg/L
- FHRA Property Boundary

Sulfolane Results

- Not Detected
- 3.14 - Less Than 20 µg/L
- 20 - 100 µg/L
- 100 - 400 µg/L
- 400 - 1,000 µg/L

0 350 700

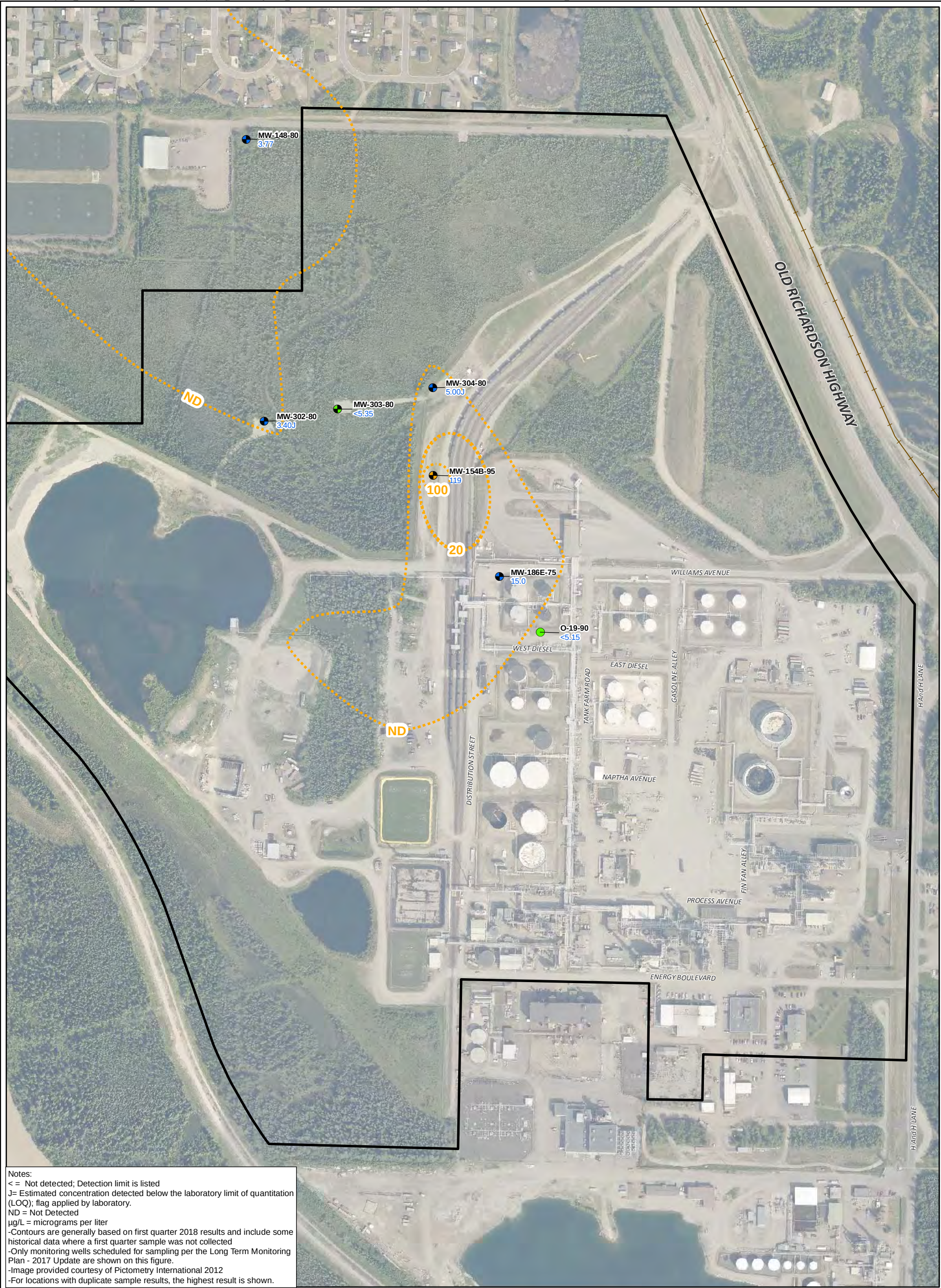
SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT
FIRST QUARTER 2018 ONSITE SULFOLANE GROUNDWATER ANALYTICAL RESULTS - 10 TO 55 FEET BELOW WATER TABLE

FIGURE

3-19

ARCADIS



Legend

- Monitoring Well
- Observation Well
- Approximate Sulfolane Isoleth in µg/L
- FHRA Property Boundary

Sulfolane Results

- Not Detected
- 3.14 - Less Than 20 µg/L
- 20 - 100 µg/L
- 100 - 400 µg/L

0 350 700

SCALE IN FEET

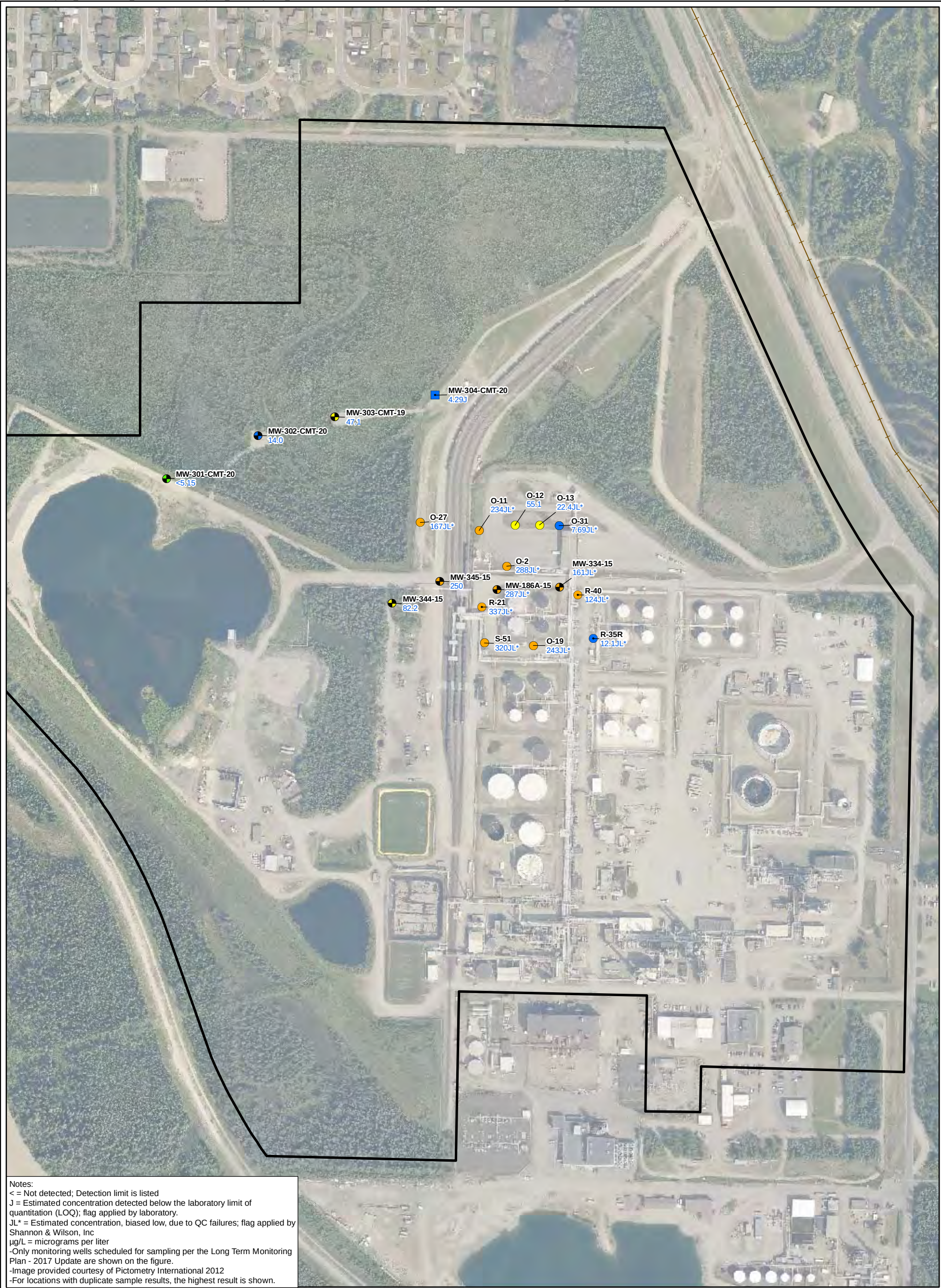
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

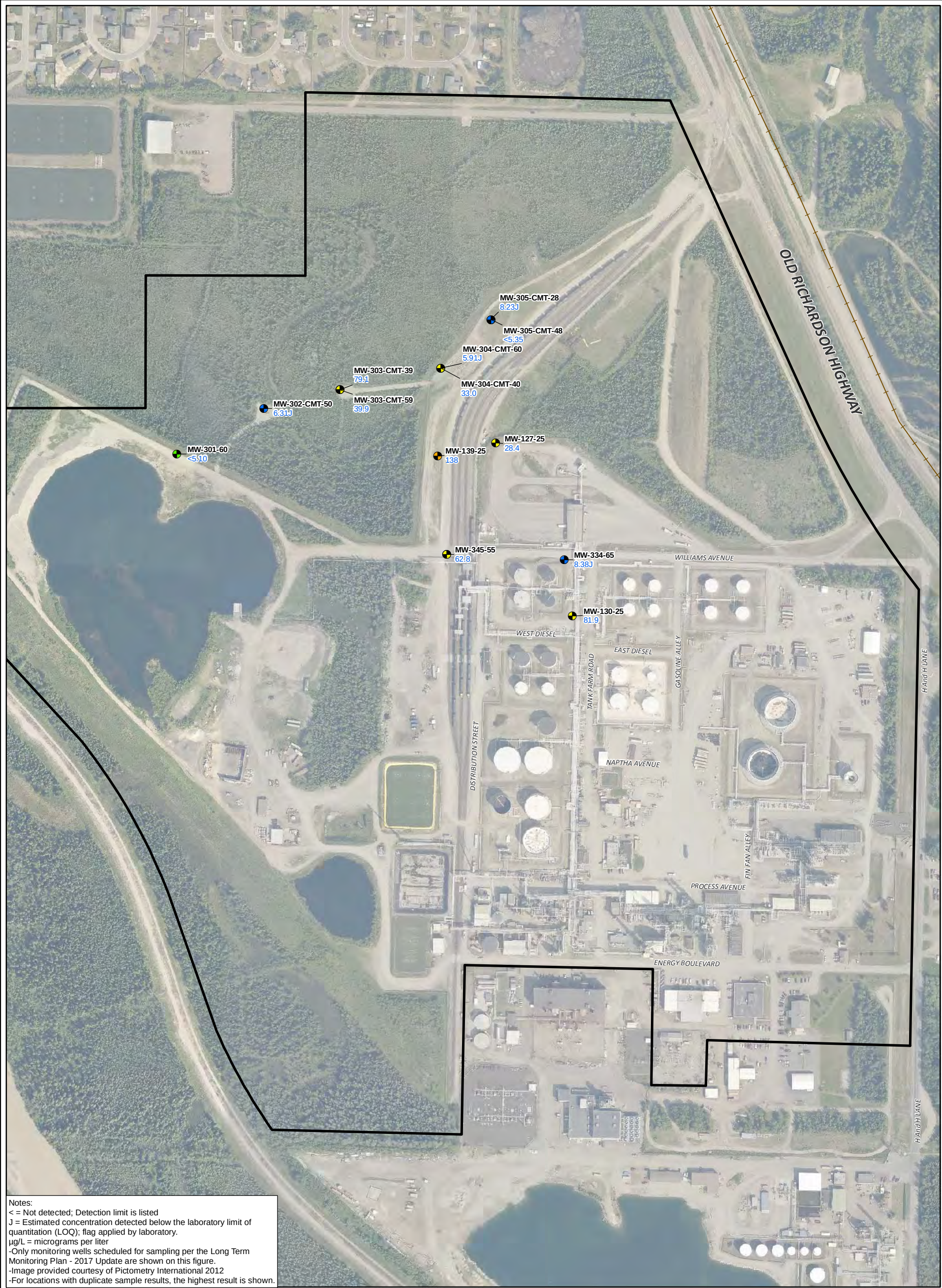
FIRST QUARTER 2018 ONSITE SULFOLANE GROUNDWATER ANALYTICAL RESULTS - 55 TO 90 FEET BELOW WATER TABLE

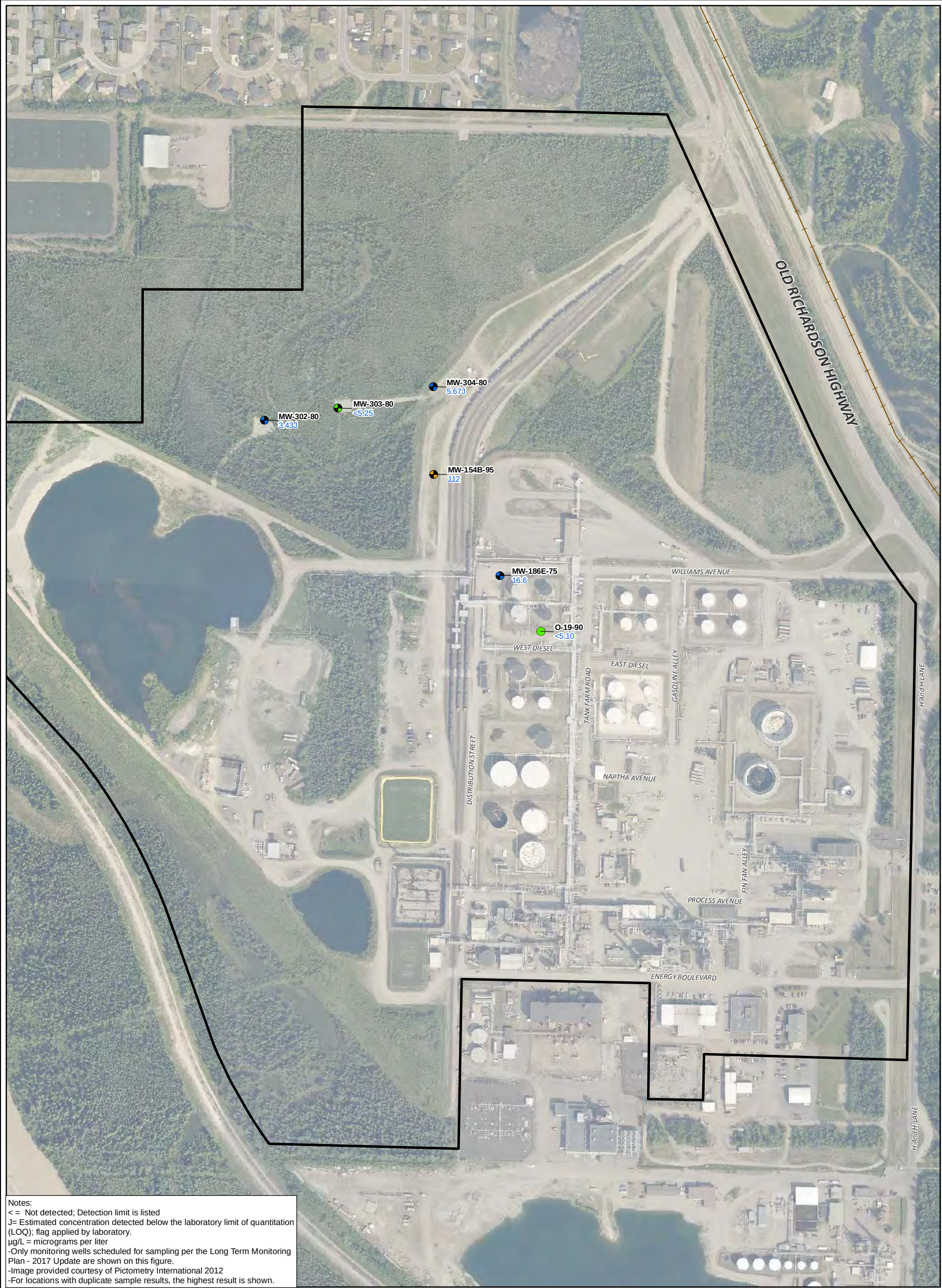
FIGURE

ARCADIS

3-20







Legend

- Monitoring Well
- Observation Well
- FHRA Property Boundary

Sulfolane Results

- Not Detected
- 3.14 - Less Than 20 µg/L
- 20 - 100 µg/L
- 100 - 400 µg/L

0 350 700

SCALE IN FEET

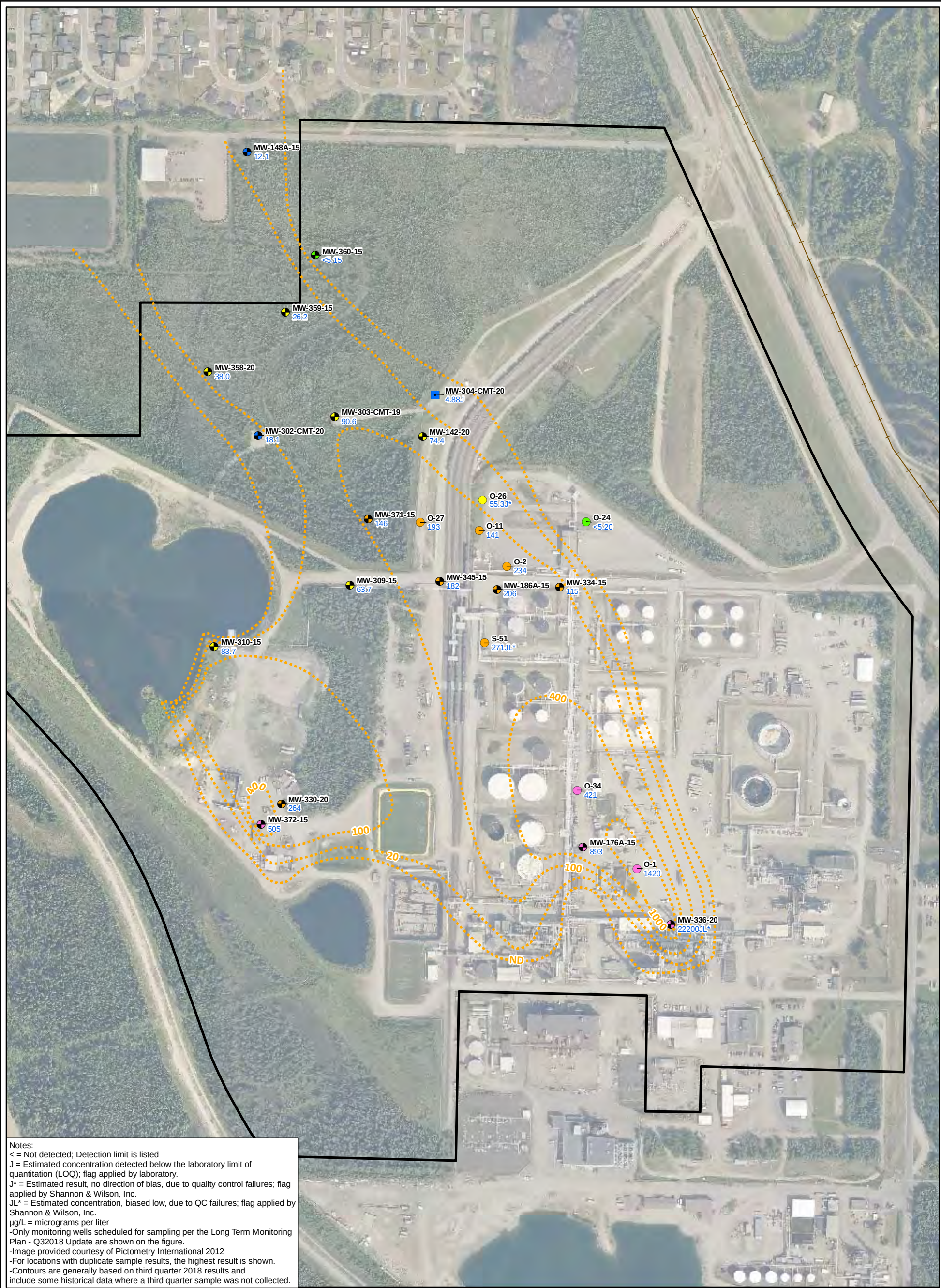
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

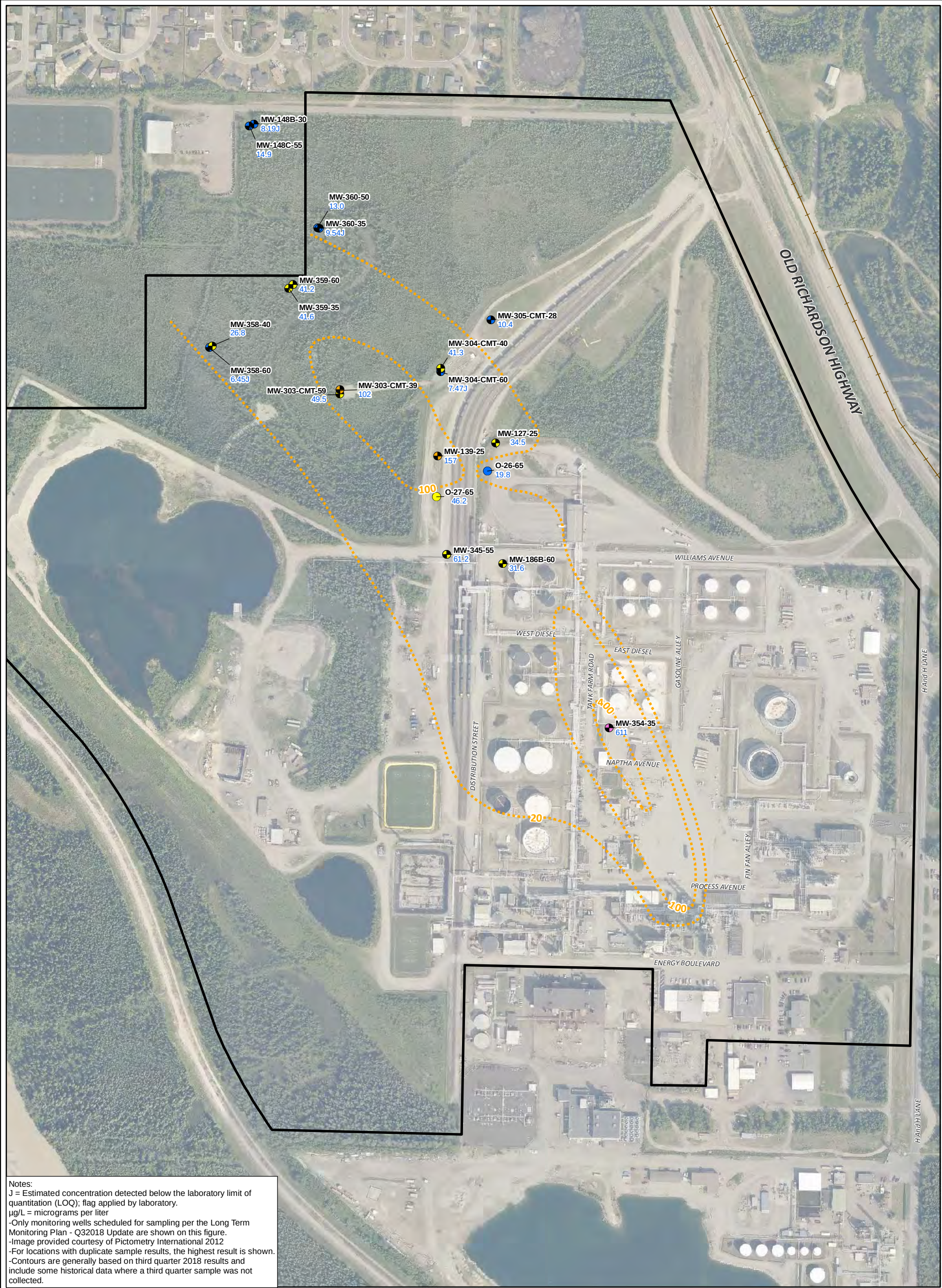
SECOND QUARTER 2018 ONSITE SULFOLANE GROUNDWATER ANALYTICAL RESULTS - 55 TO 90 FEET BELOW WATER TABLE

FIGURE

3-23

ARCADIS





Legend

- Monitoring Well
- Observation Well
- FHRA Property Boundary
- Approximate Sulfolane Isoleth in µg/L

Sulfolane Results

- Not Detected
- 3.14 - Less Than 20 µg/L
- 20 - 100 µg/L
- 100 - 400 µg/L
- > 400 µg/L

0 350 700

SCALE IN FEET

FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT
THIRD QUARTER 2018 ONSITE SULFOLANE GROUNDWATER ANALYTICAL RESULTS - 10 TO 55 FEET BELOW WATER TABLE

FIGURE

3-25

ARCADIS



Legend

- Monitoring Well
- FHRA Property Boundary
- Approximate Sulfolane Isoleth in µg/L

Sulfolane Results

- Not Detected
- 3.14 - Less Than 20 µg/L
- 20 - 100 µg/L
- 100 - 400 µg/L
- > 400 µg/L

0 350 700
SCALE IN FEET

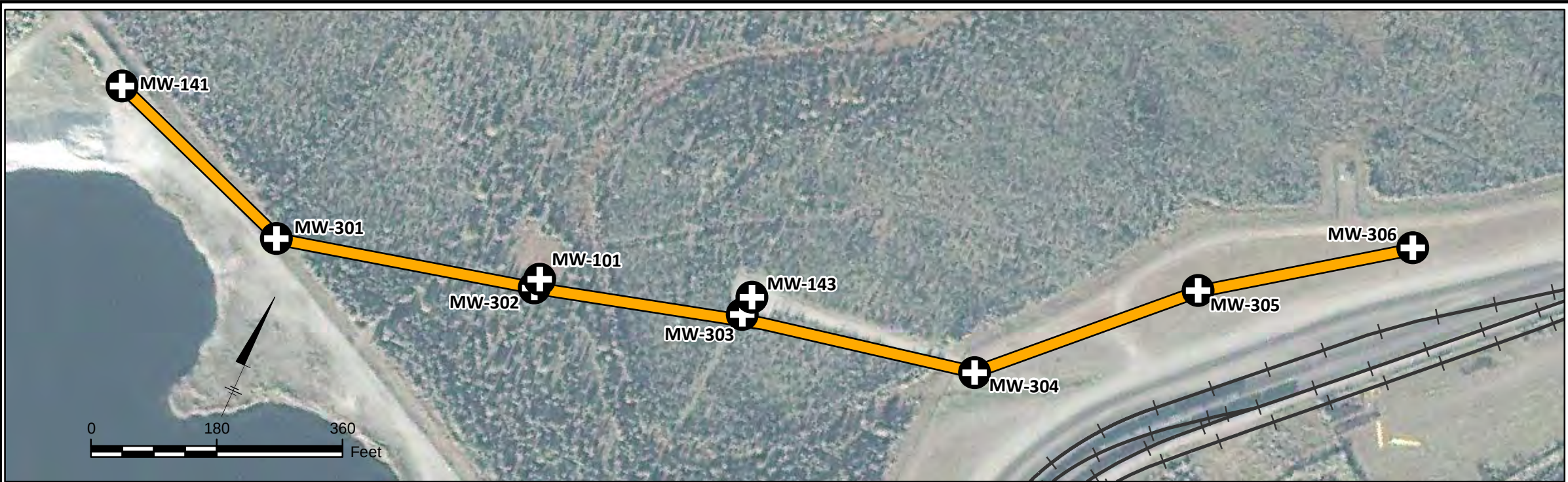
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER MONITORING REPORT

THIRD QUARTER 2018 ONSITE SULFOLANE GROUNDWATER ANALYTICAL RESULTS - 55 TO 90 FEET BELOW WATER TABLE

ARCADIS

FIGURE
3-26

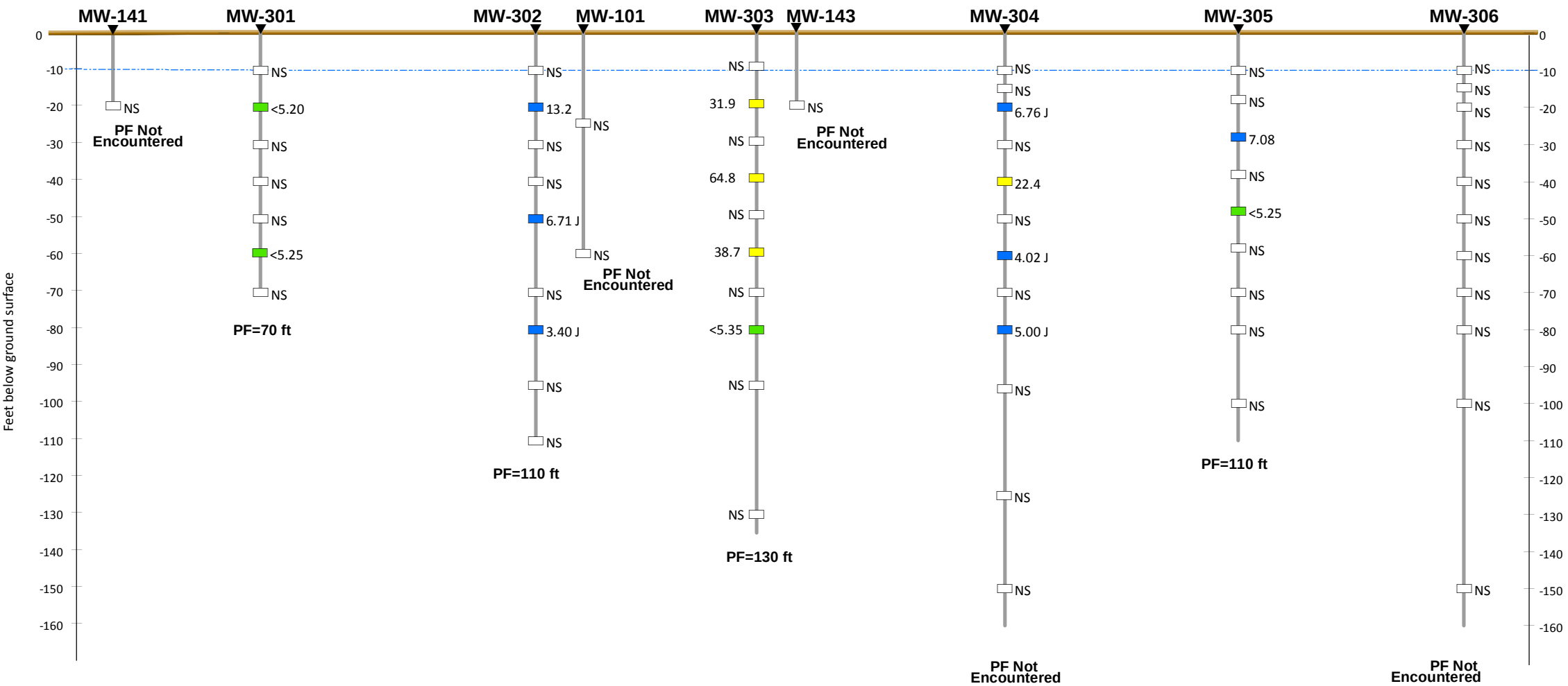
CITY: Citrix DIV/GROUP: IM/DV DB: K Sinsabaugh LD: G FRANCE
Path: Z:\GIS\Projects\ ENV\FHR\FHR_AK\NorthPoleRefinery\GW_Monitoring\2018_Q3\MXD\2018FirstSemiAnnualOnSite\Fig 3-27 1Q18 Sulfolane_VPT_Profile.mxd Date: 11/13/2018 Time: 2:31:33 PM



Legend:

Sulfolane Results

- Not Detected
- 3.14 - Less Than 20 µg/L
- 20 - 100 µg/L
- Ground Surface
- Approximate Groundwater Surface
- Well Profile



NOTES:
J = Estimated concentration detected below the laboratory limit of quantitation (LOQ). Flag applied by laboratory.
NS = Not sampled per Long-Term Monitoring Plan (LTM)
< = Not detected; Detection limit listed
PF= Permafrost encountered at bottom of boring.
ft = feet
µg/L = micrograms per liter
- For locations with duplicate sample results, the highest value is shown
- Profile has a vertical exaggeration of 5x

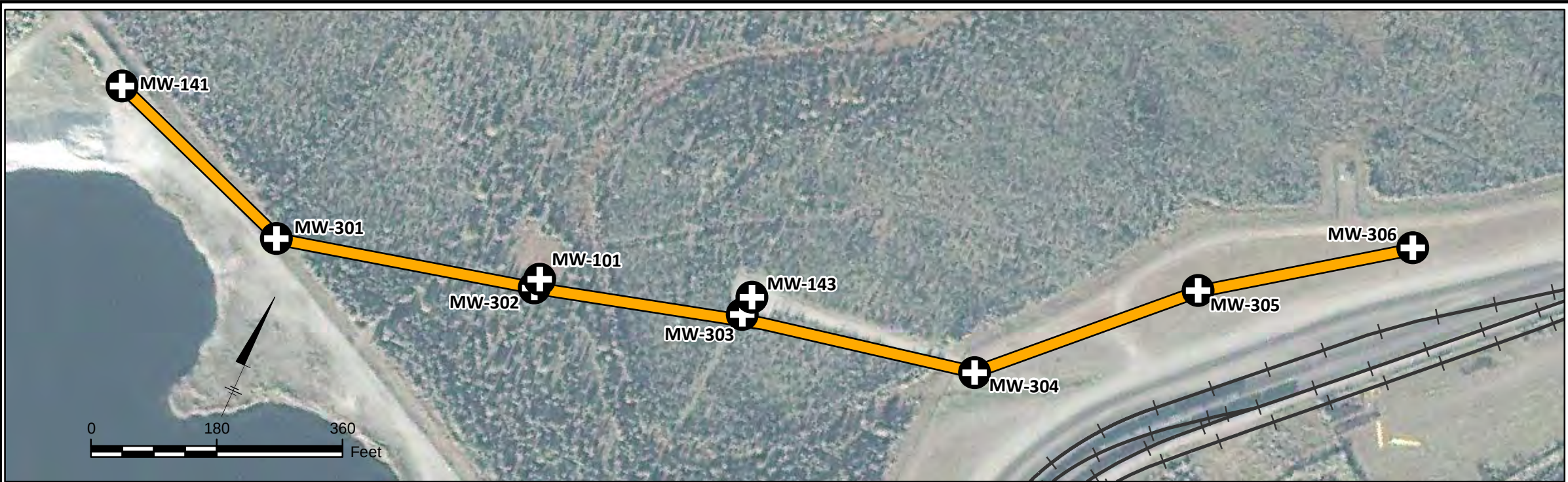
FLINT HILLS RESOURCES ALASKA, LLC
NORTH POLE TERMINAL, NORTH POLE, ALASKA
ANNUAL 2018 ONSITE GROUNDWATER
MONITORING REPORT

FIRST QUARTER 2018
SULFOLANE AT THE
VERTICAL PROFILING TRANSECT

ARCADIS

FIGURE
3-27

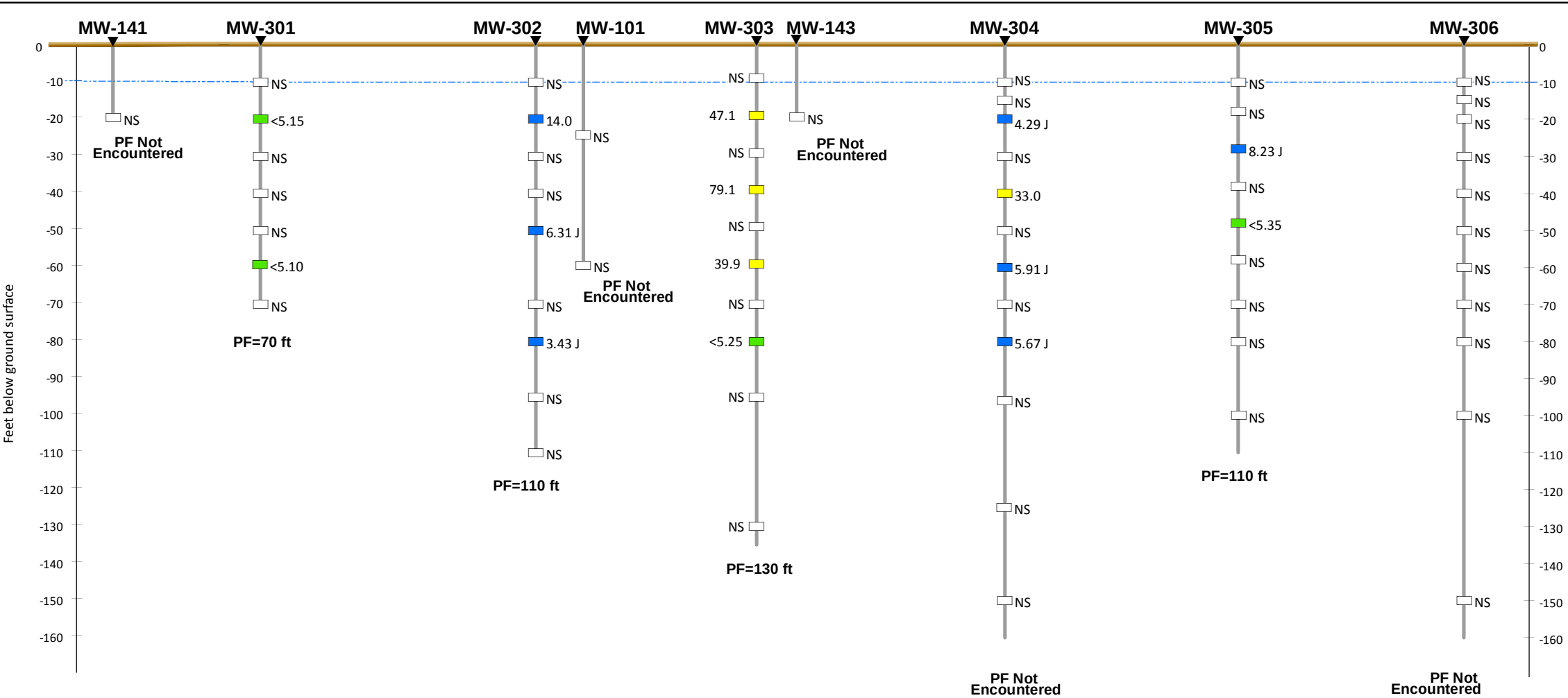
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Path: Z:\GIS\Projects\ ENV\FHR\FHR_AK\NorthPoleRefinery\GW_Monitoring\2018_Q3\MXD\2018FirstSemiAnnualOnSite\Fig 3-28 2018 Sulfolane_VPT_Profile.mxd Date: 11/13/2018 Time: 2:32:47 PM



Legend:

Sulfolane Results

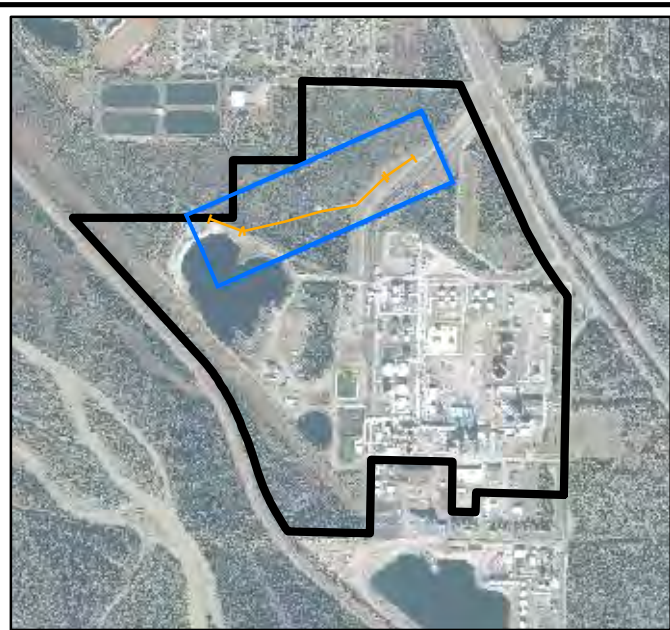
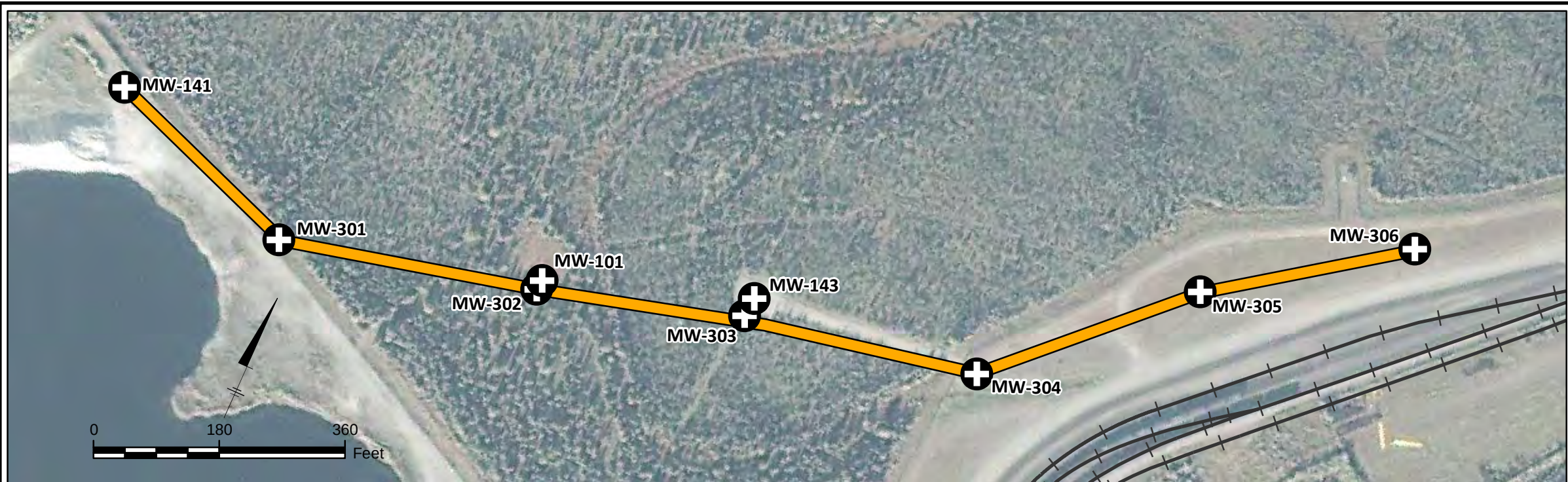
- Not Detected
- 3.14 - Less Than 20 µg/L
- 20 - 100 µg/L
- Ground Surface
- Approximate Groundwater Surface
- Well Profile



NOTES:
J = Estimated concentration detected below the laboratory limit of quantitation (LOQ). Flag applied by laboratory.
NS = Not sampled per Long-Term Monitoring Plan (LTM)
< = Not detected; Detection limit listed
PF= Permafrost encountered at bottom of boring.
ft = feet
µg/L = micrograms per liter
- For locations with duplicate sample results, the highest value is shown
- Profile has a vertical exaggeration of 5x

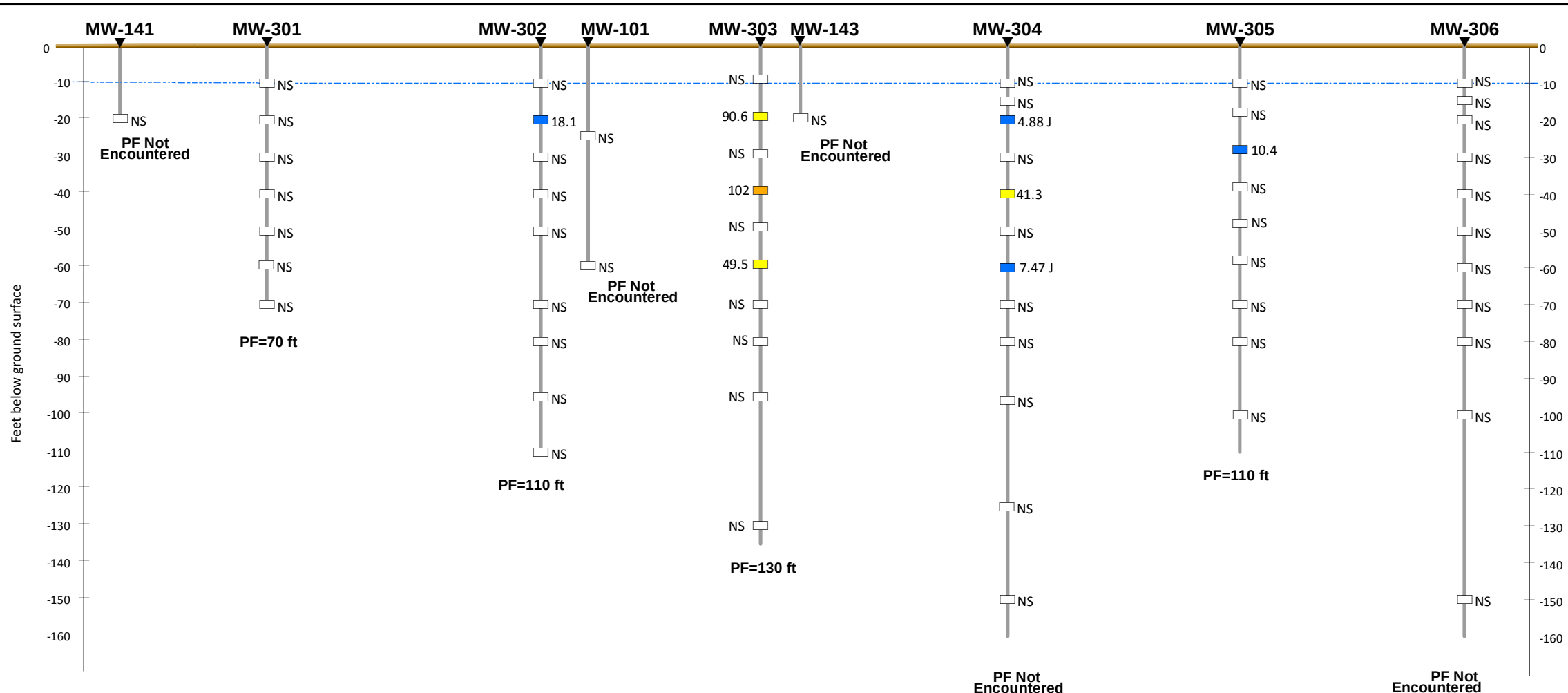
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SECOND QUARTER 2018
SULFOLANE AT THE
VERTICAL PROFILING TRANSECT

CITY: Citrix DIV/GROUP: IM/DV DB: K Sinsbaugh LD: G FRANCE
Path: Z:\GIS\Projects\ENW\EHVHR_AK\North Pole Refinery\GW_Monitoring\2018_03\MXD\2018FirstSemiAnnualOnsite\Fig. 3-29 3018 Sulfolane_VPT_Profile.mxd Date: 11/13/2018 Time: 10:48:23 AM



Legend:

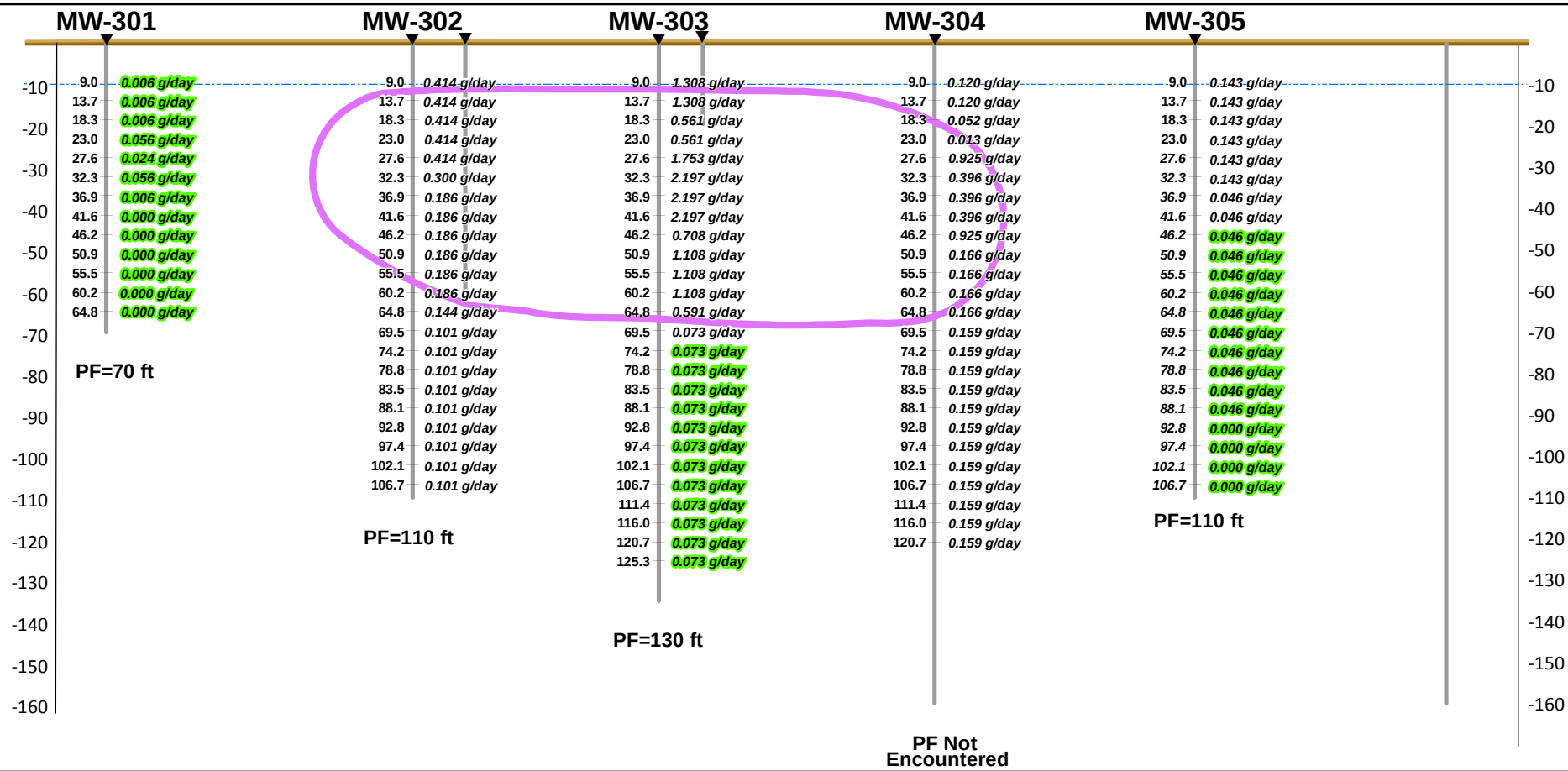
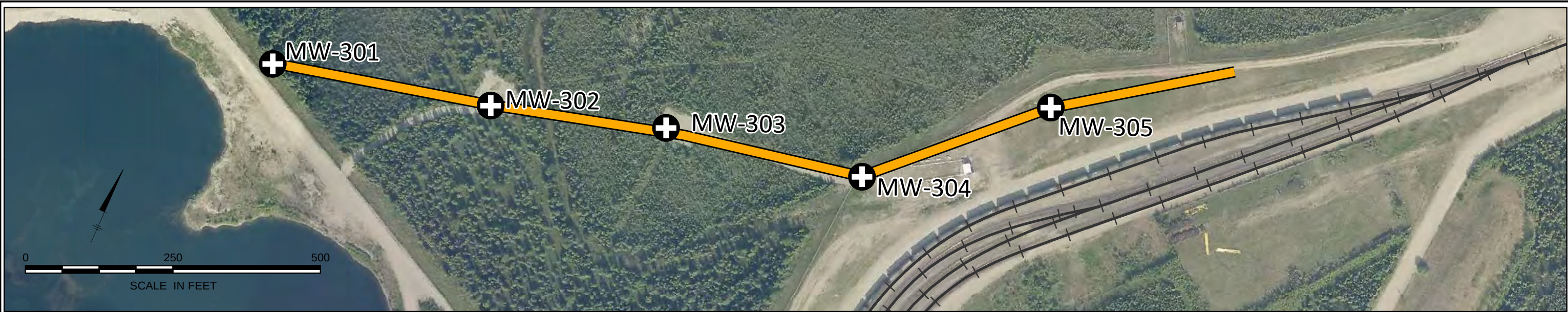
- Sulfolane Results**
- Not Detected
 - 3.14 - Less Than 20 µg/L
 - 20 - 100 µg/L
 - 100 - 400 µg/L
- Ground Surface
- Approximate Groundwater Surface
- Well Profile



NOTES:
J = Estimated concentration detected below the laboratory limit of quantitation (LOQ). Flag applied by laboratory.
NS = Not sampled per Long-Term Monitoring Plan (LTM)
< = Not detected; Detection limit listed
PF= Permafrost encountered at bottom of boring.
ft = feet
µg/L = micrograms per liter
- For locations with duplicate sample results, the highest value is shown
- Profile has a vertical exaggeration of 5x

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THIRD QUARTER 2018 SULFOLANE
AT THE VERTICAL PROFILING TRANSECT



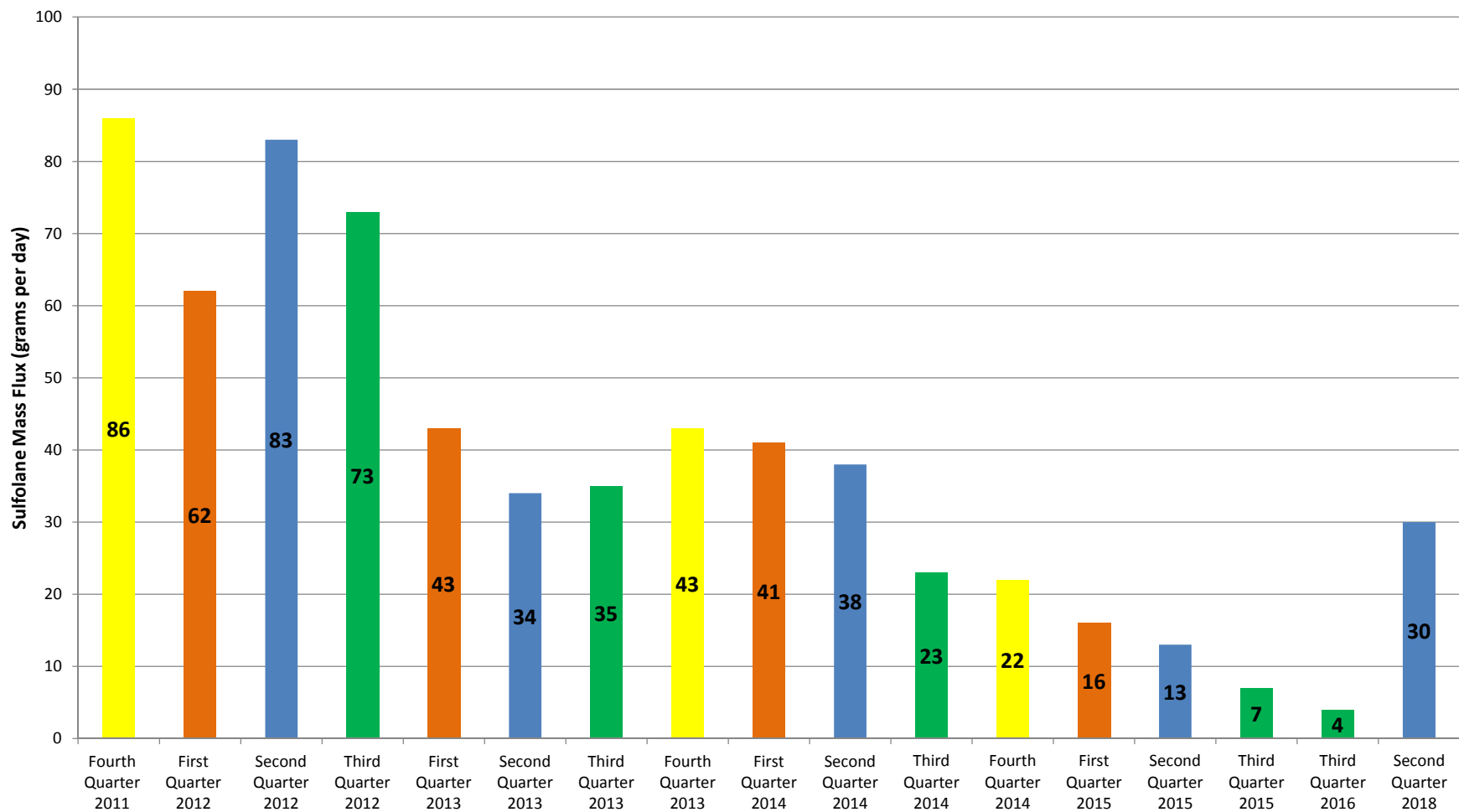
LEGEND:

- Ground Surface
- Approximate Groundwater Surface
- Well Profile
- Approximate extent of the 80% of total mass flux

Notes:
PF = Permafrost
g/day = grams per day
-Mass flux values shown were calculated using the Mass Flux Toolkit (Farhat et al. 2006)
-Depths associated with flux values were determined by the Toolkit.

Highlighted mass flux values are based on non-detect sulfolane concentrations.





NOTES:

Mass flux values shown were calculated using the Mass Flux Toolkit (Farhat et al. 2006).

Data are color coordinated per quarter.

Mass flux calculation not completed for fourth quarter 2012 because samples were not collected from majority of the vertical profiling transect (VPT) wells due to cold-weather.

Mass flux calculations calculated on an annual basis beginning in 2016.

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**SULFOLANE MASS FLUX RESULTS
FOURTH QUARTER 2011 TO
SECOND QUARTER 2018**



FIGURE

3-31

APPENDIX A

Historical Data Tables for Groundwater Elevation and LNAPL
Thickness, BTEX, Sulfolane, Geochemical Parameters, PFC, and COCs



Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-101A-25	8/18/2009	495.84	--	10.60	--	485.24	
MW-101A-25	8/1/2010	495.84	--	11.49	--	484.35	
MW-101A-25	10/1/2010	495.84	--	12.09	--	483.75	
MW-101A-25	11/1/2010	495.84	--	12.83	--	483.01	
MW-101A-25	2/25/2011	495.84	--	12.05	--	483.79	
MW-101A-25	4/12/2011	495.84	--	12.06	--	483.78	
MW-101A-25	10/21/2011	495.84	--	12.92	--	482.92	
MW-101A-25	2/15/2012	496.03	--	12.79	--	483.24	
MW-101A-25	4/20/2012	496.03	--	12.06	--	483.97	
MW-101A-25	11/1/2012	496.03	--	11.13	--	484.90	
MW-101A-25	1/24/2013	495.01	--	11.02	--	483.99	
MW-101A-25	4/24/2013	495.01	--	11.40	--	483.61	
MW-101A-25	8/1/2013	495.01	--	9.85	--	485.16	
MW-101A-25	10/1/2013	495.01	No LNAPL	11.18	0.00	483.83	
MW-101A-25	3/18/2014	495.01	--	11.87	--	483.14	
MW-101A-25	6/11/2014	495.08	--	11.40	--	483.68	
MW-101A-25	9/9/2014	495.08	--	9.99	--	485.09	
MW-101A-25	11/20/2014	495.08	--	11.10	--	483.98	
MW-101A-25	3/19/2015	495.08	--	11.61	--	483.47	
MW-101A-25	6/10/2015	495.08	--	11.12	--	483.96	
MW-101A-25	8/12/2015	495.12	--	10.06	--	485.06	
MW-101A-25	11/19/2015	495.12	--	11.20	--	483.92	
MW-101A-25	7/19/2016	495.13	--	9.40	--	485.73	
MW-101A-25	8/7/2017	495.13	--	9.91	--	485.22	
MW-101A-25	11/15/2017	495.13	--	11.43	--	483.70	
MW-101A-25	2/15/2018	495.13	--	11.82	--	483.31	
MW-101A-25	4/10/2018	495.13	--	11.75	--	483.38	
MW-101A-25	8/2/2018	495.13	--	10.15	--	484.98	
MW-101-60	8/18/2009	494.56	--	9.35	--	485.21	
MW-101-60	10/1/2010	494.56	--	10.71	--	483.85	
MW-101-60	2/9/2011	494.56	--	10.47	--	484.09	
MW-101-60	4/12/2011	494.56	No LNAPL	10.60	0.00	483.96	
MW-101-60	7/14/2011	494.56	No LNAPL	9.33	0.00	485.23	
MW-101-60	10/21/2011	494.56	--	11.43	--	483.13	
MW-101-60	2/15/2012	494.56	--	11.27	--	483.29	
MW-101-60	4/20/2012	494.56	--	10.54	--	484.02	
MW-101-60	7/31/2012	494.56	--	9.40	--	485.16	
MW-101-60	11/1/2012	494.56	--	10.73	--	483.83	
MW-101-60	1/24/2013	494.59	--	10.37	--	484.22	
MW-101-60	4/24/2013	494.59	--	10.81	--	483.78	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-101-60	8/1/2013	494.59	--	9.33	--	485.26	
MW-101-60	10/1/2013	494.59	No LNAPL	10.74	0.00	483.85	
MW-101-60	3/18/2014	494.59	--	11.23	--	483.36	
MW-101-60	6/11/2014	494.49	--	10.89	--	483.60	
MW-101-60	9/9/2014	494.49	--	9.44	--	485.05	
MW-101-60	11/20/2014	494.27	--	10.27	--	484.00	
MW-101-60	3/19/2015	494.27	--	10.72	--	483.55	
MW-101-60	6/10/2015	494.27	--	10.29	--	483.98	
MW-101-60	8/12/2015	494.27	--	9.22	--	485.05	
MW-101-60	11/19/2015	494.27	--	10.36	--	483.91	
MW-101-60	3/22/2016	494.27	No LNAPL	11.09	0.00	483.18	
MW-101-60	7/14/2016	494.27	--	9.04	--	485.23	
MW-101-60	9/13/2016	494.27	--	9.59	--	484.68	
MW-101-60	3/15/2017	494.27	--	10.55	--	483.72	
MW-102-70	8/18/2009	496.00	--	11.03	--	484.97	
MW-102-70	10/1/2010	496.00	--	12.86	--	483.14	
MW-102-70	4/25/2011	496.00	--	11.84	--	484.16	
MW-102-70	7/14/2011	496.00	No LNAPL	11.08	0.00	484.92	
MW-102-70	10/21/2011	496.00	--	12.85	--	483.15	
MW-102-70	2/16/2012	495.94	--	12.76	--	483.18	
MW-102-70	4/19/2012	495.94	--	12.16	--	483.78	
MW-102-70	7/30/2012	495.94	No LNAPL	11.00	0.00	484.94	
MW-102-70	11/1/2012	495.94	--	12.29	--	483.65	
MW-102-70	1/24/2013	496.02	--	12.12	--	483.90	
MW-102-70	4/24/2013	496.02	--	12.43	--	483.59	
MW-102-70	8/1/2013	496.02	--	11.07	--	484.95	
MW-102-70	10/1/2013	496.02	No LNAPL	12.25	0.00	483.77	
MW-102-70	3/18/2014	496.02	--	12.83	--	483.19	
MW-102-70	6/11/2014	496.09	--	12.10	--	483.99	
MW-102-70	9/9/2014	496.09	--	11.21	--	484.88	
MW-102-70	11/20/2014	496.09	No LNAPL	12.12	0.00	483.97	
MW-102-70	3/19/2015	496.09	--	12.62	--	483.47	
MW-102-70	6/10/2015	496.09	--	12.20	--	483.89	
MW-102-70	8/12/2015	496.16	--	11.24	--	484.92	
MW-102-70	11/19/2015	496.16	--	12.31	--	483.85	
MW-102-70	3/22/2016	496.16	No LNAPL	13.02	0.00	483.14	
MW-102-70	9/13/2016	496.15	--	11.49	--	484.66	
MW-102-70	3/14/2017	496.15	--	12.51	--	483.64	
MW-104-65	8/18/2009	496.21	--	11.23	--	484.98	
MW-104-65	2/8/2011	496.21	--	10.41	--	485.80	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-104-65	4/25/2011	496.21	--	12.40	--	483.81	
MW-104-65	10/21/2011	496.21	--	12.84	--	483.37	
MW-104-65	2/15/2012	496.01	--	12.74	--	483.27	
MW-104-65	4/19/2012	496.01	--	12.14	--	483.87	
MW-104-65	7/30/2012	496.01	No LNAPL	11.07	0.00	484.94	
MW-104-65	11/1/2012	496.01	No LNAPL	12.30	0.00	483.71	
MW-104-65	1/24/2013	496.02	--	12.11	--	483.91	
MW-104-65	4/24/2013	496.02	--	12.30	--	483.72	
MW-104-65	8/1/2013	496.02	--	11.03	--	484.99	
MW-104-65	10/1/2013	496.02	--	12.11	--	483.91	
MW-104-65	3/18/2014	496.02	--	12.75	--	483.27	
MW-104-65	6/11/2014	496.02	--	12.29	--	483.73	
MW-104-65	9/9/2014	496.02	--	10.98	--	485.04	
MW-104-65	11/20/2014	496.02	--	11.97	--	484.05	
MW-104-65	3/18/2015	496.02	--	12.44	--	483.58	
MW-104-65	6/11/2015	496.02	--	12.04	--	483.98	
MW-104-65	8/12/2015	496.02	--	11.10	--	484.92	
MW-104-65	11/19/2015	496.02	--	12.14	--	483.88	
MW-104-65	3/22/2016	496.02	No LNAPL	12.79	0.00	483.23	
MW-104-65	9/13/2016	496.04	--	11.24	--	484.80	
MW-104-65	3/14/2017	496.04	--	12.24	--	483.80	
MW-104-65	9/21/2017	496.03	--	12.12	--	483.91	
MW-104-65	3/12/2018	496.03	--	12.56	--	483.47	
MW-104-65	9/10/2018	496.03	--	10.74	--	485.29	
MW-105A-25	8/18/2009	499.20	--	10.52	--	488.68	
MW-105A-25	10/1/2010	499.20	--	12.25	--	486.95	
MW-105A-25	4/18/2011	499.20	--	11.90	--	487.30	
MW-105A-25	2/16/2012	499.19	--	12.88	--	486.31	
MW-105A-25	4/19/2012	499.19	No LNAPL	12.21	0.00	486.98	
MW-105A-25	7/30/2012	499.19	--	9.06	--	490.13	
MW-105A-25	11/1/2012	499.19	No LNAPL	12.32	0.00	486.87	
MW-105A-25	1/24/2013	499.21	--	12.30	--	486.91	
MW-105A-25	4/24/2013	499.21	No LNAPL	12.68	0.00	486.53	
MW-105A-25	8/1/2013	499.21	No LNAPL	10.89	0.00	488.32	
MW-105A-25	10/1/2013	499.21	No LNAPL	12.41	0.00	486.80	
MW-105A-25	3/18/2014	499.21	No LNAPL	13.09	0.00	486.12	
MW-105A-25	6/11/2014	499.40	No LNAPL	12.60	0.00	486.80	
MW-105A-25	9/9/2014	499.40	No LNAPL	11.23	0.00	488.17	
MW-105A-25	11/20/2014	499.40	No LNAPL	12.00	0.00	487.40	
MW-105A-25	3/18/2015	499.40	No LNAPL	12.47	0.00	486.93	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-105A-25	6/10/2015	499.40	No LNAPL	12.00	0.00	487.40	
MW-105A-25	8/12/2015	499.19	--	10.63	--	488.56	
MW-105A-25	11/19/2015	499.19	--	11.91	--	487.28	
MW-105A-25	3/22/2016	499.19	No LNAPL	12.82	0.00	486.37	
MW-105A-25	7/26/2016	499.19	--	9.60	--	489.59	
MW-105A-25	9/12/2016	499.19	--	10.88	--	488.31	
MW-105A-25	3/15/2017	499.19	--	11.90	--	487.29	
MW-105-65	8/18/2009	497.65	--	8.89	--	488.76	
MW-105-65	10/1/2010	497.65	--	10.43	--	487.22	
MW-105-65	4/18/2011	497.65	--	10.27	--	487.38	
MW-105-65	2/16/2012	497.64	--	11.26	--	486.38	
MW-105-65	4/19/2012	497.64	No LNAPL	10.58	0.00	487.06	
MW-105-65	7/30/2012	497.64	--	10.71	--	486.93	
MW-105-65	11/1/2012	497.64	No LNAPL	10.68	0.00	486.96	
MW-105-65	1/24/2013	497.66	--	10.56	--	487.10	
MW-105-65	4/24/2013	497.66	No LNAPL	10.86	0.00	486.80	
MW-105-65	8/1/2013	497.66	No LNAPL	9.05	0.00	488.61	
MW-105-65	10/1/2013	497.66	No LNAPL	10.61	0.00	487.05	
MW-105-65	3/18/2014	497.66	No LNAPL	11.28	0.00	486.38	
MW-105-65	6/11/2014	497.65	No LNAPL	10.79	0.00	486.86	
MW-105-65	9/9/2014	497.65	No LNAPL	9.41	0.00	488.24	
MW-105-65	11/20/2014	497.65	No LNAPL	10.17	0.00	487.48	
MW-105-65	3/18/2015	497.65	No LNAPL	10.65	0.00	487.00	
MW-105-65	6/10/2015	497.65	No LNAPL	10.17	0.00	487.48	
MW-105-65	8/12/2015	497.65	--	9.03	--	488.62	
MW-105-65	11/19/2015	497.65	--	10.28	--	487.37	
MW-105-65	3/22/2016	497.65	No LNAPL	11.19	0.00	486.46	
MW-105-65	7/26/2016	497.63	--	7.95	--	489.68	
MW-105-65	9/12/2016	497.63	--	9.24	--	488.39	
MW-105-65	3/15/2017	497.63	--	10.28	--	487.35	
MW-106-25	8/18/2009	499.04	--	12.46	--	486.58	
MW-106-25	2/24/2011	499.04	--	13.98	--	485.06	
MW-106-25	4/15/2011	499.04	--	14.01	--	485.03	
MW-106-25	7/14/2011	499.04	No LNAPL	12.54	0.00	486.50	
MW-106-25	10/21/2011	499.04	--	15.01	--	484.03	
MW-106-25	2/16/2012	499.21	--	14.79	--	484.42	
MW-106-25	4/19/2012	499.21	--	14.11	--	485.10	
MW-106-25	7/30/2012	499.21	--	12.67	--	486.54	
MW-106-25	11/1/2012	499.21	No LNAPL	14.07	0.00	485.14	
MW-106-25	1/24/2013	499.28	--	14.16	--	485.12	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-106-25	4/24/2013	499.28	--	14.52	--	484.76	
MW-106-25	8/1/2013	499.28	--	12.73	--	486.55	
MW-106-25	10/1/2013	499.28	--	14.38	--	484.90	
MW-106-25	3/19/2014	499.28	--	14.89	--	484.39	
MW-106-25	4/25/2014	499.39	--	13.99	--	485.40	
MW-106-25	5/20/2014	499.42	--	14.37	--	485.05	
MW-106-25	6/4/2014	499.43	--	14.57	--	484.86	
MW-106-25	6/11/2014	499.43	--	14.48	--	484.95	
MW-106-25	9/9/2014	499.46	--	13.37	--	486.09	
MW-106-25	11/20/2014	499.46	--	14.02	--	485.44	
MW-106-25	3/18/2015	499.40	No LNAPL	14.61	0.00	484.79	
MW-106-25	6/11/2015	499.40	No LNAPL	14.21	0.00	485.19	
MW-106-25	8/12/2015	499.54	--	12.98	--	486.56	
MW-106-25	11/19/2015	499.47	--	14.19	--	485.28	
MW-106-25	3/22/2016	499.47	No LNAPL	15.09	0.00	484.38	
MW-106-25	7/20/2016	499.58	--	12.22	--	487.36	
MW-106-25	7/27/2016	499.58	--	12.00	--	487.58	
MW-106-25	9/13/2016	499.58	--	13.53	--	486.05	
MW-106-25	3/14/2017	499.48	--	14.44	--	485.04	
MW-109-15	8/18/2009	495.15	--	7.99	--	487.16	
MW-109-15	10/1/2010	495.15	--	9.88	--	485.27	
MW-109-15	2/10/2011	495.15	--	9.30	--	485.85	
MW-109-15	4/8/2011	495.15	--	Frozen	--	—	Frozen at 14.96 ft BTOC
MW-109-15	7/14/2011	495.15	No LNAPL	7.89	0.00	487.26	
MW-109-15	10/21/2011	495.15	--	10.49	--	484.66	
MW-109-15	4/24/2013	495.20	--	9.85	--	485.35	
MW-109-15	8/1/2013	495.16	--	7.91	--	487.25	
MW-109-15	10/1/2013	495.16	--	9.56	--	485.60	
MW-109-15	3/20/2014	495.16	--	10.17	--	484.99	
MW-109-15	6/11/2014	495.12	--	9.67	--	485.45	
MW-109-15	9/9/2014	495.12	--	8.47	--	486.65	
MW-109-15	11/20/2014	495.12	--	9.13	--	485.99	
MW-109-15	3/19/2015	495.12	No LNAPL	9.70	0.00	485.42	
MW-109-15	6/11/2015	495.17	No LNAPL	9.21	0.00	485.96	
MW-109-15	8/12/2015	495.17	--	8.25	--	486.92	
MW-109-15	11/19/2015	495.17	--	9.27	--	485.90	
MW-109-15	3/22/2016	495.17	No LNAPL	10.09	0.00	485.08	
MW-109-15	7/20/2016	495.16	--	10.22	--	484.94	
MW-109-15	9/13/2016	495.16	--	8.43	--	486.73	
MW-109-15	3/14/2017	495.16	--	9.34	--	485.82	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-110-20	8/18/2009	496.58	--	9.79	--	486.79	
MW-110-20	8/1/2010	496.58	--	9.77	--	486.81	
MW-110-20	10/1/2010	496.58	--	11.72	--	484.86	
MW-110-20	11/1/2010	496.58	--	12.08	--	484.50	
MW-110-20	2/10/2011	496.58	--	11.06	--	485.52	
MW-110-20	4/8/2011	496.58	--	Frozen	--	—	Frozen at 10.93 ft BTOC
MW-110-20	7/14/2011	496.58	No LNAPL	9.80	0.00	486.78	
MW-110-20	10/21/2011	496.58	--	12.21	--	484.37	
MW-110-20	11/1/2012	496.64	No LNAPL	11.42	0.00	485.22	
MW-110-20	1/24/2013	496.73	--	11.36	--	485.37	
MW-110-20	4/24/2013	496.73	--	Frozen	--	—	Frozen at 11.26 ft BTOC
MW-110-20	8/1/2013	496.73	--	9.94	--	486.79	
MW-110-20	10/1/2013	496.73	--	10.47	--	486.26	
MW-110-20	3/18/2014	496.73	--	12.09	--	484.64	
MW-110-20	6/11/2014	496.76	--	11.64	--	485.12	
MW-110-20	9/9/2014	496.76	--	10.42	--	486.34	
MW-110-20	11/20/2014	496.50	--	10.84	--	485.66	
MW-110-20	3/19/2015	496.50	No LNAPL	11.39	0.00	485.11	
MW-110-20	6/11/2015	496.50	No LNAPL	10.96	0.00	485.54	
MW-110-20	8/12/2015	496.55	--	9.80	--	486.75	
MW-110-20	11/19/2015	496.55	--	11.01	--	485.54	
MW-110-20	3/22/2016	496.55	No LNAPL	11.85	0.00	484.70	
MW-110-20	8/9/2016	496.58	--	8.94	--	487.64	
MW-110-20	9/13/2016	496.58	--	10.19	--	486.39	
MW-110-20	10/20/2016	496.58	--	11.38	--	485.20	
MW-110-20	3/14/2017	496.58	--	11.16	--	485.42	
MW-110-65	3/18/2014	496.38	--	11.69	--	484.69	
MW-110-65	6/11/2014	496.34	--	11.24	--	485.10	
MW-110-65	9/9/2014	496.34	--	10.05	--	486.29	
MW-110-65	11/20/2014	496.34	--	10.81	--	485.53	
MW-110-65	3/19/2015	496.34	No LNAPL	11.39	0.00	484.95	
MW-110-65	6/11/2015	496.34	No LNAPL	10.96	0.00	485.38	
MW-110-65	8/12/2015	496.49	--	9.80	--	486.69	
MW-110-65	11/19/2015	496.49	--	11.00	--	485.49	
MW-110-65	3/22/2016	496.49	No LNAPL	11.86	0.00	484.63	
MW-110-65	8/9/2016	496.53	--	8.94	--	487.59	
MW-110-65	9/13/2016	496.53	--	10.22	--	486.31	
MW-110-65	3/14/2017	496.53	--	11.25	--	485.28	
MW-113-15	8/18/2009	494.72	--	8.90	--	485.82	
MW-113-15	10/1/2010	494.72	--	10.25	--	484.47	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-113-15	2/8/2011	494.72	--	9.59	--	485.13	
MW-113-15	3/25/2011	494.72	--	9.82	--	484.90	
MW-113-15	4/14/2011	494.72	--	9.81	--	484.91	
MW-113-15	7/14/2011	494.72	No LNAPL	8.50	0.00	486.22	
MW-113-15	10/21/2011	494.72	No LNAPL	10.71	0.00	484.01	
MW-113-15	1/10/2012	494.38	No LNAPL	10.68	0.00	483.70	
MW-113-15	2/15/2012	494.38	No LNAPL	10.72	0.00	483.66	
MW-113-15	4/19/2012	494.38	--	10.07	--	484.31	
MW-113-15	7/30/2012	494.38	No LNAPL	8.48	0.00	485.90	
MW-113-15	11/1/2012	494.38	--	10.11	--	484.27	
MW-113-15	1/24/2013	494.44	--	10.11	--	484.33	
MW-113-15	4/24/2013	494.51	--	10.37	--	484.14	
MW-113-15	7/23/2013	494.52	--	8.95	--	485.57	
MW-113-15	8/1/2013	494.52	--	8.90	--	485.62	
MW-113-15	8/21/2013	494.52	No LNAPL	8.85	0.00	485.67	
MW-113-15	10/1/2013	494.50	--	10.27	--	484.23	
MW-113-15	1/9/2014	494.51	--	10.41	--	484.10	
MW-113-15	2/5/2014	494.49	--	10.55	--	483.94	
MW-113-15	3/18/2014	494.53	--	10.76	--	483.77	
MW-113-15	3/24/2014	494.53	--	10.76	--	483.77	
MW-113-15	4/18/2014	494.52	--	10.64	--	483.88	
MW-113-15	5/15/2014	494.52	--	10.22	--	484.30	
MW-113-15	6/11/2014	494.53	--	10.33	--	484.20	
MW-113-15	6/19/2014	494.53	--	9.95	--	484.58	
MW-113-15	7/15/2014	494.51	--	8.29	--	486.22	
MW-113-15	8/26/2014	494.54	--	8.98	--	485.56	
MW-113-15	9/9/2014	494.54	--	9.26	--	485.28	
MW-113-15	9/24/2014	494.51	--	9.57	--	484.94	
MW-113-15	10/21/2014	494.51	--	10.51	--	484.00	
MW-113-15	11/19/2014	494.50	--	10.09	--	484.41	
MW-113-15	12/16/2014	494.51	--	10.30	--	484.21	
MW-113-15	1/21/2015	494.53	--	10.50	--	484.03	
MW-113-15	2/25/2015	494.56	--	Frozen	--	—	
MW-113-15	3/18/2015	494.55	--	Frozen	--	—	
MW-113-15	3/19/2015	494.55	—	Frozen	—	—	Frozen with datalogger; no depth to ice measurement possible.
MW-113-15	3/26/2015	494.55	--	Frozen	--	—	
MW-113-15	4/16/2015	494.57	--	10.39	--	484.18	
MW-113-15	5/21/2015	494.57	--	10.15	--	484.42	
MW-113-15	6/10/2015	494.55	No LNAPL	10.19	0.00	484.36	
MW-113-15	8/12/2015	494.56	--	9.06	--	485.50	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-113-15	8/19/2015	494.56	--	9.38	--	485.18	
MW-113-15	10/6/2015	494.56	--	9.74	--	484.82	
MW-113-15	11/19/2015	494.55	--	10.24	--	484.31	
MW-113-15	1/19/2016	494.18	--	10.39	--	483.79	
MW-113-15	3/22/2016	494.18	No LNAPL	10.65	0.00	483.53	
MW-113-15	5/26/2016	494.21	--	10.00	--	484.21	
MW-113-15	8/8/2016	494.19	--	7.93	--	486.26	
MW-113-15	9/9/2016	494.21	--	8.85	--	485.36	
MW-113-15	9/13/2016	494.21	--	8.97	--	485.24	
MW-113-15	10/20/2016	494.19	--	10.13	--	484.06	
MW-113-15	11/15/2016	494.19	--	9.44	--	484.75	
MW-113-15	2/8/2017	494.24	--	9.92	--	484.32	
MW-113-15	3/14/2017	494.26	--	10.01	--	484.25	
MW-113-15	6/13/2017	494.27	--	9.27	--	485.00	
MW-115-15	8/25/2009	495.84	8.70	8.98	0.28	487.10	
MW-115-15	7/26/2010	495.84	8.12	8.85	0.73	487.62	
MW-115-15	10/1/2010	495.84	--	10.95	--	484.89	
MW-115-15	10/14/2010	495.84	10.05	10.95	0.90	485.66	
MW-115-15	4/14/2011	495.84	9.84	9.89	0.05	485.99	
MW-115-15	5/6/2011	495.84	9.21	9.25	0.04	486.62	
MW-115-15	5/16/2011	495.84	--	10.01	--	485.83	
MW-115-15	5/24/2011	495.84	--	10.01	--	485.83	
MW-115-15	6/21/2011	495.84	9.32	9.47	0.15	486.50	
MW-115-15	7/14/2011	495.84	8.40	8.70	0.30	487.40	
MW-115-15	8/23/2011	495.84	8.77	9.11	0.34	487.02	
MW-115-15	9/22/2011	495.84	10.03	10.49	0.46	485.74	
MW-115-15	10/21/2011	495.84	10.84	10.92	0.08	484.99	
MW-115-15	10/15/2015	495.87	9.75	9.97	0.22	486.13	
MW-115-15	3/4/2016	495.87	10.48	10.61	0.13	485.42	
MW-115-15	8/17/2016	495.85	8.10	8.20	0.10	487.74	
MW-115-15	10/13/2016	495.85	9.85	9.89	0.04	485.99	
MW-115-15	10/19/2016	495.85	10.03	10.10	0.07	485.76	0.01 gallons of LNAPL recovered during well redevelopment
MW-115-15	3/1/2017	495.85	9.62	Frozen	0.01	—	Frozen at 9.63 ft BTOC
MW-116-15	8/25/2009	496.19	--	9.21	--	486.98	
MW-116-15	7/26/2010	496.19	--	8.56	--	487.63	
MW-116-15	10/1/2010	496.19	--	11.84	--	484.35	
MW-116-15	4/14/2011	496.19	--	10.24	--	485.95	
MW-116-15	5/24/2011	496.19	—	—	—	—	No access due to work being conducted in area
MW-116-15	6/21/2011	496.19	--	9.72	--	486.47	
MW-116-15	7/14/2011	496.19	No LNAPL	8.78	0.00	487.41	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-116-15	8/23/2011	496.19	No LNAPL	9.21	0.00	486.98	
MW-116-15	9/22/2011	496.19	No LNAPL	10.46	0.00	485.73	
MW-116-15	10/21/2011	496.19	No LNAPL	11.25	0.00	484.94	
MW-116-15	8/16/2016	496.20	--	8.44	--	487.76	
MW-116-15	8/31/2017	496.20	Sheen	9.50	Sheen	486.70	
MW-116-15	11/15/2017	496.20	--	10.35	--	485.85	
MW-116-15	2/14/2018	496.20	--	10.63	--	485.57	
MW-116-15	4/10/2018	496.20	--	10.62	--	485.58	
MW-116-15	8/8/2018	496.20	No LNAPL	8.30	0.00	487.90	
MW-118-45	8/18/2009	495.55	--	11.29	--	484.26	
MW-118-45	10/1/2010	495.55	--	13.08	--	482.47	
MW-118-45	4/25/2011	495.55	--	12.15	--	483.40	
MW-118-45	10/21/2011	495.55	--	13.31	--	482.24	
MW-124-25	8/25/2009	497.12	--	11.38	--	485.74	
MW-124-25	8/1/2010	497.12	--	11.39	--	485.73	
MW-124-25	10/1/2010	497.12	--	12.56	--	484.56	
MW-124-25	11/1/2010	497.12	--	13.29	--	483.83	
MW-124-25	2/24/2011	497.12	--	12.55	--	484.57	
MW-124-25	4/25/2011	497.12	Sheen	Frozen	Sheen	—	Frozen at 12.50 ft BTOC
MW-124-25	6/1/2011	497.12	--	Frozen	--	—	Frozen at 12.50 ft BTOC
MW-124-25	7/14/2011	497.12	No LNAPL	11.37	0.00	485.75	
MW-124-25	10/21/2011	497.12	--	13.37	--	483.75	
MW-124-25	8/15/2016	497.57	--	11.24	--	486.33	
MW-125-25	8/20/2009	497.01	--	11.24	--	485.77	
MW-125-25	10/1/2010	497.01	--	12.59	--	484.42	
MW-125-25	2/18/2011	497.01	--	12.36	--	484.65	
MW-125-25	4/5/2011	497.01	--	12.70	--	484.31	
MW-125-25	10/21/2011	497.01	--	13.56	--	483.45	
MW-125-25	2/16/2012	497.15	No LNAPL	13.51	0.00	483.64	
MW-125-25	4/19/2012	497.15	No LNAPL	12.86	0.00	484.29	
MW-125-25	7/30/2012	497.15	No LNAPL	11.64	0.00	485.51	
MW-125-25	11/1/2012	497.15	No LNAPL	12.97	0.00	484.18	
MW-125-25	1/24/2013	496.16	--	11.79	--	484.37	
MW-125-25	4/24/2013	496.16	No LNAPL	12.04	0.00	484.12	
MW-125-25	7/23/2013	496.20	--	10.60	--	485.60	
MW-125-25	8/1/2013	496.20	--	10.49	--	485.71	
MW-125-25	8/21/2013	496.20	No LNAPL	10.47	0.00	485.73	
MW-125-25	9/30/2013	496.19	No LNAPL	11.63	0.00	484.56	
MW-125-25	1/9/2014	496.18	No LNAPL	11.93	0.00	484.25	
MW-125-25	2/5/2014	496.19	No LNAPL	12.07	0.00	484.12	

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MW-125-25	3/18/2014	496.19	No LNAPL	12.30	0.00	483.89	
MW-125-25	3/24/2014	496.19	No LNAPL	12.33	0.00	483.86	
MW-125-25	4/18/2014	496.20	No LNAPL	12.14	0.00	484.06	
MW-125-25	5/15/2014	496.20	--	11.66	--	484.54	
MW-125-25	6/11/2014	496.21	No LNAPL	11.89	0.00	484.32	
MW-125-25	6/19/2014	496.21	No LNAPL	11.54	0.00	484.67	
MW-125-25	7/15/2014	496.20	No LNAPL	9.75	0.00	486.45	
MW-125-25	8/26/2014	496.21	No LNAPL	10.38	0.00	485.83	
MW-125-25	9/9/2014	496.21	No LNAPL	10.60	0.00	485.61	
MW-125-25	9/24/2014	496.22	No LNAPL	10.96	0.00	485.26	
MW-125-25	10/21/2014	496.20	No LNAPL	11.87	0.00	484.33	
MW-125-25	11/19/2014	496.18	No LNAPL	11.52	0.00	484.66	
MW-125-25	12/16/2014	496.19	No LNAPL	11.68	0.00	484.51	
MW-125-25	12/29/2014	496.19	No LNAPL	11.81	0.00	484.38	
MW-125-25	1/21/2015	496.20	No LNAPL	11.89	0.00	484.31	
MW-125-25	2/25/2015	496.22	No LNAPL	12.01	0.00	484.21	
MW-125-25	3/18/2015	496.21	No LNAPL	12.03	0.00	484.18	
MW-125-25	3/26/2015	496.21	No LNAPL	11.95	0.00	484.26	
MW-125-25	4/16/2015	496.22	--	11.82	--	484.40	
MW-125-25	5/21/2015	496.24	No LNAPL	11.59	0.00	484.65	
MW-125-25	6/10/2015	496.24	No LNAPL	11.63	0.00	484.61	
MW-125-25	8/12/2015	496.23	--	10.57	--	485.66	
MW-125-25	8/19/2015	496.23	No LNAPL	10.83	0.00	485.43	
MW-125-25	10/6/2015	496.23	No LNAPL	11.11	0.00	485.13	
MW-125-25	11/19/2015	496.23	--	11.70	--	484.53	
MW-125-25	1/19/2016	496.22	--	12.17	--	484.01	
MW-125-25	3/22/2016	496.22	No LNAPL	12.43	0.00	483.79	
MW-125-25	5/26/2016	496.24	No LNAPL	11.82	0.00	484.44	
MW-125-25	8/18/2016	496.21	--	10.17	--	486.04	
MW-125-25	9/9/2016	496.25	No LNAPL	10.70	0.00	485.59	
MW-125-25	9/12/2016	496.25	--	10.73	--	485.52	
MW-125-25	11/15/2016	496.21	No LNAPL	11.34	0.00	484.97	
MW-125-25	2/8/2017	496.21	No LNAPL	11.76	0.00	484.52	
MW-125-25	3/14/2017	496.21	--	11.80	--	484.41	
MW-125-25	6/13/2017	496.23	No LNAPL	11.11	0.00	485.17	
MW-125-25	8/7/2017	496.23	--	10.32	--	485.91	
MW-125-25	8/15/2017	496.23	--	10.26	--	485.97	
MW-125-25	11/16/2017	496.23	--	11.65	--	484.58	
MW-125-25	2/14/2018	496.23	--	12.05	--	484.18	
MW-125-25	4/5/2018	496.23	--	12.06	--	484.17	

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MW-125-25	8/7/2018	496.23	--	10.04	--	486.19	
MW-126-25	8/20/2009	495.55	--	10.07	--	485.48	
MW-126-25	10/1/2010	495.55	--	11.34	--	484.21	
MW-126-25	2/10/2011	495.55	--	11.11	--	484.44	
MW-126-25	4/8/2011	495.55	--	11.27	--	484.28	
MW-126-25	7/14/2011	495.55	No LNAPL	10.09	0.00	485.46	
MW-126-25	10/21/2011	495.55	--	12.05	--	483.50	
MW-126-25	8/10/2016	495.68	--	9.51	--	486.17	
MW-127-25	8/20/2009	496.36	--	10.97	--	485.39	
MW-127-25	10/1/2010	496.36	--	12.34	--	484.02	
MW-127-25	3/9/2011	496.36	--	12.27	--	484.09	
MW-127-25	4/13/2011	496.36	--	12.24	--	484.12	
MW-127-25	7/14/2011	496.36	No LNAPL	11.07	0.00	485.29	
MW-127-25	10/21/2011	496.36	--	13.06	--	483.30	
MW-127-25	8/15/2016	496.75	--	10.95	--	485.80	
MW-127-25	10/21/2016	496.75	--	12.81	--	483.94	
MW-127-25	8/2/2017	496.75	--	11.55	--	485.20	
MW-127-25	10/19/2017	496.75	--	12.70	--	484.05	
MW-127-25	1/15/2018	496.75	--	12.80	--	483.95	
MW-127-25	4/5/2018	496.75	--	13.11	--	483.64	
MW-127-25	7/10/2018	496.75	--	11.25	--	485.50	
MW-129-40	10/18/2006	495.95	--	11.24	--	484.71	
MW-129-40	4/18/2007	495.95	--	11.09	--	484.86	
MW-129-40	8/20/2009	496.06	--	10.31	--	485.75	
MW-129-40	2/10/2011	496.06	--	11.35	--	484.71	
MW-129-40	4/7/2011	496.06	--	11.52	--	484.54	
MW-129-40	10/21/2011	496.06	--	12.32	--	483.74	
MW-129-40	2/16/2012	496.06	No LNAPL	12.19	0.00	483.87	
MW-129-40	4/19/2012	496.06	No LNAPL	11.55	0.00	484.51	
MW-129-40	7/30/2012	496.06	No LNAPL	10.38	0.00	485.68	
MW-129-40	11/1/2012	496.06	No LNAPL	11.73	0.00	484.33	
MW-129-40	1/24/2013	496.05	--	11.53	--	484.52	
MW-129-40	4/24/2013	496.05	No LNAPL	11.77	0.00	484.28	
MW-129-40	8/1/2013	496.05	No LNAPL	10.36	0.00	485.69	
MW-129-40	9/30/2013	496.05	No LNAPL	11.55	0.00	484.50	
MW-129-40	3/18/2014	496.05	No LNAPL	12.17	0.00	483.88	
MW-129-40	6/11/2014	496.06	No LNAPL	11.73	0.00	484.33	
MW-129-40	9/9/2014	496.06	No LNAPL	10.42	0.00	485.64	
MW-129-40	11/20/2014	496.06	No LNAPL	11.34	0.00	484.72	
MW-129-40	3/19/2015	496.06	No LNAPL	11.83	0.00	484.23	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-129-40	6/10/2015	496.06	No LNAPL	11.42	0.00	484.64	
MW-129-40	8/12/2015	496.06	--	10.40	--	485.66	
MW-129-40	11/19/2015	496.06	--	11.51	--	484.55	
MW-129-40	3/22/2016	496.06	No LNAPL	12.25	0.00	483.81	
MW-129-40	8/10/2016	496.07	--	10.91	--	485.16	
MW-129-40	9/12/2016	496.07	--	10.53	--	485.54	
MW-129-40	3/14/2017	496.07	--	11.62	--	484.45	
MW-130-25	8/20/2009	496.79	--	10.75	--	486.04	
MW-130-25	10/1/2010	496.79	--	12.20	--	484.59	
MW-130-25	2/10/2011	496.79	--	11.54	--	485.25	
MW-130-25	4/6/2011	496.79	--	12.06	--	484.73	
MW-130-25	7/14/2011	496.79	No LNAPL	10.87	0.00	485.92	
MW-130-25	10/21/2011	496.79	--	13.02	--	483.77	
MW-130-25	2/16/2012	496.82	No LNAPL	12.91	0.00	483.91	
MW-130-25	4/19/2012	496.82	No LNAPL	12.24	0.00	484.58	
MW-130-25	7/30/2012	496.82	No LNAPL	10.99	0.00	485.83	
MW-130-25	11/1/2012	496.82	No LNAPL	12.42	0.00	484.40	
MW-130-25	1/24/2013	496.88	--	12.25	--	484.63	
MW-130-25	4/24/2013	496.88	No LNAPL	12.52	0.00	484.36	
MW-130-25	7/23/2013	496.91	--	11.11	--	485.80	
MW-130-25	8/1/2013	496.91	--	10.98	--	485.93	
MW-130-25	8/21/2013	496.91	No LNAPL	11.00	0.00	485.91	
MW-130-25	9/30/2013	496.92	No LNAPL	12.27	0.00	484.65	
MW-130-25	1/9/2014	496.91	No LNAPL	12.49	0.00	484.42	
MW-130-25	2/5/2014	496.92	No LNAPL	12.63	0.00	484.29	
MW-130-25	3/18/2014	496.92	No LNAPL	12.87	0.00	484.05	
MW-130-25	3/24/2014	496.92	No LNAPL	12.90	0.00	484.02	
MW-130-25	4/18/2014	496.94	No LNAPL	12.73	0.00	484.21	
MW-130-25	5/15/2014	496.95	--	12.25	--	484.70	
MW-130-25	6/11/2014	496.94	No LNAPL	12.45	0.00	484.49	
MW-130-25	6/19/2014	496.94	No LNAPL	12.11	0.00	484.83	
MW-130-25	7/15/2014	496.95	No LNAPL	10.28	0.00	486.67	
MW-130-25	8/26/2014	496.96	No LNAPL	10.94	0.00	486.02	
MW-130-25	9/9/2014	496.96	No LNAPL	11.21	0.00	485.75	
MW-130-25	9/24/2014	496.93	No LNAPL	11.53	0.00	485.40	
MW-130-25	10/21/2014	496.93	No LNAPL	12.46	0.00	484.47	
MW-130-25	11/19/2014	496.92	No LNAPL	12.06	0.00	484.86	
MW-130-25	12/16/2014	496.93	No LNAPL	12.24	0.00	484.69	
MW-130-25	12/29/2014	496.93	No LNAPL	12.36	0.00	484.57	
MW-130-25	1/21/2015	496.93	No LNAPL	12.42	0.00	484.51	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-130-25	2/25/2015	496.95	No LNAPL	12.55	0.00	484.40	
MW-130-25	3/18/2015	496.92	No LNAPL	12.58	0.00	484.34	
MW-130-25	3/26/2015	496.92	No LNAPL	12.51	0.00	484.41	
MW-130-25	4/16/2015	496.94	--	12.36	--	484.58	
MW-130-25	5/21/2015	496.96	No LNAPL	12.11	0.00	484.85	
MW-130-25	6/10/2015	496.98	No LNAPL	12.15	0.00	484.83	
MW-130-25	8/12/2015	496.97	--	11.04	--	485.93	
MW-130-25	8/19/2015	496.97	No LNAPL	11.35	0.00	485.65	
MW-130-25	10/6/2015	496.96	No LNAPL	11.68	0.00	485.29	
MW-130-25	11/19/2015	496.96	--	12.26	--	484.70	
MW-130-25	1/19/2016	496.96	--	12.75	--	484.17	
MW-130-25	3/22/2016	496.96	No LNAPL	13.02	0.00	483.94	
MW-130-25	5/26/2016	496.99	No LNAPL	12.39	0.00	484.62	
MW-130-25	8/18/2016	496.96	--	10.68	--	486.28	
MW-130-25	9/9/2016	496.99	No LNAPL	11.25	0.00	485.78	
MW-130-25	9/12/2016	496.99	--	11.30	--	485.69	
MW-130-25	10/20/2016	496.96	--	12.48	--	484.48	
MW-130-25	11/15/2016	496.96	No LNAPL	11.86	0.00	485.20	
MW-130-25	2/8/2017	496.98	No LNAPL	12.33	0.00	484.72	
MW-130-25	2/15/2017	496.98	No LNAPL	12.33	0.00	484.70	
MW-130-25	3/14/2017	496.98	--	12.37	--	484.61	
MW-130-25	6/13/2017	497.02	No LNAPL	11.68	0.00	485.39	
MW-130-25	8/3/2017	497.02	--	10.90	--	486.12	
MW-130-25	10/20/2017	497.02	--	12.31	--	484.71	
MW-130-25	11/15/2017	497.02	--	12.37	--	484.65	
MW-130-25	2/14/2018	497.02	--	12.62	--	484.40	
MW-130-25	4/10/2018	497.02	--	12.61	--	484.41	
MW-130-25	8/8/2018	497.04	--	10.45	--	486.59	
MW-131-25	8/18/2009	495.95	--	10.95	--	485.00	
MW-131-25	8/1/2010	495.95	--	10.89	--	485.06	
MW-131-25	10/1/2010	495.95	--	12.03	--	483.92	
MW-131-25	11/1/2010	495.95	--	12.58	--	483.37	
MW-131-25	3/9/2011	495.95	--	11.83	--	484.12	
MW-131-25	4/8/2011	495.95	--	11.81	--	484.14	
MW-131-25	7/14/2011	495.95	No LNAPL	10.64	0.00	485.31	
MW-131-25	10/21/2011	495.95	--	12.59	--	483.36	
MW-131-25	2/16/2012	495.69	--	12.48	--	483.21	
MW-131-25	4/19/2012	495.69	--	11.84	--	483.85	
MW-131-25	7/31/2012	495.69	--	10.70	--	484.99	
MW-131-25	11/1/2012	495.69	--	12.02	--	483.67	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-131-25	1/24/2013	495.75	--	11.84	--	483.91	
MW-131-25	4/24/2013	495.75	--	12.07	--	483.68	
MW-131-25	8/1/2013	495.75	--	10.71	--	485.04	
MW-131-25	10/1/2013	495.75	No LNAPL	11.90	0.00	483.85	
MW-131-25	3/18/2014	495.75	--	12.49	--	483.26	
MW-131-25	6/11/2014	495.73	--	12.45	--	483.28	
MW-131-25	9/9/2014	495.73	--	10.87	--	484.86	
MW-131-25	11/20/2014	495.73	No LNAPL	11.76	0.00	483.97	
MW-131-25	3/19/2015	495.73	--	12.23	--	483.50	
MW-131-25	6/10/2015	495.73	--	11.81	--	483.92	
MW-131-25	8/12/2015	495.77	--	10.83	--	484.94	
MW-131-25	11/19/2015	495.77	--	11.89	--	483.88	
MW-131-25	7/28/2016	495.77	--	9.98	--	485.79	
MW-131-25	7/14/2017	495.77	--	10.73	--	485.04	
MW-131-25	7/19/2018	495.77	--	10.87	--	484.90	
MW-132-20	8/20/2009	499.44	--	12.84	--	486.60	
MW-132-20	3/4/2010	499.44	--	14.09	--	485.35	
MW-132-20	4/6/2010	499.44	--	14.09	--	485.35	
MW-132-20	10/1/2010	499.44	--	14.35	--	485.09	
MW-132-20	11/1/2010	499.44	--	14.09	--	485.35	
MW-132-20	2/18/2011	499.44	--	14.06	--	485.38	
MW-132-20	4/11/2011	499.44	--	14.09	--	485.35	
MW-132-20	7/14/2011	499.44	No LNAPL	12.91	0.00	486.53	
MW-132-20	10/21/2011	499.44	No LNAPL	14.99	0.00	484.45	
MW-132-20	8/15/2016	499.45	--	12.37	--	487.08	
MW-133-20	8/20/2009	498.36	--	11.78	--	486.58	
MW-133-20	2/18/2011	498.36	--	13.00	--	485.36	
MW-133-20	4/11/2011	498.36	--	13.01	--	485.35	
MW-133-20	10/21/2011	498.36	--	13.88	--	484.48	
MW-133-20	2/16/2012	498.32	No LNAPL	13.77	0.00	484.55	
MW-133-20	4/19/2012	498.32	No LNAPL	13.13	0.00	485.19	
MW-133-20	7/30/2012	498.32	No LNAPL	11.87	0.00	486.45	
MW-133-20	11/1/2012	498.32	No LNAPL	13.31	0.00	485.01	
MW-133-20	1/24/2013	498.34	--	13.13	--	485.21	
MW-133-20	4/24/2013	498.34	No LNAPL	13.37	0.00	484.97	
MW-133-20	8/1/2013	498.34	No LNAPL	11.87	0.00	486.47	
MW-133-20	10/1/2013	498.34	No LNAPL	13.10	0.00	485.24	
MW-133-20	3/18/2014	498.34	No LNAPL	13.76	0.00	484.58	
MW-133-20	6/11/2014	498.37	No LNAPL	13.32	0.00	485.05	
MW-133-20	9/9/2014	498.37	No LNAPL	11.96	0.00	486.41	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-133-20	11/20/2014	498.37	No LNAPL	12.87	0.00	485.50	
MW-133-20	3/18/2015	498.37	No LNAPL	13.36	0.00	485.01	
MW-133-20	6/11/2015	498.37	No LNAPL	12.95	0.00	485.42	
MW-133-20	8/12/2015	498.42	--	11.58	--	486.84	
MW-133-20	11/19/2015	498.42	--	13.02	--	485.40	
MW-133-20	3/22/2016	498.42	No LNAPL	13.78	0.00	484.64	
MW-133-20	8/15/2016	498.38	--	11.32	--	487.06	
MW-133-20	9/12/2016	498.38	--	11.99	--	486.39	
MW-133-20	3/15/2017	498.38	--	13.08	--	485.30	
MW-134-20	10/18/2006	497.76	--	11.63	--	486.13	
MW-134-20	10/19/2006	497.76	--	11.63	--	486.13	
MW-134-20	4/1/2008	497.76	--	Frozen	--	—	Frozen
MW-134-20	9/4/2008	497.76	--	10.49	--	487.27	
MW-134-20	4/10/2009	497.76	--	Frozen	--	—	Frozen
MW-134-20	8/25/2009	497.79	--	10.70	--	487.09	
MW-134-20	9/3/2009	497.79	--	10.80	--	486.99	
MW-134-20	4/6/2010	497.79	--	Frozen	--	—	Frozen
MW-134-20	9/1/2010	497.79	--	10.91	--	486.88	
MW-134-20	4/8/2011	497.79	--	Frozen	--	—	Frozen at 10.9 ft BTOC
MW-134-20	7/14/2011	497.79	No LNAPL	10.51	0.00	487.28	
MW-134-20	10/21/2011	497.79	No LNAPL	12.71	0.00	485.08	
MW-134-20	8/17/2016	497.53	--	9.80	--	487.73	
MW-135-20	8/20/2009	496.95	11.10	11.11	0.01	485.85	
MW-135-20	8/1/2010	496.95	--	11.25	--	485.70	
MW-135-20	10/1/2010	496.95	--	12.36	--	484.59	
MW-135-20	11/1/2010	496.95	--	13.14	--	483.81	
MW-135-20	4/5/2011	496.95	--	Frozen	--	—	Frozen at 12.06 ft BTOC
MW-135-20	5/24/2011	496.95	--	Frozen	--	—	Frozen at 12.05 ft BTOC
MW-135-20	6/21/2011	496.95	--	11.90	--	485.05	
MW-135-20	7/14/2011	496.95	No LNAPL	11.20	0.00	485.75	
MW-135-20	8/23/2011	496.95	No LNAPL	11.51	0.00	485.44	
MW-135-20	9/22/2011	496.95	No LNAPL	12.51	0.00	484.44	
MW-135-20	10/21/2011	496.95	No LNAPL	13.24	0.00	483.71	
MW-135-20	2/16/2012	496.93	13.06	13.15	0.09	483.85	
MW-135-20	4/19/2012	496.93	13.11	Frozen	0.10	—	Frozen at 13.21 ft BTOC
MW-135-20	7/30/2012	496.93	11.23	11.30	0.07	485.69	
MW-135-20	11/1/2012	496.93	12.62	12.68	0.06	484.30	
MW-135-20	1/24/2013	496.94	12.42	12.48	0.06	484.51	
MW-135-20	4/24/2013	496.94	No LNAPL	Frozen	0.00	—	Frozen at 12.54 ft BTOC
MW-135-20	7/23/2013	496.94	11.31	11.33	0.02	485.63	

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MW-135-20	8/1/2013	496.94	11.22	11.24	0.02	485.72	
MW-135-20	8/21/2013	496.94	11.17	11.19	0.02	485.77	
MW-135-20	9/30/2013	496.93	12.28	12.30	0.02	484.65	
MW-135-20	1/9/2014	496.94	12.65	12.66	0.01	484.29	
MW-135-20	2/5/2014	496.94	12.79	12.80	0.01	484.15	
MW-135-20	3/18/2014	496.94	13.02	13.03	0.01	483.92	
MW-135-20	3/24/2014	496.94	13.04	13.05	0.01	483.90	
MW-135-20	4/18/2014	496.94	12.60	12.61	0.01	484.34	
MW-135-20	5/15/2014	496.95	Sheen	12.36	Sheen	484.59	
MW-135-20	6/11/2014	496.95	Sheen	12.59	Sheen	484.36	
MW-135-20	6/19/2014	496.95	12.25	12.26	0.01	484.70	
MW-135-20	7/15/2014	496.95	10.43	10.44	0.01	486.52	
MW-135-20	8/26/2014	496.95	Sheen	11.05	Sheen	485.90	
MW-135-20	9/9/2014	496.95	Sheen	11.28	Sheen	485.67	
MW-135-20	9/24/2014	496.95	No LNAPL	11.64	0.00	485.31	
MW-135-20	10/21/2014	496.95	No LNAPL	12.55	0.00	484.40	
MW-135-20	11/19/2014	496.94	Sheen	12.20	Sheen	484.74	
MW-135-20	12/16/2014	496.94	Sheen	12.41	Sheen	484.53	
MW-135-20	12/29/2014	496.94	Sheen	12.47	Sheen	484.47	
MW-135-20	1/21/2015	496.93	Sheen	12.52	Sheen	484.41	
MW-135-20	2/25/2015	496.94	Sheen	12.64	Sheen	484.30	
MW-135-20	3/10/2015	496.93	Sheen	Frozen	Sheen	—	Depth to ice = 12.52 feet
MW-135-20	3/18/2015	496.93	Sheen	Frozen	Sheen	—	Depth to ice = 12.52 feet
MW-135-20	3/26/2015	496.93	Sheen	12.59	Sheen	484.34	
MW-135-20	4/16/2015	496.94	Sheen	12.42	Sheen	484.52	
MW-135-20	5/21/2015	496.95	Sheen	12.24	Sheen	484.71	
MW-135-20	6/10/2015	496.95	No LNAPL	12.26	0.00	484.69	
MW-135-20	8/12/2015	496.95	No LNAPL	11.24	0.00	485.75	
MW-135-20	8/19/2015	496.95	No LNAPL	11.48	0.00	485.50	
MW-135-20	10/6/2015	496.94	No LNAPL	11.73	0.00	485.22	
MW-135-20	10/15/2015	496.94	Sheen	12.15	Sheen	484.79	DTW with IPB=12.19 feet
MW-135-20	11/19/2015	496.94	No LNAPL	12.40	0.00	484.54	
MW-135-20	1/19/2016	496.93	No LNAPL	12.87	0.00	484.06	
MW-135-20	3/4/2016	496.93	No LNAPL	12.96	0.00	483.97	
MW-135-20	3/22/2016	496.93	Sheen	13.08	Sheen	483.85	
MW-135-20	5/26/2016	496.94	No LNAPL	12.47	0.00	484.49	
MW-135-20	8/18/2016	496.93	Sheen	10.85	Sheen	486.08	
MW-135-20	9/9/2016	496.94	No LNAPL	11.32	0.00	485.66	
MW-135-20	9/12/2016	496.94	No LNAPL	11.40	0.00	485.54	
MW-135-20	10/13/2016	496.94	Sheen	12.32	Sheen	484.62	

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Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-135-20	11/15/2016	496.93	No LNAPL	11.97	0.00	485.06	
MW-135-20	2/8/2017	496.92	No LNAPL	12.40	0.00	484.59	
MW-135-20	3/1/2017	496.92	No LNAPL	12.44	0.00	484.48	
MW-135-20	3/14/2017	496.92	Sheen	12.46	Sheen	484.46	
MW-135-20	6/13/2017	496.93	No LNAPL	11.76	0.00	485.22	
MW-135-20	7/24/2017	496.93	Sheen	11.11	Sheen	485.82	
MW-135-20	8/31/2017	496.93	Sheen	11.62	Sheen	485.31	
MW-135-20	9/19/2017	496.93	Sheen	12.20	Sheen	484.73	
MW-135-20	10/24/2017	496.93	Sheen	12.55	Sheen	484.38	
MW-135-20	11/16/2017	496.93	--	12.32	--	484.61	
MW-135-20	2/13/2018	496.93	Sheen	12.76	Sheen	484.17	
MW-135-20	4/4/2018	496.93	--	12.68	--	484.25	
MW-135-20	8/8/2018	496.93	No LNAPL	10.65	0.00	486.28	
MW-136-20	8/20/2009	496.93	11.04	11.05	0.01	485.89	
MW-136-20	8/1/2010	496.93	--	11.31	--	485.62	
MW-136-20	10/1/2010	496.93	--	12.48	--	484.45	
MW-136-20	4/5/2011	496.93	--	Frozen	--	—	Frozen at 11.93 ft BTOC
MW-136-20	7/14/2011	496.93	No LNAPL	11.11	0.00	485.82	
MW-136-20	7/23/2013	496.91	--	11.22	--	485.69	
MW-136-20	8/1/2013	496.91	Sheen	11.12	Sheen	485.79	
MW-136-20	8/21/2013	496.91	Sheen	11.08	Sheen	485.83	
MW-136-20	1/9/2014	496.91	Sheen	12.57	Sheen	484.34	
MW-136-20	2/5/2014	496.91	Sheen	12.72	Sheen	484.19	
MW-136-20	3/24/2014	496.91	Sheen	12.96	Sheen	483.95	
MW-136-20	4/18/2014	496.92	Sheen	12.59	Sheen	484.33	
MW-136-20	5/15/2014	496.93	Sheen	12.28	Sheen	484.65	
MW-136-20	6/19/2014	496.92	No LNAPL	12.19	0.00	484.73	
MW-136-20	7/15/2014	496.93	Sheen	10.38	Sheen	486.55	
MW-136-20	8/26/2014	496.93	No LNAPL	10.98	0.00	485.95	
MW-136-20	9/24/2014	496.92	No LNAPL	11.59	0.00	485.33	
MW-136-20	10/21/2014	496.93	No LNAPL	12.47	0.00	484.46	
MW-136-20	11/19/2014	496.90	No LNAPL	12.13	0.00	484.77	
MW-136-20	12/16/2014	496.91	Sheen	12.28	Sheen	484.63	
MW-136-20	12/29/2014	496.91	No LNAPL	12.39	0.00	484.52	
MW-136-20	1/21/2015	496.89	Sheen	12.44	Sheen	484.45	
MW-136-20	2/25/2015	496.91	Sheen	12.56	Sheen	484.35	
MW-136-20	3/18/2015	496.90	Sheen	Frozen	Sheen	—	
MW-136-20	3/26/2015	496.90	No LNAPL	12.50	0.00	484.40	
MW-136-20	4/16/2015	496.91	No LNAPL	12.34	0.00	484.57	
MW-136-20	5/21/2015	496.93	Sheen	12.13	Sheen	484.80	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-136-20	6/10/2015	496.93	Sheen	12.17	Sheen	484.76	
MW-136-20	8/19/2015	496.94	Sheen	11.40	Sheen	485.57	
MW-136-20	10/6/2015	496.92	Sheen	11.65	Sheen	485.28	
MW-136-20	1/19/2016	496.90	Sheen	12.78	Sheen	484.12	
MW-136-20	5/26/2016	496.91	Sheen	12.39	Sheen	484.54	
MW-136-20	8/18/2016	496.90	Sheen	10.78	Sheen	486.12	
MW-136-20	9/9/2016	496.92	No LNAPL	11.23	0.00	485.73	
MW-136-20	11/15/2016	496.90	Sheen	11.89	Sheen	485.11	
MW-136-20	2/8/2017	496.88	No LNAPL	12.30	0.00	484.65	
MW-136-20	3/1/2017	496.88	Sheen	12.36	Sheen	484.52	
MW-136-20	6/13/2017	496.90	No LNAPL	11.67	0.00	485.28	
MW-137-20	8/20/2009	497.45	--	11.63	--	485.82	
MW-137-20	8/1/2010	497.45	--	11.92	--	485.53	
MW-137-20	10/1/2010	497.45	--	12.45	--	485.00	
MW-137-20	11/1/2010	497.45	--	13.16	--	484.29	
MW-137-20	4/7/2011	497.45	--	12.52	--	484.93	
MW-137-20	7/14/2011	497.45	No LNAPL	11.38	0.00	486.07	
MW-137-20	10/21/2011	497.45	No LNAPL	13.36	0.00	484.09	
MW-137-20	7/23/2013	497.41	--	11.70	--	485.71	
MW-137-20	8/1/2013	497.41	--	11.62	--	485.79	
MW-137-20	8/21/2013	497.41	No LNAPL	11.61	0.00	485.80	
MW-137-20	1/9/2014	497.43	No LNAPL	13.12	0.00	484.31	
MW-137-20	2/5/2014	497.47	No LNAPL	13.27	0.00	484.20	
MW-137-20	3/24/2014	497.48	No LNAPL	13.57	0.00	483.91	
MW-137-20	4/18/2014	497.51	No LNAPL	13.33	0.00	484.18	
MW-137-20	5/15/2014	497.50	--	12.89	--	484.61	
MW-137-20	6/19/2014	497.23	No LNAPL	12.55	0.00	484.68	Cut casing prior to survey
MW-137-20	7/15/2014	497.25	No LNAPL	10.73	0.00	486.52	
MW-137-20	8/26/2014	497.25	No LNAPL	11.31	0.00	485.94	
MW-137-20	9/24/2014	497.24	No LNAPL	11.90	0.00	485.34	
MW-137-20	10/21/2014	497.23	No LNAPL	12.79	0.00	484.44	
MW-137-20	11/19/2014	497.25	No LNAPL	12.51	0.00	484.74	
MW-137-20	12/16/2014	497.34	No LNAPL	12.74	0.00	484.60	
MW-137-20	12/29/2014	497.34	No LNAPL	12.87	0.00	484.47	
MW-137-20	1/21/2015	497.39	No LNAPL	12.96	0.00	484.43	
MW-137-20	2/25/2015	497.41	No LNAPL	13.11	0.00	484.30	
MW-137-20	3/18/2015	497.42	No LNAPL	13.13	0.00	484.29	
MW-137-20	3/26/2015	497.42	No LNAPL	13.06	0.00	484.36	
MW-137-20	4/16/2015	497.42	--	12.89	--	484.53	
MW-137-20	5/21/2015	497.43	No LNAPL	12.68	0.00	484.75	

Appendix A-1
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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-137-20	6/10/2015	497.42	No LNAPL	12.71	0.00	484.71	
MW-137-20	8/19/2015	497.43	No LNAPL	11.94	0.00	485.52	
MW-137-20	10/6/2015	497.44	--	12.19	--	485.26	
MW-137-20	1/19/2016	497.44	--	13.29	--	484.11	
MW-137-20	5/26/2016	497.50	No LNAPL	12.62	0.00	484.90	
MW-137-20	8/15/2016	497.13	--	10.85	--	486.28	
MW-137-20	9/9/2016	497.12	No LNAPL	11.47	0.00	485.69	
MW-137-20	11/15/2016	497.13	No LNAPL	12.14	0.00	485.09	
MW-137-20	2/8/2017	497.28	No LNAPL	12.70	0.00	484.65	
MW-137-20	6/13/2017	497.29	No LNAPL	12.07	0.00	485.27	
MW-137-20	8/2/2017	497.29	--	11.45	--	485.84	
MW-137-20	7/19/2018	497.29	--	11.51	--	485.78	
MW-138-20	8/17/2009	—	8.83	8.92	0.09	—	
MW-138-20	7/26/2010	496.37	8.65	8.83	0.18	487.69	
MW-138-20	10/13/2010	496.37	10.45	11.15	0.70	485.80	
MW-138-20	3/18/2011	496.37	10.30	10.48	0.18	486.04	
MW-138-20	4/8/2011	496.37	10.17	10.29	0.12	486.18	
MW-138-20	5/6/2011	496.37	--	9.61	--	486.76	
MW-138-20	5/16/2011	496.37	10.42	10.44	0.02	485.95	
MW-138-20	5/24/2011	496.37	—	—	—	—	No access due to work being conducted in area
MW-138-20	6/21/2011	496.37	—	—	—	—	Pump obstructing measurement
MW-138-20	7/14/2011	496.37	8.87	8.89	0.02	487.50	
MW-138-20	8/23/2011	496.37	9.21	9.41	0.20	487.13	
MW-138-20	9/22/2011	496.37	10.41	10.73	0.32	485.91	
MW-138-20	10/21/2011	496.37	11.14	12.07	0.93	485.07	
MW-138-20	12/7/2011	496.34	—	—	—	—	Access unavailable per NPT operator
MW-138-20	2/17/2012	496.34	11.15	11.18	0.03	485.18	
MW-138-20	3/15/2012	496.34	11.23	11.24	0.01	485.11	
MW-138-20	4/12/2012	496.34	11.03	11.04	0.01	485.31	
MW-138-20	5/14/2012	496.34	11.00	11.02	0.02	485.34	
MW-138-20	6/13/2012	496.34	Sheen	9.76	Sheen	486.58	
MW-138-20	7/18/2012	496.34	9.38	9.49	0.11	486.94	
MW-138-20	8/21/2012	496.34	8.01	8.02	0.01	488.33	
MW-138-20	9/18/2012	496.34	10.53	10.58	0.05	485.80	
MW-138-20	10/15/2012	496.34	10.46	10.54	0.08	485.87	
MW-138-20	11/29/2012	496.34	10.07	10.09	0.02	486.27	
MW-138-20	12/28/2012	496.34	10.45	10.52	0.07	485.88	
MW-138-20	2/26/2013	496.34	10.53	10.71	0.18	485.78	
MW-138-20	3/28/2013	496.34	10.69	10.80	0.11	485.63	R-35R, R-39, and R-40 were offline on this date
MW-138-20	4/24/2013	496.34	10.67	10.68	0.01	485.67	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-138-20	5/31/2013	496.34	9.39	9.40	0.01	486.95	
MW-138-20	6/24/2013	496.34	9.40	9.49	0.09	486.92	
MW-138-20	7/23/2013	496.34	9.10	9.11	0.01	487.24	
MW-138-20	8/21/2013	496.34	8.90	8.95	0.05	487.43	
MW-138-20	9/25/2013	496.34	10.08	10.19	0.11	486.24	
MW-138-20	10/29/2013	496.34	11.12	11.41	0.29	485.17	
MW-138-20	11/19/2013	496.34	10.55	10.56	0.01	485.79	
MW-138-20	12/20/2013	496.34	10.38	10.39	0.01	485.96	
MW-138-20	1/14/2014	496.34	10.74	10.92	0.18	485.57	
MW-138-20	2/25/2014	496.34	11.11	11.75	0.64	485.12	
MW-138-20	3/24/2014	496.34	11.17	11.47	0.30	485.12	
MW-138-20	4/14/2014	496.32	11.54	11.55	0.01	484.78	
MW-138-20	5/29/2014	496.32	10.70	10.95	0.25	485.58	
MW-138-20	6/20/2014	496.32	9.53	9.72	0.19	486.76	
MW-138-20	8/28/2014	496.32	8.90	9.33	0.43	487.35	
MW-138-20	9/29/2014	496.32	9.80	10.02	0.22	486.48	
MW-138-20	10/16/2014	496.32	10.39	10.57	0.18	485.90	
MW-138-20	3/10/2015	496.32	10.41	Frozen	0.08	—	Depth to ice = 10.49 feet
MW-138-20	5/21/2015	496.32	Sheen	9.36	Sheen	486.96	
MW-138-20	8/12/2015	496.37	8.97	9.10	0.13	487.42	
MW-138-20	10/15/2015	496.37	10.15	10.33	0.18	486.23	
MW-138-20	3/4/2016	496.37	Sheen	Frozen	Sheen	—	Ice at 10.80 feet
MW-138-20	6/14/2016	496.37	9.81	9.95	0.14	486.54	
MW-138-20	8/17/2016	496.34	8.46	8.78	0.32	487.83	
MW-138-20	8/18/2016	496.37	8.51	8.82	0.31	487.81	
MW-138-20	10/13/2016	496.34	10.22	10.35	0.13	486.10	
MW-138-20	10/26/2016	496.34	10.63	10.80	0.17	485.68	
MW-138-20	3/1/2017	496.34	Sheen	Frozen	Sheen	—	Ice at 9.99 ft BTOC
MW-138-20	6/6/2017	496.34	Sheen	Frozen	Sheen	—	DTW = 8.30 feet BTOC. Depth to ice not recorded
MW-139-25	8/18/2009	497.16	--	11.64	--	485.52	
MW-139-25	8/1/2010	497.16	--	11.82	--	485.34	
MW-139-25	10/1/2010	497.16	--	13.10	--	484.06	
MW-139-25	11/1/2010	497.16	--	13.76	--	483.40	
MW-139-25	2/9/2011	497.16	--	12.80	--	484.36	
MW-139-25	4/11/2011	497.16	--	12.98	--	484.18	
MW-139-25	7/14/2011	497.16	No LNAPL	11.72	0.00	485.44	
MW-139-25	10/21/2011	497.16	--	13.80	--	483.36	
MW-139-25	1/10/2012	497.18	No LNAPL	13.67	0.00	483.51	
MW-139-25	2/6/2012	497.18	No LNAPL	13.76	0.00	483.42	
MW-139-25	3/13/2012	497.18	No LNAPL	13.70	0.00	483.48	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-139-25	4/10/2012	497.18	No LNAPL	13.60	0.00	483.58	
MW-139-25	5/8/2012	497.18	No LNAPL	13.39	0.00	483.79	
MW-139-25	6/12/2012	497.18	No LNAPL	12.52	0.00	484.66	
MW-139-25	7/17/2012	497.18	No LNAPL	12.11	0.00	485.07	
MW-139-25	8/21/2012	497.18	No LNAPL	12.54	0.00	484.64	
MW-139-25	9/18/2012	497.18	No LNAPL	13.17	0.00	484.01	
MW-139-25	10/16/2012	497.18	No LNAPL	13.18	0.00	484.00	
MW-139-25	11/29/2012	497.25	No LNAPL	12.72	0.00	484.53	
MW-139-25	12/27/2012	497.25	No LNAPL	13.04	0.00	484.21	
MW-139-25	1/23/2013	497.25	No LNAPL	13.00	0.00	484.25	
MW-139-25	2/26/2013	497.25	No LNAPL	13.16	0.00	484.09	
MW-139-25	3/28/2013	497.25	No LNAPL	13.32	0.00	483.93	R-35R, R-39, and R-40 were offline on this date
MW-139-25	4/24/2013	497.25	No LNAPL	13.30	0.00	483.95	
MW-139-25	5/30/2013	497.25	No LNAPL	12.15	0.00	485.10	
MW-139-25	6/25/2013	497.25	No LNAPL	12.21	0.00	485.04	
MW-139-25	10/29/2013	497.25	No LNAPL	13.85	0.00	483.40	
MW-139-25	11/19/2013	497.25	No LNAPL	13.21	0.00	484.04	
MW-139-25	12/20/2013	497.25	No LNAPL	13.11	0.00	484.14	
MW-139-25	3/10/2015	497.28	No LNAPL	13.37	0.00	483.91	
MW-139-25	10/15/2015	497.29	No LNAPL	12.99	0.00	484.30	
MW-139-25	3/4/2016	497.29	No LNAPL	13.73	0.00	483.56	
MW-139-25	7/21/2016	497.29	--	11.10	--	486.19	
MW-139-25	10/13/2016	497.29	No LNAPL	13.15	0.00	484.14	
MW-139-25	10/14/2016	497.29	--	13.14	--	484.15	
MW-139-25	3/1/2017	497.29	No LNAPL	13.26	0.00	484.03	
MW-139-25	7/14/2017	497.29	--	11.78	--	485.51	
MW-139-25	10/20/2017	497.31	--	13.22	--	484.09	
MW-139-25	11/1/2017	497.31	No LNAPL	13.55	0.00	483.76	
MW-139-25	1/19/2018	497.31	--	13.22	--	484.09	
MW-139-25	4/4/2018	497.31	--	13.40	--	483.91	
MW-139-25	8/8/2018	497.31	--	11.44	--	485.87	
MW-139-25	11/6/2018	497.24	No LNAPL	13.20	0.00	484.04	
MW-140-25	8/20/2009	494.88	--	9.54	--	485.34	
MW-140-25	10/1/2010	494.88	--	11.00	--	483.88	
MW-140-25	2/24/2011	494.88	--	10.79	--	484.09	
MW-140-25	4/7/2011	494.88	--	12.84	--	482.04	
MW-140-25	7/14/2011	494.88	No LNAPL	9.59	0.00	485.29	
MW-140-25	10/21/2011	494.88	--	11.60	--	483.28	
MW-140-25	2/6/2012	494.85	No LNAPL	11.51	0.00	483.34	
MW-140-25	2/15/2012	494.85	No LNAPL	11.44	0.00	483.41	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-140-25	4/10/2012	494.85	No LNAPL	11.35	0.00	483.50	
MW-140-25	4/19/2012	494.85	--	10.81	--	484.04	
MW-140-25	7/17/2012	494.85	No LNAPL	9.91	0.00	484.94	
MW-140-25	7/30/2012	494.85	No LNAPL	9.65	0.00	485.20	
MW-140-25	8/21/2012	494.85	No LNAPL	10.33	0.00	484.52	
MW-140-25	9/18/2012	494.85	No LNAPL	10.94	0.00	483.91	
MW-140-25	10/16/2012	494.85	No LNAPL	10.93	0.00	483.92	
MW-140-25	11/1/2012	494.85	No LNAPL	10.94	0.00	483.91	
MW-140-25	11/29/2012	494.90	No LNAPL	10.54	0.00	484.36	
MW-140-25	12/27/2012	494.90	No LNAPL	10.82	0.00	484.08	
MW-140-25	1/24/2013	494.90	No LNAPL	10.76	0.00	484.14	
MW-140-25	2/26/2013	494.90	No LNAPL	10.90	0.00	484.00	
MW-140-25	4/24/2013	494.90	No LNAPL	11.01	0.00	483.89	
MW-140-25	8/2/2013	494.90	No LNAPL	9.63	0.00	485.27	
MW-140-25	10/1/2013	494.90	--	10.79	--	484.11	
MW-140-25	10/29/2013	494.90	No LNAPL	11.55	0.00	483.35	
MW-140-25	3/18/2014	494.90	--	11.41	--	483.49	
MW-140-25	6/11/2014	494.86	--	11.01	--	483.85	
MW-140-25	9/9/2014	494.86	--	9.75	--	485.11	
MW-140-25	11/20/2014	494.86	--	10.64	--	484.22	
MW-140-25	3/18/2015	494.86	--	11.15	--	483.71	
MW-140-25	6/11/2015	494.86	--	10.76	--	484.10	
MW-140-25	8/12/2015	494.87	--	9.72	--	485.15	
MW-140-25	10/15/2015	494.87	No LNAPL	10.65	0.00	484.22	
MW-140-25	11/19/2015	494.87	--	10.82	--	484.05	
MW-140-25	3/22/2016	494.87	No LNAPL	11.51	0.00	483.36	
MW-140-25	7/21/2016	494.88	--	8.89	--	485.99	
MW-140-25	9/13/2016	494.88	--	9.96	--	484.92	
MW-140-25	3/14/2017	494.88	--	10.94	--	483.94	
MW-140-25	7/24/2017	494.88	--	9.64	--	485.24	
MW-140-25	1/19/2018	494.88	--	10.96	--	483.92	
MW-140-25	8/8/2018	494.88	--	9.28	--	485.60	
MW-141-20	10/19/2006	492.34	--	8.44	--	483.90	
MW-141-20	4/17/2007	492.34	--	8.18	--	484.16	
MW-141-20	4/1/2008	492.34	--	8.60	--	483.74	
MW-141-20	9/4/2008	492.34	--	7.36	--	484.98	
MW-141-20	4/8/2009	492.34	--	8.34	--	484.00	
MW-141-20	8/18/2009	492.39	--	7.38	--	485.01	
MW-141-20	9/3/2009	492.39	--	7.71	--	484.68	
MW-141-20	3/4/2010	492.39	--	8.66	--	483.73	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-141-20	4/2/2010	492.39	--	8.66	--	483.73	
MW-141-20	9/1/2010	492.39	--	7.91	--	484.48	
MW-141-20	10/1/2010	492.39	--	8.78	--	483.61	
MW-141-20	2/9/2011	492.39	--	8.41	--	483.98	
MW-141-20	4/15/2011	492.39	--	8.52	--	483.87	
MW-141-20	7/14/2011	492.39	No LNAPL	7.24	0.00	485.15	
MW-141-20	10/21/2011	492.39	--	9.41	--	482.98	
MW-141-20	2/15/2012	492.39	--	9.23	--	483.16	
MW-141-20	4/19/2012	492.39	--	8.54	--	483.85	
MW-141-20	7/31/2012	492.39	--	7.28	--	485.11	
MW-141-20	11/1/2012	492.39	No LNAPL	8.59	0.00	483.80	
MW-141-20	1/24/2013	492.38	--	8.45	--	483.93	
MW-141-20	4/24/2013	492.38	--	8.77	--	483.61	
MW-141-20	8/1/2013	492.38	--	7.17	--	485.21	
MW-141-20	10/1/2013	492.38	--	8.66	--	483.72	
MW-141-20	3/18/2014	492.94	--	9.77	--	483.17	
MW-141-20	4/25/2014	493.00	--	8.83	--	484.17	
MW-141-20	5/20/2014	492.98	--	9.32	--	483.66	
MW-141-20	6/4/2014	492.99	--	9.51	--	483.48	
MW-141-20	6/11/2014	492.99	--	9.44	--	483.55	
MW-141-20	9/9/2014	492.98	--	8.34	--	484.64	
MW-141-20	11/20/2014	492.98	--	9.08	--	483.90	
MW-141-20	3/18/2015	492.86	--	9.63	--	483.23	
MW-141-20	6/11/2015	493.12	--	8.87	--	484.25	
MW-141-20	8/12/2015	493.12	--	7.77	--	485.35	
MW-141-20	11/19/2015	492.78	--	8.88	--	483.90	
MW-141-20	3/22/2016	492.65	No LNAPL	9.65	0.00	483.00	
MW-141-20	8/4/2016	492.72	--	6.74	--	485.98	
MW-141-20	9/13/2016	492.76	--	8.20	--	484.56	
MW-141-20	3/14/2017	492.64	--	9.17	--	483.47	
MW-142-150	7/15/2016	493.35	--	8.02	--	485.33	
MW-142-20	8/18/2009	496.01	--	10.79	--	485.22	
MW-142-20	8/1/2010	496.01	--	10.84	--	485.17	
MW-142-20	10/1/2010	496.01	--	12.08	--	483.93	
MW-142-20	11/1/2010	496.01	--	12.80	--	483.21	
MW-142-20	3/9/2011	496.01	--	12.06	--	483.95	
MW-142-20	4/8/2011	496.01	--	12.40	--	483.61	
MW-142-20	7/14/2011	496.01	No LNAPL	10.81	0.00	485.20	
MW-142-20	10/21/2011	496.01	--	12.85	--	483.16	
MW-142-20	2/6/2012	496.08	No LNAPL	12.80	0.00	483.28	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-142-20	4/10/2012	496.08	No LNAPL	12.66	0.00	483.42	
MW-142-20	7/17/2012	496.08	--	11.20	--	484.88	
MW-142-20	8/21/2012	496.08	--	11.62	--	484.46	
MW-142-20	9/18/2012	496.08	--	12.23	--	483.85	
MW-142-20	10/16/2012	496.08	--	12.24	--	483.84	
MW-142-20	11/29/2012	496.17	--	11.80	--	484.37	
MW-142-20	12/27/2012	496.17	--	12.12	--	484.05	
MW-142-20	1/23/2013	496.17	--	12.09	--	484.08	
MW-142-20	2/26/2013	496.17	No LNAPL	12.23	0.00	483.94	
MW-142-20	4/24/2013	496.17	No LNAPL	12.36	0.00	483.81	
MW-142-20	10/29/2013	495.73	No LNAPL	12.46	0.00	483.27	
MW-142-20	10/15/2015	495.84	No LNAPL	11.68	0.00	484.16	
MW-142-20	8/9/2016	495.84	--	9.89	--	485.95	
MW-142-20	10/13/2016	495.84	No LNAPL	11.88	0.00	483.96	
MW-142-20	10/14/2016	495.84	--	11.87	--	483.97	
MW-142-20	3/1/2017	495.84	No LNAPL	12.00	0.00	483.84	
MW-142-20	8/9/2017	495.84	--	10.60	--	485.24	
MW-142-20	9/21/2017	495.89	--	11.87	--	484.02	
MW-142-20	11/1/2017	495.89	No LNAPL	12.38	0.00	483.51	
MW-142-20	11/16/2017	495.89	--	11.90	--	483.99	
MW-142-20	2/13/2018	495.89	--	12.34	--	483.55	
MW-142-20	3/12/2018	495.89	--	12.29	--	483.60	
MW-142-20	4/26/2018	495.89	--	11.99	--	483.90	
MW-142-20	8/3/2018	495.89	--	11.73	--	484.16	
MW-142-20	9/10/2018	495.83	--	10.54	--	485.29	
MW-142-20	11/6/2018	495.83	No LNAPL	12.02	0.00	483.81	
MW-142-65	7/15/2016	493.21	--	7.95	--	485.26	
MW-143-20	8/18/2009	495.23	--	10.03	--	485.20	
MW-143-20	8/1/2010	495.23	--	9.87	--	485.36	
MW-143-20	10/1/2010	495.23	--	11.13	--	484.10	
MW-143-20	11/1/2010	495.23	--	11.82	--	483.41	
MW-143-20	3/9/2011	495.23	--	11.28	--	483.95	
MW-143-20	4/8/2011	495.23	--	11.24	--	483.99	
MW-143-20	7/14/2011	495.23	No LNAPL	10.00	0.00	485.23	
MW-143-20	10/21/2011	495.23	--	12.05	--	483.18	
MW-143-20	2/15/2012	495.30	--	12.07	--	483.23	
MW-143-20	4/20/2012	495.30	--	11.35	--	483.95	
MW-143-20	7/31/2012	495.30	--	10.17	--	485.13	
MW-143-20	11/1/2012	495.30	--	11.52	--	483.78	
MW-143-20	1/24/2013	495.37	--	11.52	--	483.85	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-143-20	4/24/2013	495.37	--	11.80	--	483.57	
MW-143-20	8/1/2013	495.37	--	10.14	--	485.23	
MW-143-20	10/1/2013	495.37	No LNAPL	11.48	0.00	483.89	
MW-143-20	3/18/2014	495.37	--	12.02	--	483.35	
MW-143-20	6/11/2014	495.28	--	11.67	--	483.61	
MW-143-20	9/9/2014	495.28	--	10.03	--	485.25	
MW-143-20	11/20/2014	494.91	--	10.88	--	484.03	
MW-143-20	3/19/2015	494.91	--	11.38	--	483.53	
MW-143-20	6/10/2015	494.91	--	10.92	--	483.99	
MW-143-20	8/12/2015	494.93	--	9.90	--	485.03	
MW-143-20	11/19/2015	494.93	--	11.01	--	483.92	
MW-143-20	7/18/2016	494.92	--	9.51	--	485.41	
MW-143-20	8/1/2017	494.92	--	9.88	--	485.04	
MW-143-20	8/3/2018	494.92	--	9.96	--	484.96	
MW-144A-25	8/18/2009	496.81	--	10.06	--	486.75	
MW-144A-25	10/1/2010	496.81	--	10.75	--	486.06	
MW-144A-25	2/8/2011	496.81	--	10.67	--	486.14	
MW-144A-25	3/25/2011	496.81	--	10.97	--	485.84	
MW-144A-25	4/25/2011	496.81	--	10.45	--	486.36	
MW-144A-25	7/14/2011	496.81	No LNAPL	9.74	0.00	487.07	
MW-144A-25	10/21/2011	496.81	--	11.68	--	485.13	
MW-144A-25	2/6/2012	495.25	No LNAPL	11.78	0.00	483.47	
MW-144A-25	2/15/2012	495.25	No LNAPL	11.72	0.00	483.53	
MW-144A-25	4/10/2012	495.25	No LNAPL	11.62	0.00	483.63	
MW-144A-25	4/19/2012	495.25	--	11.09	--	484.16	
MW-144A-25	7/17/2012	495.25	No LNAPL	10.16	0.00	485.09	
MW-144A-25	7/30/2012	495.25	No LNAPL	9.92	0.00	485.33	
MW-144A-25	8/21/2012	495.25	No LNAPL	10.59	0.00	484.66	
MW-144A-25	9/18/2012	495.25	No LNAPL	11.18	0.00	484.07	
MW-144A-25	10/16/2012	495.25	No LNAPL	11.19	0.00	484.06	
MW-144A-25	11/1/2012	495.25	No LNAPL	11.24	0.00	484.01	
MW-144A-25	11/29/2012	495.35	No LNAPL	10.81	0.00	484.54	
MW-144A-25	12/27/2012	495.35	No LNAPL	11.17	0.00	484.18	
MW-144A-25	1/23/2013	495.35	No LNAPL	11.13	0.00	484.22	
MW-144A-25	2/26/2013	495.35	No LNAPL	11.28	0.00	484.07	
MW-144A-25	4/24/2013	495.35	No LNAPL	11.42	0.00	483.93	
MW-144A-25	8/2/2013	495.35	No LNAPL	10.03	0.00	485.32	
MW-144A-25	10/1/2013	495.35	--	10.97	--	484.38	
MW-144A-25	10/29/2013	495.35	No LNAPL	11.73	0.00	483.62	
MW-144A-25	3/18/2014	495.35	--	11.65	--	483.70	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-144A-25	6/11/2014	495.31	--	11.20	--	484.11	
MW-144A-25	9/9/2014	495.31	--	9.89	--	485.42	
MW-144A-25	11/20/2014	495.31	--	10.83	--	484.48	
MW-144A-25	3/18/2015	495.31	--	11.33	--	483.98	
MW-144A-25	6/11/2015	495.31	--	10.93	--	484.38	
MW-144A-25	8/12/2015	495.31	--	9.95	--	485.36	
MW-144A-25	10/15/2015	495.31	No LNAPL	10.80	0.00	484.51	
MW-144A-25	11/19/2015	495.31	--	11.01	--	484.30	
MW-144A-25	3/22/2016	495.31	No LNAPL	11.72	0.00	483.59	
MW-144A-25	7/21/2016	495.31	--	9.16	--	486.15	
MW-144A-25	9/13/2016	495.31	--	10.08	--	485.23	
MW-144A-25	3/14/2017	495.31	--	11.10	--	484.21	
MW-144A-25	7/14/2017	495.31	--	9.78	--	485.53	
MW-144BR-90	10/21/2011	—	--	11.40	--	—	New well
MW-144BR-90	2/15/2012	494.99	No LNAPL	11.31	0.00	483.68	
MW-144BR-90	4/19/2012	494.99	--	10.69	--	484.30	
MW-144BR-90	7/30/2012	494.99	No LNAPL	9.52	0.00	485.47	
MW-144BR-90	11/1/2012	494.99	No LNAPL	10.81	0.00	484.18	
MW-144BR-90	1/24/2013	494.98	--	10.69	--	484.29	
MW-144BR-90	4/24/2013	494.98	--	10.92	--	484.06	
MW-144BR-90	8/1/2013	494.98	--	9.52	--	485.46	
MW-144BR-90	10/1/2013	494.98	--	10.70	--	484.28	
MW-144BR-90	3/18/2014	494.98	--	11.33	--	483.65	
MW-144BR-90	6/11/2014	495.00	--	10.89	--	484.11	
MW-144BR-90	9/9/2014	495.00	--	9.60	--	485.40	
MW-144BR-90	11/20/2014	495.00	--	10.50	--	484.50	
MW-144BR-90	3/18/2015	495.00	--	11.03	--	483.97	
MW-144BR-90	6/11/2015	495.00	--	10.62	--	484.38	
MW-144BR-90	8/12/2015	495.00	--	9.60	--	485.40	
MW-144BR-90	11/19/2015	495.00	--	10.67	--	484.33	
MW-144BR-90	3/22/2016	495.00	No LNAPL	11.39	0.00	483.61	
MW-144BR-90	7/21/2016	495.02	--	8.82	--	486.20	
MW-144BR-90	9/13/2016	495.02	--	9.80	--	485.22	
MW-144BR-90	3/14/2017	495.02	--	10.81	--	484.21	
MW-144BR-90	9/21/2017	495.02	--	10.64	--	484.38	
MW-144BR-90	3/12/2018	495.02	--	11.09	--	483.93	
MW-144BR-90	9/10/2018	495.03	--	9.26	--	485.77	
MW-145-20	4/1/2008	495.44	--	10.95	--	484.49	
MW-145-20	9/4/2008	495.44	--	9.87	--	485.57	
MW-145-20	4/10/2009	495.44	--	10.84	--	484.60	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-145-20	8/20/2009	495.61	--	9.84	--	485.77	
MW-145-20	9/3/2009	495.61	--	10.27	--	485.34	
MW-145-20	3/4/2010	495.61	--	11.11	--	484.50	
MW-145-20	4/6/2010	495.61	--	11.11	--	484.50	
MW-145-20	9/1/2010	495.61	--	10.38	--	485.23	
MW-145-20	10/1/2010	495.61	--	11.13	--	484.48	
MW-145-20	2/10/2011	495.61	--	10.92	--	484.69	
MW-145-20	4/7/2011	495.61	--	11.06	--	484.55	
MW-145-20	7/14/2011	495.61	No LNAPL	9.94	0.00	485.67	
MW-145-20	10/21/2011	495.61	--	11.90	--	483.71	
MW-145-20	1/10/2012	495.62	No LNAPL	11.78	0.00	483.84	
MW-145-20	2/6/2012	495.62	No LNAPL	11.86	0.00	483.76	
MW-145-20	2/16/2012	495.62	No LNAPL	11.78	0.00	483.84	
MW-145-20	3/13/2012	495.62	No LNAPL	11.75	0.00	483.87	
MW-145-20	4/10/2012	495.62	No LNAPL	11.68	0.00	483.94	
MW-145-20	4/19/2012	495.62	No LNAPL	11.13	0.00	484.49	
MW-145-20	5/8/2012	495.62	No LNAPL	11.41	0.00	484.21	
MW-145-20	6/13/2012	495.62	No LNAPL	10.54	0.00	485.08	
MW-145-20	7/17/2012	495.62	No LNAPL	10.21	0.00	485.41	
MW-145-20	7/30/2012	495.62	No LNAPL	9.96	0.00	485.66	
MW-145-20	8/21/2012	495.62	No LNAPL	10.64	0.00	484.98	
MW-145-20	9/18/2012	495.62	No LNAPL	11.25	0.00	484.37	
MW-145-20	10/16/2012	495.62	No LNAPL	11.25	0.00	484.37	
MW-145-20	11/1/2012	495.62	No LNAPL	11.32	0.00	484.30	
MW-145-20	11/29/2012	495.61	No LNAPL	10.83	0.00	484.78	
MW-145-20	12/27/2012	495.61	No LNAPL	11.16	0.00	484.45	
MW-145-20	1/23/2013	495.61	No LNAPL	11.11	0.00	484.50	
MW-145-20	2/26/2013	495.61	No LNAPL	11.25	0.00	484.36	
MW-145-20	3/29/2013	495.61	No LNAPL	11.40	0.00	484.21	R-35R, R-39, and R-40 were offline on this date
MW-145-20	4/24/2013	495.61	No LNAPL	11.38	0.00	484.23	
MW-145-20	5/31/2013	495.61	No LNAPL	10.15	0.00	485.46	
MW-145-20	6/25/2013	495.61	No LNAPL	10.24	0.00	485.37	
MW-145-20	8/2/2013	495.61	No LNAPL	9.93	0.00	485.68	
MW-145-20	10/1/2013	495.61	No LNAPL	11.13	0.00	484.48	
MW-145-20	10/29/2013	495.61	No LNAPL	11.86	0.00	483.75	
MW-145-20	11/19/2013	495.61	No LNAPL	11.30	0.00	484.31	
MW-145-20	12/20/2013	495.61	No LNAPL	11.17	0.00	484.44	
MW-145-20	3/18/2014	495.61	No LNAPL	11.74	0.00	483.87	
MW-145-20	6/11/2014	495.63	—	—	—	—	Well is obstructed
MW-145-20	9/9/2014	495.63	No LNAPL	10.00	0.00	485.63	

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MW-145-20	11/20/2014	495.63	No LNAPL	10.93	0.00	484.70	
MW-145-20	3/10/2015	495.63	No LNAPL	11.31	0.00	484.32	
MW-145-20	3/19/2015	495.63	No LNAPL	11.41	0.00	484.22	
MW-145-20	5/18/2015	495.63	No LNAPL	10.95	0.00	484.68	
MW-145-20	6/10/2015	495.63	No LNAPL	11.00	0.00	484.63	
MW-145-20	8/12/2015	495.64	No LNAPL	10.01	0.00	485.67	
MW-145-20	10/15/2015	495.64	No LNAPL	10.92	0.00	484.72	
MW-145-20	11/19/2015	495.64	--	11.07	--	484.57	
MW-145-20	3/22/2016	495.64	No LNAPL	11.85	0.00	483.79	
MW-145-20	8/10/2016	495.64	--	9.20	--	486.44	
MW-145-20	9/12/2016	495.64	--	10.10	--	485.54	
MW-145-20	3/14/2017	495.64	--	11.18	--	484.46	
MW-145-20	8/10/2017	495.64	--	9.87	--	485.77	
MW-145-20	9/21/2017	495.64	--	11.00	--	484.64	
MW-145-20	11/1/2017	495.64	No LNAPL	11.51	0.00	484.13	
MW-145-20	11/16/2017	495.64	--	11.12	--	484.52	
MW-145-20	2/15/2018	495.64	--	11.50	--	484.14	
MW-145-20	3/12/2018	495.64	--	11.45	--	484.19	
MW-145-20	4/5/2018	495.64	--	11.48	--	484.16	
MW-145-20	8/3/2018	495.64	--	9.92	--	485.72	
MW-145-20	9/10/2018	495.63	--	9.63	--	486.00	
MW-145-20	11/6/2018	495.63	No LNAPL	11.18	0.00	484.45	
MW-146A-15	1/15/2009	—	--	11.15	--	—	
MW-146A-15	8/18/2009	495.60	--	10.29	--	485.31	
MW-146A-15	10/1/2010	495.60	--	11.50	--	484.10	
MW-146A-15	4/25/2011	495.60	--	10.62	--	484.98	
MW-146A-15	7/14/2011	495.60	No LNAPL	9.68	0.00	485.92	
MW-146A-15	10/21/2011	495.60	--	11.97	--	483.63	
MW-146A-15	2/15/2012	495.07	--	11.72	--	483.35	
MW-146A-15	4/19/2012	495.07	--	11.03	--	484.04	
MW-146A-15	7/30/2012	495.07	--	9.70	--	485.37	
MW-146A-15	11/1/2012	495.07	--	11.04	--	484.03	
MW-146A-15	1/24/2013	495.09	--	10.96	--	484.13	
MW-146A-15	4/24/2013	495.09	--	11.31	--	483.78	
MW-146A-15	8/1/2013	495.09	--	9.60	--	485.49	
MW-146A-15	10/1/2013	495.09	--	11.27	--	483.82	
MW-146A-15	3/18/2014	495.07	--	11.68	--	483.39	
MW-146A-15	4/25/2014	495.10	--	10.73	--	484.37	
MW-146A-15	5/20/2014	495.08	--	11.27	--	483.81	
MW-146A-15	6/4/2014	495.07	--	11.45	--	483.62	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-146A-15	6/11/2014	495.07	--	11.39	--	483.68	
MW-146A-15	9/9/2014	495.06	--	10.42	--	484.64	
MW-146A-15	11/20/2014	495.06	--	11.01	--	484.05	
MW-146A-15	3/18/2015	495.06	--	11.60	--	483.46	
MW-146A-15	6/11/2015	495.22	--	11.16	--	484.06	
MW-146A-15	8/12/2015	495.22	--	9.93	--	485.29	
MW-146A-15	11/19/2015	495.17	--	11.12	--	484.05	
MW-146A-15	9/13/2016	495.19	--	10.54	--	484.65	
MW-146A-15	3/14/2017	495.19	--	11.41	--	483.78	
MW-146B-30	1/15/2009	—	--	10.54	--	—	
MW-146B-30	8/18/2009	494.95	--	9.73	--	485.22	
MW-146B-30	10/1/2010	494.95	--	12.68	--	482.27	
MW-146B-30	4/25/2011	494.95	--	10.50	--	484.45	
MW-146B-30	7/14/2011	494.95	No LNAPL	9.56	0.00	485.39	
MW-146B-30	10/21/2011	494.95	--	11.85	--	483.10	
MW-146B-30	2/15/2012	494.95	--	11.59	--	483.36	
MW-146B-30	4/19/2012	494.95	--	10.90	--	484.05	
MW-146B-30	7/30/2012	494.95	--	9.56	--	485.39	
MW-146B-30	11/1/2012	494.95	--	10.87	--	484.08	
MW-146B-30	1/24/2013	494.98	--	10.82	--	484.16	
MW-146B-30	4/24/2013	494.98	--	11.15	--	483.83	
MW-146B-30	8/1/2013	494.98	--	9.45	--	485.53	
MW-146B-30	10/1/2013	494.98	--	11.11	--	483.87	
MW-146B-30	3/18/2014	494.93	--	11.58	--	483.35	
MW-146B-30	4/25/2014	494.96	--	10.59	--	484.37	
MW-146B-30	5/20/2014	494.94	--	11.12	--	483.82	
MW-146B-30	6/4/2014	494.92	--	11.30	--	483.62	
MW-146B-30	6/11/2014	494.92	--	11.21	--	483.71	
MW-146B-30	9/9/2014	494.92	--	10.35	--	484.57	
MW-146B-30	11/20/2014	494.92	--	10.83	--	484.09	
MW-146B-30	3/18/2015	494.92	--	11.41	--	483.51	
MW-146B-30	6/11/2015	495.06	--	11.01	--	484.05	
MW-146B-30	8/12/2015	495.06	--	9.78	--	485.28	
MW-146B-30	11/19/2015	495.01	--	10.94	--	484.07	
MW-147A-15	1/15/2009	—	--	7.75	--	—	
MW-147A-15	8/18/2009	491.85	--	6.91	--	484.94	
MW-147A-15	10/1/2010	491.85	--	8.53	--	483.32	
MW-147A-15	4/25/2011	491.85	--	7.80	--	484.05	
MW-147A-15	7/14/2011	491.85	No LNAPL	6.90	0.00	484.95	
MW-147A-15	10/21/2011	491.85	--	9.07	--	482.78	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-147A-15	4/25/2014	491.95	--	7.87	--	484.08	
MW-147A-15	5/20/2014	491.93	--	8.40	--	483.53	
MW-147A-15	6/4/2014	491.92	--	8.58	--	483.34	
MW-147B-25	1/15/2009	—	--	8.55	--	—	
MW-147B-25	8/18/2009	492.59	--	7.76	--	484.83	
MW-147B-25	10/1/2010	492.59	--	9.28	--	483.31	
MW-147B-25	2/24/2011	492.59	--	8.95	--	483.64	
MW-147B-25	5/18/2011	492.59	--	9.23	--	483.36	
MW-147B-25	7/14/2011	492.59	No LNAPL	7.59	0.00	485.00	
MW-147B-25	10/21/2011	492.59	--	9.76	--	482.83	
MW-147B-25	2/15/2012	492.57	--	9.53	--	483.04	
MW-147B-25	4/19/2012	492.57	--	8.86	--	483.71	
MW-147B-25	7/31/2012	492.57	--	7.61	--	484.96	
MW-147B-25	11/1/2012	492.57	No LNAPL	8.91	0.00	483.66	
MW-147B-25	1/24/2013	492.59	--	8.77	--	483.82	
MW-147B-25	4/24/2013	492.59	--	9.09	--	483.50	
MW-147B-25	8/1/2013	492.59	--	7.51	--	485.08	
MW-147B-25	10/1/2013	492.59	--	9.06	--	483.53	
MW-147B-25	3/18/2014	492.54	--	9.47	--	483.07	
MW-147B-25	4/25/2014	492.59	--	8.52	--	484.07	
MW-147B-25	5/20/2014	492.55	--	9.05	--	483.50	
MW-147B-25	6/4/2014	492.56	--	9.23	--	483.33	
MW-147B-25	6/11/2014	492.56	--	9.18	--	483.38	
MW-147B-25	9/9/2014	492.55	--	8.15	--	484.40	
MW-147B-25	11/20/2014	492.55	--	8.80	--	483.75	
MW-147B-25	3/18/2015	492.43	--	9.40	--	483.03	
MW-147B-25	6/11/2015	492.69	--	8.98	--	483.71	
MW-147B-25	8/12/2015	492.69	--	7.80	--	484.89	
MW-147B-25	11/19/2015	492.67	--	8.85	--	483.82	
MW-147B-25	7/20/2016	492.54	--	7.03	--	485.51	
MW-148A-15	1/15/2009	—	--	9.88	--	—	
MW-148A-15	8/18/2009	493.26	--	9.04	--	484.22	
MW-148A-15	8/1/2010	493.26	--	8.84	--	484.42	
MW-148A-15	10/1/2010	493.26	--	10.23	--	483.03	
MW-148A-15	11/1/2010	493.26	--	10.41	--	482.85	
MW-148A-15	3/7/2011	493.26	--	10.30	--	482.96	
MW-148A-15	4/8/2011	493.26	--	10.34	--	482.92	
MW-148A-15	7/14/2011	493.26	--	9.15	--	484.11	
MW-148A-15	10/21/2011	493.26	--	10.48	--	482.78	
MW-148A-15	2/15/2012	492.99	--	10.74	--	482.25	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-148A-15	4/19/2012	492.99	--	10.12	--	482.87	
MW-148A-15	7/30/2012	492.99	--	9.05	--	483.94	
MW-148A-15	11/1/2012	492.99	--	10.43	--	482.56	
MW-148A-15	1/24/2013	493.33	--	10.47	--	482.86	
MW-148A-15	4/19/2013	493.69	--	10.78	--	482.91	
MW-148A-15	4/24/2013	493.69	--	10.70	--	482.99	
MW-148A-15	5/20/2013	493.68	--	10.43	--	483.25	
MW-148A-15	6/19/2013	493.07	--	9.04	--	484.03	
MW-148A-15	7/25/2013	493.07	--	8.86	--	484.21	
MW-148A-15	8/1/2013	493.07	--	8.77	--	484.30	
MW-148A-15	8/20/2013	493.07	--	8.84	--	484.23	
MW-148A-15	10/1/2013	493.07	--	9.94	--	483.13	
MW-148A-15	1/21/2014	493.29	--	10.45	--	482.84	
MW-148A-15	2/24/2014	493.39	--	10.77	--	482.62	
MW-148A-15	3/19/2014	493.43	--	10.90	--	482.53	
MW-148A-15	4/25/2014	493.44	--	9.97	--	483.47	
MW-148A-15	5/20/2014	493.45	--	10.36	--	483.09	
MW-148A-15	6/9/2014	493.38	--	10.43	--	482.95	
MW-148A-15	6/11/2014	493.38	--	10.40	--	482.98	
MW-148A-15	7/21/2014	492.88	--	8.06	--	484.82	
MW-148A-15	8/28/2014	492.88	--	8.59	--	484.29	
MW-148A-15	9/9/2014	492.88	--	8.70	--	484.18	
MW-148A-15	9/26/2014	492.89	--	9.14	--	483.75	
MW-148A-15	10/27/2014	492.89	--	10.12	--	482.77	
MW-148A-15	11/25/2014	493.03	--	9.96	--	483.07	
MW-148A-15	12/17/2014	493.14	--	10.13	--	483.01	
MW-148A-15	1/28/2015	493.27	--	10.53	--	482.74	
MW-148A-15	2/17/2015	493.32	--	10.60	--	482.72	
MW-148A-15	3/18/2015	493.31	--	10.55	--	482.76	
MW-148A-15	4/14/2015	493.31	--	10.38	--	482.93	
MW-148A-15	5/18/2015	493.31	--	10.05	--	483.26	
MW-148A-15	6/11/2015	493.33	--	Frozen	--	—	
MW-148A-15	7/22/2015	492.93	--	8.90	--	484.03	
MW-148A-15	8/12/2015	492.92	--	8.76	--	484.16	
MW-148A-15	9/30/2015	492.94	--	9.29	--	483.65	
MW-148A-15	10/22/2015	492.93	No LNAPL	9.85	0.00	483.08	
MW-148A-15	11/19/2015	492.93	--	9.83	--	483.10	
MW-148A-15	11/25/2015	492.93	No LNAPL	9.70	0.00	483.23	
MW-148A-15	12/11/2015	493.00	--	9.94	--	483.06	
MW-148A-15	1/26/2016	493.21	--	10.63	--	482.58	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-148A-15	3/22/2016	493.21	--	10.90	--	482.31	
MW-148A-15	7/25/2016	492.87	--	7.69	--	485.18	
MW-148A-15	9/13/2016	493.33	--	8.98	--	484.35	
MW-148A-15	3/14/2017	493.33	--	10.41	--	482.92	
MW-148A-15	7/10/2017	493.26	--	9.38	--	483.88	
MW-148A-15	1/16/2018	493.29	--	10.03	--	483.26	
MW-148A-15	7/16/2018	493.36	--	9.17	--	484.19	
MW-148B-30	1/15/2009	—	--	9.85	--	—	
MW-148B-30	8/18/2009	493.31	--	9.04	--	484.27	
MW-148B-30	8/1/2010	493.31	--	9.15	--	484.16	
MW-148B-30	10/1/2010	493.31	--	11.33	--	481.98	
MW-148B-30	11/1/2010	493.31	--	10.70	--	482.61	
MW-148B-30	3/7/2011	493.31	--	10.17	--	483.14	
MW-148B-30	4/8/2011	493.31	--	10.15	--	483.16	
MW-148B-30	7/14/2011	493.31	--	9.01	--	484.30	
MW-148B-30	10/21/2011	493.31	--	10.91	--	482.40	
MW-148B-30	2/15/2012	493.25	--	10.80	--	482.45	
MW-148B-30	4/19/2012	493.25	--	10.11	--	483.14	
MW-148B-30	7/30/2012	493.25	--	9.03	--	484.22	
MW-148B-30	11/1/2012	493.25	--	9.80	--	483.45	
MW-148B-30	1/24/2013	492.78	--	9.63	--	483.15	
MW-148B-30	4/19/2013	492.83	--	9.93	--	482.90	
MW-148B-30	4/24/2013	492.83	--	9.88	--	482.95	
MW-148B-30	5/20/2013	492.83	--	9.62	--	483.21	
MW-148B-30	6/19/2013	492.86	--	8.83	--	484.03	
MW-148B-30	7/25/2013	492.86	--	8.65	--	484.21	
MW-148B-30	8/1/2013	492.86	--	8.57	--	484.29	
MW-148B-30	8/20/2013	492.85	--	8.62	--	484.23	
MW-148B-30	10/1/2013	492.86	--	9.80	--	483.06	
MW-148B-30	1/21/2014	492.93	--	10.09	--	482.84	
MW-148B-30	2/24/2014	492.98	--	10.37	--	482.61	
MW-148B-30	3/19/2014	492.97	--	10.45	--	482.52	
MW-148B-30	4/25/2014	492.98	--	9.51	--	483.47	
MW-148B-30	5/20/2014	492.99	--	9.93	--	483.06	
MW-148B-30	6/9/2014	493.01	--	10.09	--	482.92	
MW-148B-30	6/11/2014	493.01	--	10.05	--	482.96	
MW-148B-30	7/21/2014	493.03	--	8.26	--	484.77	
MW-148B-30	8/28/2014	493.04	--	8.79	--	484.25	
MW-148B-30	9/9/2014	493.04	--	8.93	--	484.11	
MW-148B-30	9/26/2014	493.04	--	9.34	--	483.70	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-148B-30	10/27/2014	493.04	--	10.29	--	482.75	
MW-148B-30	11/20/2014	493.02	--	9.82	--	483.20	
MW-148B-30	11/25/2014	493.02	--	9.96	--	483.06	
MW-148B-30	12/17/2014	493.02	--	10.02	--	483.00	
MW-148B-30	1/28/2015	493.00	--	10.28	--	482.72	
MW-148B-30	2/17/2015	493.02	--	10.31	--	482.71	
MW-148B-30	3/18/2015	493.01	--	10.29	--	482.72	
MW-148B-30	4/14/2015	493.02	--	10.09	--	482.93	
MW-148B-30	5/18/2015	493.03	--	9.78	--	483.25	
MW-148B-30	6/11/2015	493.05	--	9.63	--	483.42	
MW-148B-30	7/22/2015	493.05	--	9.02	--	484.03	
MW-148B-30	8/12/2015	493.05	--	8.90	--	484.15	
MW-148B-30	9/30/2015	493.07	--	9.54	--	483.53	
MW-148B-30	10/22/2015	493.06	No LNAPL	9.99	0.00	483.07	
MW-148B-30	11/19/2015	493.04	--	10.01	--	483.03	
MW-148B-30	11/25/2015	493.04	No LNAPL	9.80	0.00	483.24	
MW-148B-30	12/11/2015	493.06	--	10.02	--	483.04	
MW-148B-30	1/26/2016	493.03	--	10.45	--	482.58	
MW-148B-30	7/25/2016	493.04	--	7.94	--	485.10	
MW-148B-30	7/10/2017	493.04	--	9.09	--	483.95	
MW-148B-30	1/16/2018	493.04	--	10.33	--	482.71	
MW-148B-30	7/16/2018	493.04	--	9.01	--	484.03	
MW-148C-55	2/15/2012	493.05	--	10.50	--	482.55	Installed 9/27/11
MW-148C-55	4/19/2012	493.05	--	10.12	--	482.93	
MW-148C-55	7/30/2012	493.05	--	8.75	--	484.30	
MW-148C-55	11/1/2012	493.05	--	9.96	--	483.09	
MW-148C-55	1/24/2013	493.29	--	10.26	--	483.03	
MW-148C-55	4/19/2013	493.64	--	10.69	--	482.95	
MW-148C-55	4/24/2013	493.64	--	10.64	--	483.00	
MW-148C-55	5/20/2013	493.64	--	10.40	--	483.24	
MW-148C-55	6/19/2013	493.66	--	9.60	--	484.06	
MW-148C-55	7/25/2013	493.33	--	9.09	--	484.24	
MW-148C-55	8/1/2013	493.33	--	8.99	--	484.34	
MW-148C-55	8/20/2013	493.33	--	9.05	--	484.28	
MW-148C-55	10/1/2013	493.33	--	10.21	--	483.12	
MW-148C-55	1/21/2014	493.32	--	10.46	--	482.86	
MW-148C-55	2/24/2014	493.40	--	10.75	--	482.65	
MW-148C-55	3/19/2014	493.51	--	10.92	--	482.59	
MW-148C-55	4/25/2014	493.54	--	10.03	--	483.51	
MW-148C-55	5/20/2014	493.54	--	10.44	--	483.10	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-148C-55	6/9/2014	493.54	--	10.58	--	482.96	
MW-148C-55	6/11/2014	493.54	--	10.54	--	483.00	
MW-148C-55	7/21/2014	493.47	--	8.66	--	484.81	
MW-148C-55	8/28/2014	493.46	--	9.18	--	484.28	
MW-148C-55	9/9/2014	493.46	--	9.38	--	484.08	
MW-148C-55	9/26/2014	493.47	--	9.74	--	483.73	
MW-148C-55	10/27/2014	493.47	--	10.70	--	482.77	
MW-148C-55	11/20/2014	493.47	--	10.25	--	483.22	
MW-148C-55	11/25/2014	493.47	--	10.38	--	483.09	
MW-148C-55	12/17/2014	493.54	--	10.50	--	483.04	
MW-148C-55	1/28/2015	493.71	--	10.94	--	482.77	
MW-148C-55	2/17/2015	493.82	--	11.07	--	482.75	
MW-148C-55	3/18/2015	493.86	--	11.07	--	482.79	
MW-148C-55	4/14/2015	493.90	--	10.93	--	482.97	
MW-148C-55	5/18/2015	493.90	--	10.60	--	483.30	
MW-148C-55	6/11/2015	493.91	--	10.45	--	483.46	
MW-148C-55	7/22/2015	493.55	--	9.05	--	484.50	
MW-148C-55	8/12/2015	493.12	--	8.94	--	484.18	
MW-148C-55	9/30/2015	493.14	--	9.58	--	483.56	
MW-148C-55	10/22/2015	493.12	No LNAPL	10.03	0.00	483.09	
MW-148C-55	11/19/2015	493.11	--	10.01	--	483.10	
MW-148C-55	11/25/2015	493.11	No LNAPL	9.84	0.00	483.27	
MW-148C-55	12/11/2015	493.16	--	10.06	--	483.10	
MW-148C-55	1/26/2016	493.38	--	10.76	--	482.62	
MW-148C-55	3/22/2016	493.38	--	11.12	--	482.26	
MW-148C-55	7/25/2016	493.38	--	8.45	--	484.93	
MW-148C-55	9/13/2016	493.38	--	9.76	--	483.62	
MW-148C-55	3/14/2017	493.38	--	11.16	--	482.22	
MW-148C-55	7/10/2017	493.38	--	9.55	--	483.83	
MW-148C-55	1/18/2018	493.38	--	10.45	--	482.93	
MW-148C-55	7/16/2018	493.38	--	9.23	--	484.15	
MW-148-80	1/21/2014	493.01	--	10.18	--	482.83	
MW-148-80	2/24/2014	493.02	--	10.38	--	482.64	
MW-148-80	3/19/2014	493.01	--	10.47	--	482.54	
MW-148-80	4/25/2014	493.02	--	9.54	--	483.48	
MW-148-80	5/20/2014	493.02	--	9.96	--	483.06	
MW-148-80	6/9/2014	493.03	--	10.10	--	482.93	
MW-148-80	6/11/2014	493.03	--	10.10	--	482.93	
MW-148-80	7/21/2014	493.04	--	8.29	--	484.75	
MW-148-80	8/28/2014	493.05	--	8.80	--	484.25	

Appendix A-1
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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-148-80	9/9/2014	493.05	--	8.97	--	484.08	
MW-148-80	9/26/2014	493.05	--	9.36	--	483.69	
MW-148-80	10/27/2014	493.06	--	10.32	--	482.74	
MW-148-80	11/20/2014	493.06	--	9.86	--	483.20	
MW-148-80	11/25/2014	493.06	--	9.99	--	483.07	
MW-148-80	12/17/2014	493.06	--	10.05	--	483.01	
MW-148-80	1/28/2015	493.06	--	10.30	--	482.76	
MW-148-80	2/17/2015	493.17	--	10.45	--	482.72	
MW-148-80	3/18/2015	493.17	--	10.41	--	482.76	
MW-148-80	4/14/2015	493.16	--	10.24	--	482.92	
MW-148-80	5/18/2015	493.16	--	9.91	--	483.25	
MW-148-80	6/11/2015	493.16	--	9.76	--	483.40	
MW-148-80	7/22/2015	493.17	--	9.13	--	484.04	
MW-148-80	8/12/2015	493.17	--	9.02	--	484.15	
MW-148-80	9/30/2015	493.18	--	9.66	--	483.52	
MW-148-80	10/22/2015	493.17	No LNAPL	10.12	0.00	483.05	
MW-148-80	11/19/2015	493.17	--	10.07	--	483.10	
MW-148-80	11/25/2015	493.17	No LNAPL	9.92	0.00	483.25	
MW-148-80	12/11/2015	493.22	--	10.14	--	483.08	
MW-148-80	1/26/2016	493.49	--	10.90	--	482.59	
MW-148-80	3/22/2016	493.49	--	11.30	--	482.19	
MW-148-80	7/25/2016	493.49	--	8.58	--	484.91	
MW-148-80	9/13/2016	493.49	--	9.93	--	483.56	
MW-148-80	3/14/2017	493.49	--	10.48	--	483.01	
MW-148-80	7/12/2017	493.49	--	9.25	--	484.24	
MW-148-80	1/18/2018	493.49	--	10.58	--	482.91	
MW-148-80	7/16/2018	493.49	--	9.23	--	484.26	
MW-148-100	1/21/2014	493.17	--	10.32	--	482.85	
MW-148-100	2/24/2014	493.18	--	10.53	--	482.65	
MW-148-100	3/19/2014	493.17	--	10.61	--	482.56	
MW-148-100	4/25/2014	493.18	--	9.68	--	483.50	
MW-148-100	5/20/2014	493.18	--	10.09	--	483.09	
MW-148-100	6/9/2014	493.19	--	10.25	--	482.94	
MW-148-100	6/11/2014	493.19	--	10.21	--	482.98	
MW-148-100	7/21/2014	493.21	--	8.43	--	484.78	
MW-148-100	8/28/2014	493.20	--	8.94	--	484.26	
MW-148-100	9/9/2014	493.20	--	9.13	--	484.07	
MW-148-100	9/26/2014	493.21	--	9.50	--	483.71	
MW-148-100	10/27/2014	493.22	--	10.46	--	482.76	
MW-148-100	11/20/2014	493.21	--	9.98	--	483.23	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-148-100	11/25/2014	493.21	--	10.12	--	483.09	
MW-148-100	12/17/2014	493.22	--	10.19	--	483.03	
MW-148-100	1/28/2015	493.20	--	10.43	--	482.77	
MW-148-100	2/17/2015	493.22	--	10.47	--	482.75	
MW-148-100	3/18/2015	493.21	--	10.43	--	482.78	
MW-148-100	4/14/2015	493.22	--	10.25	--	482.97	
MW-148-100	5/18/2015	493.21	--	9.93	--	483.28	
MW-148-100	6/11/2015	493.21	--	9.79	--	483.42	
MW-148-100	7/22/2015	493.23	--	9.16	--	484.07	
MW-148-100	8/12/2015	493.22	--	9.04	--	484.18	
MW-148-100	9/30/2015	493.23	--	9.69	--	483.54	
MW-148-100	10/22/2015	493.22	No LNAPL	10.15	0.00	483.07	
MW-148-100	11/19/2015	493.22	--	10.09	--	483.13	
MW-148-100	11/25/2015	493.22	No LNAPL	9.94	0.00	483.28	
MW-148-100	12/11/2015	493.23	--	10.16	--	483.07	
MW-148-100	1/26/2016	493.21	--	10.60	--	482.61	
MW-148-100	3/22/2016	493.21	--	10.74	--	482.47	
MW-148-100	7/25/2016	493.21	--	8.05	--	485.16	
MW-148-100	9/13/2016	493.21	--	9.39	--	483.82	
MW-148-100	3/14/2017	493.21	--	10.29	--	482.92	
MW-148D-150	2/15/2012	493.32	--	10.78	--	482.54	Installed 9/26/11
MW-148D-150	4/19/2012	493.32	--	9.83	--	483.49	
MW-148D-150	7/30/2012	493.32	--	9.05	--	484.27	
MW-148D-150	11/1/2012	493.32	--	10.23	--	483.09	
MW-148D-150	1/24/2013	493.02	--	10.14	--	482.88	
MW-148D-150	4/19/2013	493.37	--	10.42	--	482.95	
MW-148D-150	4/24/2013	493.37	--	10.36	--	483.01	
MW-148D-150	5/20/2013	493.35	--	10.13	--	483.22	
MW-148D-150	6/19/2013	493.37	--	9.32	--	484.05	
MW-148D-150	7/25/2013	493.36	--	9.12	--	484.24	
MW-148D-150	8/1/2013	493.36	--	9.03	--	484.33	
MW-148D-150	8/20/2013	493.35	--	9.08	--	484.27	
MW-148D-150	10/1/2013	493.36	--	10.26	--	483.10	
MW-148D-150	1/21/2014	493.33	--	10.46	--	482.87	
MW-148D-150	2/24/2014	493.34	--	10.69	--	482.65	
MW-148D-150	3/19/2014	493.33	--	10.77	--	482.56	
MW-148D-150	4/25/2014	493.35	--	9.84	--	483.51	
MW-148D-150	5/20/2014	493.35	--	10.26	--	483.09	
MW-148D-150	6/9/2014	493.36	--	10.41	--	482.95	
MW-148D-150	6/11/2014	493.36	--	10.38	--	482.98	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-148D-150	7/21/2014	493.38	--	8.59	--	484.79	
MW-148D-150	8/28/2014	493.38	--	9.11	--	484.27	
MW-148D-150	9/9/2014	493.38	--	9.28	--	484.10	
MW-148D-150	9/26/2014	493.38	--	9.67	--	483.71	
MW-148D-150	10/27/2014	493.39	--	10.62	--	482.77	
MW-148D-150	11/20/2014	493.36	--	10.16	--	483.20	
MW-148D-150	11/25/2014	493.36	--	10.26	--	483.10	
MW-148D-150	12/17/2014	493.37	--	10.33	--	483.04	
MW-148D-150	1/28/2015	493.35	--	10.57	--	482.78	
MW-148D-150	2/17/2015	493.37	--	10.67	--	482.70	
MW-148D-150	3/18/2015	493.35	--	10.59	--	482.76	
MW-148D-150	4/14/2015	493.37	--	10.40	--	482.97	
MW-148D-150	5/18/2015	493.37	--	10.09	--	483.28	
MW-148D-150	6/11/2015	493.39	--	9.95	--	483.44	
MW-148D-150	7/22/2015	493.39	--	9.32	--	484.07	
MW-148D-150	8/12/2015	493.38	--	9.21	--	484.17	
MW-148D-150	9/30/2015	493.03	--	9.51	--	483.52	
MW-148D-150	10/22/2015	493.03	No LNAPL	9.96	0.00	483.07	
MW-148D-150	11/19/2015	493.02	--	9.93	--	483.09	
MW-148D-150	11/25/2015	493.02	No LNAPL	9.74	0.00	483.28	
MW-148D-150	12/11/2015	493.03	--	9.94	--	483.09	
MW-148D-150	1/26/2016	493.01	--	10.40	--	482.61	
MW-148D-150	3/22/2016	493.00	--	10.52	--	482.48	
MW-148D-150	7/25/2016	493.00	--	7.88	--	485.12	
MW-148D-150	9/13/2016	493.00	--	9.19	--	483.81	
MW-148D-150	3/14/2017	493.00	--	10.09	--	482.91	
MW-149A-15	1/15/2009	—	--	10.85	--	—	
MW-149A-15	8/18/2009	493.92	--	10.12	--	483.80	
MW-149A-15	8/1/2010	493.92	--	9.75	--	484.17	
MW-149A-15	10/1/2010	493.92	--	11.35	--	482.57	
MW-149A-15	11/1/2010	493.92	--	11.24	--	482.68	
MW-149A-15	3/7/2011	493.92	--	10.75	--	483.17	
MW-149A-15	3/25/2011	493.92	--	10.78	--	483.14	
MW-149A-15	4/18/2011	493.92	--	10.71	--	483.21	
MW-149A-15	7/14/2011	493.92	--	9.62	--	484.30	
MW-149A-15	10/21/2011	493.92	--	11.36	--	482.56	
MW-149A-15	2/15/2012	493.65	--	11.37	--	482.28	
MW-149A-15	4/19/2012	493.65	--	10.74	--	482.91	
MW-149A-15	7/30/2012	493.65	--	9.70	--	483.95	
MW-149A-15	11/1/2012	493.65	--	10.87	--	482.78	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-149A-15	1/24/2013	493.68	--	10.85	--	482.83	
MW-149A-15	4/24/2013	493.68	--	10.90	--	482.78	
MW-149A-15	8/1/2013	493.72	--	9.62	--	484.10	
MW-149A-15	10/1/2013	493.72	--	10.61	--	483.11	
MW-149A-15	3/18/2014	493.65	--	11.17	--	482.48	
MW-149A-15	6/11/2014	493.65	--	10.75	--	482.90	
MW-149A-15	9/9/2014	493.65	--	9.51	--	484.14	
MW-149A-15	11/20/2014	493.65	--	10.52	--	483.13	
MW-149A-15	3/18/2015	493.65	--	10.94	--	482.71	
MW-149A-15	6/11/2015	493.65	--	10.55	--	483.10	
MW-149A-15	8/12/2015	493.65	--	9.63	--	484.02	Casing will need cutting
MW-149A-15	11/19/2015	493.65	--	10.61	--	483.04	
MW-149A-15	3/22/2016	493.65	--	11.21	--	482.44	
MW-149A-15	7/25/2016	493.67	--	8.61	--	485.06	
MW-149A-15	9/13/2016	493.67	--	9.81	--	483.86	
MW-149A-15	3/14/2017	493.67	--	10.81	--	482.86	
MW-149A-15	7/10/2017	493.67	--	9.80	--	483.87	
MW-149A-15	9/21/2017	493.22	--	10.20	--	483.02	
MW-149A-15	3/13/2018	493.22	--	10.59	--	482.63	
MW-149A-15	9/10/2018	493.20	--	8.89	--	484.31	
MW-149B-20	1/15/2009	—	--	10.64	--	—	
MW-149B-20	8/18/2009	493.76	--	9.00	--	484.76	
MW-149B-20	8/1/2010	493.76	--	9.44	--	484.32	
MW-149B-20	10/1/2010	493.76	--	11.31	--	482.45	
MW-149B-20	11/1/2010	493.76	--	10.60	--	483.16	
MW-149B-20	3/25/2011	493.76	--	10.48	--	483.28	
MW-149B-20	4/18/2011	493.76	--	10.39	--	483.37	
MW-149B-20	7/14/2011	493.76	--	9.33	--	484.43	
MW-149B-20	10/21/2011	493.76	--	11.01	--	482.75	
MW-149B-20	2/15/2012	493.34	--	11.03	--	482.31	
MW-149B-20	3/18/2014	493.45	--	10.99	--	482.46	
MW-149B-20	6/11/2014	493.45	--	10.56	--	482.89	
MW-149B-20	9/9/2014	493.45	--	9.35	--	484.10	
MW-149B-20	11/20/2014	493.45	--	10.33	--	483.12	
MW-149B-20	3/18/2015	493.45	--	10.73	--	482.72	
MW-149B-20	6/11/2015	493.45	--	10.36	--	483.09	
MW-149B-20	8/12/2015	493.46	--	9.44	--	484.02	
MW-149B-20	11/19/2015	493.46	--	10.41	--	483.05	
MW-149B-20	7/25/2016	493.46	--	8.44	--	485.02	
MW-154A-75	2/17/2010	497.98	--	13.83	--	484.15	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-154A-75	3/17/2010	497.98	--	13.94	--	484.04	
MW-154A-75	4/30/2010	497.98	--	14.03	--	483.95	
MW-154A-75	8/1/2010	497.98	--	12.61	--	485.37	
MW-154A-75	10/1/2010	497.98	--	13.94	--	484.04	
MW-154A-75	11/1/2010	497.98	--	14.60	--	483.38	
MW-154A-75	1/1/2011	497.98	--	13.55	--	484.43	
MW-154A-75	4/25/2011	497.98	--	13.36	--	484.62	
MW-154A-75	7/14/2011	497.98	--	12.55	--	485.43	
MW-154A-75	10/21/2011	497.98	--	14.63	--	483.35	
MW-154A-75	2/15/2012	497.99	No LNAPL	14.50	0.00	483.49	
MW-154A-75	4/19/2012	497.99	--	13.86	--	484.13	
MW-154A-75	7/30/2012	497.99	No LNAPL	12.63	0.00	485.36	
MW-154A-75	11/1/2012	497.99	No LNAPL	13.96	0.00	484.03	
MW-154A-75	1/24/2013	498.04	--	13.82	--	484.22	
MW-154A-75	4/24/2013	498.04	--	14.11	--	483.93	
MW-154A-75	8/1/2013	498.04	--	12.53	--	485.51	
MW-154A-75	10/1/2013	498.04	--	13.93	--	484.11	
MW-154A-75	3/18/2014	498.04	--	14.51	--	483.53	
MW-154A-75	6/11/2014	498.10	--	14.10	--	484.00	
MW-154A-75	9/9/2014	498.10	--	12.94	--	485.16	
MW-154A-75	11/20/2014	498.10	--	13.78	--	484.32	
MW-154A-75	3/18/2015	498.10	--	14.28	--	483.82	
MW-154A-75	6/11/2015	498.10	--	13.85	--	484.25	
MW-154A-75	8/12/2015	498.10	--	12.72	--	485.38	
MW-154A-75	11/19/2015	498.10	--	13.91	--	484.19	
MW-154A-75	3/22/2016	498.10	No LNAPL	14.66	0.00	483.44	
MW-154A-75	7/29/2016	498.10	--	11.93	--	486.17	
MW-154A-75	9/13/2016	498.10	--	13.09	--	485.01	
MW-154A-75	10/18/2016	498.10	--	14.11	--	483.99	
MW-154A-75	3/14/2017	498.10	--	14.03	--	484.07	
MW-154B-95	3/17/2010	—	--	13.66	--	—	
MW-154B-95	4/30/2010	497.67	--	13.76	--	483.91	
MW-154B-95	8/1/2010	497.67	--	12.34	--	485.33	
MW-154B-95	10/1/2010	497.67	--	13.77	--	483.90	
MW-154B-95	11/1/2010	497.67	--	14.31	--	483.36	
MW-154B-95	4/25/2011	497.67	--	13.10	--	484.57	
MW-154B-95	7/14/2011	497.67	--	12.29	--	485.38	
MW-154B-95	10/21/2011	497.67	--	14.35	--	483.32	
MW-154B-95	7/29/2016	497.88	--	11.69	--	486.19	
MW-154B-95	10/18/2016	497.88	--	13.88	--	484.00	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-154B-95	7/25/2017	497.89	--	12.49	--	485.40	
MW-154B-95	10/20/2017	497.89	--	13.85	--	484.04	
MW-154B-95	2/13/2018	497.89	--	14.20	--	483.69	
MW-154B-95	4/6/2018	497.93	--	14.19	--	483.74	
MW-154B-95	8/7/2018	497.97	--	12.12	--	485.85	
MW-173A-15	8/1/2010	—	--	10.55	--	—	
MW-173A-15	10/1/2010	496.00	--	11.75	--	484.25	
MW-173A-15	11/1/2010	496.00	--	12.37	--	483.63	
MW-173A-15	2/8/2011	496.00	--	11.65	--	484.35	
MW-173A-15	4/1/2011	496.00	--	11.86	--	484.14	
MW-173A-15	7/14/2011	496.00	No LNAPL	10.44	0.00	485.56	
MW-173A-15	10/21/2011	496.00	--	12.54	--	483.46	
MW-173A-15	2/15/2012	496.16	--	12.55	--	483.61	
MW-173A-15	4/19/2012	496.16	--	12.02	--	484.14	
MW-173A-15	7/30/2012	496.16	No LNAPL	10.88	0.00	485.28	
MW-173A-15	11/1/2012	496.16	No LNAPL	12.14	0.00	484.02	
MW-173A-15	1/24/2013	496.28	--	12.06	--	484.22	
MW-173A-15	4/24/2013	496.28	--	12.32	--	483.96	
MW-173A-15	8/1/2013	496.10	--	10.65	--	485.45	
MW-173A-15	10/1/2013	496.10	--	11.69	--	484.41	
MW-173A-15	3/18/2014	496.10	--	Frozen	--	—	Frozen; depth to ice not recorded.
MW-173A-15	6/11/2014	496.18	--	12.03	--	484.15	
MW-173A-15	9/9/2014	496.18	--	10.60	--	485.58	
MW-173A-15	11/20/2014	496.18	--	11.68	--	484.50	
MW-173A-15	3/18/2015	496.18	--	12.30	--	483.88	
MW-173A-15	6/11/2015	496.18	--	11.79	--	484.39	
MW-173A-15	8/12/2015	496.11	--	10.65	--	485.46	
MW-173A-15	11/19/2015	496.11	--	11.72	--	484.39	
MW-173A-15	3/22/2016	496.11	No LNAPL	12.53	0.00	483.58	
MW-173A-15	7/27/2016	496.20	--	9.95	--	486.25	
MW-173A-15	9/13/2016	496.20	--	10.86	--	485.34	
MW-173A-15	3/14/2017	496.20	--	12.08	--	484.12	
MW-173B-150	8/1/2010	—	--	10.85	--	—	
MW-173B-150	10/1/2010	496.41	--	12.00	--	484.41	
MW-173B-150	11/1/2010	496.41	--	12.71	--	483.70	
MW-173B-150	2/8/2011	496.41	--	11.92	--	484.49	
MW-173B-150	4/13/2011	496.41	--	12.11	--	484.30	
MW-173B-150	7/14/2011	496.41	No LNAPL	10.89	0.00	485.52	
MW-173B-150	10/21/2011	496.41	--	12.72	--	483.69	
MW-173B-150	2/15/2012	496.40	--	12.68	--	483.72	

Appendix A-1
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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-173B-150	4/19/2012	496.40	--	12.11	--	484.29	
MW-173B-150	7/30/2012	496.40	No LNAPL	10.91	0.00	485.49	
MW-173B-150	11/1/2012	496.40	No LNAPL	12.15	0.00	484.25	
MW-173B-150	1/24/2013	496.40	--	12.04	--	484.36	
MW-173B-150	4/24/2013	496.40	--	11.34	--	485.06	
MW-173B-150	8/1/2013	496.41	--	10.84	--	485.57	
MW-173B-150	10/1/2013	496.41	--	11.96	--	484.45	
MW-173B-150	3/18/2014	496.41	--	12.69	--	483.72	
MW-173B-150	6/11/2014	496.47	--	12.17	--	484.30	
MW-173B-150	9/9/2014	496.47	--	10.76	--	485.71	
MW-173B-150	11/20/2014	496.47	--	11.78	--	484.69	
MW-173B-150	3/18/2015	496.47	--	12.37	--	484.10	
MW-173B-150	6/11/2015	496.47	--	11.89	--	484.58	
MW-173B-150	8/12/2015	496.43	--	10.93	--	485.50	
MW-173B-150	11/19/2015	496.43	--	11.95	--	484.48	
MW-173B-150	3/22/2016	496.43	No LNAPL	12.76	0.00	483.67	
MW-173B-150	7/29/2016	496.41	--	10.13	--	486.28	
MW-173B-150	9/13/2016	496.41	--	11.02	--	485.39	
MW-173B-150	3/14/2017	496.41	--	12.14	--	484.27	
MW-173B-150	9/21/2017	496.41	--	11.90	--	484.51	
MW-173B-150	3/12/2018	496.41	--	12.40	--	484.01	
MW-173B-150	9/10/2018	496.33	--	10.49	--	485.84	
MW-174-15	8/1/2013	494.66	--	8.32	--	486.34	
MW-174-15	1/9/2014	494.69	--	10.01	--	484.68	
MW-174-15	2/5/2014	494.76	--	10.20	--	484.56	
MW-174-15	3/18/2014	494.89	--	10.56	--	484.33	
MW-174-15	3/24/2014	494.89	--	10.90	--	483.99	
MW-174-15	4/18/2014	494.89	--	10.38	--	484.51	
MW-174-15	5/15/2014	494.37	--	9.93	--	484.44	
MW-174-15	6/11/2014	494.38	--	9.67	--	484.71	
MW-174-15	6/19/2014	494.38	--	9.20	--	485.18	
MW-174-15	7/15/2014	494.40	--	7.39	--	487.01	
MW-174-15	8/26/2014	494.40	--	8.14	--	486.26	
MW-174-15	9/9/2014	494.40	--	8.40	--	486.00	
MW-174-15	9/24/2014	494.36	--	8.80	--	485.56	
MW-174-15	10/21/2014	494.37	--	9.75	--	484.62	
MW-174-15	11/19/2014	494.45	--	9.37	--	485.08	
MW-174-15	12/16/2014	494.54	--	9.66	--	484.88	
MW-174-15	12/29/2014	494.54	No LNAPL	9.82	0.00	484.72	
MW-174-15	1/21/2015	494.65	--	9.94	--	484.71	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-174-15	2/25/2015	494.75	--	10.11	--	484.64	
MW-174-15	3/18/2015	494.76	--	10.18	--	484.58	
MW-174-15	3/26/2015	494.76	--	10.10	--	484.66	
MW-174-15	4/16/2015	494.81	--	9.96	--	484.85	
MW-174-15	5/21/2015	494.81	--	9.69	--	485.12	
MW-174-15	6/10/2015	494.54	--	9.42	--	485.12	
MW-174-15	8/12/2015	494.51	--	8.33	--	486.18	
MW-174-15	8/19/2015	494.51	--	8.58	--	485.93	
MW-174-15	10/6/2015	494.53	--	9.05	--	485.48	
MW-174-15	11/19/2015	494.53	--	9.52	--	485.01	
MW-174-15	1/19/2016	494.64	--	10.21	--	484.43	
MW-174-15	3/22/2016	494.64	No LNAPL	10.58	0.00	484.06	
MW-174-15	5/26/2016	494.30	--	9.40	--	484.90	
MW-174-15	7/20/2016	494.32	--	7.34	--	486.98	
MW-174-15	9/9/2016	494.29	No LNAPL	8.34	0.00	485.95	
MW-174-15	9/13/2016	494.29	--	8.47	--	485.82	
MW-174-15	11/15/2016	494.32	--	8.94	--	485.38	
MW-174-15	2/8/2017	494.52	--	9.59	--	484.93	
MW-174-15	2/15/2017	494.52	--	9.62	--	484.90	
MW-174-15	3/14/2017	494.52	--	9.73	--	484.79	
MW-174-15	6/13/2017	494.35	--	8.61	--	485.74	
MW-174-15	9/21/2017	494.40	--	9.43	--	484.97	
MW-174-15	3/12/2018	494.51	--	9.95	--	484.56	
MW-174-15	9/10/2018	494.43	--	8.19	--	486.24	
MW-174A-50	1/1/2011	493.92	--	8.61	--	485.31	
MW-174A-50	7/14/2011	493.92	No LNAPL	7.62	0.00	486.30	
MW-174A-50	10/21/2011	493.92	--	9.94	--	483.98	
MW-174A-50	2/15/2012	494.16	No LNAPL	10.11	0.00	484.05	
MW-174A-50	4/19/2012	494.16	--	9.46	--	484.70	
MW-174A-50	7/30/2012	494.16	--	7.88	--	486.28	
MW-174A-50	11/1/2012	494.16	--	9.29	--	484.87	
MW-174A-50	1/24/2013	494.25	--	9.60	--	484.65	
MW-174A-50	4/24/2013	494.25	--	10.00	--	484.25	
MW-174A-50	8/1/2013	494.40	--	8.07	--	486.33	
MW-174A-50	10/1/2013	494.40	--	9.53	--	484.87	
MW-174A-50	1/9/2014	494.39	--	9.69	--	484.70	
MW-174A-50	2/5/2014	494.41	--	9.83	--	484.58	
MW-174A-50	3/18/2014	494.53	--	10.22	--	484.31	
MW-174A-50	3/24/2014	494.53	--	10.25	--	484.28	
MW-174A-50	4/18/2014	494.54	--	10.02	--	484.52	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-174A-50	5/15/2014	494.00	--	9.57	--	484.43	
MW-174A-50	6/11/2014	494.00	--	9.30	--	484.70	
MW-174A-50	6/19/2014	494.00	--	8.90	--	485.10	
MW-174A-50	7/15/2014	494.03	--	7.06	--	486.97	
MW-174A-50	8/26/2014	494.02	--	7.77	--	486.25	
MW-174A-50	9/9/2014	494.02	--	8.12	--	485.90	
MW-174A-50	9/24/2014	493.98	--	8.42	--	485.56	
MW-174A-50	10/21/2014	493.99	--	9.35	--	484.64	
MW-174A-50	11/19/2014	494.08	--	8.97	--	485.11	
MW-174A-50	12/16/2014	494.18	--	9.28	--	484.90	
MW-174A-50	1/21/2015	494.29	--	9.58	--	484.71	
MW-174A-50	2/25/2015	494.36	--	9.72	--	484.64	
MW-174A-50	3/18/2015	494.39	--	9.82	--	484.57	
MW-174A-50	3/26/2015	494.39	--	9.72	--	484.67	
MW-174A-50	4/16/2015	494.43	--	9.59	--	484.84	
MW-174A-50	5/21/2015	494.45	--	9.32	--	485.13	
MW-174A-50	6/10/2015	494.40	--	9.34	--	485.06	
MW-174A-50	8/12/2015	494.14	--	7.95	--	486.19	
MW-174A-50	8/19/2015	494.14	--	8.21	--	485.93	
MW-174A-50	10/6/2015	494.15	--	8.67	--	485.48	
MW-174A-50	11/19/2015	494.15	--	9.12	--	485.03	
MW-174A-50	1/19/2016	494.29	--	9.86	--	484.43	
MW-174A-50	3/22/2016	494.29	No LNAPL	10.25	0.00	484.04	
MW-174A-50	5/26/2016	494.40	--	9.37	--	485.03	
MW-174A-50	7/20/2016	494.33	--	7.31	--	487.02	
MW-174A-50	9/9/2016	494.26	--	8.28	--	485.98	
MW-174A-50	9/13/2016	494.26	--	8.43	--	485.83	
MW-174A-50	11/15/2016	494.33	--	8.92	--	485.41	
MW-174A-50	2/8/2017	494.57	--	9.62	--	484.95	
MW-174A-50	3/14/2017	494.57	--	9.75	--	484.82	
MW-174A-50	6/13/2017	494.65	--	9.00	--	485.65	
MW-174A-50	9/21/2017	493.67	--	8.69	--	484.98	
MW-174A-50	3/12/2018	493.67	--	9.10	--	484.57	
MW-174A-50	9/10/2018	493.59	--	7.35	--	486.24	
MW-174B-90	11/1/2010	493.15	--	8.79	--	484.36	
MW-174B-90	1/1/2011	493.15	--	7.93	--	485.22	
MW-174B-90	7/14/2011	493.15	No LNAPL	6.94	0.00	486.21	
MW-174B-90	10/21/2011	493.15	--	9.23	--	483.92	
MW-174B-90	2/15/2012	493.28	No LNAPL	9.14	0.00	484.14	
MW-174B-90	4/19/2012	493.28	--	8.50	--	484.78	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-174B-90	7/30/2012	493.28	--	7.14	--	486.14	
MW-174B-90	11/1/2012	493.28	--	8.56	--	484.72	
MW-174B-90	1/24/2013	493.37	--	8.56	--	484.81	
MW-174B-90	4/24/2013	493.37	--	8.92	--	484.45	
MW-174B-90	8/1/2013	493.53	--	7.25	--	486.28	
MW-174B-90	10/1/2013	493.53	--	8.74	--	484.79	
MW-174B-90	1/9/2014	493.51	--	8.88	--	484.63	
MW-174B-90	2/5/2014	493.51	--	9.02	--	484.49	
MW-174B-90	3/18/2014	493.51	--	9.28	--	484.23	
MW-174B-90	3/24/2014	493.51	--	9.37	--	484.14	
MW-174B-90	4/18/2014	493.51	--	9.07	--	484.44	
MW-174B-90	5/15/2014	493.52	--	8.66	--	484.86	
MW-174B-90	6/11/2014	493.51	--	8.88	--	484.63	
MW-174B-90	6/19/2014	493.51	--	8.49	--	485.02	
MW-174B-90	7/15/2014	493.55	--	6.63	--	486.92	
MW-174B-90	8/26/2014	493.53	--	7.36	--	486.17	
MW-174B-90	9/9/2014	493.53	--	7.72	--	485.81	
MW-174B-90	9/24/2014	493.50	--	8.01	--	485.49	
MW-174B-90	10/21/2014	493.50	--	8.95	--	484.55	
MW-174B-90	11/19/2014	493.50	--	8.47	--	485.03	
MW-174B-90	12/16/2014	493.51	--	8.67	--	484.84	
MW-174B-90	1/21/2015	493.51	--	8.88	--	484.63	
MW-174B-90	2/25/2015	493.55	--	8.97	--	484.58	
MW-174B-90	3/18/2015	493.54	--	9.05	--	484.49	
MW-174B-90	3/26/2015	493.54	--	8.95	--	484.59	
MW-174B-90	4/16/2015	493.58	--	8.81	--	484.77	
MW-174B-90	5/21/2015	493.58	--	8.55	--	485.03	
MW-174B-90	6/10/2015	493.54	--	8.56	--	484.98	
MW-174B-90	8/12/2015	493.55	--	7.46	--	486.09	
MW-174B-90	8/19/2015	493.55	--	7.72	--	485.83	
MW-174B-90	10/6/2015	493.55	--	8.16	--	485.39	
MW-174B-90	11/19/2015	493.55	--	8.81	--	484.74	
MW-174B-90	1/19/2016	493.55	--	9.20	--	484.35	
MW-174B-90	3/22/2016	493.55	No LNAPL	9.42	0.00	484.13	
MW-174B-90	5/26/2016	493.55	--	8.74	--	484.81	
MW-174B-90	8/9/2016	493.54	--	6.58	--	486.96	
MW-174B-90	9/9/2016	493.55	--	7.67	--	485.88	
MW-174B-90	9/13/2016	493.55	--	7.81	--	485.74	
MW-174B-90	11/15/2016	493.54	--	8.22	--	485.32	
MW-174B-90	2/8/2017	493.52	--	8.66	--	484.86	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-174B-90	3/14/2017	493.52	--	8.75	--	484.77	
MW-174B-90	6/13/2017	493.54	--	7.97	--	485.57	
MW-174B-90	9/21/2017	493.58	--	8.68	--	484.90	
MW-174B-90	3/12/2018	493.58	--	9.05	--	484.53	
MW-174B-90	9/10/2018	493.49	--	7.32	--	486.17	
MW-175-90	11/1/2010	496.80	--	8.40	--	488.40	
MW-175-90	7/15/2011	496.80	No LNAPL	10.82	0.00	485.98	
MW-175-90	10/21/2011	496.80	--	12.89	--	483.91	
MW-175-90	2/16/2012	496.90	No LNAPL	12.81	0.00	484.09	
MW-175-90	4/19/2012	496.90	No LNAPL	12.16	0.00	484.74	
MW-175-90	7/30/2012	496.90	No LNAPL	10.91	0.00	485.99	
MW-175-90	11/1/2012	496.90	No LNAPL	12.28	0.00	484.62	
MW-175-90	1/24/2013	497.06	--	12.26	--	484.80	
MW-175-90	4/24/2013	497.04	No LNAPL	12.53	0.00	484.51	
MW-175-90	7/23/2013	497.09	--	11.14	--	485.95	
MW-175-90	8/1/2013	497.09	--	11.00	--	486.09	
MW-175-90	8/21/2013	497.09	No LNAPL	10.99	0.00	486.10	
MW-175-90	9/30/2013	497.09	No LNAPL	12.26	0.00	484.83	
MW-175-90	1/9/2014	497.08	No LNAPL	12.51	0.00	484.57	
MW-175-90	2/5/2014	497.11	No LNAPL	12.67	0.00	484.44	
MW-175-90	3/18/2014	497.15	No LNAPL	12.96	0.00	484.19	
MW-175-90	3/24/2014	497.15	No LNAPL	12.98	0.00	484.17	
MW-175-90	4/18/2014	497.16	No LNAPL	12.80	0.00	484.36	
MW-175-90	5/15/2014	497.15	--	12.32	--	484.83	
MW-175-90	6/11/2014	497.15	No LNAPL	12.49	0.00	484.66	
MW-175-90	6/19/2014	497.15	No LNAPL	12.16	0.00	484.99	
MW-175-90	7/15/2014	497.16	No LNAPL	10.35	0.00	486.81	
MW-175-90	8/26/2014	497.16	No LNAPL	10.97	0.00	486.19	
MW-175-90	9/9/2014	497.16	No LNAPL	11.24	0.00	485.92	
MW-175-90	9/24/2014	497.16	No LNAPL	11.59	0.00	485.57	
MW-175-90	10/21/2014	497.14	No LNAPL	12.50	0.00	484.64	
MW-175-90	11/19/2014	497.13	No LNAPL	12.12	0.00	485.01	
MW-175-90	12/16/2014	497.13	No LNAPL	12.31	0.00	484.82	
MW-175-90	12/29/2014	497.13	No LNAPL	12.43	0.00	484.70	
MW-175-90	1/21/2015	497.14	No LNAPL	12.50	0.00	484.64	
MW-175-90	2/25/2015	497.18	No LNAPL	12.63	0.00	484.55	
MW-175-90	3/18/2015	497.19	No LNAPL	12.68	0.00	484.51	
MW-175-90	3/26/2015	497.19	No LNAPL	12.60	0.00	484.59	
MW-175-90	4/16/2015	497.21	--	12.45	--	484.76	
MW-175-90	5/21/2015	497.22	No LNAPL	12.20	0.00	485.02	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-175-90	6/10/2015	497.19	No LNAPL	12.22	0.00	484.97	
MW-175-90	8/12/2015	497.20	--	11.17	--	486.03	
MW-175-90	8/19/2015	497.20	No LNAPL	11.43	0.00	485.80	
MW-175-90	10/6/2015	496.93	No LNAPL	11.48	0.00	485.46	Casing was cut down 0.28 feet on 10-1-15
MW-175-90	11/19/2015	496.91	--	12.03	--	484.88	
MW-175-90	1/19/2016	496.90	--	12.51	--	484.35	
MW-175-90	3/22/2016	496.94	No LNAPL	12.82	0.00	484.12	
MW-175-90	5/26/2016	496.94	No LNAPL	12.16	0.00	484.80	
MW-175-90	8/19/2016	496.93	--	10.55	--	486.38	
MW-175-90	9/9/2016	496.93	No LNAPL	11.03	0.00	485.94	
MW-175-90	9/12/2016	496.94	--	11.09	--	485.85	
MW-175-90	11/15/2016	496.93	No LNAPL	11.65	0.00	485.38	
MW-175-90	2/8/2017	497.04	No LNAPL	12.20	0.00	484.91	
MW-175-90	3/14/2017	497.04	--	12.27	--	484.77	
MW-175-90	6/13/2017	497.06	No LNAPL	11.52	0.00	485.59	
MW-176A-15	11/1/2010	496.99	--	12.82	--	484.17	
MW-176A-15	3/25/2011	496.99	--	15.25	--	481.74	
MW-176A-15	4/6/2011	496.99	11.08	12.84	1.76	485.58	
MW-176A-15	7/15/2011	496.99	No LNAPL	9.99	0.00	487.00	
MW-176A-15	10/21/2011	496.99	11.69	15.41	3.72	484.61	
MW-176A-15	2/16/2012	496.99	11.51	15.51	4.00	484.74	
MW-176A-15	4/12/2012	496.99	11.32	15.72	4.40	484.85	
MW-176A-15	5/7/2012	496.99	11.27	14.75	3.48	485.07	
MW-176A-15	5/11/2012	496.99	11.73	13.04	1.31	485.02	Initial levels of first May 2012 baildown test
MW-176A-15	5/31/2012	496.99	11.15	11.80	0.65	485.72	Initial levels of second May 2012 baildown test
MW-176A-15	7/18/2012	496.99	10.38	11.09	0.71	486.48	
MW-176A-15	8/21/2012	496.99	10.53	12.77	2.24	486.04	
MW-176A-15	9/19/2012	496.99	11.14	14.03	2.89	485.31	
MW-176A-15	10/15/2012	496.99	11.17	13.67	2.50	485.36	
MW-176A-15	10/26/2012	496.99	11.63	14.57	2.94	484.81	Initial levels of first October 2012 baildown test
MW-176A-15	10/29/2012	496.99	11.71	14.40	2.69	484.78	Initial levels of second October 2012 baildown test
MW-176A-15	11/29/2012	497.02	10.96	12.23	1.27	485.82	
MW-176A-15	12/28/2012	497.02	11.23	13.21	1.98	485.42	
MW-176A-15	2/26/2013	497.02	10.99	15.06	4.07	485.27	
MW-176A-15	3/28/2013	497.02	11.19	14.90	3.71	485.14	R-35R, R-39, and R-40 were offline on this date
MW-176A-15	4/24/2013	497.02	11.11	15.09	3.98	485.17	
MW-176A-15	7/23/2013	497.02	Sheen	10.21	Sheen	486.81	
MW-176A-15	10/29/2013	497.02	11.80	14.92	3.12	484.64	
MW-176A-15	1/14/2014	497.02	11.58	13.61	2.03	485.06	
MW-176A-15	2/24/2014	497.02	11.73	14.31	2.58	484.81	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-176A-15	3/18/2014	497.02	11.60	15.36	3.76	484.72	
MW-176A-15	4/14/2014	497.07	No LNAPL	Frozen	0.00	—	Frozen at 7.02 feet below the measuring point
MW-176A-15	5/16/2014	497.07	11.36	12.48	1.12	485.50	
MW-176A-15	6/11/2014	497.07	11.45	13.41	1.96	485.26	
MW-176A-15	7/19/2014	497.07	9.41	10.28	0.87	487.50	
MW-176A-15	9/9/2014	497.07	10.34	11.46	1.12	486.52	
MW-176A-15	10/16/2014	497.07	11.39	12.69	1.30	485.44	
MW-176A-15	11/20/2014	497.07	11.16	12.09	0.93	485.74	
MW-176A-15	3/10/2015	497.07	11.42	13.08	1.66	485.34	
MW-176A-15	3/19/2015	497.07	11.54	13.36	1.82	485.19	
MW-176A-15	5/18/2015	497.07	11.15	Frozen	0.52	—	Well was frozen; depth to ice = 11.67 feet
MW-176A-15	6/11/2015	497.07	11.28	12.03	0.75	485.65	
MW-176A-15	8/12/2015	497.11	10.24	10.25	0.01	486.91	
MW-176A-15	10/15/2015	497.11	11.15	12.76	1.61	485.70	
MW-176A-15	11/19/2015	497.11	11.29	12.44	1.15	485.61	
MW-176A-15	3/4/2016	497.11	11.65	14.93	3.28	484.90	
MW-176A-15	3/22/2016	497.11	11.78	15.15	3.37	484.70	
MW-176A-15	6/14/2016	497.11	11.19	11.38	0.19	485.88	
MW-176A-15	7/2/2016	497.11	No LNAPL	10.69	0.00	486.42	
MW-176A-15	7/9/2016	497.11	No LNAPL	10.14	0.00	486.97	
MW-176A-15	8/16/2016	497.17	9.77	9.95	0.18	487.37	
MW-176A-15	8/18/2016	497.11	9.81	9.85	0.04	487.29	
MW-176A-15	9/12/2016	497.17	10.38	11.47	1.09	486.59	
MW-176A-15	10/13/2016	497.17	11.40	12.38	0.98	485.59	
MW-176A-15	10/15/2016	497.17	12.70	13.20	0.50	484.38	
MW-176A-15	10/22/2016	497.17	11.50	13.14	1.64	485.36	
MW-176A-15	10/26/2016	497.17	11.72	12.85	1.13	485.24	
MW-176A-15	10/28/2016	497.17	11.57	12.57	1.00	485.41	
MW-176A-15	11/5/2016	497.17	10.85	11.05	0.20	486.28	
MW-176A-15	11/12/2016	497.17	10.90	11.30	0.40	486.20	
MW-176A-15	11/19/2016	497.17	10.92	11.33	0.41	486.17	
MW-176A-15	11/26/2016	497.17	11.10	11.85	0.75	485.93	
MW-176A-15	12/3/2016	497.17	11.30	12.20	0.90	485.70	
MW-176A-15	12/10/2016	497.17	11.25	12.00	0.75	485.78	
MW-176A-15	12/17/2016	497.17	11.25	11.99	0.74	485.78	
MW-176A-15	12/24/2016	497.17	11.30	11.90	0.60	485.76	
MW-176A-15	12/31/2016	497.17	11.30	11.90	0.60	485.76	
MW-176A-15	1/7/2017	497.17	11.60	12.05	0.45	485.49	
MW-176A-15	1/15/2017	497.17	11.30	12.11	0.81	485.72	
MW-176A-15	1/21/2017	497.17	11.32	12.10	0.78	485.70	

Appendix A-1
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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-176A-15	1/28/2017	497.17	11.31	12.30	0.99	485.68	
MW-176A-15	2/4/2017	497.17	11.60	13.20	1.60	485.27	
MW-176A-15	2/11/2017	497.17	11.11	13.55	2.44	485.61	
MW-176A-15	2/18/2017	497.17	11.06	14.18	3.12	485.53	
MW-176A-15	2/25/2017	497.17	11.15	13.88	2.73	485.51	
MW-176A-15	3/2/2017	497.17	11.29	13.26	1.97	485.51	
MW-176A-15	3/4/2017	497.17	11.20	13.38	2.18	485.56	
MW-176A-15	3/11/2017	497.17	11.40	12.80	1.40	485.51	
MW-176A-15	3/15/2017	497.17	11.40	Frozen	0.70	—	Depth to ice = 12.10 feet
MW-176A-15	3/18/2017	497.17	11.35	Frozen	0.86	—	Depth to ice = 12.21 feet
MW-176A-15	3/24/2017	497.17	11.34	Frozen	0.66	—	Depth to ice = 12.00 feet
MW-176A-15	4/1/2017	497.17	11.33	12.30	0.97	485.66	
MW-176A-15	4/8/2017	497.17	11.45	12.15	0.70	485.59	
MW-176A-15	4/15/2017	497.17	11.55	Frozen	0.75	—	Depth to ice = 12.3 feet
MW-176A-15	4/22/2017	497.17	11.56	12.20	0.64	485.49	
MW-176A-15	4/29/2017	497.17	11.50	Frozen	0.50	—	Depth to ice = 12 ft BTOC
MW-176A-15	5/6/2017	497.17	11.48	12.28	0.80	485.54	
MW-176A-15	5/13/2017	497.17	11.48	Frozen	0.74	—	Ice or obstruction at 12.22 feet
MW-176A-15	5/20/2017	497.17	11.50	Frozen	0.50	—	Frozen. DTW recorded to the nearest foot on field sheet as "12~?".
MW-176A-15	5/27/2017	497.17	11.40	12.50	1.10	485.57	
MW-176A-15	6/3/2017	497.17	11.20	12.20	1.00	485.78	
MW-176A-15	6/6/2017	497.17	11.37	Frozen	0.91	—	Ice at 12.28 ft BTOC
MW-176A-15	6/10/2017	497.17	11.45	Frozen	0.82	—	Depth to ice = 12.27 feet
MW-176A-15	6/16/2017	497.17	No LNAPL	10.67	0.00	486.50	
MW-176A-15	6/24/2017	497.17	10.60	11.00	0.40	486.50	
MW-176A-15	7/1/2017	497.17	10.78	10.81	0.03	486.38	
MW-176A-15	7/8/2017	497.17	No LNAPL	10.42	0.00	486.75	
MW-176A-15	7/13/2017	497.17	Sheen	10.24	Sheen	486.93	
MW-176A-15	9/21/2017	497.22	11.20	13.15	1.95	485.66	
MW-176A-15	1/19/2018	497.22	11.33	13.13	1.80	485.55	
MW-176A-15	3/12/2018	497.22	11.52	14.10	2.58	485.22	
MW-176A-15	8/8/2018	497.22	Sheen	9.71	Sheen	487.51	
MW-176A-15	9/10/2018	497.11	10.12	10.13	0.01	486.99	
MW-176B-50	11/1/2010	496.94	--	11.92	--	485.02	
MW-176B-50	1/1/2011	496.94	--	11.01	--	485.93	
MW-176B-50	4/6/2011	496.94	--	Frozen	--	—	Frozen at 11.16 ft BTOC
MW-176B-50	6/1/2011	496.94	--	Frozen	--	—	Frozen at 11.15 ft BTOC
MW-176B-50	7/15/2011	496.94	No LNAPL	9.93	0.00	487.01	
MW-176B-50	10/21/2011	496.94	Sheen	12.25	Sheen	484.69	
MW-176B-50	2/16/2012	496.92	Sheen	12.08	Sheen	484.84	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-176B-50	4/19/2012	496.92	No LNAPL	Frozen	0.00	—	Frozen at 12.08 ft BTOC
MW-176B-50	7/30/2012	496.92	Sheen	10.00	Sheen	486.92	
MW-176B-50	11/1/2012	496.92	No LNAPL	11.47	0.00	485.45	
MW-176B-50	1/24/2013	496.93	--	11.37	--	485.56	
MW-176B-50	4/24/2013	496.93	No LNAPL	11.41	0.00	485.52	
MW-176B-50	8/1/2013	496.93	No LNAPL	9.97	0.00	486.96	
MW-176B-50	10/1/2013	496.93	No LNAPL	11.44	0.00	485.49	
MW-176B-50	3/18/2014	496.93	No LNAPL	12.06	0.00	484.87	
MW-176B-50	6/11/2014	496.96	No LNAPL	11.61	0.00	485.35	
MW-176B-50	9/9/2014	496.96	No LNAPL	10.35	0.00	486.61	
MW-176B-50	11/20/2014	496.96	No LNAPL	11.14	0.00	485.82	
MW-176B-50	3/19/2015	496.96	No LNAPL	Frozen	0.00	—	Depth to ice = 11.51 feet
MW-176B-50	6/11/2015	496.96	No LNAPL	11.23	0.00	485.73	
MW-176B-50	8/12/2015	496.97	--	10.09	--	486.88	
MW-176B-50	11/19/2015	496.97	--	11.27	--	485.70	
MW-176B-50	3/22/2016	496.97	No LNAPL	12.12	0.00	484.85	
MW-176B-50	8/15/2016	497.00	--	9.54	--	487.46	
MW-176B-50	9/12/2016	497.00	--	10.35	--	486.65	
MW-176B-50	3/15/2017	497.00	--	Frozen	--	—	Depth to ice = 11.35 feet
MW-176B-50	9/21/2017	497.03	--	11.32	--	485.71	
MW-176B-50	3/12/2018	497.03	--	11.76	--	485.27	
MW-176B-50	9/10/2018	496.93	--	9.95	--	486.98	
MW-176C-90	11/1/2010	496.89	--	12.53	--	484.36	
MW-176C-90	4/6/2011	496.89	--	Frozen	--	—	Frozen at 11.04 ft BTOC
MW-176C-90	6/1/2011	496.89	--	Frozen	--	—	Frozen at 11.00 ft BTOC
MW-176C-90	7/15/2011	496.89	No LNAPL	9.85	0.00	487.04	
MW-176C-90	10/21/2011	496.89	--	12.13	--	484.76	
MW-176C-90	2/16/2012	496.84	No LNAPL	11.91	0.00	484.93	
MW-176C-90	4/19/2012	496.84	—	Frozen	—	—	Frozen w/dedicated pump
MW-176C-90	7/30/2012	496.84	--	9.90	--	486.94	
MW-176C-90	11/1/2012	496.84	No LNAPL	11.35	0.00	485.49	
MW-176C-90	1/24/2013	496.86	--	11.25	--	485.61	
MW-176C-90	4/24/2013	496.86	—	Frozen	—	—	Frozen w/dedicated pump
MW-176C-90	8/1/2013	496.86	No LNAPL	9.86	0.00	487.00	
MW-176C-90	10/1/2013	496.86	No LNAPL	11.33	0.00	485.53	
MW-176C-90	3/18/2014	496.86	No LNAPL	11.93	0.00	484.93	
MW-176C-90	6/11/2014	496.86	No LNAPL	11.49	0.00	485.37	
MW-176C-90	9/9/2014	496.86	No LNAPL	10.24	0.00	486.62	
MW-176C-90	11/20/2014	496.86	No LNAPL	11.00	0.00	485.86	
MW-176C-90	3/19/2015	496.86	No LNAPL	Frozen	0.00	—	Depth to ice = 11.33 feet

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-176C-90	6/11/2015	496.86	No LNAPL	11.10	0.00	485.76	
MW-176C-90	8/12/2015	496.86	--	9.97	--	486.89	
MW-176C-90	11/19/2015	496.86	--	11.10	--	485.76	
MW-176C-90	3/22/2016	496.86	---	Frozen	---	---	Frozen with dedicated pump
MW-176C-90	8/15/2016	496.86	--	9.35	--	487.51	
MW-176C-90	9/12/2016	496.86	--	10.06	--	486.80	
MW-176C-90	3/15/2017	496.86	--	Frozen	--	---	Depth to ice = 11.20 feet
MW-177-90	11/1/2010	497.91	--	12.21	--	485.70	
MW-177-90	4/13/2011	497.91	--	Frozen	--	---	Frozen at 10.90 ft BTOC
MW-177-90	6/1/2011	497.91	--	Frozen	--	---	Frozen at 10.70 ft BTOC
MW-177-90	7/14/2011	497.91	No LNAPL	9.46	0.00	488.45	
MW-177-90	10/21/2011	497.91	--	11.99	--	485.92	
MW-177-90	2/16/2012	497.90	--	Frozen	--	---	Frozen at 11.82 ft BTOC
MW-177-90	4/19/2012	497.90	---	Frozen	---	---	Frozen w/dedicated pump
MW-177-90	7/30/2012	497.90	--	9.61	--	488.29	
MW-177-90	11/1/2012	497.90	No LNAPL	11.20	0.00	486.70	
MW-177-90	1/24/2013	497.92	--	11.10	--	486.82	
MW-177-90	4/24/2013	497.92	No LNAPL	Frozen	0.00	---	Frozen at 11.14 ft BTOC
MW-177-90	8/1/2013	497.92	No LNAPL	9.59	0.00	488.33	
MW-177-90	10/1/2013	497.92	No LNAPL	11.15	0.00	486.77	
MW-177-90	8/10/2016	497.92	--	8.66	--	489.26	
MW-178A-15	11/1/2010	496.51	--	11.39	--	485.12	
MW-178A-15	1/1/2011	496.51	--	10.55	--	485.96	
MW-178A-15	4/8/2011	496.51	--	Frozen	--	---	Frozen at 10.90 ft BTOC
MW-178A-15	6/1/2011	496.51	--	Frozen	--	---	Frozen at 10.60 ft BTOC
MW-178A-15	7/15/2011	496.51	No LNAPL	9.51	0.00	487.00	
MW-178A-15	10/21/2011	496.51	No LNAPL	11.77	0.00	484.74	
MW-178A-15	1/11/2012	496.48	No LNAPL	11.63	0.00	484.85	
MW-178A-15	2/7/2012	496.48	No LNAPL	Frozen	0.00	---	Frozen at 11.97 ft BTOC
MW-178A-15	2/16/2012	496.48	No LNAPL	Frozen	0.00	---	Frozen at 11.67 ft BTOC
MW-178A-15	4/10/2012	496.48	No LNAPL	Frozen	0.00	---	Frozen at 11.67 ft BTOC
MW-178A-15	7/18/2012	496.48	No LNAPL	9.96	0.00	486.52	
MW-178A-15	8/21/2012	496.48	No LNAPL	10.34	0.00	486.14	
MW-178A-15	9/18/2012	496.48	No LNAPL	11.07	0.00	485.41	
MW-178A-15	10/16/2012	496.48	No LNAPL	11.08	0.00	485.40	
MW-178A-15	11/29/2012	496.48	No LNAPL	10.58	0.00	485.90	
MW-178A-15	12/27/2012	496.48	No LNAPL	10.95	0.00	485.53	
MW-178A-15	1/24/2013	496.48	No LNAPL	Frozen	0.00	---	Frozen at 10.91 ft BTOC
MW-178A-15	2/26/2013	496.48	No LNAPL	Frozen	0.00	---	Frozen at 10.91 ft BTOC
MW-178A-15	4/24/2013	496.48	No LNAPL	Frozen	0.00	---	Frozen at 10.89 ft BTOC

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-178A-15	10/29/2013	496.48	No LNAPL	11.74	0.00	484.74	
MW-178A-15	10/15/2015	496.50	No LNAPL	10.72	0.00	485.78	
MW-178A-15	8/12/2016	496.50	--	8.87	--	487.63	
MW-178A-15	10/13/2016	496.50	No LNAPL	10.85	0.00	485.65	
MW-178A-15	3/1/2017	496.50	No LNAPL	Frozen	0.00	—	Ice at 10.75 ft BTOC
MW-178B-50	11/1/2010	496.12	--	10.99	--	485.13	
MW-178B-50	1/1/2011	496.12	--	10.13	--	485.99	
MW-178B-50	4/8/2011	496.12	--	Frozen	--	—	Frozen
MW-178B-50	6/1/2011	496.12	--	Frozen	--	—	Frozen at 10.25 ft BTOC
MW-178B-50	7/15/2011	496.12	No LNAPL	9.11	0.00	487.01	
MW-178B-50	10/21/2011	496.12	--	11.36	--	484.76	
MW-178B-50	2/16/2012	496.09	No LNAPL	Frozen	0.00	—	Frozen at 11.26 ft BTOC
MW-178B-50	8/12/2016	496.11	--	8.47	--	487.64	
MW-178B-50	10/20/2016	496.11	--	10.65	--	485.46	
MW-178C-90	11/1/2010	497.30	--	12.23	--	485.07	
MW-178C-90	4/8/2011	497.30	--	Frozen	--	—	Frozen at 11.51 ft BTOC
MW-178C-90	6/1/2011	497.30	--	Frozen	--	—	Frozen at 11.55 ft BTOC
MW-178C-90	7/15/2011	497.30	No LNAPL	10.20	0.00	487.10	
MW-178C-90	10/21/2011	497.30	--	12.57	--	484.73	
MW-178C-90	2/16/2012	497.26	—	Frozen	—	—	Frozen w/dedicated pump
MW-178C-90	4/19/2012	497.26	—	Frozen	—	—	Frozen w/dedicated pump
MW-178C-90	7/30/2012	497.26	No LNAPL	10.33	0.00	486.93	
MW-178C-90	11/1/2012	497.26	No LNAPL	11.80	0.00	485.46	
MW-178C-90	1/24/2013	497.27	—	Frozen	—	—	Frozen w/dedicated pump
MW-178C-90	4/24/2013	497.27	—	Frozen	—	—	Frozen w/dedicated pump
MW-178C-90	8/1/2013	497.27	No LNAPL	10.30	0.00	486.97	
MW-178C-90	10/1/2013	497.27	No LNAPL	11.76	0.00	485.51	
MW-178C-90	3/18/2014	497.27	No LNAPL	12.34	0.00	484.93	
MW-178C-90	6/11/2014	497.29	No LNAPL	12.91	0.00	484.38	
MW-178C-90	9/9/2014	497.29	No LNAPL	10.65	0.00	486.64	
MW-178C-90	11/20/2014	497.29	No LNAPL	11.40	0.00	485.89	
MW-178C-90	3/19/2015	497.29	—	Frozen	—	—	Frozen with dedicated pump; no depth to ice measurement possible
MW-178C-90	6/11/2015	497.29	No LNAPL	11.63	0.00	485.66	
MW-178C-90	8/12/2015	497.29	--	10.39	--	486.90	
MW-178C-90	11/19/2015	497.29	--	11.52	--	485.77	
MW-178C-90	8/12/2016	497.30	--	9.85	--	487.45	
MW-179A-15	11/1/2010	496.96	--	11.75	--	485.21	
MW-179A-15	4/1/2011	496.96	--	Frozen	--	—	Frozen at 10.30 ft BTOC
MW-179A-15	6/1/2011	496.96	--	Frozen	--	—	Frozen at 11.34 ft BTOC
MW-179A-15	7/15/2011	496.96	No LNAPL	9.91	0.00	487.05	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-179A-15	10/21/2011	496.96	No LNAPL	12.17	0.00	484.79	
MW-179A-15	1/11/2012	496.94	No LNAPL	12.03	0.00	484.91	
MW-179A-15	2/7/2012	496.94	No LNAPL	Frozen	0.00	—	Frozen at 12.08 ft BTOC
MW-179A-15	2/16/2012	496.94	No LNAPL	Frozen	0.00	—	Frozen at 12.10 ft BTOC
MW-179A-15	4/10/2012	496.94	No LNAPL	Frozen	0.00	—	Frozen at 12.09 ft BTOC
MW-179A-15	4/19/2012	496.94	No LNAPL	Frozen	0.00	—	Frozen at 12.06 ft BTOC
MW-179A-15	7/18/2012	496.94	No LNAPL	10.37	0.00	486.57	
MW-179A-15	7/30/2012	496.94	No LNAPL	9.96	0.00	486.98	
MW-179A-15	8/21/2012	496.94	No LNAPL	10.76	0.00	486.18	
MW-179A-15	9/18/2012	496.94	No LNAPL	11.46	0.00	485.48	
MW-179A-15	10/16/2012	496.94	No LNAPL	11.47	0.00	485.47	
MW-179A-15	11/1/2012	496.94	No LNAPL	11.46	0.00	485.48	
MW-179A-15	11/29/2012	496.96	No LNAPL	10.98	0.00	485.98	
MW-179A-15	12/27/2012	496.96	—	Frozen	—	—	Frozen w/data logger
MW-179A-15	1/24/2013	496.96	—	Frozen	—	—	Frozen w/data logger
MW-179A-15	2/26/2013	496.96	—	Frozen	—	—	Frozen w/data logger
MW-179A-15	4/24/2013	496.96	—	Frozen	—	—	Frozen w/data logger
MW-179A-15	5/20/2013	496.96	—	Frozen	—	—	Frozen w/data logger
MW-179A-15	6/25/2013	496.96	—	Frozen	—	—	Frozen w/data logger
MW-179A-15	8/1/2013	496.96	No LNAPL	9.95	0.00	487.01	
MW-179A-15	10/1/2013	496.96	No LNAPL	11.38	0.00	485.58	
MW-179A-15	10/29/2013	496.96	No LNAPL	12.14	0.00	484.82	
MW-179A-15	3/18/2014	496.98	—	Frozen	—	—	The well was frozen with a data logger installed-- no measurement possible
MW-179A-15	6/11/2014	496.97	—	Frozen	—	—	The well was frozen with a data logger installed-- no measurement possible
MW-179A-15	9/9/2014	496.97	No LNAPL	10.24	0.00	486.73	
MW-179A-15	11/20/2014	496.97	No LNAPL	11.05	0.00	485.92	
MW-179A-15	3/19/2015	496.97	—	Frozen	—	—	Frozen with datalogger; no depth to ice measurement possible
MW-179A-15	6/11/2015	496.97	—	Frozen	—	—	Datalogger present, no measurements possible
MW-179A-15	8/12/2015	496.97	--	9.99	--	486.98	
MW-179A-15	10/15/2015	496.97	No LNAPL	11.11	0.00	485.86	
MW-179A-15	11/19/2015	496.97	--	11.19	--	485.78	
MW-179A-15	8/12/2016	496.98	--	9.25	--	487.73	
MW-179B-50	11/1/2010	496.75	--	11.53	--	485.22	
MW-179B-50	4/1/2011	496.75	--	Frozen	--	—	Frozen at 10.10 ft BTOC
MW-179B-50	6/1/2011	496.75	--	Frozen	--	—	Frozen at 10.85 ft BTOC
MW-179B-50	7/15/2011	496.75	No LNAPL	9.68	0.00	487.07	
MW-179B-50	10/21/2011	496.75	--	11.94	--	484.81	
MW-179B-50	2/16/2012	496.74	No LNAPL	Frozen	0.00	—	Frozen at 11.84 ft BTOC
MW-179B-50	4/19/2012	496.74	No LNAPL	Frozen	0.00	—	Frozen at 11.64 ft BTOC
MW-179B-50	7/30/2012	496.74	No LNAPL	9.73	0.00	487.01	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-179B-50	11/1/2012	496.74	No LNAPL	11.21	0.00	485.53	
MW-179B-50	1/24/2013	496.75	—	Frozen	—	—	Frozen w/data logger
MW-179B-50	4/24/2013	496.75	—	Frozen	—	—	Frozen w/data logger
MW-179B-50	8/1/2013	496.75	No LNAPL	9.71	0.00	487.04	
MW-179B-50	10/1/2013	496.75	No LNAPL	11.15	0.00	485.60	
MW-179B-50	3/18/2014	496.75	—	Frozen	—	—	The well was frozen with a data logger installed-- no measurement possible
MW-179B-50	6/11/2014	496.76	—	Frozen	—	—	The well was frozen with a data logger installed-- no measurement possible
MW-179B-50	9/9/2014	496.76	No LNAPL	10.02	0.00	486.74	
MW-179B-50	11/20/2014	496.76	No LNAPL	10.82	0.00	485.94	
MW-179B-50	3/19/2015	496.76	—	Frozen	—	—	Frozen with datalogger; no depth to ice measurement possible
MW-179B-50	6/11/2015	496.76	--	Frozen	--	—	Datalogger present, no measurements possible
MW-179B-50	8/12/2015	496.76	--	9.78	--	486.98	
MW-179B-50	11/19/2015	496.76	--	10.97	--	485.79	
MW-179B-50	8/12/2016	496.76	--	9.03	--	487.73	
MW-179C-90	11/1/2010	497.27	--	12.06	--	485.21	
MW-179C-90	4/1/2011	497.27	--	Frozen	--	—	Frozen at 10.60 ft BTOC
MW-179C-90	6/1/2011	497.27	--	Frozen	--	—	Frozen at 11.15 ft BTOC
MW-179C-90	7/15/2011	497.27	No LNAPL	10.19	0.00	487.08	
MW-179C-90	10/21/2011	497.27	--	12.49	--	484.78	
MW-179C-90	2/16/2012	497.25	—	Frozen	—	—	Frozen w/dedicated pump
MW-179C-90	4/19/2012	497.25	—	Frozen	—	—	Frozen w/dedicated pump
MW-179C-90	7/30/2012	497.25	No LNAPL	10.25	0.00	487.00	
MW-179C-90	11/1/2012	497.25	No LNAPL	11.73	0.00	485.52	
MW-179C-90	1/24/2013	497.06	—	Frozen	—	—	Frozen w/data logger
MW-179C-90	4/24/2013	497.27	—	Frozen	—	—	Frozen w/data logger
MW-179C-90	8/1/2013	497.26	No LNAPL	10.24	0.00	487.02	
MW-179C-90	10/1/2013	497.26	No LNAPL	11.67	0.00	485.59	
MW-179C-90	3/18/2014	497.26	—	Frozen	—	—	The well was frozen with a data logger installed-- no measurement possible
MW-179C-90	6/11/2014	497.28	—	Frozen	—	—	The well was frozen with a data logger installed-- no measurement possible
MW-179C-90	9/9/2014	497.28	No LNAPL	10.54	0.00	486.74	
MW-179C-90	11/20/2014	497.28	No LNAPL	11.34	0.00	485.94	
MW-179C-90	3/19/2015	497.28	—	Frozen	—	—	Frozen with datalogger; no depth to ice measurement possible
MW-179C-90	6/11/2015	497.28	—	Frozen	—	—	Datalogger present, no measurements possible
MW-179C-90	8/12/2015	497.28	--	10.31	--	486.97	
MW-179C-90	11/19/2015	497.28	--	11.46	--	485.82	
MW-179C-90	8/12/2016	497.28	--	9.57	--	487.71	
MW-179D-135	2/16/2012	—	No LNAPL	Frozen	0.00	—	Frozen at 12.17 ft BTOC
MW-179D-135	4/19/2012	—	No LNAPL	Frozen	0.00	—	Frozen at 12.16 ft BTOC
MW-179D-135	7/30/2012	—	No LNAPL	10.06	0.00	—	
MW-179D-135	11/1/2012	—	No LNAPL	11.53	0.00	—	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-179D-135	1/24/2013	—	—	Frozen	—	—	Frozen w/data logger
MW-179D-135	4/24/2013	497.07	—	Frozen	—	—	Frozen w/data logger
MW-179D-135	8/1/2013	497.06	No LNAPL	10.03	0.00	487.03	
MW-179D-135	10/1/2013	497.06	No LNAPL	11.48	0.00	485.58	
MW-179D-135	3/18/2014	497.06	—	Frozen	—	—	The well was frozen with a data logger installed-- no measurement possible
MW-179D-135	6/11/2014	497.07	—	Frozen	—	—	The well was frozen with a data logger installed-- no measurement possible
MW-179D-135	9/9/2014	497.07	No LNAPL	10.35	0.00	486.72	
MW-179D-135	11/20/2014	497.07	No LNAPL	11.14	0.00	485.93	
MW-179D-135	3/19/2015	497.07	—	Frozen	—	—	Frozen with datalogger; no depth to ice measurement possible
MW-179D-135	6/11/2015	497.07	—	Frozen	—	—	Datalogger present, no measurements possible
MW-179D-135	8/12/2015	497.06	--	10.40	--	486.66	
MW-179D-135	11/19/2015	497.06	--	11.26	--	485.80	
MW-180A-15	11/1/2010	497.43	--	12.15	--	485.28	
MW-180A-15	1/1/2011	497.43	--	11.15	--	486.28	
MW-180A-15	4/1/2011	497.43	--	Frozen	--	—	Frozen at 11.39 ft BTOC
MW-180A-15	6/1/2011	497.43	--	Frozen	--	—	Frozen at 11.6 ft BTOC
MW-180A-15	7/15/2011	497.43	No LNAPL	10.10	0.00	487.33	
MW-180A-15	10/21/2011	497.43	No LNAPL	12.36	0.00	485.07	
MW-180A-15	2/7/2012	497.40	No LNAPL	12.27	0.00	485.13	
MW-180A-15	2/16/2012	497.40	No LNAPL	Frozen	0.00	—	Frozen at 12.24 ft BTOC
MW-180A-15	4/10/2012	497.40	No LNAPL	Frozen	0.00	—	Frozen at 12.24 ft BTOC
MW-180A-15	7/18/2012	497.40	No LNAPL	10.55	0.00	486.85	
MW-180A-15	8/21/2012	497.40	No LNAPL	10.95	0.00	486.45	
MW-180A-15	9/18/2012	497.40	No LNAPL	11.65	0.00	485.75	
MW-180A-15	10/16/2012	497.40	No LNAPL	11.66	0.00	485.74	
MW-180A-15	11/29/2012	497.42	No LNAPL	11.20	0.00	486.22	
MW-180A-15	12/27/2012	497.42	No LNAPL	11.54	0.00	485.88	
MW-180A-15	1/24/2013	497.42	No LNAPL	Frozen	0.00	—	Frozen at 11.53 ft BTOC
MW-180A-15	2/26/2013	497.42	No LNAPL	Frozen	0.00	—	Frozen at 11.48 ft BTOC
MW-180A-15	4/24/2013	497.42	No LNAPL	Frozen	0.00	—	Frozen at 11.48 ft BTOC
MW-180A-15	10/29/2013	497.42	No LNAPL	12.33	0.00	485.09	
MW-180A-15	10/15/2015	497.43	No LNAPL	11.27	0.00	486.16	
MW-180A-15	8/12/2016	497.42	--	9.41	--	488.01	
MW-180A-15	10/13/2016	497.42	No LNAPL	11.37	0.00	486.05	
MW-180A-15	3/1/2017	497.42	No LNAPL	11.39	0.00	486.03	
MW-180A-15	8/10/2017	497.42	--	10.01	--	487.41	
MW-180A-15	8/16/2017	497.42	--	9.79	--	487.63	
MW-180A-15	11/15/2017	497.42	--	11.63	--	485.79	
MW-180A-15	2/14/2018	497.42	--	11.77	--	485.65	
MW-180A-15	4/11/2018	497.42	--	11.79	--	485.63	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-180A-15	8/8/2018	497.42	--	9.56	--	487.86	
MW-180B-50	11/1/2010	496.89	--	11.55	--	485.34	
MW-180B-50	1/1/2011	496.89	--	10.61	--	486.28	
MW-180B-50	4/1/2011	496.89	--	Frozen	--	—	Frozen at 10.58 ft BTOC
MW-180B-50	6/1/2011	496.89	--	Frozen	--	—	Frozen at 11.20 ft BTOC
MW-180B-50	7/15/2011	496.89	No LNAPL	9.59	0.00	487.30	
MW-180B-50	10/21/2011	496.89	--	11.86	--	485.03	
MW-180B-50	2/16/2012	496.86	No LNAPL	Frozen	0.00	—	Frozen at 11.74 ft BTOC
MW-180B-50	4/19/2012	496.86	No LNAPL	Frozen	0.00	—	Frozen at 11.74 ft BTOC
MW-180B-50	7/30/2012	496.86	No LNAPL	9.64	0.00	487.22	
MW-180B-50	11/1/2012	496.86	No LNAPL	11.14	0.00	485.72	
MW-180B-50	1/24/2013	496.87	--	Frozen	--	—	Frozen at 11.09 ft BTOC
MW-180B-50	4/24/2013	496.87	No LNAPL	Frozen	0.00	—	Frozen at 11.02 ft BTOC
MW-180B-50	8/1/2013	496.87	No LNAPL	9.64	0.00	487.23	
MW-180B-50	10/1/2013	496.87	No LNAPL	11.06	0.00	485.81	
MW-180B-50	3/18/2014	496.87	No LNAPL	11.67	0.00	485.20	
MW-180B-50	6/11/2014	496.91	No LNAPL	11.22	0.00	485.69	
MW-180B-50	9/9/2014	496.91	No LNAPL	9.91	0.00	487.00	
MW-180B-50	11/20/2014	496.91	No LNAPL	10.72	0.00	486.19	
MW-180B-50	3/19/2015	496.91	--	11.20	--	485.71	
MW-180B-50	6/10/2015	496.91	No LNAPL	10.75	0.00	486.16	
MW-180B-50	8/12/2015	496.90	--	9.67	--	487.23	
MW-180B-50	11/19/2015	496.90	--	10.81	--	486.09	
MW-180B-50	3/22/2016	496.90	No LNAPL	Frozen	0.00	—	Ice at 11.57 feet
MW-180B-50	8/12/2016	496.88	--	8.94	--	487.94	
MW-180B-50	9/12/2016	496.88	--	9.87	--	487.01	
MW-180B-50	3/14/2017	496.88	--	10.83	--	486.05	
MW-180C-90	11/1/2010	497.06	--	11.70	--	485.36	
MW-180C-90	1/1/2011	497.06	--	10.77	--	486.29	
MW-180C-90	4/1/2011	497.06	—	Frozen	—	—	Frozen w/dedicated pump
MW-180C-90	6/1/2011	497.06	--	10.65	--	486.41	
MW-180C-90	7/14/2011	497.06	No LNAPL	9.74	0.00	487.32	
MW-180C-90	10/21/2011	497.06	--	12.02	--	485.04	
MW-180C-90	2/16/2012	497.05	—	Frozen	—	—	Frozen w/dedicated pump
MW-180C-90	4/19/2012	497.05	—	Frozen	—	—	Frozen w/dedicated pump
MW-180C-90	7/30/2012	497.05	No LNAPL	9.80	0.00	487.25	
MW-180C-90	11/1/2012	497.05	No LNAPL	11.29	0.00	485.76	
MW-180C-90	1/24/2013	497.05	—	Frozen	—	—	Frozen w/dedicated pump
MW-180C-90	4/24/2013	497.05	—	Frozen	—	—	Frozen w/dedicated pump
MW-180C-90	8/1/2013	497.05	No LNAPL	9.80	0.00	487.25	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-180C-90	10/1/2013	497.05	No LNAPL	11.23	0.00	485.82	
MW-180C-90	3/18/2014	497.05	No LNAPL	11.84	0.00	485.21	
MW-180C-90	6/11/2014	497.09	No LNAPL	11.40	0.00	485.69	
MW-180C-90	9/9/2014	497.09	No LNAPL	10.08	0.00	487.01	
MW-180C-90	11/20/2014	497.09	No LNAPL	10.87	0.00	486.22	
MW-180C-90	3/19/2015	497.09	--	11.35	--	485.74	
MW-180C-90	6/10/2015	497.09	No LNAPL	10.93	0.00	486.16	
MW-180C-90	8/12/2015	497.08	--	9.83	--	487.25	
MW-180C-90	11/19/2015	497.08	--	10.98	--	486.10	
MW-180C-90	3/22/2016	497.08	---	Frozen	---	---	Frozen with dedicated pump
MW-180C-90	8/12/2016	497.07	--	9.09	--	487.98	
MW-180C-90	9/12/2016	497.07	--	10.02	--	487.05	
MW-180C-90	3/14/2017	497.07	--	11.04	--	486.03	
MW-186A-15	11/1/2010	496.00	--	12.37	--	483.63	
MW-186A-15	3/25/2011	496.00	--	11.95	--	484.05	
MW-186A-15	7/14/2011	496.00	10.19	10.51	0.32	485.75	
MW-186A-15	8/23/2011	496.00	10.49	10.73	0.24	485.47	
MW-186A-15	9/22/2011	496.00	11.59	11.93	0.34	484.35	
MW-186A-15	10/21/2011	496.00	12.28	12.67	0.39	483.65	
MW-186A-15	12/2/2011	495.95	11.95	12.64	0.69	483.87	
MW-186A-15	1/10/2012	495.95	12.08	12.78	0.70	483.74	
MW-186A-15	2/19/2012	495.95	12.04	12.76	0.72	483.78	
MW-186A-15	3/15/2012	495.95	12.08	12.84	0.76	483.73	
MW-186A-15	4/12/2012	495.95	11.94	12.75	0.81	483.86	
MW-186A-15	4/19/2012	495.95	11.36	12.26	0.90	484.42	
MW-186A-15	5/7/2012	495.95	11.70	12.50	0.80	484.10	
MW-186A-15	6/12/2012	495.95	11.01	11.12	0.11	484.92	
MW-186A-15	7/18/2012	495.95	10.67	10.73	0.06	485.27	
MW-186A-15	7/30/2012	495.95	10.30	10.31	0.01	485.65	
MW-186A-15	8/21/2012	495.95	10.91	11.74	0.83	484.89	
MW-186A-15	9/19/2012	495.95	11.61	12.22	0.61	484.23	
MW-186A-15	10/15/2012	495.95	11.56	12.09	0.53	484.29	
MW-186A-15	10/17/2012	495.95	11.65	12.17	0.52	484.20	Initial levels of first October 2012 baildown test
MW-186A-15	10/18/2012	495.95	11.70	12.08	0.38	484.18	Initial levels of second October 2012 baildown test
MW-186A-15	11/1/2012	495.95	11.61	12.17	0.56	484.24	
MW-186A-15	11/29/2012	495.95	11.16	11.52	0.36	484.72	
MW-186A-15	12/27/2012	495.95	11.48	11.96	0.48	484.38	
MW-186A-15	1/24/2013	495.95	11.45	11.93	0.48	484.41	
MW-186A-15	2/26/2013	495.95	11.59	12.07	0.48	484.27	
MW-186A-15	3/21/2013	495.91	11.71	12.04	0.33	484.14	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-186A-15	3/29/2013	495.91	11.74	12.16	0.42	484.09	R-35R, R-39, and R-40 were offline on this date
MW-186A-15	4/19/2013	495.95	11.73	12.33	0.60	484.11	
MW-186A-15	4/24/2013	495.95	11.67	12.25	0.58	484.17	
MW-186A-15	5/20/2013	495.96	11.49	12.00	0.51	484.38	
MW-186A-15	6/19/2013	495.97	10.85	10.91	0.06	485.11	
MW-186A-15	6/24/2013	495.97	10.80	11.13	0.33	485.11	
MW-186A-15	7/23/2013	496.00	10.53	10.73	0.20	485.43	
MW-186A-15	7/25/2013	496.00	10.58	10.78	0.20	485.38	
MW-186A-15	8/1/2013	495.97	10.51	10.55	0.04	485.45	
MW-186A-15	8/20/2013	495.97	10.52	10.78	0.26	485.40	
MW-186A-15	8/21/2013	495.97	10.45	10.52	0.07	485.51	
MW-186A-15	9/30/2013	495.96	11.57	12.30	0.73	484.25	
MW-186A-15	10/22/2013	495.97	12.25	12.64	0.39	483.65	
MW-186A-15	11/26/2013	495.96	11.33	11.87	0.54	484.53	
MW-186A-15	12/18/2013	495.96	11.61	12.28	0.67	484.23	
MW-186A-15	1/9/2014	495.96	11.83	12.40	0.57	484.02	
MW-186A-15	1/30/2014	495.96	11.84	12.31	0.47	484.03	
MW-186A-15	2/5/2014	495.96	11.98	12.50	0.52	483.88	
MW-186A-15	2/24/2014	495.96	12.12	12.51	0.39	483.77	
MW-186A-15	3/14/2014	495.96	12.23	12.60	0.37	483.66	
MW-186A-15	3/18/2014	495.96	12.20	12.59	0.39	483.69	
MW-186A-15	3/24/2014	495.96	12.27	12.64	0.37	483.62	
MW-186A-15	4/18/2014	495.95	12.15	12.53	0.38	483.73	
MW-186A-15	5/15/2014	495.96	11.67	12.17	0.50	484.20	
MW-186A-15	5/16/2014	495.96	11.70	12.22	0.52	484.16	
MW-186A-15	5/20/2014	495.97	11.79	12.32	0.53	484.08	
MW-186A-15	6/10/2014	495.98	11.82	12.23	0.41	484.08	
MW-186A-15	6/11/2014	495.98	11.80	12.22	0.42	484.10	
MW-186A-15	6/19/2014	495.97	11.45	11.82	0.37	484.45	
MW-186A-15	7/15/2014	495.98	No LNAPL	9.78	0.00	486.20	
MW-186A-15	8/26/2014	495.98	No LNAPL	10.44	0.00	485.54	
MW-186A-15	9/9/2014	495.98	No LNAPL	10.70	0.00	485.28	
MW-186A-15	9/24/2014	495.96	Sheen	11.00	Sheen	484.96	
MW-186A-15	10/21/2014	495.97	11.93	11.97	0.04	484.03	
MW-186A-15	11/19/2014	495.96	11.50	11.75	0.25	484.41	
MW-186A-15	12/16/2014	495.98	11.70	12.04	0.34	484.22	
MW-186A-15	12/29/2014	495.98	11.81	12.18	0.37	484.10	
MW-186A-15	1/21/2015	495.96	11.84	12.27	0.43	484.04	
MW-186A-15	2/25/2015	495.94	11.94	12.26	0.32	483.94	
MW-186A-15	3/10/2015	495.92	11.83	12.17	0.34	484.03	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-186A-15	3/18/2015	495.92	11.93	12.28	0.35	483.92	
MW-186A-15	3/26/2015	495.92	11.88	12.25	0.37	483.97	
MW-186A-15	4/16/2015	495.93	11.75	12.05	0.30	484.12	
MW-186A-15	5/21/2015	495.95	11.54	11.68	0.14	484.38	
MW-186A-15	6/10/2015	495.98	11.57	11.80	0.23	484.37	
MW-186A-15	7/22/2015	495.97	Sheen	10.66	Sheen	485.33	
MW-186A-15	8/12/2015	495.97	Sheen	10.54	Sheen	485.47	
MW-186A-15	8/19/2015	495.97	No LNAPL	10.81	0.00	485.19	
MW-186A-15	9/30/2015	495.96	11.30	11.43	0.13	484.68	
MW-186A-15	10/6/2015	495.96	11.13	11.24	0.11	484.85	
MW-186A-15	10/15/2015	495.97	11.50	11.85	0.35	484.44	
MW-186A-15	10/22/2015	495.97	11.74	11.96	0.22	484.24	
MW-186A-15	11/19/2015	495.98	11.64	11.95	0.31	484.28	
MW-186A-15	11/25/2015	495.98	11.41	11.64	0.23	484.56	
MW-186A-15	12/11/2015	495.96	11.65	11.88	0.23	484.30	
MW-186A-15	1/19/2016	495.98	12.15	12.45	0.30	483.77	
MW-186A-15	1/26/2016	495.98	12.19	12.50	0.31	483.77	
MW-186A-15	3/4/2016	495.98	12.24	12.53	0.29	483.74	
MW-186A-15	3/22/2016	495.98	12.35	12.72	0.37	483.56	
MW-186A-15	3/24/2016	495.98	12.32	12.65	0.33	483.60	Baildown testing not conducted- insufficient LNAPL thickness
MW-186A-15	3/25/2016	495.98	12.30	12.67	0.37	483.61	Baildown testing not conducted- insufficient LNAPL thickness
MW-186A-15	3/31/2016	495.98	12.16	12.50	0.34	483.76	Baildown testing not conducted- insufficient LNAPL thickness
MW-186A-15	5/26/2016	495.97	11.72	12.03	0.31	484.21	
MW-186A-15	8/18/2016	495.97	10.16	10.17	0.01	485.81	
MW-186A-15	9/9/2016	495.97	No LNAPL	10.65	0.00	485.36	
MW-186A-15	9/12/2016	495.97	No LNAPL	10.69	0.00	485.28	
MW-186A-15	10/13/2016	495.97	11.67	11.68	0.01	484.30	
MW-186A-15	10/25/2016	495.97	12.05	12.06	0.01	483.92	
MW-186A-15	11/15/2016	495.97	Sheen	11.28	Sheen	484.73	
MW-186A-15	2/8/2017	495.94	11.67	11.88	0.21	484.30	
MW-186A-15	2/15/2017	495.94	11.69	11.95	0.26	484.23	
MW-186A-15	3/1/2017	495.94	11.71	11.97	0.26	484.18	
MW-186A-15	3/10/2017	495.94	11.73	12.00	0.27	484.16	Baildown testing not conducted- insufficient LNAPL thickness
MW-186A-15	3/14/2017	495.94	11.72	12.06	0.34	484.16	
MW-186A-15	6/13/2017	495.97	No LNAPL	11.04	0.00	484.99	
MW-186A-15	7/13/2017	495.97	No LNAPL	10.24	0.00	485.73	
MW-186A-15	9/21/2017	495.98	11.46	11.47	0.01	484.52	
MW-186A-15	10/18/2017	495.98	Sheen	11.50	Sheen	484.48	
MW-186A-15	2/13/2018	495.98	11.90	12.32	0.42	484.00	
MW-186A-15	3/12/2018	495.98	11.81	12.22	0.41	484.09	

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Historical Groundwater Elevation and LNAPL Thickness Data

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-186A-15	4/3/2018	495.98	11.81	12.15	0.34	484.11	
MW-186A-15	7/17/2018	495.98	No LNAPL	10.24	0.00	485.74	
MW-186A-15	9/10/2018	495.98	No LNAPL	10.07	0.00	485.91	
MW-186B-60	11/1/2010	495.82	--	11.93	--	483.89	
MW-186B-60	3/25/2011	495.82	--	11.32	--	484.50	
MW-186B-60	7/14/2011	495.82	No LNAPL	9.97	0.00	485.85	
MW-186B-60	8/23/2011	495.82	--	10.25	--	485.57	
MW-186B-60	9/22/2011	495.82	--	11.36	--	484.46	
MW-186B-60	10/21/2011	495.82	--	12.10	--	483.72	
MW-186B-60	1/10/2012	495.77	No LNAPL	11.96	0.00	483.81	
MW-186B-60	2/16/2012	495.77	No LNAPL	11.99	0.00	483.78	
MW-186B-60	4/19/2012	495.77	No LNAPL	11.32	0.00	484.45	
MW-186B-60	7/30/2012	495.77	No LNAPL	10.04	0.00	485.73	
MW-186B-60	11/1/2012	495.77	No LNAPL	11.46	0.00	484.31	
MW-186B-60	1/24/2013	495.80	--	11.35	--	484.45	
MW-186B-60	3/21/2013	495.83	No LNAPL	11.61	0.00	484.22	
MW-186B-60	4/19/2013	495.88	No LNAPL	11.67	0.00	484.21	
MW-186B-60	4/24/2013	495.88	No LNAPL	11.58	0.00	484.30	Not specified as a vertical gradient well in the 2013 SAP
MW-186B-60	5/20/2013	495.88	--	11.36	--	484.52	
MW-186B-60	6/19/2013	495.84	--	10.51	--	485.33	
MW-186B-60	7/23/2013	495.87	--	10.23	--	485.64	
MW-186B-60	7/25/2013	495.87	--	10.28	--	485.59	
MW-186B-60	8/1/2013	495.83	No LNAPL	10.14	0.00	485.69	
MW-186B-60	8/20/2013	495.84	--	10.20	--	485.64	
MW-186B-60	8/21/2013	495.84	No LNAPL	10.11	0.00	485.73	
MW-186B-60	9/30/2013	495.84	No LNAPL	11.42	0.00	484.42	
MW-186B-60	1/9/2014	495.87	No LNAPL	11.65	0.00	484.22	
MW-186B-60	1/30/2014	495.87	--	11.76	--	484.11	
MW-186B-60	2/5/2014	495.87	No LNAPL	11.80	0.00	484.07	
MW-186B-60	2/24/2014	495.89	--	11.97	--	483.92	
MW-186B-60	3/14/2014	495.90	--	12.04	--	483.86	
MW-186B-60	3/18/2014	495.90	No LNAPL	12.03	0.00	483.87	
MW-186B-60	3/24/2014	495.90	No LNAPL	12.07	0.00	483.83	
MW-186B-60	4/18/2014	495.88	No LNAPL	11.91	0.00	483.97	
MW-186B-60	5/15/2014	495.87	--	11.45	--	484.42	
MW-186B-60	5/20/2014	495.88	--	11.53	--	484.35	
MW-186B-60	6/10/2014	495.88	--	11.62	--	484.26	
MW-186B-60	6/11/2014	495.88	No LNAPL	11.61	0.00	484.27	
MW-186B-60	6/19/2014	495.87	No LNAPL	11.24	0.00	484.63	
MW-186B-60	7/15/2014	495.88	--	9.47	--	486.41	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-186B-60	8/26/2014	495.88	No LNAPL	10.14	0.00	485.74	
MW-186B-60	9/9/2014	495.88	No LNAPL	10.41	0.00	485.47	
MW-186B-60	9/24/2014	495.87	No LNAPL	10.74	0.00	485.13	
MW-186B-60	10/21/2014	495.88	No LNAPL	11.65	0.00	484.23	
MW-186B-60	11/19/2014	495.87	No LNAPL	11.27	0.00	484.60	
MW-186B-60	12/16/2014	495.92	No LNAPL	11.48	0.00	484.44	
MW-186B-60	12/29/2014	495.92	No LNAPL	11.63	0.00	484.29	
MW-186B-60	1/21/2015	495.91	No LNAPL	11.67	0.00	484.24	
MW-186B-60	2/25/2015	495.92	No LNAPL	11.78	0.00	484.14	
MW-186B-60	3/18/2015	495.89	--	11.81	--	484.08	
MW-186B-60	3/26/2015	495.89	No LNAPL	11.74	0.00	484.15	
MW-186B-60	4/16/2015	495.90	--	11.58	--	484.32	
MW-186B-60	5/21/2015	495.89	--	11.31	--	484.58	
MW-186B-60	6/10/2015	495.89	No LNAPL	11.35	0.00	484.54	
MW-186B-60	7/22/2015	495.89	--	10.37	--	485.52	
MW-186B-60	8/12/2015	495.89	--	10.31	--	485.58	
MW-186B-60	8/19/2015	495.89	No LNAPL	10.55	0.00	485.37	
MW-186B-60	9/30/2015	495.88	--	11.04	--	484.84	
MW-186B-60	10/6/2015	495.88	No LNAPL	10.89	0.00	485.00	
MW-186B-60	10/22/2015	495.91	No LNAPL	11.51	0.00	484.40	
MW-186B-60	11/19/2015	495.90	--	11.42	--	484.48	
MW-186B-60	11/25/2015	495.90	No LNAPL	11.21	0.00	484.72	
MW-186B-60	12/11/2015	495.90	--	11.42	--	484.48	
MW-186B-60	1/19/2016	495.92	--	11.93	--	483.95	
MW-186B-60	1/26/2016	495.92	--	11.99	--	483.93	
MW-186B-60	3/22/2016	495.92	No LNAPL	12.22	0.00	483.70	
MW-186B-60	5/26/2016	495.91	No LNAPL	11.55	0.00	484.38	
MW-186B-60	8/12/2016	495.91	--	9.58	--	486.33	
MW-186B-60	9/9/2016	495.92	No LNAPL	10.46	0.00	485.50	
MW-186B-60	9/12/2016	495.92	--	10.48	--	485.44	
MW-186B-60	10/20/2016	495.91	--	11.68	--	484.23	
MW-186B-60	11/15/2016	495.91	No LNAPL	11.07	0.00	484.94	
MW-186B-60	2/8/2017	495.97	No LNAPL	11.56	0.00	484.48	
MW-186B-60	2/15/2017	495.97	No LNAPL	11.59	0.00	484.43	
MW-186B-60	3/14/2017	495.97	--	11.90	--	484.07	
MW-186B-60	6/13/2017	495.95	No LNAPL	10.84	0.00	485.16	
MW-186B-60	7/12/2017	495.95	--	10.14	--	485.81	
MW-186B-60	9/21/2017	495.95	--	11.33	--	484.62	
MW-186B-60	3/12/2018	495.95	--	11.80	--	484.15	
MW-186B-60	7/18/2018	495.95	--	10.13	--	485.82	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-186B-60	9/10/2018	495.97	--	10.00	--	485.97	
MW-186E-75	11/1/2012	495.73	No LNAPL	11.38	0.00	484.35	
MW-186E-75	1/24/2013	495.71	--	11.25	--	484.46	
MW-186E-75	3/21/2013	495.76	No LNAPL	11.52	0.00	484.24	
MW-186E-75	4/19/2013	495.80	No LNAPL	11.58	0.00	484.22	
MW-186E-75	4/24/2013	495.80	No LNAPL	11.51	0.00	484.29	Not specified as a vertical gradient well in the 2013 SAP
MW-186E-75	5/20/2013	495.79	--	11.26	--	484.53	
MW-186E-75	6/19/2013	495.78	--	10.40	--	485.38	
MW-186E-75	7/23/2013	495.81	--	10.13	--	485.68	
MW-186E-75	7/25/2013	495.81	--	10.16	--	485.65	
MW-186E-75	8/1/2013	495.78	No LNAPL	10.03	0.00	485.75	
MW-186E-75	8/20/2013	495.78	--	10.07	--	485.71	
MW-186E-75	8/21/2013	495.78	No LNAPL	10.01	0.00	485.77	
MW-186E-75	9/30/2013	495.77	No LNAPL	11.31	0.00	484.46	
MW-186E-75	1/9/2014	495.79	No LNAPL	11.53	0.00	484.26	
MW-186E-75	1/30/2014	495.79	--	11.57	--	484.22	
MW-186E-75	2/5/2014	495.79	No LNAPL	11.67	0.00	484.12	
MW-186E-75	2/24/2014	495.78	--	11.84	--	483.94	
MW-186E-75	3/14/2014	495.78	--	11.90	--	483.88	
MW-186E-75	3/18/2014	495.78	No LNAPL	11.89	0.00	483.89	
MW-186E-75	3/24/2014	495.78	No LNAPL	11.92	0.00	483.86	
MW-186E-75	4/18/2014	495.76	No LNAPL	11.75	0.00	484.01	
MW-186E-75	5/15/2014	495.77	--	11.30	--	484.47	
MW-186E-75	5/20/2014	495.78	--	11.40	--	484.38	
MW-186E-75	6/10/2014	495.79	--	11.50	--	484.29	
MW-186E-75	6/11/2014	495.79	No LNAPL	11.50	0.00	484.29	
MW-186E-75	6/19/2014	495.78	No LNAPL	11.13	0.00	484.65	
MW-186E-75	7/15/2014	495.79	--	9.36	--	486.43	
MW-186E-75	8/26/2014	495.79	--	10.02	--	485.77	
MW-186E-75	9/9/2014	495.79	No LNAPL	10.28	0.00	485.51	
MW-186E-75	9/24/2014	495.79	No LNAPL	10.62	0.00	485.17	
MW-186E-75	10/21/2014	495.78	No LNAPL	11.52	0.00	484.26	
MW-186E-75	11/19/2014	495.78	No LNAPL	11.14	0.00	484.64	
MW-186E-75	12/16/2014	495.82	No LNAPL	11.35	0.00	484.47	
MW-186E-75	12/29/2014	495.82	No LNAPL	11.46	0.00	484.36	
MW-186E-75	1/21/2015	495.80	No LNAPL	11.52	0.00	484.28	
MW-186E-75	2/25/2015	495.77	No LNAPL	11.63	0.00	484.14	
MW-186E-75	3/18/2015	495.76	--	11.65	--	484.11	
MW-186E-75	3/26/2015	495.76	No LNAPL	11.57	0.00	484.19	
MW-186E-75	4/16/2015	495.78	--	11.43	--	484.35	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-186E-75	5/21/2015	495.78	--	11.17	--	484.61	
MW-186E-75	6/10/2015	495.79	No LNAPL	11.20	0.00	484.59	
MW-186E-75	7/22/2015	495.79	--	10.23	--	485.56	
MW-186E-75	8/12/2015	495.80	--	10.17	--	485.63	
MW-186E-75	8/19/2015	495.80	No LNAPL	10.41	0.00	485.42	
MW-186E-75	9/30/2015	495.78	--	10.91	--	484.87	
MW-186E-75	10/6/2015	495.79	No LNAPL	10.75	0.00	485.05	
MW-186E-75	10/22/2015	495.79	No LNAPL	11.37	0.00	484.42	
MW-186E-75	11/19/2015	495.79	--	11.27	--	484.52	
MW-186E-75	11/25/2015	495.79	No LNAPL	11.05	0.00	484.77	
MW-186E-75	12/11/2015	495.79	--	11.29	--	484.50	
MW-186E-75	1/19/2016	495.82	--	11.79	--	483.99	
MW-186E-75	1/26/2016	495.82	--	11.85	--	483.97	
MW-186E-75	3/22/2016	495.82	No LNAPL	12.06	0.00	483.76	
MW-186E-75	5/26/2016	495.82	No LNAPL	11.43	0.00	484.41	
MW-186E-75	8/12/2016	495.81	--	9.37	--	486.44	
MW-186E-75	9/9/2016	495.82	No LNAPL	10.33	0.00	485.53	
MW-186E-75	9/12/2016	495.82	--	10.37	--	485.45	
MW-186E-75	10/20/2016	495.81	--	11.55	--	484.26	
MW-186E-75	11/15/2016	495.81	No LNAPL	10.94	0.00	484.97	
MW-186E-75	2/8/2017	495.85	No LNAPL	11.42	0.00	484.50	
MW-186E-75	2/15/2017	495.85	No LNAPL	11.45	0.00	484.45	
MW-186E-75	3/14/2017	495.85	--	11.47	--	484.38	
MW-186E-75	6/13/2017	495.87	No LNAPL	10.75	0.00	485.17	
MW-186E-75	8/3/2017	495.87	--	10.04	--	485.83	
MW-186E-75	10/19/2017	495.87	--	11.39	--	484.48	
MW-186E-75	1/18/2018	495.87	--	11.43	--	484.44	
MW-186E-75	4/5/2018	495.87	--	11.72	--	484.15	
MW-186C-100	11/1/2010	495.76	--	11.80	--	483.96	
MW-186C-100	3/25/2011	495.76	--	11.20	--	484.56	
MW-186C-100	7/15/2011	495.76	No LNAPL	9.89	0.00	485.87	
MW-186C-100	8/23/2011	495.76	--	10.18	--	485.58	
MW-186C-100	9/22/2011	495.76	--	11.28	--	484.48	
MW-186C-100	10/21/2011	495.76	--	11.99	--	483.77	
MW-186C-100	1/10/2012	495.72	No LNAPL	11.81	0.00	483.91	
MW-186C-100	3/21/2013	495.75	No LNAPL	11.48	0.00	484.27	
MW-186C-100	4/19/2013	495.80	No LNAPL	11.55	0.00	484.25	
MW-186C-100	4/24/2013	495.80	No LNAPL	11.48	0.00	484.32	
MW-186C-100	5/20/2013	495.78	--	11.21	--	484.57	
MW-186C-100	6/19/2013	495.76	--	10.30	--	485.46	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-186C-100	7/25/2013	495.79	--	10.06	--	485.73	
MW-186C-100	8/1/2013	495.75	No LNAPL	9.95	0.00	485.80	
MW-186C-100	8/20/2013	495.76	--	9.99	--	485.77	
MW-186C-100	9/30/2013	495.76	No LNAPL	11.24	0.00	484.52	
MW-186C-100	1/9/2014	495.76	No LNAPL	11.45	0.00	484.31	
MW-186C-100	1/30/2014	495.76	--	11.47	--	484.29	
MW-186C-100	2/5/2014	495.76	No LNAPL	11.60	0.00	484.16	
MW-186C-100	2/24/2014	495.78	--	11.77	--	484.01	
MW-186C-100	3/14/2014	495.78	--	11.85	--	483.93	
MW-186C-100	3/18/2014	495.78	No LNAPL	11.85	0.00	483.93	
MW-186C-100	3/24/2014	495.78	No LNAPL	11.87	0.00	483.91	
MW-186C-100	4/18/2014	495.77	No LNAPL	11.68	0.00	484.09	
MW-186C-100	5/15/2014	495.76	--	11.23	--	484.53	
MW-186C-100	5/20/2014	495.78	--	11.33	--	484.45	
MW-186C-100	6/10/2014	495.78	--	11.43	--	484.35	
MW-186C-100	6/11/2014	495.78	No LNAPL	11.44	0.00	484.34	
MW-186C-100	6/19/2014	495.76	No LNAPL	11.08	0.00	484.68	
MW-186C-100	7/15/2014	495.77	--	9.27	--	486.50	
MW-186C-100	8/26/2014	495.78	--	9.94	--	485.84	
MW-186C-100	9/9/2014	495.78	No LNAPL	10.21	0.00	485.57	
MW-186C-100	9/24/2014	495.77	No LNAPL	10.55	0.00	485.22	
MW-186C-100	10/21/2014	495.77	No LNAPL	11.48	0.00	484.29	
MW-186C-100	11/19/2014	495.75	No LNAPL	11.07	0.00	484.68	
MW-186C-100	12/16/2014	495.80	No LNAPL	11.26	0.00	484.54	
MW-186C-100	12/29/2014	495.80	No LNAPL	11.39	0.00	484.41	
MW-186C-100	1/21/2015	495.79	No LNAPL	11.46	0.00	484.33	
MW-186C-100	2/25/2015	495.78	No LNAPL	11.57	0.00	484.21	
MW-186C-100	3/18/2015	495.76	--	11.59	--	484.17	
MW-186C-100	3/26/2015	495.76	No LNAPL	11.52	0.00	484.24	
MW-186C-100	4/16/2015	495.77	--	11.38	--	484.39	
MW-186C-100	5/21/2015	495.75	--	11.12	--	484.63	
MW-186C-100	6/10/2015	495.77	No LNAPL	11.12	0.00	484.65	
MW-186C-100	7/22/2015	495.77	--	10.25	--	485.52	
MW-186C-100	8/12/2015	495.77	--	10.11	--	485.66	
MW-186C-100	8/19/2015	495.77	No LNAPL	10.34	0.00	485.46	
MW-186C-100	9/30/2015	495.76	--	10.84	--	484.92	
MW-186C-100	10/6/2015	495.76	No LNAPL	10.68	0.00	485.09	
MW-186C-100	10/22/2015	495.78	No LNAPL	11.29	0.00	484.49	
MW-186C-100	11/19/2015	495.77	--	11.23	--	484.54	
MW-186C-100	11/25/2015	495.77	No LNAPL	10.96	0.00	484.84	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-186C-100	12/11/2015	495.77	--	11.20	--	484.57	
MW-186C-100	1/19/2016	495.78	--	11.71	--	484.03	
MW-186C-100	1/26/2016	495.78	--	11.76	--	484.02	
MW-186C-100	5/26/2016	495.77	No LNAPL	11.34	0.00	484.45	
MW-186C-100	8/12/2016	495.76	--	9.37	--	486.39	
MW-186C-100	9/9/2016	495.78	No LNAPL	10.26	0.00	485.56	
MW-186C-100	11/15/2016	495.76	No LNAPL	10.84	0.00	485.02	
MW-186C-100	2/8/2017	495.78	No LNAPL	11.31	0.00	484.54	
MW-186C-100	2/15/2017	495.78	No LNAPL	11.33	0.00	484.50	
MW-186C-100	6/13/2017	495.79	No LNAPL	10.60	0.00	485.24	
MW-186D-135	2/16/2012	495.13	No LNAPL	11.24	0.00	483.89	
MW-186D-135	4/19/2012	495.13	No LNAPL	10.58	0.00	484.55	
MW-186D-135	7/30/2012	495.13	No LNAPL	9.28	0.00	485.85	
MW-186D-135	11/1/2012	495.13	No LNAPL	11.29	0.00	483.84	
MW-186D-135	1/24/2013	495.72	--	11.17	--	484.55	
MW-186D-135	4/19/2013	495.81	No LNAPL	11.50	0.00	484.31	
MW-186D-135	4/24/2013	495.81	No LNAPL	11.42	0.00	484.39	Not specified as a vertical gradient well in the 2013 SAP
MW-186D-135	5/20/2013	495.77	--	11.17	--	484.60	
MW-186D-135	6/19/2013	495.75	--	10.23	--	485.52	
MW-186D-135	7/25/2013	495.77	--	10.00	--	485.77	
MW-186D-135	8/1/2013	495.75	No LNAPL	9.88	0.00	485.87	
MW-186D-135	8/20/2013	495.76	--	9.92	--	485.84	
MW-186D-135	9/30/2013	495.75	No LNAPL	11.18	0.00	484.57	
MW-186D-135	1/9/2014	495.77	No LNAPL	11.40	0.00	484.37	
MW-186D-135	1/30/2014	495.77	--	11.45	--	484.32	
MW-186D-135	2/5/2014	495.77	No LNAPL	11.54	0.00	484.23	
MW-186D-135	2/24/2014	495.78	--	11.72	--	484.06	
MW-186D-135	3/14/2014	495.78	--	11.80	--	483.98	
MW-186D-135	3/18/2014	495.78	No LNAPL	11.80	0.00	483.98	
MW-186D-135	3/24/2014	495.78	No LNAPL	11.83	0.00	483.95	
MW-186D-135	4/18/2014	495.77	No LNAPL	11.63	0.00	484.14	
MW-186D-135	5/15/2014	495.78	--	11.18	--	484.60	
MW-186D-135	5/20/2014	495.78	--	11.27	--	484.51	
MW-186D-135	6/10/2014	495.78	--	11.39	--	484.39	
MW-186D-135	6/11/2014	495.78	No LNAPL	11.39	0.00	484.39	
MW-186D-135	6/19/2014	495.77	No LNAPL	11.03	0.00	484.74	
MW-186D-135	7/15/2014	495.78	--	9.22	--	486.56	
MW-186D-135	8/26/2014	495.79	--	9.89	--	485.90	
MW-186D-135	9/9/2014	495.79	No LNAPL	10.17	0.00	485.62	
MW-186D-135	9/24/2014	495.78	No LNAPL	10.50	0.00	485.28	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-186D-135	10/21/2014	495.78	No LNAPL	11.41	0.00	484.37	
MW-186D-135	11/19/2014	495.77	No LNAPL	11.01	0.00	484.76	
MW-186D-135	12/16/2014	495.82	No LNAPL	11.22	0.00	484.60	
MW-186D-135	12/29/2014	495.82	No LNAPL	11.35	0.00	484.47	
MW-186D-135	1/21/2015	495.81	No LNAPL	11.42	0.00	484.39	
MW-186D-135	2/25/2015	495.80	No LNAPL	11.52	0.00	484.28	
MW-186D-135	3/18/2015	495.78	--	11.55	--	484.23	
MW-186D-135	3/26/2015	495.78	No LNAPL	11.47	0.00	484.31	
MW-186D-135	4/16/2015	495.80	--	11.33	--	484.47	
MW-186D-135	5/21/2015	495.77	--	11.04	--	484.73	
MW-186D-135	6/10/2015	495.79	No LNAPL	11.08	0.00	484.71	
MW-186D-135	7/22/2015	495.79	--	10.09	--	485.70	
MW-186D-135	8/12/2015	495.79	--	10.01	--	485.78	
MW-186D-135	8/19/2015	495.79	No LNAPL	10.29	0.00	485.53	
MW-186D-135	9/30/2015	495.77	--	10.79	--	484.98	
MW-186D-135	10/6/2015	495.78	No LNAPL	10.63	0.00	485.16	
MW-186D-135	10/22/2015	495.79	No LNAPL	11.25	0.00	484.54	
MW-186D-135	11/19/2015	495.78	--	11.15	--	484.63	
MW-186D-135	11/25/2015	495.78	No LNAPL	10.92	0.00	484.89	
MW-186D-135	12/11/2015	495.78	--	11.15	--	484.63	
MW-186D-135	1/19/2016	495.79	--	11.65	--	484.10	
MW-186D-135	1/26/2016	495.79	--	11.70	--	484.09	
MW-186D-135	3/22/2016	495.79	No LNAPL	11.97	0.00	483.82	
MW-186D-135	5/26/2016	495.78	No LNAPL	11.27	0.00	484.53	
MW-186D-135	9/9/2016	495.80	No LNAPL	10.17	0.00	485.67	
MW-186D-135	9/12/2016	495.80	--	10.24	--	485.56	
MW-186D-135	11/15/2016	495.78	No LNAPL	10.79	0.00	485.09	
MW-186D-135	2/8/2017	495.82	No LNAPL	11.27	0.00	484.62	
MW-186D-135	2/15/2017	495.82	No LNAPL	11.29	0.00	484.58	
MW-186D-135	3/14/2017	495.82	--	11.30	--	484.52	
MW-186D-135	6/13/2017	495.80	No LNAPL	10.54	0.00	485.31	
MW-192A-15	10/21/2011	—	--	10.46	--	—	New well
MW-192A-15	2/16/2012	495.86	--	10.20	--	485.66	
MW-192A-15	4/19/2012	495.86	--	9.47	--	486.39	
MW-192A-15	7/30/2012	495.86	--	7.95	--	487.91	
MW-192A-15	11/1/2012	495.86	No LNAPL	9.46	0.00	486.40	
MW-192A-15	1/24/2013	495.90	--	9.60	--	486.30	
MW-192A-15	4/24/2013	495.90	--	9.46	--	486.44	
MW-192A-15	8/1/2013	495.90	--	8.05	--	487.85	
MW-192A-15	10/1/2013	495.90	--	9.80	--	486.10	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-192A-15	3/18/2014	495.90	--	10.37	--	485.53	
MW-192A-15	6/11/2014	496.11	--	9.91	--	486.20	
MW-192A-15	9/9/2014	496.11	--	8.71	--	487.40	
MW-192A-15	11/20/2014	496.11	No LNAPL	9.31	0.00	486.80	
MW-192A-15	3/19/2015	496.11	--	9.89	--	486.22	
MW-192A-15	6/11/2015	496.11	No LNAPL	9.51	0.00	486.60	
MW-192A-15	8/12/2015	496.19	--	8.20	--	487.99	
MW-192A-15	11/19/2015	496.19	--	9.46	--	486.73	
MW-192A-15	3/22/2016	496.19	No LNAPL	10.45	0.00	485.74	
MW-192A-15	7/26/2016	496.25	--	7.12	--	489.13	
MW-192A-15	9/13/2016	496.25	--	8.71	--	487.54	
MW-192A-15	3/14/2017	496.25	--	9.72	--	486.53	
MW-192A-15	8/10/2017	496.25	--	8.19	--	488.06	
MW-192A-15	8/16/2017	496.25	--	7.96	--	488.29	
MW-192A-15	9/21/2017	496.34	--	9.76	--	486.58	
MW-192A-15	11/15/2017	496.34	--	9.86	--	486.48	
MW-192A-15	2/15/2018	496.34	--	10.21	--	486.13	
MW-192A-15	3/12/2018	496.34	--	10.14	--	486.20	
MW-192A-15	4/10/2018	496.34	--	10.17	--	486.17	
MW-192A-15	8/7/2018	496.34	--	7.75	--	488.59	
MW-192A-15	9/10/2018	496.28	--	8.35	--	487.93	
MW-192B-55	10/21/2011	—	--	9.99	--	—	New well
MW-192B-55	2/16/2012	495.42	--	9.76	--	485.66	
MW-192B-55	4/19/2012	495.42	--	9.02	--	486.40	
MW-192B-55	7/30/2012	495.42	--	7.51	--	487.91	
MW-192B-55	11/1/2012	495.42	No LNAPL	9.02	0.00	486.40	
MW-192B-55	1/24/2013	495.47	--	9.13	--	486.34	
MW-192B-55	4/24/2013	495.47	--	9.97	--	485.50	
MW-192B-55	8/1/2013	495.47	--	7.75	--	487.72	
MW-192B-55	10/1/2013	495.47	--	9.30	--	486.17	
MW-192B-55	3/18/2014	495.47	--	9.84	--	485.63	
MW-192B-55	6/11/2014	495.59	--	9.93	--	485.66	
MW-192B-55	9/9/2014	495.59	--	8.20	--	487.39	
MW-192B-55	11/20/2014	495.59	No LNAPL	8.78	0.00	486.81	
MW-192B-55	3/19/2015	495.59	--	9.31	--	486.28	
MW-192B-55	6/11/2015	495.59	No LNAPL	8.98	0.00	486.61	
MW-192B-55	8/12/2015	495.64	--	7.70	--	487.94	
MW-192B-55	11/19/2015	495.64	--	8.91	--	486.73	
MW-192B-55	3/22/2016	495.64	No LNAPL	9.80	0.00	485.84	
MW-192B-55	7/26/2016	495.66	--	6.50	--	489.16	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-192B-55	9/13/2016	495.66	--	8.11	--	487.55	
MW-192B-55	3/14/2017	495.66	--	9.00	--	486.66	
MW-192B-55	9/21/2017	495.65	--	9.06	--	486.59	
MW-192B-55	3/12/2018	495.65	--	9.44	--	486.21	
MW-192B-55	9/10/2018	495.59	--	7.63	--	487.96	
MW-195A-15	2/7/2012	495.98	No LNAPL	11.62	0.00	484.36	
MW-195A-15	2/15/2012	495.98	No LNAPL	11.54	0.00	484.44	
MW-195A-15	4/10/2012	495.98	No LNAPL	11.44	0.00	484.54	
MW-195A-15	4/19/2012	495.98	--	10.86	--	485.12	
MW-195A-15	7/17/2012	495.98	No LNAPL	9.83	0.00	486.15	
MW-195A-15	7/30/2012	495.98	--	9.46	--	486.52	
MW-195A-15	8/21/2012	495.98	No LNAPL	10.27	0.00	485.71	
MW-195A-15	9/18/2012	495.98	No LNAPL	11.04	0.00	484.94	
MW-195A-15	10/16/2012	495.98	No LNAPL	11.06	0.00	484.92	
MW-195A-15	11/1/2012	495.98	No LNAPL	10.90	0.00	485.08	
MW-195A-15	11/29/2012	496.10	No LNAPL	10.55	0.00	485.55	
MW-195A-15	12/27/2012	496.10	No LNAPL	10.98	0.00	485.12	
MW-195A-15	1/23/2013	496.10	No LNAPL	10.94	0.00	485.16	
MW-195A-15	2/26/2013	496.10	No LNAPL	11.13	0.00	484.97	
MW-195A-15	4/24/2013	496.10	No LNAPL	11.25	0.00	484.85	
MW-195A-15	8/2/2013	496.10	No LNAPL	9.43	0.00	486.67	
MW-195A-15	10/1/2013	496.10	--	11.08	--	485.02	
MW-195A-15	10/29/2013	496.10	No LNAPL	11.83	0.00	484.27	
MW-195A-15	3/18/2014	496.10	--	11.76	--	484.34	
MW-195A-15	6/11/2014	496.32	--	11.35	--	484.97	
MW-195A-15	9/9/2014	496.32	--	10.18	--	486.14	
MW-195A-15	11/20/2014	496.32	No LNAPL	10.94	0.00	485.38	
MW-195A-15	3/19/2015	496.32	--	11.55	--	484.77	
MW-195A-15	6/11/2015	496.32	No LNAPL	11.13	0.00	485.19	
MW-195A-15	8/12/2015	496.43	--	9.77	--	486.66	
MW-195A-15	10/15/2015	496.43	No LNAPL	11.05	0.00	485.38	
MW-195A-15	11/19/2015	496.43	--	11.01	--	485.42	
MW-195A-15	3/22/2016	496.43	No LNAPL	11.94	0.00	484.49	
MW-195A-15	7/20/2016	496.49	--	9.15	--	487.34	
MW-195A-15	9/13/2016	496.49	--	10.31	--	486.18	
MW-195A-15	10/19/2016	496.49	--	11.45	--	485.04	
MW-195A-15	3/14/2017	496.49	--	10.97	--	485.52	
MW-195B-150	2/15/2012	496.09	No LNAPL	11.56	0.00	484.53	
MW-195B-150	4/19/2012	496.09	--	10.86	--	485.23	
MW-195B-150	7/30/2012	496.09	--	9.48	--	486.61	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-195B-150	11/1/2012	496.09	--	10.89	--	485.20	
MW-195B-150	1/24/2013	496.12	--	10.86	--	485.26	
MW-195B-150	4/24/2013	496.12	--	11.18	--	484.94	
MW-195B-150	8/1/2013	496.12	--	9.41	--	486.71	
MW-195B-150	10/1/2013	496.12	--	11.00	--	485.12	
MW-195B-150	3/18/2014	496.12	--	11.53	--	484.59	
MW-195B-150	6/11/2014	496.11	--	11.11	--	485.00	
MW-195B-150	9/9/2014	496.11	--	9.96	--	486.15	
MW-195B-150	11/20/2014	496.11	No LNAPL	10.63	0.00	485.48	
MW-195B-150	3/19/2015	496.11	--	11.16	--	484.95	
MW-195B-150	6/11/2015	496.11	No LNAPL	10.76	0.00	485.35	
MW-195B-150	8/12/2015	496.17	--	9.60	--	486.57	
MW-195B-150	11/19/2015	496.17	--	10.75	--	485.42	
MW-195B-150	3/22/2016	496.17	No LNAPL	11.58	0.00	484.59	
MW-195B-150	9/13/2016	496.14	--	9.99	--	486.15	
MW-195B-150	3/14/2017	496.14	--	10.89	--	485.25	
MW-196-15	2/7/2012	497.20	No LNAPL	11.36	0.00	485.84	
MW-196-15	4/10/2012	497.20	No LNAPL	11.22	0.00	485.98	
MW-196-15	7/17/2012	497.20	No LNAPL	9.49	0.00	487.71	
MW-196-15	8/21/2012	497.20	No LNAPL	9.98	0.00	487.22	
MW-196-15	9/18/2012	497.20	No LNAPL	10.74	0.00	486.46	
MW-196-15	10/16/2012	497.20	No LNAPL	10.77	0.00	486.43	
MW-196-15	11/29/2012	497.37	No LNAPL	10.33	0.00	487.04	
MW-196-15	12/27/2012	497.37	No LNAPL	10.84	0.00	486.53	
MW-196-15	1/24/2013	497.37	No LNAPL	10.85	0.00	486.52	
MW-196-15	2/26/2013	497.37	No LNAPL	11.06	0.00	486.31	
MW-196-15	4/24/2013	497.37	No LNAPL	11.21	0.00	486.16	
MW-196-15	10/29/2013	497.37	No LNAPL	11.53	0.00	485.84	
MW-196-15	10/15/2015	497.09	No LNAPL	10.18	0.00	486.91	
MW-196-15	8/9/2016	497.29	--	8.13	--	489.16	
MW-197A-65	7/30/2012	495.15	No LNAPL	9.28	0.00	485.87	
MW-197A-65	11/1/2012	495.15	No LNAPL	10.67	0.00	484.48	
MW-197A-65	1/24/2013	495.17	--	10.57	--	484.60	
MW-197A-65	4/24/2013	495.17	No LNAPL	10.87	0.00	484.30	
MW-197A-65	7/23/2013	495.27	--	9.49	--	485.78	
MW-197A-65	8/1/2013	495.27	--	9.36	--	485.91	
MW-197A-65	8/21/2013	495.27	No LNAPL	9.35	0.00	485.92	
MW-197A-65	9/30/2013	495.27	No LNAPL	10.62	0.00	484.65	
MW-197A-65	1/9/2014	495.28	No LNAPL	10.87	0.00	484.41	
MW-197A-65	2/5/2014	495.30	No LNAPL	11.01	0.00	484.29	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-197A-65	3/18/2014	495.28	No LNAPL	11.25	0.00	484.03	
MW-197A-65	3/24/2014	495.28	No LNAPL	11.28	0.00	484.00	
MW-197A-65	4/18/2014	495.31	No LNAPL	11.09	0.00	484.22	
MW-197A-65	5/15/2014	495.31	--	10.67	--	484.64	
MW-197A-65	6/11/2014	495.30	No LNAPL	10.83	0.00	484.47	
MW-197A-65	6/19/2014	495.30	No LNAPL	10.49	0.00	484.81	
MW-197A-65	7/15/2014	495.32	No LNAPL	8.68	0.00	486.64	
MW-197A-65	8/26/2014	495.32	No LNAPL	9.30	0.00	486.02	
MW-197A-65	9/9/2014	495.32	No LNAPL	9.57	0.00	485.75	
MW-197A-65	9/24/2014	495.29	No LNAPL	9.91	0.00	485.38	
MW-197A-65	10/21/2014	495.29	No LNAPL	10.83	0.00	484.46	
MW-197A-65	11/19/2014	495.27	No LNAPL	10.43	0.00	484.84	
MW-197A-65	12/16/2014	495.29	No LNAPL	10.62	0.00	484.67	
MW-197A-65	12/29/2014	495.29	No LNAPL	10.74	0.00	484.55	
MW-197A-65	1/21/2015	495.31	No LNAPL	10.81	0.00	484.50	
MW-197A-65	2/25/2015	495.33	No LNAPL	10.95	0.00	484.38	
MW-197A-65	3/18/2015	495.30	--	10.98	--	484.32	
MW-197A-65	3/26/2015	495.30	No LNAPL	10.91	0.00	484.39	
MW-197A-65	4/16/2015	495.33	--	10.76	--	484.57	
MW-197A-65	5/21/2015	495.32	No LNAPL	10.51	0.00	484.81	
MW-197A-65	6/10/2015	495.34	No LNAPL	10.54	0.00	484.80	
MW-197A-65	8/12/2015	495.33	--	9.48	--	485.85	
MW-197A-65	8/19/2015	495.33	No LNAPL	9.76	0.00	485.60	
MW-197A-65	10/6/2015	495.32	No LNAPL	10.07	0.00	485.26	
MW-197A-65	11/19/2015	495.32	--	10.61	--	484.71	
MW-197A-65	1/19/2016	495.32	--	11.11	--	484.17	
MW-197A-65	3/22/2016	495.32	No LNAPL	11.38	0.00	483.94	
MW-197A-65	5/26/2016	495.34	No LNAPL	10.75	0.00	484.61	
MW-197A-65	8/18/2016	495.31	--	9.09	--	486.22	
MW-197A-65	9/9/2016	495.33	No LNAPL	9.64	0.00	485.73	
MW-197A-65	9/12/2016	495.33	--	9.67	--	485.66	
MW-197A-65	11/15/2016	495.31	No LNAPL	10.25	0.00	485.16	
MW-197A-65	2/8/2017	495.37	No LNAPL	10.74	0.00	484.70	
MW-197A-65	3/14/2017	495.37	--	10.81	--	484.56	
MW-197A-65	6/13/2017	495.43	No LNAPL	10.12	0.00	485.36	
MW-197B-150	7/23/2013	495.30	--	9.41	--	485.89	
MW-197B-150	8/1/2013	495.30	--	9.29	--	486.01	
MW-197B-150	8/21/2013	495.30	No LNAPL	9.30	0.00	486.00	
MW-197B-150	1/9/2014	495.30	No LNAPL	10.81	0.00	484.49	
MW-197B-150	2/5/2014	495.32	No LNAPL	10.95	0.00	484.37	

Appendix A-1
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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-197B-150	3/24/2014	495.30	No LNAPL	11.23	0.00	484.07	
MW-197B-150	4/18/2014	495.33	No LNAPL	11.05	0.00	484.28	
MW-197B-150	5/15/2014	495.32	--	10.53	--	484.79	
MW-197B-150	6/19/2014	495.32	No LNAPL	10.42	0.00	484.90	
MW-197B-150	7/15/2014	495.33	No LNAPL	8.62	0.00	486.71	
MW-197B-150	8/26/2014	495.33	No LNAPL	9.24	0.00	486.09	
MW-197B-150	9/24/2014	495.30	No LNAPL	9.86	0.00	485.44	
MW-197B-150	10/21/2014	495.30	No LNAPL	10.76	0.00	484.54	
MW-197B-150	11/19/2014	495.28	No LNAPL	10.38	0.00	484.90	
MW-197B-150	12/16/2014	495.30	No LNAPL	10.56	0.00	484.74	
MW-197B-150	12/29/2014	495.30	No LNAPL	10.67	0.00	484.63	
MW-197B-150	1/21/2015	495.30	No LNAPL	10.72	0.00	484.58	
MW-197B-150	2/25/2015	495.29	No LNAPL	10.84	0.00	484.45	
MW-197B-150	3/18/2015	495.26	No LNAPL	10.87	0.00	484.39	
MW-197B-150	3/26/2015	495.26	No LNAPL	10.79	0.00	484.47	
MW-197B-150	4/16/2015	495.29	--	10.66	--	484.63	
MW-197B-150	5/21/2015	495.30	No LNAPL	10.41	0.00	484.89	
MW-197B-150	6/10/2015	495.32	No LNAPL	10.43	0.00	484.89	
MW-197B-150	8/19/2015	495.31	No LNAPL	9.65	0.00	485.69	
MW-197B-150	10/6/2015	495.30	No LNAPL	9.98	0.00	485.33	
MW-197B-150	1/19/2016	495.30	--	11.01	--	484.25	
MW-197B-150	5/26/2016	495.32	No LNAPL	10.65	0.00	484.69	
MW-197B-150	9/9/2016	495.31	No LNAPL	9.53	0.00	485.82	
MW-197B-150	11/15/2016	495.28	No LNAPL	10.15	0.00	485.23	
MW-197B-150	2/8/2017	495.29	No LNAPL	10.60	0.00	484.76	
MW-197B-150	6/13/2017	495.31	No LNAPL	9.91	0.00	485.45	
MW-198-150	2/18/2012	493.31	No LNAPL	8.31	0.00	485.00	
MW-198-150	4/19/2012	493.31	No LNAPL	7.60	0.00	485.71	
MW-198-150	7/30/2012	493.31	No LNAPL	6.16	0.00	487.15	
MW-198-150	11/1/2012	493.31	No LNAPL	7.65	0.00	485.66	
MW-198-150	1/24/2013	493.32	--	7.61	--	485.71	
MW-198-150	4/24/2013	493.32	No LNAPL	Frozen	0.00	—	Frozen at 7.65 ft BTOC
MW-198-150	8/1/2013	493.32	No LNAPL	6.11	0.00	487.21	
MW-198-150	10/1/2013	493.32	No LNAPL	7.75	0.00	485.57	
MW-198-150	3/18/2014	493.32	No LNAPL	8.31	0.00	485.01	
MW-198-150	6/11/2014	493.32	No LNAPL	7.70	0.00	485.62	
MW-198-150	9/9/2014	493.32	No LNAPL	6.64	0.00	486.68	
MW-198-150	11/20/2014	493.32	No LNAPL	7.38	0.00	485.94	
MW-198-150	3/18/2015	493.32	--	7.90	--	485.42	
MW-198-150	6/10/2015	493.32	No LNAPL	Frozen	0.00	—	Depth to ice is 7.57 feet

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-198-150	8/12/2015	493.32	--	6.25	--	487.07	
MW-198-150	11/20/2015	493.32	--	7.41	--	485.91	
MW-198-150	3/22/2016	493.32	No LNAPL	8.34	0.00	484.98	
MW-198-150	9/12/2016	493.33	--	6.56	--	486.77	
MW-198-150	3/15/2017	493.33	--	7.59	--	485.74	
MW-198-150	9/21/2017	493.16	--	7.36	--	485.80	
MW-198-150	9/10/2018	493.16	--	5.97	--	487.19	
MW-199-150	2/15/2012	495.89	No LNAPL	12.03	0.00	483.86	
MW-199-150	4/19/2012	495.89	--	11.36	--	484.53	
MW-199-150	7/30/2012	495.89	No LNAPL	10.07	0.00	485.82	
MW-199-150	11/1/2012	495.89	--	11.41	--	484.48	
MW-199-150	1/24/2013	495.90	--	11.37	--	484.53	
MW-199-150	4/24/2013	495.90	--	11.62	--	484.28	
MW-199-150	7/23/2013	495.92	--	10.16	--	485.76	
MW-199-150	8/1/2013	495.92	--	10.05	--	485.87	
MW-199-150	8/21/2013	495.92	No LNAPL	10.05	0.00	485.87	
MW-199-150	10/1/2013	495.90	--	11.45	--	484.45	
MW-199-150	1/9/2014	495.93	--	11.62	--	484.31	
MW-199-150	2/5/2014	495.91	--	11.72	--	484.19	
MW-199-150	3/18/2014	495.94	--	12.03	--	483.91	
MW-199-150	3/24/2014	495.94	--	12.05	--	483.89	
MW-199-150	4/18/2014	495.95	--	11.80	--	484.15	
MW-199-150	5/15/2014	495.91	--	11.39	--	484.52	
MW-199-150	6/11/2014	495.95	--	11.59	--	484.36	
MW-199-150	6/19/2014	495.95	--	11.23	--	484.72	
MW-199-150	7/15/2014	495.91	--	9.41	--	486.50	
MW-199-150	8/26/2014	495.92	--	10.10	--	485.82	
MW-199-150	9/9/2014	495.92	--	10.42	--	485.50	
MW-199-150	9/24/2014	495.90	--	10.73	--	485.17	
MW-199-150	10/21/2014	495.90	--	11.65	--	484.25	
MW-199-150	11/19/2014	495.90	--	11.23	--	484.67	
MW-199-150	12/16/2014	495.93	--	11.43	--	484.50	
MW-199-150	1/21/2015	495.91	--	11.62	--	484.29	
MW-199-150	2/25/2015	495.92	--	11.69	--	484.23	
MW-199-150	3/18/2015	495.93	--	11.75	--	484.18	
MW-199-150	3/26/2015	495.93	--	11.67	--	484.26	
MW-199-150	4/16/2015	495.92	--	11.51	--	484.41	
MW-199-150	5/21/2015	495.92	--	11.23	--	484.69	
MW-199-150	6/10/2015	495.90	--	11.29	--	484.61	
MW-199-150	8/12/2015	495.90	--	10.23	--	485.67	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-199-150	8/19/2015	495.90	--	10.48	--	485.42	
MW-199-150	10/6/2015	495.90	--	10.84	--	485.06	
MW-199-150	11/19/2015	495.90	--	11.31	--	484.59	
MW-199-150	1/19/2016	495.91	--	11.87	--	484.04	
MW-199-150	3/22/2016	495.91	No LNAPL	12.12	0.00	483.79	
MW-199-150	5/26/2016	495.90	--	11.46	--	484.44	
MW-199-150	8/9/2016	495.91	--	9.36	--	486.55	
MW-199-150	9/9/2016	495.90	--	10.38	--	485.52	
MW-199-150	9/13/2016	495.90	--	10.52	--	485.38	
MW-199-150	11/15/2016	495.91	--	10.96	--	484.95	
MW-199-150	2/8/2017	495.91	--	11.40	--	484.51	
MW-199-150	3/14/2017	495.91	--	11.48	--	484.43	
MW-199-150	6/13/2017	495.89	--	10.70	--	485.19	
MW-300-150	2/16/2012	495.98	No LNAPL	11.02	0.00	484.96	
MW-300-150	4/19/2012	495.98	No LNAPL	10.34	0.00	485.64	
MW-300-150	7/30/2012	495.98	No LNAPL	9.00	0.00	486.98	
MW-300-150	11/1/2012	495.98	No LNAPL	10.45	0.00	485.53	
MW-300-150	1/24/2013	496.00	--	10.34	--	485.66	
MW-300-150	4/24/2013	496.00	No LNAPL	10.58	0.00	485.42	
MW-300-150	8/1/2013	496.00	No LNAPL	9.98	0.00	486.02	
MW-300-150	10/1/2013	496.00	No LNAPL	10.36	0.00	485.64	
MW-300-150	3/18/2014	496.00	No LNAPL	10.98	0.00	485.02	
MW-300-150	6/11/2014	496.04	No LNAPL	10.55	0.00	485.49	
MW-300-150	9/9/2014	496.04	No LNAPL	9.21	0.00	486.83	
MW-300-150	11/20/2014	496.04	No LNAPL	10.04	0.00	486.00	
MW-300-150	3/19/2015	496.04	--	10.53	--	485.51	
MW-300-150	6/11/2015	496.04	No LNAPL	10.12	0.00	485.92	
MW-300-150	8/12/2015	496.03	--	8.98	--	487.05	
MW-300-150	11/19/2015	496.03	--	10.15	--	485.88	
MW-300-150	3/22/2016	496.03	No LNAPL	11.00	0.00	485.03	
MW-300-150	9/12/2016	496.02	--	9.19	--	486.83	
MW-300-150	3/14/2017	496.02	--	10.21	--	485.81	
MW-300-150	9/21/2017	496.03	--	10.15	--	485.88	
MW-300-150	3/12/2018	496.03	--	10.58	--	485.45	
MW-300-150	9/10/2018	495.94	--	8.77	--	487.17	
MW-301-CMT-10	2/15/2012	—	--	9.57	--	—	
MW-301-CMT-10	4/20/2012	—	--	Frozen	--	—	Frozen at 9.50 ft BTOC
MW-301-CMT-10	7/31/2012	—	--	7.61	--	—	
MW-301-CMT-10	11/1/2012	—	--	8.99	--	—	
MW-301-CMT-10	1/24/2013	—	--	8.98	--	—	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-301-CMT-10	4/24/2013	—	--	Frozen	--	—	Frozen at 9.15 ft BTOC
MW-301-CMT-10	8/1/2013	—	--	7.64	--	—	
MW-301-CMT-10	10/1/2013	493.00	--	9.10	--	483.90	
MW-301-CMT-10	1/9/2014	493.15	--	6.34	--	486.81	
MW-301-CMT-10	2/5/2014	493.14	--	9.48	--	483.66	
MW-301-CMT-10	3/18/2014	493.18	--	9.80	--	483.38	
MW-301-CMT-10	3/24/2014	493.18	--	9.87	--	483.31	
MW-301-CMT-10	4/18/2014	493.13	--	9.54	--	483.59	
MW-301-CMT-10	5/15/2014	493.15	--	9.28	--	483.87	
MW-301-CMT-10	6/11/2014	493.16	--	9.48	--	483.68	
MW-301-CMT-10	6/19/2014	493.16	--	6.11	--	487.05	
MW-301-CMT-10	7/15/2014	493.13	--	7.22	--	485.91	
MW-301-CMT-10	9/9/2014	493.13	--	8.29	--	484.84	
MW-301-CMT-10	11/20/2014	493.13	--	9.22	--	483.91	
MW-301-CMT-10	3/19/2015	493.13	--	9.89	--	483.24	
MW-301-CMT-10	6/10/2015	493.13	--	9.38	--	483.75	
MW-301-CMT-10	8/12/2015	493.27	--	8.28	--	484.99	
MW-301-CMT-10	11/19/2015	493.27	--	9.49	--	483.78	
MW-301-CMT-10	3/22/2016	493.27	--	10.43	--	482.84	
MW-301-CMT-10	7/15/2016	492.79	--	7.37	--	485.42	
MW-301-CMT-10	9/13/2016	492.79	--	8.00	--	484.79	
MW-301-CMT-10	3/15/2017	492.79	--	9.30	--	483.49	
MW-301-CMT-20	2/15/2012	—	--	9.57	--	—	
MW-301-CMT-20	4/20/2012	—	--	Frozen	--	—	Frozen at 9.49 ft BTOC
MW-301-CMT-20	7/31/2012	—	--	7.60	--	—	
MW-301-CMT-20	11/1/2012	—	--	8.98	--	—	
MW-301-CMT-20	1/24/2013	—	--	8.97	--	—	
MW-301-CMT-20	4/24/2013	—	--	Frozen	--	—	Frozen at 9.17 ft BTOC
MW-301-CMT-20	8/1/2013	—	--	7.62	--	—	
MW-301-CMT-20	10/1/2013	—	--	9.11	--	—	
MW-301-CMT-20	3/18/2014	—	--	9.79	--	—	
MW-301-CMT-20	6/11/2014	493.15	--	9.47	--	483.68	
MW-301-CMT-20	9/9/2014	493.15	--	8.27	--	484.88	
MW-301-CMT-20	11/20/2014	493.15	--	9.13	--	484.02	
MW-301-CMT-20	3/19/2015	493.15	--	9.88	--	483.27	
MW-301-CMT-20	6/10/2015	493.15	--	9.39	--	483.76	
MW-301-CMT-20	8/12/2015	493.27	--	8.29	--	484.98	
MW-301-CMT-20	11/19/2015	493.27	--	9.46	--	483.81	
MW-301-CMT-20	7/15/2016	492.79	--	7.35	--	485.44	
MW-301-CMT-20	7/26/2017	492.79	--	7.55	--	485.24	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-301-CMT-20	10/16/2017	492.79	--	8.82	--	483.97	
MW-301-CMT-20	1/18/2018	492.79	--	8.97	--	483.82	
MW-301-CMT-20	4/4/2018	492.79	--	9.45	--	483.34	
MW-301-CMT-30	2/15/2012	—	--	9.58	--	—	
MW-301-CMT-30	4/20/2012	—	--	Frozen	--	—	Frozen at 9.38 ft BTOC
MW-301-CMT-30	7/31/2012	—	--	7.61	--	—	
MW-301-CMT-30	11/1/2012	—	--	8.98	--	—	
MW-301-CMT-30	1/24/2013	—	--	8.97	--	—	
MW-301-CMT-30	4/24/2013	—	--	Frozen	--	—	Frozen at 9.15 ft BTOC
MW-301-CMT-30	8/1/2013	—	--	7.63	--	—	
MW-301-CMT-30	10/1/2013	—	--	9.12	--	—	
MW-301-CMT-30	3/18/2014	—	--	9.81	--	—	
MW-301-CMT-30	6/11/2014	493.15	--	9.50	--	483.65	
MW-301-CMT-30	9/9/2014	493.15	--	8.28	--	484.87	
MW-301-CMT-30	11/20/2014	493.15	--	9.13	--	484.02	
MW-301-CMT-30	3/19/2015	493.15	--	9.89	--	483.26	
MW-301-CMT-30	6/10/2015	493.15	--	9.38	--	483.77	
MW-301-CMT-30	8/12/2015	493.27	--	8.30	--	484.97	
MW-301-CMT-30	11/19/2015	493.27	--	9.47	--	483.80	
MW-301-CMT-30	7/15/2016	492.79	--	7.38	--	485.41	
MW-301-CMT-40	2/15/2012	—	--	9.59	--	—	
MW-301-CMT-40	4/20/2012	—	--	Frozen	--	—	Frozen at 8.70 ft BTOC
MW-301-CMT-40	7/31/2012	—	--	7.66	--	—	
MW-301-CMT-40	11/1/2012	—	--	8.99	--	—	
MW-301-CMT-40	1/24/2013	—	--	8.98	--	—	
MW-301-CMT-40	4/24/2013	—	--	Frozen	--	—	Frozen at 9.16 ft BTOC
MW-301-CMT-40	8/1/2013	—	--	7.64	--	—	
MW-301-CMT-40	10/1/2013	—	--	9.12	--	—	
MW-301-CMT-40	3/18/2014	—	--	9.81	--	—	
MW-301-CMT-40	6/11/2014	493.15	--	9.50	--	483.65	
MW-301-CMT-40	9/9/2014	493.15	--	8.29	--	484.86	
MW-301-CMT-40	11/20/2014	493.15	--	9.12	--	484.03	
MW-301-CMT-40	3/19/2015	493.15	--	9.90	--	483.25	
MW-301-CMT-40	6/10/2015	493.15	--	9.38	--	483.77	
MW-301-CMT-40	8/12/2015	493.27	--	8.29	--	484.98	
MW-301-CMT-40	11/19/2015	493.27	--	9.49	--	483.78	
MW-301-CMT-40	7/15/2016	492.79	--	7.39	--	485.40	
MW-301-CMT-50	2/15/2012	—	--	9.70	--	—	
MW-301-CMT-50	4/20/2012	—	--	Frozen	--	—	Frozen at 9.36 ft BTOC
MW-301-CMT-50	7/31/2012	—	--	7.62	--	—	

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Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-301-CMT-50	11/1/2012	—	--	9.10	--	—	
MW-301-CMT-50	1/24/2013	—	--	8.98	--	—	
MW-301-CMT-50	4/24/2013	—	--	Frozen	--	—	Frozen at 9.16 ft BTOC
MW-301-CMT-50	8/1/2013	—	--	7.66	--	—	
MW-301-CMT-50	10/1/2013	—	--	9.13	--	—	
MW-301-CMT-50	3/18/2014	—	--	9.81	--	—	
MW-301-CMT-50	6/11/2014	493.15	--	9.48	--	483.67	
MW-301-CMT-50	9/9/2014	493.15	--	8.27	--	484.88	
MW-301-CMT-50	11/20/2014	493.15	No LNAPL	9.20	0.00	483.95	
MW-301-CMT-50	3/19/2015	493.15	--	9.90	--	483.25	
MW-301-CMT-50	6/10/2015	493.15	--	9.39	--	483.76	
MW-301-CMT-50	8/12/2015	493.27	--	8.31	--	484.96	
MW-301-CMT-50	11/19/2015	493.27	--	9.47	--	483.80	
MW-301-CMT-50	7/15/2016	492.79	--	7.38	--	485.41	
MW-301-60	2/15/2012	492.76	--	9.52	--	483.24	
MW-301-60	4/20/2012	492.76	--	8.78	--	483.98	
MW-301-60	7/31/2012	492.76	--	7.59	--	485.17	
MW-301-60	11/1/2012	492.76	--	8.94	--	483.82	
MW-301-60	1/24/2013	492.85	--	8.72	--	484.13	
MW-301-60	4/24/2013	492.85	--	Frozen	--	—	Frozen at 9.24 ft BTOC
MW-301-60	8/1/2013	492.85	--	7.25	--	485.60	
MW-301-60	10/1/2013	492.61	No LNAPL	8.75	0.00	483.86	
MW-301-60	3/18/2014	492.65	--	9.32	--	483.33	
MW-301-60	4/25/2014	492.60	--	8.38	--	484.22	
MW-301-60	5/20/2014	492.66	--	8.84	--	483.82	
MW-301-60	6/4/2014	492.65	--	9.02	--	483.63	
MW-301-60	6/11/2014	492.65	--	8.98	--	483.67	
MW-301-60	9/9/2014	492.65	--	7.85	--	484.80	
MW-301-60	11/20/2014	492.65	No LNAPL	8.69	0.00	483.96	
MW-301-60	3/19/2015	492.54	--	9.22	--	483.32	
MW-301-60	6/10/2015	492.86	--	8.74	--	484.12	
MW-301-60	8/12/2015	492.86	--	7.65	--	485.21	Datalogger was found displaced on arrival- reset to proper position
MW-301-60	11/19/2015	492.86	--	8.84	--	484.02	
MW-301-60	3/22/2016	492.75	No LNAPL	9.58	0.00	483.17	
MW-301-60	7/21/2016	492.75	--	6.68	--	486.07	
MW-301-60	9/13/2016	492.75	--	8.11	--	484.64	
MW-301-60	3/15/2017	492.75	--	9.08	--	483.67	
MW-301-60	7/14/2017	492.75	--	7.56	--	485.19	
MW-301-60	9/21/2017	492.87	--	8.99	--	483.88	
MW-301-60	10/16/2017	492.87	--	8.91	--	483.96	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-301-60	1/16/2018	492.87	--	9.12	--	483.75	
MW-301-60	3/12/2018	492.87	--	9.37	--	483.50	
MW-301-60	4/6/2018	492.87	--	9.41	--	483.46	
MW-301-60	9/10/2018	492.70	--	7.67	--	485.03	
MW-301-70	2/15/2012	—	--	9.09	--	—	
MW-301-70	4/20/2012	—	--	8.37	--	—	
MW-301-70	7/31/2012	—	--	7.18	--	—	
MW-301-70	11/1/2012	—	--	8.52	--	—	
MW-301-70	1/24/2013	492.46	--	8.59	--	483.87	
MW-301-70	4/24/2013	492.46	--	9.89	--	482.57	
MW-301-70	8/1/2013	492.46	--	7.26	--	485.20	
MW-301-70	10/1/2013	492.65	No LNAPL	8.78	0.00	483.87	
MW-301-70	1/9/2014	492.73	--	8.92	--	483.81	
MW-301-70	2/5/2014	492.72	--	9.08	--	483.64	
MW-301-70	3/18/2014	492.77	--	9.37	--	483.40	
MW-301-70	3/24/2014	492.77	--	9.40	--	483.37	
MW-301-70	4/18/2014	492.70	--	9.10	--	483.60	
MW-301-70	4/25/2014	492.70	--	8.45	--	484.25	
MW-301-70	5/15/2014	492.73	--	8.81	--	483.92	
MW-301-70	5/20/2014	492.77	--	8.93	--	483.84	
MW-301-70	6/4/2014	492.76	--	9.10	--	483.66	
MW-301-70	6/11/2014	492.73	--	9.06	--	483.67	
MW-301-70	6/19/2014	492.73	--	8.69	--	484.04	
MW-301-70	7/15/2014	492.74	--	6.85	--	485.89	
MW-301-70	8/26/2014	492.75	--	7.60	--	485.15	
MW-301-70	9/9/2014	492.75	--	7.94	--	484.81	
MW-301-70	9/24/2014	492.75	--	8.22	--	484.53	
MW-301-70	10/21/2014	492.72	--	9.14	--	483.58	
MW-301-70	11/19/2014	492.66	--	8.69	--	483.97	
MW-301-70	11/20/2014	492.66	No LNAPL	8.68	0.00	483.98	
MW-301-70	12/16/2014	492.62	--	8.91	--	483.71	
MW-301-70	1/21/2015	492.63	--	9.15	--	483.48	
MW-301-70	2/25/2015	492.64	--	9.22	--	483.42	
MW-301-70	3/18/2015	492.85	--	9.28	--	483.57	
MW-301-70	3/19/2015	492.85	--	9.26	--	483.59	
MW-301-70	3/26/2015	492.85	--	9.20	--	483.65	
MW-301-70	4/16/2015	492.85	--	9.06	--	483.79	
MW-301-70	5/21/2015	492.85	--	8.76	--	484.09	
MW-301-70	6/10/2015	492.51	--	8.35	--	484.16	
MW-301-70	6/10/2015	492.51	--	8.39	--	484.12	

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Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-301-70	8/12/2015	492.51	--	7.27	--	485.24	Datalogger was found displaced on arrival - reset to proper position
MW-301-70	8/19/2015	492.51	--	7.55	--	484.96	
MW-301-70	10/6/2015	492.52	--	8.01	--	484.51	
MW-301-70	11/19/2015	492.50	--	8.45	--	484.05	
MW-301-70	1/19/2016	492.51	--	8.95	--	483.56	
MW-301-70	3/22/2016	492.41	No LNAPL	9.25	0.00	483.16	
MW-301-70	5/26/2016	492.51	--	8.57	--	483.94	
MW-301-70	7/21/2016	492.47	--	6.33	--	486.14	
MW-301-70	9/9/2016	492.51	--	7.62	--	484.89	
MW-301-70	9/13/2016	492.51	--	7.74	--	484.77	
MW-301-70	11/15/2016	492.47	--	8.18	--	484.29	
MW-301-70	2/8/2017	492.49	--	8.69	--	483.80	
MW-301-70	3/15/2017	492.49	--	8.79	--	483.70	
MW-301-70	6/13/2017	492.61	--	8.00	--	484.61	
MW-302-CMT-10	2/15/2012	—	--	11.05	--	—	
MW-302-CMT-10	4/20/2012	—	--	10.27	--	—	
MW-302-CMT-10	7/31/2012	—	--	9.13	--	—	
MW-302-CMT-10	11/1/2012	—	--	10.50	--	—	
MW-302-CMT-10	1/24/2013	—	--	10.36	--	—	
MW-302-CMT-10	4/24/2013	—	--	10.71	--	—	
MW-302-CMT-10	8/1/2013	—	--	9.02	--	—	
MW-302-CMT-10	10/1/2013	—	--	10.42	--	—	
MW-302-CMT-10	3/18/2014	—	--	10.97	--	—	
MW-302-CMT-10	6/11/2014	494.27	--	10.60	--	483.67	
MW-302-CMT-10	9/9/2014	494.27	--	9.42	--	484.85	
MW-302-CMT-10	11/20/2014	494.27	--	10.21	--	484.06	
MW-302-CMT-10	3/19/2015	494.27	--	10.78	--	483.49	
MW-302-CMT-10	6/10/2015	494.27	--	10.29	--	483.98	
MW-302-CMT-10	8/12/2015	494.24	--	9.24	--	485.00	
MW-302-CMT-10	11/19/2015	494.24	--	10.39	--	483.85	
MW-302-CMT-10	7/14/2016	494.16	--	8.95	--	485.21	
MW-302-CMT-10	9/13/2016	494.16	--	9.60	--	484.56	
MW-302-CMT-10	3/15/2017	494.16	--	10.60	--	483.56	
MW-302-CMT-20	2/15/2012	—	--	11.05	--	—	
MW-302-CMT-20	4/20/2012	—	--	10.25	--	—	
MW-302-CMT-20	7/31/2012	—	--	9.12	--	—	
MW-302-CMT-20	11/1/2012	—	--	10.47	--	—	
MW-302-CMT-20	1/24/2013	—	--	10.35	--	—	
MW-302-CMT-20	4/24/2013	—	--	10.70	--	—	
MW-302-CMT-20	8/1/2013	—	--	9.03	--	—	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-302-CMT-20	10/1/2013	—	--	10.41	--	—	
MW-302-CMT-20	3/18/2014	—	--	10.96	--	—	
MW-302-CMT-20	6/11/2014	494.27	--	10.59	--	483.68	
MW-302-CMT-20	9/9/2014	494.27	--	9.43	--	484.84	
MW-302-CMT-20	11/20/2014	494.27	--	10.25	--	484.02	
MW-302-CMT-20	3/19/2015	494.27	--	10.77	--	483.50	
MW-302-CMT-20	6/10/2015	494.27	--	10.29	--	483.98	
MW-302-CMT-20	8/12/2015	494.24	--	9.24	--	485.00	
MW-302-CMT-20	11/19/2015	494.24	--	10.39	--	483.85	
MW-302-CMT-20	7/14/2016	494.16	--	8.95	--	485.21	
MW-302-CMT-20	10/19/2016	494.16	--	10.49	--	483.67	
MW-302-CMT-20	7/31/2017	494.16	--	9.27	--	484.89	
MW-302-CMT-20	10/17/2017	494.16	--	10.37	--	483.79	
MW-302-CMT-20	2/12/2018	494.16	--	10.90	--	483.26	
MW-302-CMT-20	4/5/2018	494.16	--	10.86	--	483.30	
MW-302-CMT-20	7/11/2018	494.16	--	8.96	--	485.20	
MW-302-CMT-30	2/15/2012	—	--	11.10	--	—	
MW-302-CMT-30	4/20/2012	—	--	10.25	--	—	
MW-302-CMT-30	7/31/2012	—	--	9.12	--	—	
MW-302-CMT-30	11/1/2012	—	--	10.48	--	—	
MW-302-CMT-30	1/24/2013	—	--	10.35	--	—	
MW-302-CMT-30	4/24/2013	—	--	10.70	--	—	
MW-302-CMT-30	8/1/2013	—	--	9.02	--	—	
MW-302-CMT-30	10/1/2013	—	--	10.41	--	—	
MW-302-CMT-30	3/18/2014	—	--	10.96	--	—	
MW-302-CMT-30	6/11/2014	494.27	--	10.60	--	483.67	
MW-302-CMT-30	9/9/2014	494.27	--	9.43	--	484.84	
MW-302-CMT-30	11/20/2014	494.27	--	10.21	--	484.06	
MW-302-CMT-30	3/19/2015	494.27	--	10.77	--	483.50	
MW-302-CMT-30	6/10/2015	494.27	--	10.29	--	483.98	
MW-302-CMT-30	8/12/2015	494.24	--	9.24	--	485.00	
MW-302-CMT-30	11/19/2015	494.24	--	10.38	--	483.86	
MW-302-CMT-30	7/14/2016	494.16	--	8.94	--	485.22	
MW-302-CMT-40	2/15/2012	—	--	11.13	--	—	
MW-302-CMT-40	4/20/2012	—	--	10.26	--	—	
MW-302-CMT-40	7/31/2012	—	--	9.10	--	—	
MW-302-CMT-40	11/1/2012	—	--	10.47	--	—	
MW-302-CMT-40	1/24/2013	—	--	10.37	--	—	
MW-302-CMT-40	4/24/2013	—	--	10.69	--	—	
MW-302-CMT-40	8/1/2013	—	--	9.06	--	—	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-302-CMT-40	10/1/2013	—	--	10.40	--	—	
MW-302-CMT-40	3/18/2014	—	--	10.96	--	—	
MW-302-CMT-40	6/11/2014	494.27	--	10.60	--	483.67	
MW-302-CMT-40	9/9/2014	494.27	--	9.42	--	484.85	
MW-302-CMT-40	11/20/2014	494.27	--	10.21	--	484.06	
MW-302-CMT-40	3/19/2015	494.27	--	10.77	--	483.50	
MW-302-CMT-40	6/10/2015	494.27	--	10.28	--	483.99	
MW-302-CMT-40	8/12/2015	494.24	--	9.23	--	485.01	
MW-302-CMT-40	11/19/2015	494.24	--	10.36	--	483.88	
MW-302-CMT-40	7/14/2016	494.16	--	8.94	--	485.22	
MW-302-CMT-50	2/15/2012	—	--	11.15	--	—	
MW-302-CMT-50	4/20/2012	—	--	10.27	--	—	
MW-302-CMT-50	7/31/2012	—	--	9.13	--	—	
MW-302-CMT-50	11/1/2012	—	--	10.48	--	—	
MW-302-CMT-50	1/24/2013	—	--	10.36	--	—	
MW-302-CMT-50	4/24/2013	—	--	10.70	--	—	
MW-302-CMT-50	8/1/2013	—	--	9.05	--	—	
MW-302-CMT-50	10/1/2013	—	--	10.40	--	—	
MW-302-CMT-50	3/18/2014	—	--	10.97	--	—	
MW-302-CMT-50	6/11/2014	494.27	--	10.61	--	483.66	
MW-302-CMT-50	9/9/2014	494.27	--	9.43	--	484.84	
MW-302-CMT-50	11/20/2014	494.27	--	10.23	--	484.04	
MW-302-CMT-50	3/19/2015	494.27	--	10.77	--	483.50	
MW-302-CMT-50	6/10/2015	494.27	--	10.29	--	483.98	
MW-302-CMT-50	8/12/2015	494.24	--	9.25	--	484.99	
MW-302-CMT-50	11/19/2015	494.24	--	10.39	--	483.85	
MW-302-CMT-50	3/22/2016	494.24	--	11.12	--	483.12	
MW-302-CMT-50	7/14/2016	494.16	--	8.96	--	485.20	
MW-302-CMT-50	9/13/2016	494.16	--	9.61	--	484.55	
MW-302-CMT-50	3/15/2017	494.16	--	10.60	--	483.56	
MW-302-CMT-50	7/31/2017	494.16	--	9.41	--	484.75	
MW-302-CMT-50	9/21/2017	494.16	--	10.41	--	483.75	
MW-302-CMT-50	10/17/2017	494.16	--	10.38	--	483.78	
MW-302-CMT-50	2/12/2018	494.16	--	10.91	--	483.25	
MW-302-CMT-50	3/13/2018	494.16	--	10.74	--	483.42	
MW-302-CMT-50	4/5/2018	494.16	--	10.87	--	483.29	
MW-302-CMT-50	9/10/2018	494.21	--	9.11	--	485.10	
MW-302-70	2/15/2012	493.25	--	9.96	--	483.29	
MW-302-70	4/20/2012	493.25	--	9.24	--	484.01	
MW-302-70	7/31/2012	493.25	--	8.32	--	484.93	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-302-70	11/1/2012	493.25	--	9.41	--	483.84	
MW-302-70	1/24/2013	493.29	--	9.26	--	484.03	
MW-302-70	4/24/2013	493.29	--	9.51	--	483.78	
MW-302-70	8/1/2013	493.29	--	8.03	--	485.26	
MW-302-70	10/1/2013	493.29	No LNAPL	9.43	0.00	483.86	
MW-302-70	3/18/2014	493.29	--	9.92	--	483.37	
MW-302-70	6/11/2014	493.16	--	9.58	--	483.58	
MW-302-70	9/9/2014	493.16	--	8.43	--	484.73	
MW-302-70	11/20/2014	493.16	No LNAPL	9.23	0.00	483.93	
MW-302-70	3/19/2015	493.16	--	9.72	--	483.44	
MW-302-70	6/10/2015	493.16	--	9.30	--	483.86	
MW-302-70	8/12/2015	493.27	--	8.24	--	485.03	
MW-302-70	11/19/2015	493.27	--	9.39	--	483.88	
MW-302-70	7/14/2016	493.25	--	8.11	--	485.14	
MW-302-80	2/15/2012	493.46	--	10.19	--	483.27	
MW-302-80	4/20/2012	493.46	--	9.45	--	484.01	
MW-302-80	7/31/2012	493.46	--	8.10	--	485.36	
MW-302-80	11/1/2012	493.46	--	9.67	--	483.79	
MW-302-80	1/24/2013	493.49	--	9.51	--	483.98	
MW-302-80	4/24/2013	493.49	--	9.73	--	483.76	
MW-302-80	8/1/2013	493.49	--	8.23	--	485.26	
MW-302-80	10/1/2013	493.49	No LNAPL	9.66	0.00	483.83	
MW-302-80	3/18/2014	493.49	--	10.19	--	483.30	
MW-302-80	6/11/2014	493.38	--	9.81	--	483.57	
MW-302-80	9/9/2014	493.38	--	8.69	--	484.69	
MW-302-80	11/20/2014	493.38	No LNAPL	9.45	0.00	483.93	
MW-302-80	3/19/2015	493.38	--	9.94	--	483.44	
MW-302-80	6/10/2015	493.38	--	9.52	--	483.86	
MW-302-80	8/12/2015	493.48	--	8.48	--	485.00	
MW-302-80	11/19/2015	493.48	--	9.61	--	483.87	
MW-302-80	7/14/2016	493.46	--	8.29	--	485.17	
MW-302-80	9/13/2016	493.46	--	8.83	--	484.63	
MW-302-80	3/15/2017	493.46	--	9.78	--	483.68	
MW-302-80	8/1/2017	493.46	--	8.46	--	485.00	
MW-302-80	9/21/2017	493.67	--	9.68	--	483.99	
MW-302-80	10/16/2017	493.67	--	9.64	--	484.03	
MW-302-80	2/13/2018	493.67	--	10.15	--	483.52	
MW-302-80	3/13/2018	493.67	--	10.04	--	483.63	
MW-302-80	4/5/2018	493.67	--	10.10	--	483.57	
MW-302-80	9/10/2018	493.41	--	8.35	--	485.06	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-302-95	7/31/2012	492.93	--	7.84	--	485.09	
MW-302-95	11/1/2012	492.93	--	9.12	--	483.81	
MW-302-95	1/24/2013	493.00	--	8.96	--	484.04	
MW-302-95	4/24/2013	493.00	--	9.23	--	483.77	
MW-302-95	8/1/2013	493.00	--	5.75	--	487.25	
MW-302-95	10/1/2013	493.00	No LNAPL	9.15	0.00	483.85	
MW-302-95	3/18/2014	493.00	--	9.93	--	483.07	
MW-302-95	6/11/2014	492.85	--	9.30	--	483.55	
MW-302-95	9/9/2014	492.85	--	8.15	--	484.70	
MW-302-95	11/20/2014	492.85	No LNAPL	8.95	0.00	483.90	
MW-302-95	3/19/2015	492.85	--	9.42	--	483.43	
MW-302-95	6/10/2015	492.85	--	9.00	--	483.85	
MW-302-95	8/12/2015	492.95	--	7.95	--	485.00	
MW-302-95	11/19/2015	492.95	--	9.08	--	483.87	
MW-302-95	7/14/2016	492.93	--	7.79	--	485.14	
MW-302-110	2/15/2012	493.60	--	10.37	--	483.23	
MW-302-110	4/20/2012	493.60	--	9.64	--	483.96	
MW-302-110	7/31/2012	493.60	--	8.49	--	485.11	
MW-302-110	11/1/2012	493.60	--	9.83	--	483.77	
MW-302-110	1/24/2013	493.65	--	9.68	--	483.97	
MW-302-110	4/24/2013	493.65	--	9.93	--	483.72	
MW-302-110	8/1/2013	493.65	--	8.41	--	485.24	
MW-302-110	10/1/2013	493.65	No LNAPL	9.83	0.00	483.82	
MW-302-110	3/18/2014	493.65	--	10.38	--	483.27	
MW-302-110	6/11/2014	493.58	--	10.00	--	483.58	
MW-302-110	9/9/2014	493.58	--	8.85	--	484.73	
MW-302-110	11/20/2014	493.58	No LNAPL	9.61	0.00	483.97	
MW-302-110	3/19/2015	493.58	--	10.13	--	483.45	
MW-302-110	6/10/2015	493.58	--	9.70	--	483.88	
MW-302-110	8/12/2015	493.66	--	8.65	--	485.01	
MW-302-110	11/19/2015	493.66	--	9.78	--	483.88	
MW-302-110	7/14/2016	493.65	--	8.47	--	485.18	
MW-302-110	9/13/2016	493.65	--	9.01	--	484.64	
MW-302-110	3/15/2017	493.65	--	9.98	--	483.67	
MW-303-CMT-9	2/15/2012	—	--	12.62	--	—	
MW-303-CMT-9	4/20/2012	—	--	11.73	--	—	
MW-303-CMT-9	7/31/2012	—	--	10.69	--	—	
MW-303-CMT-9	11/1/2012	—	--	12.02	--	—	
MW-303-CMT-9	1/24/2013	—	--	12.00	--	—	
MW-303-CMT-9	4/24/2013	—	--	12.27	--	—	

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Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-303-CMT-9	8/1/2013	—	--	10.87	--	—	
MW-303-CMT-9	10/1/2013	—	--	11.85	--	—	
MW-303-CMT-9	3/18/2014	—	--	12.63	--	—	
MW-303-CMT-9	6/11/2014	495.91	--	12.70	--	483.21	
MW-303-CMT-9	9/9/2014	495.91	--	10.84	--	485.07	
MW-303-CMT-9	11/20/2014	495.91	--	11.76	--	484.15	
MW-303-CMT-9	3/19/2015	495.91	--	12.46	--	483.45	
MW-303-CMT-9	6/10/2015	495.91	--	11.75	--	484.16	
MW-303-CMT-9	8/12/2015	495.73	--	10.74	--	484.99	
MW-303-CMT-9	11/19/2015	495.73	--	11.87	--	483.86	
MW-303-CMT-9	7/14/2016	495.67	--	10.59	--	485.08	
MW-303-CMT-9	9/13/2016	495.67	--	11.01	--	484.66	
MW-303-CMT-9	3/15/2017	495.67	--	12.28	--	483.39	
MW-303-CMT-19	2/15/2012	—	--	12.64	--	—	
MW-303-CMT-19	4/20/2012	—	--	11.74	--	—	
MW-303-CMT-19	7/31/2012	—	--	10.70	--	—	
MW-303-CMT-19	11/1/2012	—	--	12.02	--	—	
MW-303-CMT-19	1/24/2013	—	--	11.59	--	—	
MW-303-CMT-19	4/24/2013	—	--	12.25	--	—	
MW-303-CMT-19	8/1/2013	—	--	10.89	--	—	
MW-303-CMT-19	10/1/2013	—	--	11.86	--	—	
MW-303-CMT-19	3/18/2014	—	--	12.61	--	—	
MW-303-CMT-19	6/11/2014	495.91	--	11.96	--	483.95	
MW-303-CMT-19	9/9/2014	495.91	--	10.85	--	485.06	
MW-303-CMT-19	11/20/2014	495.91	--	11.78	--	484.13	
MW-303-CMT-19	3/19/2015	495.91	--	12.46	--	483.45	
MW-303-CMT-19	6/10/2015	495.91	--	11.76	--	484.15	
MW-303-CMT-19	8/12/2015	495.73	--	10.74	--	484.99	
MW-303-CMT-19	11/19/2015	495.73	--	11.87	--	483.86	
MW-303-CMT-19	7/14/2016	495.67	--	10.59	--	485.08	
MW-303-CMT-19	7/28/2017	495.67	--	10.75	--	484.92	
MW-303-CMT-19	10/17/2017	495.67	--	11.87	--	483.80	
MW-303-CMT-19	2/12/2018	495.67	--	12.55	--	483.12	
MW-303-CMT-19	4/5/2018	495.67	--	12.56	--	483.11	
MW-303-CMT-19	7/11/2018	495.67	--	10.50	--	485.17	
MW-303-CMT-29	2/15/2012	—	--	12.65	--	—	
MW-303-CMT-29	4/20/2012	—	--	11.75	--	—	
MW-303-CMT-29	7/31/2012	—	--	10.70	--	—	
MW-303-CMT-29	11/1/2012	—	--	12.02	--	—	
MW-303-CMT-29	1/24/2013	—	--	11.59	--	—	

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Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-303-CMT-29	4/24/2013	—	--	12.25	--	—	
MW-303-CMT-29	8/1/2013	—	--	10.86	--	—	
MW-303-CMT-29	10/1/2013	—	--	11.86	--	—	
MW-303-CMT-29	3/18/2014	—	--	12.62	--	—	
MW-303-CMT-29	6/11/2014	495.91	--	12.06	--	483.85	
MW-303-CMT-29	9/9/2014	495.91	--	10.86	--	485.05	
MW-303-CMT-29	11/20/2014	495.91	--	11.77	--	484.14	
MW-303-CMT-29	3/19/2015	495.91	--	12.46	--	483.45	
MW-303-CMT-29	6/10/2015	495.91	--	11.77	--	484.14	
MW-303-CMT-29	8/12/2015	495.73	--	10.74	--	484.99	
MW-303-CMT-29	11/19/2015	495.73	--	11.86	--	483.87	
MW-303-CMT-29	7/14/2016	495.67	--	10.61	--	485.06	
MW-303-CMT-39	2/15/2012	—	--	12.64	--	—	
MW-303-CMT-39	4/20/2012	—	--	11.71	--	—	
MW-303-CMT-39	7/31/2012	—	--	10.70	--	—	
MW-303-CMT-39	11/1/2012	—	--	12.02	--	—	
MW-303-CMT-39	1/24/2013	—	--	12.01	--	—	
MW-303-CMT-39	4/24/2013	—	--	12.25	--	—	
MW-303-CMT-39	8/1/2013	—	--	10.86	--	—	
MW-303-CMT-39	10/1/2013	—	--	11.86	--	—	
MW-303-CMT-39	3/18/2014	—	--	12.61	--	—	
MW-303-CMT-39	6/11/2014	495.91	--	12.06	--	483.85	
MW-303-CMT-39	9/9/2014	495.91	--	10.87	--	485.04	
MW-303-CMT-39	11/20/2014	495.91	--	11.78	--	484.13	
MW-303-CMT-39	3/19/2015	495.91	--	12.46	--	483.45	
MW-303-CMT-39	6/10/2015	495.91	--	11.75	--	484.16	
MW-303-CMT-39	8/12/2015	495.73	--	10.75	--	484.98	
MW-303-CMT-39	11/19/2015	495.73	--	11.86	--	483.87	
MW-303-CMT-39	7/14/2016	495.67	--	10.59	--	485.08	
MW-303-CMT-39	7/28/2017	495.67	--	10.75	--	484.92	
MW-303-CMT-39	10/17/2017	495.67	--	11.88	--	483.79	
MW-303-CMT-39	2/12/2018	495.67	--	12.55	--	483.12	
MW-303-CMT-39	4/5/2018	495.67	--	12.57	--	483.10	
MW-303-CMT-39	8/2/2018	495.67	--	10.79	--	484.88	
MW-303-CMT-49	2/15/2012	—	--	12.64	--	—	
MW-303-CMT-49	4/20/2012	—	--	11.73	--	—	
MW-303-CMT-49	7/31/2012	—	--	10.70	--	—	
MW-303-CMT-49	11/1/2012	—	--	12.02	--	—	
MW-303-CMT-49	1/24/2013	—	--	11.59	--	—	
MW-303-CMT-49	4/24/2013	—	--	12.26	--	—	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-303-CMT-49	8/1/2013	—	--	10.86	--	—	
MW-303-CMT-49	10/1/2013	—	--	11.86	--	—	
MW-303-CMT-49	3/18/2014	—	--	12.61	--	—	
MW-303-CMT-49	6/11/2014	495.91	--	12.08	--	483.83	
MW-303-CMT-49	9/9/2014	495.91	--	10.86	--	485.05	
MW-303-CMT-49	11/20/2014	495.91	--	11.77	--	484.14	
MW-303-CMT-49	3/19/2015	495.91	--	12.47	--	483.44	
MW-303-CMT-49	6/10/2015	495.91	--	11.75	--	484.16	
MW-303-CMT-49	8/12/2015	495.73	--	10.75	--	484.98	
MW-303-CMT-49	11/19/2015	495.73	--	11.84	--	483.89	
MW-303-CMT-49	7/14/2016	495.67	--	10.61	--	485.06	
MW-303-CMT-59	2/15/2012	—	--	12.65	--	—	
MW-303-CMT-59	4/20/2012	—	--	11.75	--	—	
MW-303-CMT-59	7/31/2012	—	--	10.70	--	—	
MW-303-CMT-59	11/1/2012	—	--	12.02	--	—	
MW-303-CMT-59	1/24/2013	—	--	12.00	--	—	
MW-303-CMT-59	4/24/2013	—	--	12.26	--	—	
MW-303-CMT-59	8/1/2013	—	--	10.88	--	—	
MW-303-CMT-59	10/1/2013	—	--	11.88	--	—	
MW-303-CMT-59	3/18/2014	—	--	12.61	--	—	
MW-303-CMT-59	6/11/2014	495.91	--	12.05	--	483.86	
MW-303-CMT-59	9/9/2014	495.91	--	10.87	--	485.04	
MW-303-CMT-59	11/20/2014	495.91	--	11.78	--	484.13	
MW-303-CMT-59	3/19/2015	495.91	--	12.46	--	483.45	
MW-303-CMT-59	6/10/2015	495.91	--	11.77	--	484.14	
MW-303-CMT-59	8/12/2015	495.73	--	10.76	--	484.97	
MW-303-CMT-59	11/19/2015	495.73	--	11.86	--	483.87	
MW-303-CMT-59	3/22/2016	495.73	--	12.76	--	482.97	
MW-303-CMT-59	7/14/2016	495.67	--	10.61	--	485.06	
MW-303-CMT-59	9/13/2016	495.67	--	11.05	--	484.62	
MW-303-CMT-59	3/15/2017	495.67	--	12.29	--	483.38	
MW-303-CMT-59	7/28/2017	495.67	--	10.76	--	484.91	
MW-303-CMT-59	9/21/2017	495.70	--	11.93	--	483.77	
MW-303-CMT-59	10/17/2017	495.70	--	11.89	--	483.81	
MW-303-CMT-59	2/12/2018	495.70	--	12.55	--	483.15	
MW-303-CMT-59	3/13/2018	495.70	--	12.54	--	483.16	
MW-303-CMT-59	4/5/2018	495.70	--	12.58	--	483.12	
MW-303-CMT-59	7/11/2018	495.70	--	10.51	--	485.19	
MW-303-CMT-59	9/10/2018	495.73	--	10.61	--	485.12	
MW-303-70	2/15/2012	495.03	--	11.75	--	483.28	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-303-70	4/20/2012	495.03	--	11.02	--	484.01	
MW-303-70	7/31/2012	495.03	--	9.90	--	485.13	
MW-303-70	11/1/2012	495.03	--	11.26	--	483.77	
MW-303-70	1/24/2013	495.06	--	11.14	--	483.92	
MW-303-70	4/24/2013	495.06	--	11.39	--	483.67	
MW-303-70	8/1/2013	495.06	--	9.89	--	485.17	
MW-303-70	10/1/2013	495.06	No LNAPL	11.25	0.00	483.81	
MW-303-70	3/18/2014	491.74	--	8.49	--	483.25	
MW-303-70	6/11/2014	491.74	--	8.14	--	483.60	
MW-303-70	9/9/2014	491.74	--	6.93	--	484.81	
MW-303-70	11/20/2014	491.74	No LNAPL	7.73	0.00	484.01	
MW-303-70	3/19/2015	491.74	--	8.31	--	483.43	
MW-303-70	6/10/2015	491.74	--	7.85	--	483.89	
MW-303-70	8/12/2015	491.82	--	6.84	--	484.98	Casing needs to be cut
MW-303-70	11/19/2015	491.82	--	7.95	--	483.87	
MW-303-70	7/18/2016	491.93	--	6.48	--	485.45	
MW-303-80	2/15/2012	—	--	11.79	--	—	
MW-303-80	4/20/2012	—	--	11.07	--	—	
MW-303-80	7/31/2012	—	--	9.95	--	—	
MW-303-80	11/1/2012	—	--	11.27	--	—	
MW-303-80	1/24/2013	495.12	--	11.17	--	483.95	
MW-303-80	4/24/2013	495.12	--	11.41	--	483.71	
MW-303-80	8/1/2013	495.12	--	9.96	--	485.16	
MW-303-80	10/1/2013	495.12	No LNAPL	11.30	0.00	483.82	
MW-303-80	3/18/2014	491.77	--	8.49	--	483.28	
MW-303-80	6/11/2014	491.77	--	8.15	--	483.62	
MW-303-80	9/9/2014	491.77	--	6.97	--	484.80	
MW-303-80	11/20/2014	491.77	No LNAPL	7.81	0.00	483.96	
MW-303-80	3/19/2015	491.77	--	8.31	--	483.46	
MW-303-80	6/10/2015	491.77	--	7.85	--	483.92	
MW-303-80	8/12/2015	491.83	--	6.83	--	485.00	
MW-303-80	11/19/2015	491.83	--	7.94	--	483.89	
MW-303-80	3/22/2016	491.83	No LNAPL	8.69	0.00	483.14	
MW-303-80	7/18/2016	491.83	--	6.39	--	485.44	
MW-303-80	9/13/2016	491.83	--	7.14	--	484.69	
MW-303-80	3/15/2017	491.83	--	8.19	--	483.64	
MW-303-80	8/1/2017	491.83	--	6.87	--	484.96	
MW-303-80	9/21/2017	491.62	--	7.80	--	483.82	
MW-303-80	10/16/2017	491.62	--	7.72	--	483.90	
MW-303-80	2/15/2018	491.62	--	8.29	--	483.33	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-303-80	3/13/2018	491.62	--	8.17	--	483.45	
MW-303-80	4/5/2018	491.62	--	8.25	--	483.37	
MW-303-80	9/10/2018	491.56	--	6.45	--	485.11	
MW-303-95	4/20/2012	—	--	11.02	--	—	
MW-303-95	7/31/2012	495.11	--	9.91	--	485.20	
MW-303-95	11/1/2012	495.11	--	12.24	--	482.87	
MW-303-95	1/24/2013	495.12	--	11.15	--	483.97	
MW-303-95	4/24/2013	495.12	--	11.38	--	483.74	
MW-303-95	8/1/2013	495.12	--	9.87	--	485.25	
MW-303-95	10/1/2013	495.12	No LNAPL	11.25	0.00	483.87	
MW-303-95	3/18/2014	495.12	--	11.84	--	483.28	
MW-303-95	6/11/2014	495.08	--	11.44	--	483.64	
MW-303-95	9/9/2014	495.08	--	10.25	--	484.83	
MW-303-95	11/20/2014	495.08	No LNAPL	11.05	0.00	484.03	
MW-303-95	3/19/2015	495.08	--	11.59	--	483.49	
MW-303-95	6/10/2015	495.08	--	11.13	--	483.95	
MW-303-95	8/12/2015	495.15	--	10.10	--	485.05	
MW-303-95	11/19/2015	495.15	--	11.20	--	483.95	
MW-303-95	7/18/2016	495.14	--	9.65	--	485.49	
MW-303-130	2/15/2012	495.12	--	11.80	--	483.32	
MW-303-130	4/20/2012	495.12	--	11.07	--	484.05	
MW-303-130	7/31/2012	495.12	--	9.95	--	485.17	
MW-303-130	11/1/2012	495.12	--	11.24	--	483.88	
MW-303-130	1/24/2013	495.15	--	11.13	--	484.02	
MW-303-130	4/24/2013	495.15	--	11.38	--	483.77	
MW-303-130	8/1/2013	495.15	--	9.89	--	485.26	
MW-303-130	10/1/2013	495.15	No LNAPL	11.25	0.00	483.90	
MW-303-130	3/18/2014	495.15	--	11.79	--	483.36	
MW-303-130	6/11/2014	495.08	--	11.43	--	483.65	
MW-303-130	9/9/2014	495.08	--	10.13	--	484.95	
MW-303-130	11/20/2014	495.08	No LNAPL	10.99	0.00	484.09	
MW-303-130	3/19/2015	495.08	--	11.56	--	483.52	
MW-303-130	6/10/2015	495.08	--	11.13	--	483.95	
MW-303-130	8/12/2015	495.13	--	10.08	--	485.05	
MW-303-130	11/19/2015	495.13	--	11.17	--	483.96	
MW-303-130	3/22/2016	495.13	No LNAPL	11.91	0.00	483.22	
MW-303-130	7/18/2016	495.12	--	9.64	--	485.48	
MW-303-130	9/13/2016	495.12	--	10.40	--	484.72	
MW-303-130	3/15/2017	495.12	--	11.37	--	483.75	
MW-304-CMT-10	2/17/2012	—	--	Frozen	--	—	Frozen at 2.45 ft BTOC

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-304-CMT-10	4/20/2012	—	--	Frozen	--	—	Frozen at 5.04 ft BTOC
MW-304-CMT-10	7/31/2012	—	--	12.53	--	—	
MW-304-CMT-10	11/1/2012	—	--	-	--	—	
MW-304-CMT-10	1/24/2013	—	--	Frozen	--	—	Frozen at 2.60 ft BTOC
MW-304-CMT-10	4/24/2013	—	--	Frozen	--	—	Frozen at 3.54 ft BTOC
MW-304-CMT-10	8/1/2013	—	--	12.40	--	—	
MW-304-CMT-10	10/1/2013	—	--	Dry	--	—	Well channel was dry
MW-304-CMT-10	3/18/2014	—	--	Dry	--	—	Well channel was dry
MW-304-CMT-10	6/11/2014	497.59	--	Dry	--	—	Well channel was dry, measured to 13.32 feet
MW-304-CMT-10	9/9/2014	497.59	--	12.61	--	484.98	
MW-304-CMT-10	11/20/2014	497.59	--	Dry	--	—	Well was dry
MW-304-CMT-10	3/19/2015	497.59	--	Dry	--	—	Depth to ice/bottom = 13.42 feet
MW-304-CMT-10	6/10/2015	497.59	--	Dry	--	—	BOW measured to be 13.40 feet
MW-304-CMT-10	8/12/2015	497.56	--	12.52	--	485.04	
MW-304-CMT-10	11/19/2015	497.56	--	Dry	--	—	Depth to bottom = 13.08 feet
MW-304-CMT-10	3/22/2016	497.56	--	Dry	--	—	Well is dry; bottom at 13.42 feet
MW-304-CMT-10	7/21/2016	497.56	--	11.77	--	485.79	
MW-304-CMT-10	9/13/2016	497.56	--	12.79	--	484.77	
MW-304-CMT-10	3/14/2017	497.56	--	Dry	--	—	Well was dry. Depth to bottom not recorded
MW-304-15	4/20/2012	—	--	13.02	--	—	
MW-304-15	7/31/2012	496.95	--	11.81	--	485.14	
MW-304-15	11/1/2012	496.95	--	13.16	--	483.79	
MW-304-15	1/24/2013	496.97	--	13.00	--	483.97	
MW-304-15	3/20/2013	497.00	--	Frozen	--	—	Frozen/obstructed; a depth to ice was not recorded
MW-304-15	4/19/2013	496.98	--	Frozen	--	—	Frozen/obstructed at 2.69 feet below measuring point
MW-304-15	4/24/2013	496.98	--	Frozen	--	—	Frozen at 3.47 ft BTOC
MW-304-15	5/21/2013	496.99	--	Frozen	--	—	Frozen at 5.83 feet below measuring point
MW-304-15	6/19/2013	496.98	--	12.17	--	484.81	
MW-304-15	7/25/2013	496.96	--	11.93	--	485.03	
MW-304-15	8/1/2013	496.96	--	11.82	--	485.14	
MW-304-15	8/20/2013	496.97	--	11.88	--	485.09	
MW-304-15	10/1/2013	496.97	No LNAPL	13.07	0.00	483.90	
MW-304-15	1/9/2014	496.98	--	13.30	--	483.68	
MW-304-15	1/30/2014	496.99	--	13.33	--	483.66	
MW-304-15	2/5/2014	496.99	--	13.39	--	483.60	
MW-304-15	2/24/2014	496.99	--	13.58	--	483.41	
MW-304-15	3/14/2014	497.01	--	13.64	--	483.37	
MW-304-15	3/18/2014	497.01	--	13.63	--	483.38	
MW-304-15	3/24/2014	497.01	--	13.87	--	483.14	
MW-304-15	4/18/2014	497.00	--	13.45	--	483.55	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-304-15	4/25/2014	497.00	--	12.74	--	484.26	
MW-304-15	5/15/2014	497.00	--	13.05	--	483.95	
MW-304-15	5/20/2014	496.99	--	13.13	--	483.86	
MW-304-15	6/10/2014	497.00	--	13.25	--	483.75	
MW-304-15	6/11/2014	497.00	--	13.27	--	483.73	
MW-304-15	6/19/2014	496.99	--	12.96	--	484.03	
MW-304-15	7/15/2014	496.99	--	11.15	--	485.84	
MW-304-15	8/26/2014	496.99	--	11.83	--	485.16	
MW-304-15	8/28/2014	496.99	--	11.85	--	485.14	
MW-304-15	9/9/2014	496.99	--	12.05	--	484.94	
MW-304-15	9/24/2014	496.99	--	12.39	--	484.60	
MW-304-15	9/26/2014	496.99	--	12.42	--	484.57	
MW-304-15	10/21/2014	496.99	--	13.27	--	483.72	
MW-304-15	10/27/2014	496.99	No LNAPL	13.45	0.00	483.54	
MW-304-15	11/19/2014	496.99	--	12.94	--	484.05	
MW-304-15	11/20/2014	496.99	No LNAPL	12.91	0.00	484.08	
MW-304-15	12/16/2014	497.02	No LNAPL	13.15	0.00	483.87	
MW-304-15	12/29/2014	497.02	No LNAPL	13.27	0.00	483.75	
MW-304-15	1/21/2015	497.03	--	13.35	--	483.68	
MW-304-15	2/2/2015	497.03	No LNAPL	13.44	0.00	483.59	
MW-304-15	2/17/2015	497.02	No LNAPL	13.45	0.00	483.57	
MW-304-15	2/25/2015	497.02	--	13.42	--	483.60	
MW-304-15	3/18/2015	497.03	--	13.47	--	483.56	
MW-304-15	3/19/2015	497.03	--	13.45	--	483.58	
MW-304-15	3/26/2015	497.03	--	13.39	--	483.64	
MW-304-15	4/14/2015	497.04	--	13.26	--	483.78	
MW-304-15	4/16/2015	497.04	--	13.24	--	483.80	
MW-304-15	5/18/2015	497.04	--	12.96	--	484.08	
MW-304-15	5/21/2015	497.04	--	12.97	--	484.07	
MW-304-15	6/10/2015	497.03	--	13.00	--	484.03	
MW-304-15	7/22/2015	496.89	--	11.95	--	484.94	
MW-304-15	8/12/2015	496.88	--	11.84	--	485.04	
MW-304-15	8/19/2015	496.88	--	12.10	--	484.78	
MW-304-15	9/30/2015	496.90	--	12.54	--	484.36	
MW-304-15	10/6/2015	496.89	--	12.35	--	484.54	
MW-304-15	10/22/2015	496.89	No LNAPL	13.01	0.00	483.88	
MW-304-15	11/19/2015	496.89	--	12.95	--	483.94	
MW-304-15	11/25/2015	496.89	No LNAPL	12.77	0.00	484.15	
MW-304-15	12/11/2015	496.89	--	12.96	--	483.93	
MW-304-15	1/19/2016	496.90	--	13.44	--	483.46	

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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-304-15	1/26/2016	496.91	--	13.50	--	483.41	
MW-304-15	5/26/2016	496.91	--	13.07	--	483.84	
MW-304-15	7/22/2016	496.92	--	10.84	--	486.08	
MW-304-15	9/9/2016	496.92	--	12.01	--	484.91	
MW-304-15	10/14/2016	496.92	--	13.01	--	483.91	
MW-304-15	11/15/2016	496.92	--	12.66	--	484.26	
MW-304-15	2/8/2017	496.95	--	13.07	--	483.88	
MW-304-15	2/15/2017	496.95	--	13.12	--	483.83	
MW-304-15	6/13/2017	496.97	--	12.42	--	484.55	
MW-304-CMT-20	2/17/2012	—	--	14.33	--	—	
MW-304-CMT-20	4/20/2012	—	--	14.08	--	—	
MW-304-CMT-20	7/31/2012	—	--	12.54	--	—	
MW-304-CMT-20	11/1/2012	—	--	13.86	--	—	
MW-304-CMT-20	1/24/2013	—	--	13.65	--	—	
MW-304-CMT-20	4/24/2013	—	--	13.86	--	—	
MW-304-CMT-20	8/1/2013	—	--	12.41	--	—	
MW-304-CMT-20	10/1/2013	—	--	13.67	--	—	
MW-304-CMT-20	3/18/2014	—	--	14.27	--	—	
MW-304-CMT-20	6/11/2014	497.59	--	13.85	--	483.74	
MW-304-CMT-20	9/9/2014	497.59	--	12.61	--	484.98	
MW-304-CMT-20	11/20/2014	497.59	--	13.48	--	484.11	
MW-304-CMT-20	3/19/2015	497.59	--	14.01	--	483.58	
MW-304-CMT-20	6/10/2015	497.59	--	13.54	--	484.05	
MW-304-CMT-20	8/12/2015	497.56	--	12.52	--	485.04	
MW-304-CMT-20	11/19/2015	497.56	--	13.60	--	483.96	
MW-304-CMT-20	7/21/2016	497.56	--	11.70	--	485.86	
MW-304-CMT-20	10/19/2016	497.56	--	13.82	--	483.74	
MW-304-CMT-20	7/28/2017	497.56	--	12.56	--	485.00	
MW-304-CMT-20	10/17/2017	497.56	--	13.62	--	483.94	
MW-304-CMT-20	2/12/2018	497.56	--	14.14	--	483.42	
MW-304-CMT-20	4/11/2018	497.56	--	14.10	--	483.46	
MW-304-CMT-20	7/13/2018	497.56	--	12.47	--	485.09	
MW-304-CMT-30	2/17/2012	—	--	Frozen	--	—	Frozen at 3.26 ft BTOC
MW-304-CMT-30	4/20/2012	—	--	13.89	--	—	
MW-304-CMT-30	7/31/2012	—	--	12.51	--	—	
MW-304-CMT-30	11/1/2012	—	--	13.85	--	—	
MW-304-CMT-30	1/24/2013	—	--	13.65	--	—	
MW-304-CMT-30	4/24/2013	—	--	13.86	--	—	
MW-304-CMT-30	8/1/2013	—	--	12.41	--	—	
MW-304-CMT-30	10/1/2013	—	--	13.67	--	—	

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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-304-CMT-30	3/18/2014	—	--	14.27	--	—	
MW-304-CMT-30	6/11/2014	497.59	--	13.86	--	483.73	
MW-304-CMT-30	9/9/2014	497.59	--	12.63	--	484.96	
MW-304-CMT-30	11/20/2014	497.59	--	13.49	--	484.10	
MW-304-CMT-30	3/19/2015	497.59	--	14.01	--	483.58	
MW-304-CMT-30	6/10/2015	497.59	--	13.55	--	484.04	
MW-304-CMT-30	8/12/2015	497.56	--	12.53	--	485.03	
MW-304-CMT-30	11/19/2015	497.56	--	13.60	--	483.96	
MW-304-CMT-30	7/21/2016	497.56	--	11.71	--	485.85	
MW-304-CMT-40	2/17/2012	—	--	Frozen	--	—	Frozen at 2.44 ft BTOC
MW-304-CMT-40	4/20/2012	—	--	13.79	--	—	
MW-304-CMT-40	7/31/2012	—	--	12.52	--	—	
MW-304-CMT-40	11/1/2012	—	--	13.86	--	—	
MW-304-CMT-40	1/24/2013	—	--	13.65	--	—	
MW-304-CMT-40	4/24/2013	—	--	13.86	--	—	
MW-304-CMT-40	8/1/2013	—	--	12.43	--	—	
MW-304-CMT-40	10/1/2013	—	--	13.67	--	—	
MW-304-CMT-40	3/18/2014	—	--	14.27	--	—	
MW-304-CMT-40	6/11/2014	497.59	--	13.86	--	483.73	
MW-304-CMT-40	9/9/2014	497.59	--	12.63	--	484.96	
MW-304-CMT-40	11/20/2014	497.59	--	13.48	--	484.11	
MW-304-CMT-40	3/19/2015	497.59	--	14.02	--	483.57	
MW-304-CMT-40	6/10/2015	497.59	--	13.55	--	484.04	
MW-304-CMT-40	8/12/2015	497.56	--	12.52	--	485.04	
MW-304-CMT-40	11/19/2015	497.56	--	13.61	--	483.95	
MW-304-CMT-40	7/21/2016	497.56	--	11.72	--	485.84	
MW-304-CMT-40	7/28/2017	497.56	--	12.61	--	484.95	
MW-304-CMT-40	10/17/2017	497.56	--	13.65	--	483.91	
MW-304-CMT-40	2/13/2018	497.56	--	14.15	--	483.41	
MW-304-CMT-40	4/11/2018	497.56	--	14.12	--	483.44	
MW-304-CMT-40	7/17/2018	497.56	--	12.51	--	485.05	
MW-304-CMT-50	2/17/2012	—	--	Frozen	--	—	Frozen at 2.62 ft BTOC
MW-304-CMT-50	4/20/2012	—	--	13.71	--	—	
MW-304-CMT-50	7/31/2012	—	--	12.52	--	—	
MW-304-CMT-50	11/1/2012	—	--	13.85	--	—	
MW-304-CMT-50	1/24/2013	—	--	13.66	--	—	
MW-304-CMT-50	4/24/2013	—	--	13.86	--	—	
MW-304-CMT-50	8/1/2013	—	--	12.39	--	—	
MW-304-CMT-50	10/1/2013	—	--	13.66	--	—	
MW-304-CMT-50	3/18/2014	—	--	14.25	--	—	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-304-CMT-50	6/11/2014	497.59	--	13.86	--	483.73	
MW-304-CMT-50	9/9/2014	497.59	--	12.61	--	484.98	
MW-304-CMT-50	11/20/2014	497.59	--	13.50	--	484.09	
MW-304-CMT-50	3/19/2015	497.59	--	14.00	--	483.59	
MW-304-CMT-50	6/10/2015	497.59	--	13.55	--	484.04	
MW-304-CMT-50	8/12/2015	497.56	--	12.53	--	485.03	
MW-304-CMT-50	11/19/2015	497.56	--	13.60	--	483.96	
MW-304-CMT-50	7/21/2016	497.56	--	11.69	--	485.87	
MW-304-CMT-60	2/17/2012	—	--	Frozen	--	—	Frozen at 3.32 ft BTOC
MW-304-CMT-60	4/20/2012	—	--	13.67	--	—	
MW-304-CMT-60	7/31/2012	—	--	12.51	--	—	
MW-304-CMT-60	11/1/2012	—	--	13.85	--	—	
MW-304-CMT-60	1/24/2013	—	--	13.66	--	—	
MW-304-CMT-60	4/24/2013	—	--	13.86	--	—	
MW-304-CMT-60	8/1/2013	—	--	12.37	--	—	
MW-304-CMT-60	10/1/2013	—	--	13.66	--	—	
MW-304-CMT-60	3/18/2014	—	--	14.26	--	—	
MW-304-CMT-60	6/11/2014	497.59	--	13.85	--	483.74	
MW-304-CMT-60	9/9/2014	497.59	--	12.62	--	484.97	
MW-304-CMT-60	11/20/2014	497.59	--	13.46	--	484.13	
MW-304-CMT-60	3/19/2015	497.59	--	14.00	--	483.59	
MW-304-CMT-60	6/10/2015	497.59	--	13.54	--	484.05	
MW-304-CMT-60	8/12/2015	497.56	--	12.53	--	485.03	
MW-304-CMT-60	11/19/2015	497.56	--	13.59	--	483.97	
MW-304-CMT-60	3/22/2016	497.56	--	14.31	--	483.25	
MW-304-CMT-60	7/21/2016	497.56	--	11.67	--	485.89	
MW-304-CMT-60	9/13/2016	497.56	--	12.79	--	484.77	
MW-304-CMT-60	3/14/2017	497.56	--	13.80	--	483.76	
MW-304-CMT-60	7/28/2017	497.56	--	12.32	--	485.24	
MW-304-CMT-60	10/17/2017	497.56	--	13.68	--	483.88	
MW-304-CMT-60	2/13/2018	497.56	--	14.15	--	483.41	
MW-304-CMT-60	4/11/2018	497.56	--	14.09	--	483.47	
MW-304-CMT-60	7/17/2018	497.56	--	12.47	--	485.09	
MW-304-70	2/16/2012	496.94	--	13.63	--	483.31	
MW-304-70	4/20/2012	496.94	--	12.99	--	483.95	
MW-304-70	7/31/2012	496.94	--	11.83	--	485.11	
MW-304-70	11/1/2012	496.94	--	13.12	--	483.82	
MW-304-70	1/24/2013	496.99	--	12.97	--	484.02	
MW-304-70	4/24/2013	496.99	--	13.21	--	483.78	
MW-304-70	8/1/2013	496.99	--	11.79	--	485.20	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-304-70	10/1/2013	496.99	No LNAPL	13.05	0.00	483.94	
MW-304-70	3/18/2014	496.99	--	13.63	--	483.36	
MW-304-70	6/11/2014	496.96	--	13.24	--	483.72	
MW-304-70	9/9/2014	496.96	--	12.04	--	484.92	
MW-304-70	11/20/2014	496.96	No LNAPL	12.88	0.00	484.08	
MW-304-70	3/19/2015	496.96	--	13.39	--	483.57	
MW-304-70	6/10/2015	496.96	--	12.95	--	484.01	
MW-304-70	8/12/2015	496.98	--	11.93	--	485.05	
MW-304-70	11/19/2015	496.98	--	13.02	--	483.96	
MW-304-70	7/27/2016	496.99	--	11.03	--	485.96	
MW-304-80	2/16/2012	496.69	--	13.39	--	483.30	
MW-304-80	4/20/2012	496.69	--	12.71	--	483.98	
MW-304-80	7/31/2012	496.69	--	11.56	--	485.13	
MW-304-80	11/1/2012	496.69	--	12.90	--	483.79	
MW-304-80	1/24/2013	496.75	--	12.73	--	484.02	
MW-304-80	4/19/2013	496.73	--	13.04	--	483.69	
MW-304-80	4/24/2013	496.73	--	12.94	--	483.79	
MW-304-80	5/21/2013	496.72	--	12.73	--	483.99	
MW-304-80	6/19/2013	496.72	--	11.87	--	484.85	
MW-304-80	7/25/2013	496.71	--	11.66	--	485.05	
MW-304-80	8/1/2013	496.71	--	11.73	--	484.98	
MW-304-80	8/20/2013	496.72	--	11.59	--	485.13	
MW-304-80	10/1/2013	496.72	No LNAPL	12.82	0.00	483.90	
MW-304-80	1/30/2014	496.73	--	13.02	--	483.71	
MW-304-80	2/24/2014	496.71	--	13.30	--	483.41	
MW-304-80	3/14/2014	496.74	--	13.36	--	483.38	
MW-304-80	3/18/2014	496.74	--	13.36	--	483.38	
MW-304-80	4/25/2014	496.73	--	12.43	--	484.30	
MW-304-80	5/20/2014	496.73	--	12.84	--	483.89	
MW-304-80	6/10/2014	496.73	--	12.96	--	483.77	
MW-304-80	6/11/2014	496.73	--	12.98	--	483.75	
MW-304-80	7/15/2014	496.73	--	10.88	--	485.85	
MW-304-80	8/28/2014	496.73	--	11.55	--	485.18	
MW-304-80	9/9/2014	496.73	--	11.80	--	484.93	
MW-304-80	9/26/2014	496.74	--	12.15	--	484.59	
MW-304-80	10/27/2014	496.73	No LNAPL	13.16	0.00	483.57	
MW-304-80	11/20/2014	496.74	No LNAPL	12.61	0.00	484.13	
MW-304-80	12/16/2014	496.74	No LNAPL	12.84	0.00	483.90	
MW-304-80	2/2/2015	496.75	No LNAPL	13.14	0.00	483.61	
MW-304-80	2/17/2015	496.75	No LNAPL	13.14	0.00	483.61	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-304-80	3/19/2015	496.75	--	13.14	--	483.61	
MW-304-80	4/14/2015	496.76	--	12.93	--	483.83	
MW-304-80	5/18/2015	496.76	--	12.63	--	484.13	
MW-304-80	6/10/2015	496.74	--	12.69	--	484.05	
MW-304-80	7/22/2015	496.75	--	11.79	--	484.96	
MW-304-80	8/12/2015	496.75	--	11.69	--	485.06	
MW-304-80	9/30/2015	496.76	--	12.39	--	484.37	
MW-304-80	10/22/2015	496.75	No LNAPL	12.84	0.00	483.91	
MW-304-80	11/19/2015	496.76	--	12.80	--	483.96	
MW-304-80	11/25/2015	496.76	No LNAPL	12.61	0.00	484.18	
MW-304-80	12/11/2015	496.73	--	12.80	--	483.93	
MW-304-80	1/26/2016	496.74	--	13.30	--	483.44	
MW-304-80	3/22/2016	496.74	No LNAPL	13.49	0.00	483.25	
MW-304-80	7/22/2016	496.74	--	10.85	--	485.89	
MW-304-80	9/13/2016	496.74	--	11.95	--	484.79	
MW-304-80	3/14/2017	496.74	--	12.90	--	483.84	
MW-304-80	7/25/2017	496.74	--	11.61	--	485.13	
MW-304-80	10/16/2017	496.74	--	12.75	--	483.99	
MW-304-80	2/13/2018	496.74	--	13.27	--	483.47	
MW-304-80	4/6/2018	496.74	--	13.25	--	483.49	
MW-304-96	4/20/2012	—	--	12.91	--	—	
MW-304-96	7/31/2012	—	--	11.76	--	—	
MW-304-96	11/1/2012	—	--	13.80	--	—	
MW-304-96	1/24/2013	496.95	--	12.99	--	483.96	
MW-304-96	4/24/2013	496.95	--	13.16	--	483.79	
MW-304-96	8/1/2013	496.95	--	11.52	--	485.43	
MW-304-96	10/1/2013	496.95	No LNAPL	13.01	0.00	483.94	
MW-304-96	3/18/2014	496.95	--	13.58	--	483.37	
MW-304-96	6/11/2014	496.92	--	13.19	--	483.73	
MW-304-96	9/9/2014	496.92	--	12.00	--	484.92	
MW-304-96	11/20/2014	496.92	No LNAPL	12.83	0.00	484.09	
MW-304-96	3/19/2015	496.92	--	13.35	--	483.57	
MW-304-96	6/10/2015	496.92	--	12.90	--	484.02	
MW-304-96	8/12/2015	496.93	--	11.88	--	485.05	
MW-304-96	11/19/2015	496.93	--	12.94	--	483.99	
MW-304-96	7/27/2016	496.95	--	10.96	--	485.99	
MW-304-125	2/16/2012	497.09	--	13.76	--	483.33	
MW-304-125	4/20/2012	497.09	--	13.08	--	484.01	
MW-304-125	7/31/2012	497.09	--	12.15	--	484.94	
MW-304-125	11/1/2012	497.09	--	13.48	--	483.61	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-304-125	1/24/2013	497.32	--	13.27	--	484.05	
MW-304-125	3/20/2013	497.33	--	13.52	--	483.81	
MW-304-125	4/19/2013	497.31	--	13.60	--	483.71	
MW-304-125	4/24/2013	497.31	--	13.51	--	483.80	
MW-304-125	5/21/2013	497.31	--	13.31	--	484.00	
MW-304-125	6/19/2013	497.31	--	12.44	--	484.87	
MW-304-125	7/25/2013	497.30	--	12.24	--	485.06	
MW-304-125	8/1/2013	497.30	--	12.12	--	485.18	
MW-304-125	8/20/2013	497.30	--	12.16	--	485.14	
MW-304-125	10/1/2013	497.31	No LNAPL	13.39	0.00	483.92	
MW-304-125	1/30/2014	497.30	--	13.58	--	483.72	
MW-304-125	2/24/2014	497.29	--	13.85	--	483.44	
MW-304-125	3/14/2014	497.31	--	13.91	--	483.40	
MW-304-125	3/18/2014	497.31	--	13.94	--	483.37	
MW-304-125	4/25/2014	497.32	--	13.02	--	484.30	
MW-304-125	5/20/2014	497.31	--	13.42	--	483.89	
MW-304-125	6/10/2014	497.32	--	13.53	--	483.79	
MW-304-125	6/11/2014	497.32	--	13.54	--	483.78	
MW-304-125	7/15/2014	497.31	--	11.46	--	485.85	
MW-304-125	8/28/2014	497.31	--	12.14	--	485.17	
MW-304-125	9/9/2014	497.31	--	12.37	--	484.94	
MW-304-125	9/26/2014	497.32	--	12.71	--	484.61	
MW-304-125	10/27/2014	497.32	No LNAPL	13.75	0.00	483.57	
MW-304-125	11/20/2014	497.29	No LNAPL	13.17	0.00	484.12	
MW-304-125	12/16/2014	497.30	No LNAPL	13.40	0.00	483.90	
MW-304-125	2/2/2015	497.31	No LNAPL	13.68	0.00	483.63	
MW-304-125	2/17/2015	497.30	No LNAPL	13.68	0.00	483.62	
MW-304-125	3/19/2015	497.30	--	13.68	--	483.62	
MW-304-125	4/14/2015	497.32	--	13.49	--	483.83	
MW-304-125	5/18/2015	497.32	--	13.19	--	484.13	
MW-304-125	6/10/2015	497.30	--	13.23	--	484.07	
MW-304-125	7/22/2015	497.31	--	12.34	--	484.97	
MW-304-125	8/12/2015	497.30	--	12.25	--	485.05	
MW-304-125	9/30/2015	497.32	--	12.94	--	484.38	
MW-304-125	10/22/2015	497.31	No LNAPL	13.38	0.00	483.93	
MW-304-125	11/19/2015	497.31	--	13.31	--	484.00	
MW-304-125	11/25/2015	497.31	No LNAPL	13.15	0.00	484.19	
MW-304-125	12/11/2015	497.29	--	13.35	--	483.94	
MW-304-125	1/26/2016	497.30	--	13.87	--	483.43	
MW-304-125	3/22/2016	497.30	No LNAPL	14.05	0.00	483.25	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-304-125	7/22/2016	497.29	--	11.20	--	486.09	
MW-304-125	9/13/2016	497.29	--	12.51	--	484.78	
MW-304-125	3/14/2017	497.34	--	13.47	--	483.87	
MW-304-150	2/16/2012	497.00	--	13.65	--	483.35	
MW-304-150	4/20/2012	497.00	--	12.96	--	484.04	
MW-304-150	7/31/2012	497.18	--	12.01	--	485.17	
MW-304-150	11/1/2012	497.18	--	13.35	--	483.83	
MW-304-150	1/24/2013	497.21	--	12.96	--	484.25	
MW-304-150	3/20/2013	497.21	--	13.42	--	483.79	
MW-304-150	4/19/2013	497.18	--	13.47	--	483.71	
MW-304-150	4/24/2013	497.18	--	13.39	--	483.79	
MW-304-150	5/21/2013	497.20	--	13.19	--	484.01	
MW-304-150	6/19/2013	497.18	--	12.31	--	484.87	
MW-304-150	7/25/2013	497.16	--	12.10	--	485.06	
MW-304-150	8/1/2013	497.17	--	12.01	--	485.16	
MW-304-150	8/20/2013	497.16	--	12.03	--	485.13	
MW-304-150	10/1/2013	497.16	No LNAPL	13.24	0.00	483.92	
MW-304-150	1/9/2014	497.18	--	13.45	--	483.73	
MW-304-150	1/30/2014	497.20	--	13.46	--	483.74	
MW-304-150	2/5/2014	497.20	--	13.57	--	483.63	
MW-304-150	2/24/2014	497.18	--	13.76	--	483.42	
MW-304-150	3/14/2014	497.20	--	13.81	--	483.39	
MW-304-150	3/18/2014	497.20	--	13.81	--	483.39	
MW-304-150	3/24/2014	497.20	--	13.87	--	483.33	
MW-304-150	4/18/2014	497.21	--	13.62	--	483.59	
MW-304-150	4/25/2014	497.21	--	12.92	--	484.29	
MW-304-150	5/15/2014	497.22	--	13.22	--	484.00	
MW-304-150	5/20/2014	497.21	--	13.31	--	483.90	
MW-304-150	6/10/2014	497.19	--	13.42	--	483.77	
MW-304-150	6/11/2014	497.19	--	13.42	--	483.77	
MW-304-150	6/19/2014	497.19	--	13.09	--	484.10	
MW-304-150	7/15/2014	497.18	--	11.34	--	485.84	
MW-304-150	7/15/2014	497.18	--	11.31	--	485.87	
MW-304-150	8/26/2014	497.18	--	11.97	--	485.21	
MW-304-150	8/28/2014	497.18	--	12.00	--	485.18	
MW-304-150	9/9/2014	497.18	--	12.20	--	484.98	
MW-304-150	9/24/2014	497.18	--	12.56	--	484.62	
MW-304-150	9/26/2014	497.18	--	12.57	--	484.61	
MW-304-150	10/21/2014	497.18	--	13.43	--	483.75	
MW-304-150	10/27/2014	497.18	No LNAPL	13.60	0.00	483.58	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-304-150	11/19/2014	497.18	--	13.07	--	484.11	
MW-304-150	11/20/2014	497.18	No LNAPL	13.06	0.00	484.12	
MW-304-150	12/16/2014	497.19	No LNAPL	13.27	0.00	483.92	
MW-304-150	12/29/2014	497.19	No LNAPL	13.38	0.00	483.81	
MW-304-150	1/21/2015	497.20	--	13.45	--	483.75	
MW-304-150	2/2/2015	497.20	No LNAPL	13.58	0.00	483.62	
MW-304-150	2/17/2015	497.20	No LNAPL	13.58	0.00	483.62	
MW-304-150	2/25/2015	497.20	--	13.53	--	483.67	
MW-304-150	3/18/2015	497.21	--	13.60	--	483.61	
MW-304-150	3/19/2015	497.21	--	13.58	--	483.63	
MW-304-150	3/26/2015	497.21	--	13.52	--	483.69	
MW-304-150	4/14/2015	497.23	--	13.39	--	483.84	
MW-304-150	4/16/2015	497.23	--	13.38	--	483.85	
MW-304-150	5/18/2015	497.21	--	13.10	--	484.11	
MW-304-150	5/21/2015	497.21	--	13.10	--	484.11	
MW-304-150	6/10/2015	497.20	--	13.13	--	484.07	
MW-304-150	7/22/2015	497.20	--	12.21	--	484.99	
MW-304-150	8/12/2015	497.18	--	12.11	--	485.07	
MW-304-150	8/19/2015	497.18	--	12.37	--	484.81	
MW-304-150	9/30/2015	497.20	--	12.84	--	484.36	
MW-304-150	10/6/2015	497.19	--	12.65	--	484.54	
MW-304-150	10/22/2015	497.20	No LNAPL	13.27	0.00	483.93	
MW-304-150	11/19/2015	497.20	--	13.18	--	484.02	
MW-304-150	11/25/2015	497.20	No LNAPL	13.02	0.00	484.21	
MW-304-150	12/11/2015	497.18	--	13.24	--	483.94	
MW-304-150	1/19/2016	497.19	--	13.69	--	483.50	
MW-304-150	1/26/2016	497.19	--	13.74	--	483.45	
MW-304-150	5/26/2016	497.19	--	13.31	--	483.88	
MW-304-150	7/27/2016	497.02	--	11.03	--	485.99	
MW-304-150	9/9/2016	497.03	--	12.09	--	484.94	
MW-304-150	11/15/2016	497.02	--	12.73	--	484.29	
MW-304-150	2/8/2017	497.05	--	13.14	--	483.91	
MW-304-150	2/15/2017	497.05	--	13.16	--	483.89	
MW-304-150	6/13/2017	497.04	--	12.44	--	484.60	
MW-305-CMT-8	2/17/2012	—	--	Frozen	--	—	Frozen at 2.24 ft BTOC
MW-305-CMT-8	4/19/2012	—	--	Frozen	--	—	Frozen at 5.04 ft BTOC
MW-305-CMT-8	7/31/2012	—	--	Frozen	--	—	Frozen at 11.08 ft BTOC
MW-305-CMT-8	11/1/2012	—	--	Dry	--	—	
MW-305-CMT-8	1/24/2013	—	--	Frozen	--	—	Frozen at 2.40 ft BTOC
MW-305-CMT-8	4/24/2013	—	--	Frozen	--	—	Frozen at 3.48 ft BTOC

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-305-CMT-8	8/1/2013	—	--	Dry	--	—	Well channel was dry
MW-305-CMT-8	10/1/2013	—	--	Dry	--	—	Well channel was dry
MW-305-CMT-8	3/18/2014	—	--	Dry	--	—	Well channel was dry
MW-305-CMT-8	6/11/2014	496.44	--	Dry	--	—	Well channel was dry, measured to 11.04 feet
MW-305-CMT-8	9/9/2014	496.44	--	Dry	--	—	Well channel was dry; total well depth measured 11.17 feet
MW-305-CMT-8	11/20/2014	496.44	--	Dry	--	—	Well was dry
MW-305-CMT-8	3/19/2015	496.44	--	Dry	--	—	Depth to ice/bottom = 11.23 feet
MW-305-CMT-8	6/10/2015	496.44	--	Dry	--	—	BOW measured to be 11.17 feet
MW-305-CMT-8	8/12/2015	496.44	--	Dry	--	—	Depth to bottom = 11.16 feet
MW-305-CMT-8	11/19/2015	496.44	—	—	—	—	Depth to bottom = 10.87 feet
MW-305-CMT-8	8/19/2016	496.34	--	Dry	--	—	Well was dry
MW-305-CMT-8	10/18/2016	496.34	--	Dry	--	—	Well was dry
MW-305-CMT-18	2/17/2012	—	--	Frozen	--	—	Frozen at 3.33 ft BTOC
MW-305-CMT-18	4/19/2012	—	--	12.54	--	—	
MW-305-CMT-18	7/31/2012	—	--	11.36	--	—	
MW-305-CMT-18	11/1/2012	—	--	12.66	--	—	
MW-305-CMT-18	1/24/2013	—	--	12.48	--	—	
MW-305-CMT-18	4/24/2013	—	--	12.75	--	—	
MW-305-CMT-18	8/1/2013	—	--	11.25	--	—	
MW-305-CMT-18	10/1/2013	—	--	12.47	--	—	
MW-305-CMT-18	3/18/2014	—	--	13.13	--	—	
MW-305-CMT-18	6/11/2014	496.44	--	12.65	--	483.79	
MW-305-CMT-18	9/9/2014	496.44	--	11.42	--	485.02	
MW-305-CMT-18	11/20/2014	496.44	--	12.30	--	484.14	
MW-305-CMT-18	3/19/2015	496.44	--	12.89	--	483.55	
MW-305-CMT-18	6/10/2015	496.44	--	12.38	--	484.06	
MW-305-CMT-18	8/12/2015	496.44	--	11.38	--	485.06	
MW-305-CMT-18	11/19/2015	496.44	--	12.46	--	483.98	
MW-305-CMT-18	7/22/2016	496.34	--	10.38	--	485.96	
MW-305-CMT-18	9/13/2016	496.34	--	11.64	--	484.70	
MW-305-CMT-18	3/14/2017	496.34	--	12.80	--	483.54	
MW-305-CMT-28	2/17/2012	—	--	Frozen	--	—	Frozen at 3.38 ft BTOC
MW-305-CMT-28	4/19/2012	—	--	12.53	--	—	
MW-305-CMT-28	7/31/2012	—	--	11.35	--	—	
MW-305-CMT-28	11/1/2012	—	--	12.66	--	—	
MW-305-CMT-28	1/24/2013	—	--	12.49	--	—	
MW-305-CMT-28	4/24/2013	—	--	12.75	--	—	
MW-305-CMT-28	8/1/2013	—	--	11.25	--	—	
MW-305-CMT-28	10/1/2013	—	--	12.48	--	—	
MW-305-CMT-28	3/18/2014	—	--	13.14	--	—	

Appendix A-1
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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-305-CMT-28	6/11/2014	496.44	--	12.68	--	483.76	
MW-305-CMT-28	9/9/2014	496.44	--	11.42	--	485.02	
MW-305-CMT-28	11/20/2014	496.44	--	12.32	--	484.12	
MW-305-CMT-28	3/19/2015	496.44	--	12.88	--	483.56	
MW-305-CMT-28	6/10/2015	496.44	--	12.38	--	484.06	
MW-305-CMT-28	8/12/2015	496.44	--	11.39	--	485.05	
MW-305-CMT-28	11/19/2015	496.44	--	12.46	--	483.98	
MW-305-CMT-28	7/22/2016	496.34	--	10.35	--	485.99	
MW-305-CMT-28	7/27/2017	496.34	--	11.36	--	484.98	
MW-305-CMT-28	10/17/2017	496.34	--	12.40	--	483.94	
MW-305-CMT-28	1/18/2018	496.34	--	12.65	--	483.69	
MW-305-CMT-28	4/11/2018	496.34	--	12.94	--	483.40	
MW-305-CMT-28	7/18/2018	496.34	--	11.33	--	485.01	
MW-305-CMT-38	2/17/2012	—	--	13.13	--	—	
MW-305-CMT-38	4/19/2012	—	--	12.50	--	—	
MW-305-CMT-38	7/31/2012	—	--	11.34	--	—	
MW-305-CMT-38	11/1/2012	—	--	12.64	--	—	
MW-305-CMT-38	1/24/2013	—	--	12.47	--	—	
MW-305-CMT-38	4/24/2013	—	--	12.72	--	—	
MW-305-CMT-38	8/1/2013	—	--	11.23	--	—	
MW-305-CMT-38	10/1/2013	—	--	12.45	--	—	
MW-305-CMT-38	3/18/2014	—	--	13.11	--	—	
MW-305-CMT-38	6/11/2014	496.44	--	12.68	--	483.76	
MW-305-CMT-38	9/9/2014	496.44	--	11.40	--	485.04	
MW-305-CMT-38	11/20/2014	496.44	--	12.31	--	484.13	
MW-305-CMT-38	3/19/2015	496.44	--	12.87	--	483.57	
MW-305-CMT-38	6/10/2015	496.44	--	12.38	--	484.06	
MW-305-CMT-38	8/12/2015	496.44	--	11.37	--	485.07	
MW-305-CMT-38	11/19/2015	496.44	--	12.47	--	483.97	
MW-305-CMT-38	7/27/2016	496.34	--	10.48	--	485.86	
MW-305-CMT-48	2/17/2012	—	--	13.14	--	—	
MW-305-CMT-48	4/19/2012	—	--	12.52	--	—	
MW-305-CMT-48	7/31/2012	—	--	11.37	--	—	
MW-305-CMT-48	11/1/2012	—	--	12.66	--	—	
MW-305-CMT-48	1/24/2013	—	--	12.47	--	—	
MW-305-CMT-48	4/24/2013	—	--	Frozen	--	—	Frozen at 3.76 ft BTOC
MW-305-CMT-48	8/1/2013	—	--	11.26	--	—	
MW-305-CMT-48	10/1/2013	—	--	12.47	--	—	
MW-305-CMT-48	3/18/2014	—	--	13.13	--	—	
MW-305-CMT-48	6/11/2014	496.44	--	12.73	--	483.71	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-305-CMT-48	9/9/2014	496.44	--	11.42	--	485.02	
MW-305-CMT-48	11/20/2014	496.44	--	12.33	--	484.11	
MW-305-CMT-48	3/19/2015	496.44	--	12.88	--	483.56	
MW-305-CMT-48	6/10/2015	496.44	--	12.39	--	484.05	
MW-305-CMT-48	8/12/2015	496.44	--	11.41	--	485.03	
MW-305-CMT-48	11/19/2015	496.44	--	12.44	--	484.00	
MW-305-CMT-48	7/27/2016	496.34	--	10.58	--	485.76	
MW-305-CMT-48	7/27/2017	496.34	--	11.41	--	484.93	
MW-305-CMT-48	10/17/2017	496.34	--	12.40	--	483.94	
MW-305-CMT-48	1/18/2018	496.34	--	12.62	--	483.72	
MW-305-CMT-48	4/11/2018	496.34	--	12.93	--	483.41	
MW-305-CMT-58	2/17/2012	—	--	13.16	--	—	
MW-305-CMT-58	4/19/2012	—	--	12.53	--	—	
MW-305-CMT-58	7/31/2012	—	--	11.39	--	—	
MW-305-CMT-58	11/1/2012	—	--	12.68	--	—	
MW-305-CMT-58	1/24/2013	—	--	12.48	--	—	
MW-305-CMT-58	4/24/2013	—	--	12.76	--	—	
MW-305-CMT-58	8/1/2013	—	--	11.30	--	—	
MW-305-CMT-58	10/1/2013	—	--	12.47	--	—	
MW-305-CMT-58	3/18/2014	—	--	13.17	--	—	
MW-305-CMT-58	6/11/2014	496.44	--	12.68	--	483.76	
MW-305-CMT-58	9/9/2014	496.44	--	11.43	--	485.01	
MW-305-CMT-58	11/20/2014	496.44	--	12.35	--	484.09	
MW-305-CMT-58	3/19/2015	496.44	--	12.89	--	483.55	
MW-305-CMT-58	6/10/2015	496.44	--	12.38	--	484.06	
MW-305-CMT-58	8/12/2015	496.44	--	11.39	--	485.05	
MW-305-CMT-58	11/19/2015	496.44	--	12.46	--	483.98	
MW-305-CMT-58	7/27/2016	496.34	--	10.53	--	485.81	
MW-305-CMT-58	9/13/2016	496.34	--	11.65	--	484.69	
MW-305-CMT-58	3/14/2017	496.34	--	12.70	--	483.64	
MW-305-70	2/16/2012	495.58	--	12.41	--	483.17	
MW-305-70	4/19/2012	495.58	--	11.80	--	483.78	
MW-305-70	7/31/2012	495.58	--	10.68	--	484.90	
MW-305-70	11/1/2012	495.58	--	11.93	--	483.65	
MW-305-70	1/24/2013	495.67	--	11.83	--	483.84	
MW-305-70	4/24/2013	495.67	--	12.11	--	483.56	
MW-305-70	8/1/2013	495.67	--	10.73	--	484.94	
MW-305-70	10/1/2013	495.67	No LNAPL	11.93	0.00	483.74	
MW-305-70	3/18/2014	495.67	--	12.50	--	483.17	
MW-305-70	6/11/2014	495.76	--	12.12	--	483.64	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-305-70	9/9/2014	495.76	--	11.89	--	483.87	
MW-305-70	11/20/2014	495.76	No LNAPL	11.78	0.00	483.98	
MW-305-70	3/19/2015	495.76	--	12.28	--	483.48	
MW-305-70	6/10/2015	495.76	--	11.87	--	483.89	
MW-305-70	8/12/2015	495.79	--	10.89	--	484.90	
MW-305-70	11/19/2015	495.79	--	11.95	--	483.84	
MW-305-70	7/27/2016	495.79	--	9.98	--	485.81	
MW-305-80	2/16/2012	495.35	--	12.15	--	483.20	
MW-305-80	4/19/2012	495.35	--	11.50	--	483.85	
MW-305-80	7/31/2012	495.35	--	10.37	--	484.98	
MW-305-80	11/1/2012	495.35	--	11.66	--	483.69	
MW-305-80	1/24/2013	495.38	--	10.47	--	484.91	The DTW measurement was recorded as 10.47 ft BTOC on the field form
MW-305-80	4/24/2013	495.38	--	11.72	--	483.66	
MW-305-80	8/1/2013	495.38	--	10.35	--	485.03	
MW-305-80	10/1/2013	495.38	No LNAPL	11.86	0.00	483.52	
MW-305-80	3/18/2014	495.38	--	12.14	--	483.24	
MW-305-80	6/11/2014	495.37	--	11.72	--	483.65	
MW-305-80	9/9/2014	495.37	--	10.48	--	484.89	
MW-305-80	11/20/2014	495.37	No LNAPL	11.38	0.00	483.99	
MW-305-80	3/19/2015	495.37	--	11.85	--	483.52	
MW-305-80	6/10/2015	495.37	--	11.45	--	483.92	
MW-305-80	8/12/2015	495.37	--	10.47	--	484.90	
MW-305-80	11/19/2015	495.37	--	11.59	--	483.78	
MW-305-80	7/27/2016	495.37	--	9.59	--	485.78	
MW-305-80	9/13/2016	495.37	--	10.70	--	484.67	
MW-305-80	3/14/2017	495.37	--	11.70	--	483.67	
MW-305-100	2/16/2012	—	--	12.45	--	—	
MW-305-100	4/19/2012	—	--	11.81	--	—	
MW-305-100	7/31/2012	—	--	10.56	--	—	
MW-305-100	11/1/2012	—	--	11.94	--	—	
MW-305-100	1/24/2013	495.71	--	11.78	--	483.93	
MW-305-100	4/24/2013	495.71	--	12.05	--	483.66	
MW-305-100	8/1/2013	495.71	--	10.62	--	485.09	
MW-305-100	10/1/2013	495.71	No LNAPL	11.85	0.00	483.86	
MW-305-100	3/18/2014	495.71	--	12.40	--	483.31	
MW-305-100	6/11/2014	495.73	--	12.03	--	483.70	
MW-305-100	9/9/2014	495.73	--	10.82	--	484.91	
MW-305-100	11/20/2014	495.73	No LNAPL	11.69	0.00	484.04	
MW-305-100	3/19/2015	495.73	--	12.19	--	483.54	
MW-305-100	6/10/2015	495.73	--	11.75	--	483.98	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-305-100	8/12/2015	495.72	--	10.76	--	484.96	
MW-305-100	11/19/2015	495.72	--	11.82	--	483.90	
MW-305-100	7/27/2016	495.72	--	9.89	--	485.83	
MW-305-100	9/13/2016	495.72	--	11.00	--	484.72	
MW-305-100	3/14/2017	495.72	--	12.04	--	483.68	
MW-306-CMT-10	2/17/2012	—	--	Frozen	--	—	Frozen at 2.54 ft BTOC
MW-306-CMT-10	4/19/2012	—	--	Frozen	--	—	Frozen at 5.09 ft BTOC
MW-306-CMT-10	7/31/2012	—	--	12.10	--	—	
MW-306-CMT-10	11/1/2012	—	--	13.35	--	—	
MW-306-CMT-10	1/24/2013	—	--	13.14	--	—	
MW-306-CMT-10	4/24/2013	—	--	13.31	--	—	
MW-306-CMT-10	8/1/2013	—	--	11.97	--	—	
MW-306-CMT-10	10/1/2013	—	--	13.09	--	—	
MW-306-CMT-10	3/18/2014	—	--	Dry	--	—	Well channel was dry
MW-306-CMT-10	6/11/2014	496.89	--	13.31	--	483.58	
MW-306-CMT-10	9/9/2014	496.89	--	12.01	--	484.88	
MW-306-CMT-10	11/20/2014	496.89	--	12.98	--	483.91	
MW-306-CMT-10	12/16/2014	496.89	--	13.15	--	483.74	
MW-306-CMT-10	3/19/2015	496.89	--	Dry	--	—	Depth to ice/bottom = 13.65 feet
MW-306-CMT-10	6/10/2015	496.89	--	13.00	--	483.89	
MW-306-CMT-10	8/12/2015	496.84	--	12.05	--	484.79	
MW-306-CMT-10	11/19/2015	496.84	--	13.07	--	483.77	
MW-306-CMT-10	7/22/2016	496.87	--	11.15	--	485.72	
MW-306-CMT-10	9/13/2016	496.87	--	12.24	--	484.63	
MW-306-CMT-10	3/14/2017	496.87	--	13.35	--	483.52	
MW-306-15	4/19/2012	—	--	12.98	--	—	
MW-306-15	7/31/2012	496.74	--	11.86	--	484.88	
MW-306-15	11/1/2012	496.74	--	13.14	--	483.60	
MW-306-15	1/24/2013	496.78	--	12.95	--	483.83	
MW-306-15	3/20/2013	496.79	--	13.17	--	483.62	
MW-306-15	4/19/2013	496.77	--	13.24	--	483.53	
MW-306-15	4/24/2013	496.77	--	13.17	--	483.60	
MW-306-15	5/21/2013	496.77	--	12.93	--	483.84	
MW-306-15	6/19/2013	496.76	--	12.13	--	484.63	
MW-306-15	7/25/2013	496.74	--	11.94	--	484.80	
MW-306-15	8/1/2013	496.75	--	11.86	--	484.89	
MW-306-15	8/20/2013	496.76	--	11.90	--	484.86	
MW-306-15	10/1/2013	496.76	No LNAPL	12.97	0.00	483.79	
MW-306-15	1/30/2014	496.78	--	13.24	--	483.54	
MW-306-15	2/5/2014	496.78	--	13.34	--	483.44	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-306-15	2/24/2014	496.78	--	13.52	--	483.26	
MW-306-15	3/14/2014	496.77	--	13.58	--	483.19	
MW-306-15	3/18/2014	496.77	--	13.62	--	483.15	
MW-306-15	3/24/2014	496.77	--	13.66	--	483.11	
MW-306-15	4/18/2014	496.77	--	12.74	--	484.03	
MW-306-15	4/25/2014	496.77	--	12.71	--	484.06	
MW-306-15	5/15/2014	496.77	--	12.96	--	483.81	
MW-306-15	5/20/2014	496.77	--	13.03	--	483.74	
MW-306-15	6/10/2014	496.77	--	13.16	--	483.61	
MW-306-15	6/11/2014	496.77	--	13.18	--	483.59	
MW-306-15	6/19/2014	496.77	--	12.89	--	483.88	
MW-306-15	7/15/2014	496.76	No LNAPL	11.14	0.00	485.62	
MW-306-15	8/26/2014	496.77	--	11.74	--	485.03	
MW-306-15	8/28/2014	496.77	--	11.75	--	485.02	
MW-306-15	9/9/2014	496.77	--	11.88	--	484.89	
MW-306-15	9/24/2014	496.77	--	12.28	--	484.49	
MW-306-15	9/26/2014	496.77	--	12.31	--	484.46	
MW-306-15	10/21/2014	496.76	--	13.14	--	483.62	
MW-306-15	10/27/2014	496.77	No LNAPL	13.31	0.00	483.46	
MW-306-15	11/19/2014	496.76	--	12.86	--	483.90	
MW-306-15	11/20/2014	496.76	No LNAPL	12.85	0.00	483.91	
MW-306-15	12/16/2014	496.77	No LNAPL	13.07	0.00	483.70	
MW-306-15	12/29/2014	496.77	No LNAPL	13.16	0.00	483.61	
MW-306-15	1/21/2015	496.79	--	13.24	--	483.55	
MW-306-15	2/2/2015	496.77	No LNAPL	13.33	0.00	483.44	
MW-306-15	2/17/2015	496.77	No LNAPL	13.34	0.00	483.43	
MW-306-15	2/25/2015	496.79	--	13.28	--	483.51	
MW-306-15	3/18/2015	496.77	--	13.35	--	483.42	
MW-306-15	3/19/2015	496.77	--	13.32	--	483.45	
MW-306-15	3/26/2015	496.77	--	13.27	--	483.50	
MW-306-15	4/14/2015	496.78	--	13.14	--	483.64	
MW-306-15	4/16/2015	496.78	--	13.11	--	483.67	
MW-306-15	5/18/2015	496.79	--	12.86	--	483.93	
MW-306-15	5/21/2015	496.79	--	12.84	--	483.95	
MW-306-15	6/4/2015	496.77	--	12.67	--	484.10	
MW-306-15	6/10/2015	496.77	--	12.90	--	483.87	
MW-306-15	7/22/2015	496.79	--	12.07	--	484.72	
MW-306-15	8/12/2015	496.78	--	11.95	--	484.83	
MW-306-15	8/19/2015	496.78	--	12.18	--	484.60	
MW-306-15	9/30/2015	496.80	--	12.53	--	484.27	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-306-15	10/6/2015	496.78	--	12.34	--	484.44	
MW-306-15	10/22/2015	496.79	No LNAPL	12.99	0.00	483.80	
MW-306-15	11/19/2015	496.79	--	13.00	--	483.79	
MW-306-15	11/25/2015	496.79	No LNAPL	12.85	0.00	483.97	Datalogger downloaded
MW-306-15	12/11/2015	496.79	--	12.99	--	483.80	
MW-306-15	1/19/2016	496.79	--	13.46	--	483.33	
MW-306-15	1/26/2016	496.80	--	13.50	--	483.30	
MW-306-15	5/26/2016	496.80	--	13.10	--	483.70	
MW-306-15	7/20/2016	496.79	--	11.38	--	485.41	
MW-306-15	9/9/2016	496.81	--	12.03	--	484.78	
MW-306-15	11/15/2016	496.79	--	12.73	--	484.06	
MW-306-15	2/8/2017	496.82	--	13.10	--	483.72	
MW-306-15	2/15/2017	496.82	--	13.14	--	483.68	
MW-306-15	6/13/2017	496.57	--	12.20	--	484.37	
MW-306-CMT-20	2/17/2012	—	--	13.75	--	—	
MW-306-CMT-20	4/19/2012	—	--	13.18	--	—	
MW-306-CMT-20	7/31/2012	—	--	12.08	--	—	
MW-306-CMT-20	11/1/2012	—	--	13.35	--	—	
MW-306-CMT-20	1/24/2013	—	--	13.13	--	—	
MW-306-CMT-20	4/24/2013	—	--	13.31	--	—	
MW-306-CMT-20	8/1/2013	—	--	11.97	--	—	
MW-306-CMT-20	10/1/2013	—	--	13.09	--	—	
MW-306-CMT-20	3/18/2014	—	--	13.72	--	—	
MW-306-CMT-20	6/11/2014	496.89	--	13.31	--	483.58	
MW-306-CMT-20	9/9/2014	496.89	--	12.03	--	484.86	
MW-306-CMT-20	11/20/2014	496.89	--	12.98	--	483.91	
MW-306-CMT-20	12/16/2014	496.89	--	13.14	--	483.75	
MW-306-CMT-20	3/19/2015	496.89	--	13.48	--	483.41	
MW-306-CMT-20	6/10/2015	496.89	--	13.01	--	483.88	
MW-306-CMT-20	8/12/2015	496.84	--	12.06	--	484.78	
MW-306-CMT-20	11/19/2015	496.84	--	13.08	--	483.76	
MW-306-CMT-20	7/22/2016	496.87	--	11.13	--	485.74	
MW-306-CMT-30	2/17/2012	—	--	13.76	--	—	
MW-306-CMT-30	4/19/2012	—	--	13.18	--	—	
MW-306-CMT-30	7/31/2012	—	--	12.08	--	—	
MW-306-CMT-30	11/1/2012	—	--	13.35	--	—	
MW-306-CMT-30	1/24/2013	—	--	13.12	--	—	
MW-306-CMT-30	4/24/2013	—	--	13.31	--	—	
MW-306-CMT-30	8/1/2013	—	--	11.95	--	—	
MW-306-CMT-30	10/1/2013	—	--	13.09	--	—	

Appendix A-1
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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-306-CMT-30	3/18/2014	—	--	13.72	--	—	
MW-306-CMT-30	6/11/2014	496.89	--	13.30	--	483.59	
MW-306-CMT-30	9/9/2014	496.89	--	12.02	--	484.87	
MW-306-CMT-30	11/20/2014	496.89	--	12.97	--	483.92	
MW-306-CMT-30	12/16/2014	496.89	--	13.17	--	483.72	
MW-306-CMT-30	3/19/2015	496.89	--	13.48	--	483.41	
MW-306-CMT-30	6/10/2015	496.89	--	13.03	--	483.86	
MW-306-CMT-30	8/12/2015	496.84	--	12.08	--	484.76	
MW-306-CMT-30	11/19/2015	496.84	--	13.08	--	483.76	
MW-306-CMT-30	7/22/2016	496.87	--	11.13	--	485.74	
MW-306-CMT-40	2/17/2012	—	--	Frozen	--	—	Frozen at 3.26 ft BTOC
MW-306-CMT-40	4/19/2012	—	--	13.19	--	—	
MW-306-CMT-40	7/31/2012	—	--	12.10	--	—	
MW-306-CMT-40	11/1/2012	—	--	13.35	--	—	
MW-306-CMT-40	1/24/2013	—	--	13.13	--	—	
MW-306-CMT-40	4/24/2013	—	--	13.31	--	—	
MW-306-CMT-40	8/1/2013	—	--	12.00	--	—	
MW-306-CMT-40	10/1/2013	—	--	13.11	--	—	
MW-306-CMT-40	3/18/2014	—	--	13.72	--	—	
MW-306-CMT-40	6/11/2014	496.89	--	13.32	--	483.57	
MW-306-CMT-40	9/9/2014	496.89	--	12.05	--	484.84	
MW-306-CMT-40	11/20/2014	496.89	--	12.99	--	483.90	
MW-306-CMT-40	12/16/2014	496.89	--	13.17	--	483.72	
MW-306-CMT-40	3/19/2015	496.89	--	13.49	--	483.40	
MW-306-CMT-40	6/10/2015	496.89	--	13.04	--	483.85	
MW-306-CMT-40	8/12/2015	496.84	--	12.08	--	484.76	
MW-306-CMT-40	11/19/2015	496.84	--	13.10	--	483.74	
MW-306-CMT-40	7/22/2016	496.87	--	11.17	--	485.70	
MW-306-CMT-50	2/17/2012	—	--	Frozen	--	—	Frozen at 3.35 ft BTOC
MW-306-CMT-50	4/19/2012	—	--	Frozen	--	—	Frozen at 5.29 ft BTOC
MW-306-CMT-50	7/31/2012	—	--	12.10	--	—	
MW-306-CMT-50	11/1/2012	—	--	13.35	--	—	
MW-306-CMT-50	1/24/2013	—	--	13.13	--	—	
MW-306-CMT-50	4/24/2013	—	--	13.31	--	—	
MW-306-CMT-50	8/1/2013	—	--	12.00	--	—	
MW-306-CMT-50	10/1/2013	—	--	13.11	--	—	
MW-306-CMT-50	3/18/2014	—	--	13.72	--	—	
MW-306-CMT-50	6/11/2014	496.89	--	13.32	--	483.57	
MW-306-CMT-50	9/9/2014	496.89	--	12.05	--	484.84	
MW-306-CMT-50	11/20/2014	496.89	--	12.99	--	483.90	

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Flint Hills Resources Alaska, LLC
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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-306-CMT-50	12/16/2014	496.89	--	13.18	--	483.71	
MW-306-CMT-50	3/19/2015	496.89	--	13.48	--	483.41	
MW-306-CMT-50	6/10/2015	496.89	--	13.06	--	483.83	
MW-306-CMT-50	8/12/2015	496.84	--	12.09	--	484.75	
MW-306-CMT-50	11/19/2015	496.84	--	13.09	--	483.75	
MW-306-CMT-50	7/22/2016	496.87	--	11.17	--	485.70	
MW-306-CMT-60	2/17/2012	—	--	Frozen	--	—	Frozen at 3.33 ft BTOC
MW-306-CMT-60	4/19/2012	—	--	Frozen	--	—	Frozen at 5.15 ft BTOC
MW-306-CMT-60	7/31/2012	—	--	12.10	--	—	
MW-306-CMT-60	11/1/2012	—	--	13.35	--	—	
MW-306-CMT-60	1/24/2013	—	--	13.14	--	—	
MW-306-CMT-60	4/24/2013	—	--	13.32	--	—	
MW-306-CMT-60	8/1/2013	—	--	12.01	--	—	
MW-306-CMT-60	10/1/2013	—	--	13.11	--	—	
MW-306-CMT-60	3/18/2014	—	--	13.72	--	—	
MW-306-CMT-60	6/11/2014	496.89	--	13.33	--	483.56	
MW-306-CMT-60	9/9/2014	496.89	--	12.05	--	484.84	
MW-306-CMT-60	11/20/2014	496.89	--	13.00	--	483.89	
MW-306-CMT-60	12/16/2014	496.89	--	13.19	--	483.70	
MW-306-CMT-60	3/19/2015	496.89	--	13.49	--	483.40	
MW-306-CMT-60	6/10/2015	496.89	--	13.06	--	483.83	
MW-306-CMT-60	8/12/2015	496.84	--	12.08	--	484.76	
MW-306-CMT-60	11/19/2015	496.84	--	13.07	--	483.77	
MW-306-CMT-60	3/22/2016	496.84	--	13.84	--	483.00	
MW-306-CMT-60	7/22/2016	496.87	--	11.17	--	485.70	
MW-306-CMT-60	9/13/2016	496.87	--	12.29	--	484.58	
MW-306-CMT-60	3/14/2017	496.87	--	13.30	--	483.57	
MW-306-70	2/16/2012	496.68	--	13.57	--	483.11	
MW-306-70	4/19/2012	496.68	--	12.96	--	483.72	
MW-306-70	7/31/2012	496.68	--	11.86	--	484.82	
MW-306-70	11/1/2012	496.68	--	13.10	--	483.58	
MW-306-70	1/24/2013	496.70	--	-	--	—	The depth to water measurement was not recorded on the field form.
MW-306-70	4/24/2013	496.70	--	13.15	--	483.55	
MW-306-70	8/1/2013	496.70	--	11.80	--	484.90	
MW-306-70	10/1/2013	496.70	No LNAPL	12.96	0.00	483.74	
MW-306-70	3/18/2014	496.70	--	13.55	--	483.15	
MW-306-70	6/11/2014	496.70	--	13.15	--	483.55	
MW-306-70	9/9/2014	496.70	--	11.97	--	484.73	
MW-306-70	11/20/2014	496.68	No LNAPL	12.82	0.00	483.86	
MW-306-70	12/16/2014	496.69	No LNAPL	13.04	0.00	483.65	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-306-70	2/2/2015	496.69	No LNAPL	13.30	0.00	483.39	
MW-306-70	2/17/2015	496.69	No LNAPL	13.31	0.00	483.38	
MW-306-70	3/19/2015	496.69	--	13.30	--	483.39	
MW-306-70	4/14/2015	496.71	--	13.12	--	483.59	
MW-306-70	5/18/2015	496.72	--	12.82	--	483.90	
MW-306-70	6/4/2015	496.69	--	12.64	--	484.05	
MW-306-70	6/10/2015	496.69	--	12.85	--	483.84	
MW-306-70	7/22/2015	496.70	--	12.05	--	484.65	
MW-306-70	8/12/2015	496.69	--	11.93	--	484.76	
MW-306-70	9/30/2015	496.71	--	12.52	--	484.19	
MW-306-70	10/22/2015	496.70	No LNAPL	12.97	0.00	483.73	
MW-306-70	11/19/2015	496.70	--	12.96	--	483.74	
MW-306-70	11/25/2015	496.70	No LNAPL	12.81	0.00	483.92	
MW-306-70	12/11/2015	496.70	--	12.96	--	483.74	
MW-306-70	1/26/2016	496.70	--	13.46	--	483.24	
MW-306-70	7/26/2016	496.70	--	11.06	--	485.64	
MW-306-80	2/16/2012	496.50	--	13.38	--	483.12	
MW-306-80	4/19/2012	496.50	--	12.77	--	483.73	
MW-306-80	7/31/2012	496.50	--	11.65	--	484.85	
MW-306-80	11/1/2012	496.50	--	12.92	--	483.58	
MW-306-80	1/24/2013	496.52	--	12.75	--	483.77	
MW-306-80	4/19/2013	496.53	--	13.04	--	483.49	
MW-306-80	4/24/2013	496.53	--	13.04	--	483.49	
MW-306-80	5/21/2013	496.52	--	12.73	--	483.79	
MW-306-80	6/19/2013	496.51	--	11.94	--	484.57	
MW-306-80	7/25/2013	496.50	--	11.75	--	484.75	
MW-306-80	8/1/2013	496.50	--	11.66	--	484.84	
MW-306-80	8/20/2013	496.52	--	11.70	--	484.82	
MW-306-80	10/1/2013	496.52	No LNAPL	12.80	0.00	483.72	
MW-306-80	1/30/2014	496.51	--	13.07	--	483.44	
MW-306-80	2/24/2014	496.53	--	13.32	--	483.21	
MW-306-80	3/14/2014	496.51	--	13.39	--	483.12	
MW-306-80	3/18/2014	496.51	--	13.38	--	483.13	
MW-306-80	4/25/2014	496.51	--	12.51	--	484.00	
MW-306-80	5/20/2014	496.52	--	12.83	--	483.69	
MW-306-80	6/10/2014	496.52	--	12.96	--	483.56	
MW-306-80	6/11/2014	496.52	--	12.98	--	483.54	
MW-306-80	7/15/2014	496.51	--	10.96	--	485.55	
MW-306-80	8/28/2014	496.52	--	11.57	--	484.95	
MW-306-80	9/9/2014	496.52	--	11.80	--	484.72	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-306-80	9/26/2014	496.52	--	12.13	--	484.39	
MW-306-80	10/27/2014	496.52	No LNAPL	13.12	0.00	483.40	
MW-306-80	11/20/2014	496.51	No LNAPL	12.65	0.00	483.86	
MW-306-80	12/16/2014	496.51	No LNAPL	12.85	0.00	483.66	
MW-306-80	2/2/2015	496.52	No LNAPL	13.12	0.00	483.40	
MW-306-80	2/17/2015	496.52	No LNAPL	13.09	0.00	483.43	
MW-306-80	3/19/2015	496.51	--	13.11	--	483.40	
MW-306-80	4/14/2015	496.52	--	12.92	--	483.60	
MW-306-80	5/18/2015	496.53	--	12.65	--	483.88	
MW-306-80	6/4/2015	496.52	--	12.48	--	484.04	
MW-306-80	6/10/2015	496.52	--	12.69	--	483.83	
MW-306-80	7/22/2015	496.53	--	11.87	--	484.66	
MW-306-80	8/12/2015	496.52	--	11.75	--	484.77	
MW-306-80	9/30/2015	496.53	--	12.35	--	484.18	
MW-306-80	10/22/2015	496.52	No LNAPL	12.79	0.00	483.73	
MW-306-80	11/19/2015	496.53	--	12.79	--	483.74	
MW-306-80	11/25/2015	496.53	No LNAPL	12.63	0.00	483.93	
MW-306-80	12/11/2015	496.53	--	12.79	--	483.74	
MW-306-80	1/26/2016	496.53	--	13.28	--	483.25	
MW-306-80	3/22/2016	496.52	No LNAPL	13.47	0.00	483.05	
MW-306-80	7/26/2016	496.52	--	10.87	--	485.65	
MW-306-80	9/13/2016	496.52	--	11.95	--	484.57	
MW-306-80	3/14/2017	496.52	--	12.93	--	483.59	
MW-306-80	9/21/2017	496.54	--	12.82	--	483.72	
MW-306-80	3/12/2018	496.54	--	13.24	--	483.30	
MW-306-80	9/10/2018	496.47	--	11.49	--	484.98	
MW-306-100	2/16/2012	—	--	12.41	--	—	
MW-306-100	4/19/2012	—	--	11.80	--	—	
MW-306-100	7/31/2012	—	--	10.71	--	—	
MW-306-100	11/1/2012	—	--	11.98	--	—	
MW-306-100	1/24/2013	495.55	--	11.79	--	483.76	
MW-306-100	4/24/2013	495.55	--	12.01	--	483.54	
MW-306-100	8/1/2013	495.55	--	10.68	--	484.87	
MW-306-100	10/1/2013	495.55	No LNAPL	11.81	0.00	483.74	
MW-306-100	3/18/2014	495.55	--	12.40	--	483.15	
MW-306-100	6/11/2014	495.55	--	12.00	--	483.55	
MW-306-100	9/9/2014	495.55	--	10.78	--	484.77	
MW-306-100	11/20/2014	495.53	No LNAPL	11.68	0.00	483.85	
MW-306-100	12/16/2014	495.54	No LNAPL	11.89	0.00	483.65	
MW-306-100	3/19/2015	495.54	--	12.15	--	483.39	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-306-100	6/10/2015	495.54	--	11.73	--	483.81	
MW-306-100	8/12/2015	495.55	--	10.79	--	484.76	
MW-306-100	11/19/2015	495.55	--	11.83	--	483.72	
MW-306-100	7/26/2016	495.53	--	9.90	--	485.63	
MW-306-150	2/16/2012	496.00	--	12.93	--	483.07	
MW-306-150	4/19/2012	496.00	--	12.32	--	483.68	
MW-306-150	7/31/2012	496.00	--	11.18	--	484.82	
MW-306-150	11/1/2012	496.00	--	12.45	--	483.55	
MW-306-150	1/24/2013	495.98	--	12.26	--	483.72	
MW-306-150	3/20/2013	496.05	--	12.51	--	483.54	
MW-306-150	4/19/2013	496.03	--	12.58	--	483.45	
MW-306-150	4/24/2013	496.03	--	12.50	--	483.53	
MW-306-150	5/21/2013	496.01	--	12.26	--	483.75	
MW-306-150	6/19/2013	495.99	--	11.44	--	484.55	
MW-306-150	7/25/2013	495.98	--	11.26	--	484.72	
MW-306-150	8/1/2013	495.98	--	11.17	--	484.81	
MW-306-150	8/20/2013	496.00	--	11.20	--	484.80	
MW-306-150	10/1/2013	496.00	No LNAPL	12.29	0.00	483.71	
MW-306-150	1/30/2014	496.02	--	12.54	--	483.48	
MW-306-150	2/5/2014	496.02	--	12.65	--	483.37	
MW-306-150	2/24/2014	496.00	--	12.83	--	483.17	
MW-306-150	3/14/2014	496.00	--	12.88	--	483.12	
MW-306-150	3/18/2014	496.00	--	12.92	--	483.08	
MW-306-150	3/24/2014	496.00	--	12.92	--	483.08	
MW-306-150	4/18/2014	496.01	--	13.43	--	482.58	
MW-306-150	4/25/2014	496.01	--	12.02	--	483.99	
MW-306-150	5/15/2014	496.00	--	12.27	--	483.73	
MW-306-150	5/20/2014	496.00	--	12.34	--	483.66	
MW-306-150	6/10/2014	496.00	--	12.47	--	483.53	
MW-306-150	6/11/2014	496.00	--	12.48	--	483.52	
MW-306-150	6/19/2014	496.00	--	12.17	--	483.83	
MW-306-150	7/15/2014	496.00	No LNAPL	10.48	0.00	485.52	
MW-306-150	8/26/2014	496.00	--	11.06	--	484.94	
MW-306-150	8/28/2014	496.00	--	11.07	--	484.93	
MW-306-150	9/9/2014	496.00	--	11.26	--	484.74	
MW-306-150	9/24/2014	496.00	--	11.60	--	484.40	
MW-306-150	9/26/2014	496.00	--	11.64	--	484.36	
MW-306-150	10/21/2014	495.99	--	12.44	--	483.55	
MW-306-150	10/27/2014	496.00	No LNAPL	12.61	0.00	483.39	
MW-306-150	11/19/2014	495.99	--	12.18	--	483.81	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-306-150	11/20/2014	495.99	No LNAPL	12.14	0.00	483.85	
MW-306-150	12/16/2014	496.01	No LNAPL	12.36	0.00	483.65	
MW-306-150	12/29/2014	496.01	No LNAPL	12.45	0.00	483.56	
MW-306-150	1/21/2015	496.01	--	12.54	--	483.47	
MW-306-150	2/2/2015	496.01	No LNAPL	12.62	0.00	483.39	
MW-306-150	2/17/2015	496.01	No LNAPL	12.64	0.00	483.37	
MW-306-150	2/25/2015	496.02	--	12.60	--	483.42	
MW-306-150	3/18/2015	496.01	--	12.65	--	483.36	
MW-306-150	3/19/2015	496.01	--	12.63	--	483.38	
MW-306-150	3/26/2015	496.01	--	12.59	--	483.42	
MW-306-150	4/14/2015	496.03	--	12.47	--	483.56	
MW-306-150	4/16/2015	496.03	--	12.45	--	483.58	
MW-306-150	5/18/2015	496.02	--	12.15	--	483.87	
MW-306-150	5/21/2015	496.02	--	12.16	--	483.86	
MW-306-150	6/4/2015	496.00	--	11.98	--	484.02	
MW-306-150	6/10/2015	496.00	--	12.20	--	483.80	
MW-306-150	7/22/2015	496.02	--	11.38	--	484.64	
MW-306-150	8/12/2015	496.00	--	11.27	--	484.73	
MW-306-150	8/19/2015	496.00	--	11.48	--	484.52	
MW-306-150	9/30/2015	496.01	--	11.87	--	484.14	
MW-306-150	10/6/2015	496.00	--	11.68	--	484.32	
MW-306-150	10/22/2015	496.01	No LNAPL	12.29	0.00	483.72	
MW-306-150	11/19/2015	496.01	--	12.29	--	483.72	
MW-306-150	11/25/2015	496.01	No LNAPL	12.14	0.00	483.90	
MW-306-150	12/11/2015	496.01	--	12.29	--	483.72	
MW-306-150	1/19/2016	496.01	--	12.76	--	483.25	
MW-306-150	1/26/2016	496.02	--	12.79	--	483.23	
MW-306-150	3/22/2016	496.02	No LNAPL	12.99	0.00	483.03	
MW-306-150	5/26/2016	496.01	--	12.34	--	483.67	
MW-306-150	7/26/2016	496.00	--	10.37	--	485.63	
MW-306-150	9/9/2016	496.02	--	11.35	--	484.67	
MW-306-150	9/13/2016	496.02	--	11.46	--	484.56	
MW-306-150	11/15/2016	496.00	--	12.03	--	483.97	
MW-306-150	2/8/2017	496.03	--	12.41	--	483.62	
MW-306-150	3/14/2017	496.03	--	12.47	--	483.56	
MW-306-150	6/13/2017	496.02	--	11.71	--	484.31	
MW-307-150	2/16/2012	495.48	No LNAPL	Frozen	0.00	—	Frozen at 11.34 ft BTOC
MW-307-150	4/19/2012	495.48	No LNAPL	Frozen	0.00	—	Frozen at 11.34 ft BTOC
MW-307-150	7/30/2012	495.48	No LNAPL	9.48	0.00	486.00	
MW-307-150	11/1/2012	495.48	No LNAPL	10.85	0.00	484.63	

Appendix A-1
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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-307-150	1/24/2013	495.49	--	10.68	--	484.81	
MW-307-150	4/24/2013	495.49	No LNAPL	10.72	0.00	484.77	
MW-307-150	7/23/2013	495.47	--	9.55	--	485.92	
MW-307-150	8/1/2013	495.47	--	9.57	--	485.90	
MW-307-150	8/21/2013	495.47	No LNAPL	9.44	0.00	486.03	
MW-307-150	9/30/2013	495.48	No LNAPL	10.68	0.00	484.80	
MW-307-150	1/9/2014	495.48	No LNAPL	10.94	0.00	484.54	
MW-307-150	2/5/2014	495.48	No LNAPL	11.56	0.00	483.92	
MW-307-150	3/18/2014	495.47	No LNAPL	11.32	0.00	484.15	
MW-307-150	3/24/2014	495.47	No LNAPL	11.35	0.00	484.12	
MW-307-150	4/18/2014	495.48	No LNAPL	11.16	0.00	484.32	
MW-307-150	5/15/2014	495.49	--	10.67	--	484.82	
MW-307-150	6/11/2014	495.49	No LNAPL	10.90	0.00	484.59	
MW-307-150	6/19/2014	495.49	No LNAPL	10.55	0.00	484.94	
MW-307-150	7/15/2014	495.50	No LNAPL	8.75	0.00	486.75	
MW-307-150	8/26/2014	495.49	No LNAPL	9.34	0.00	486.15	
MW-307-150	9/9/2014	495.49	No LNAPL	9.60	0.00	485.89	
MW-307-150	9/24/2014	495.48	No LNAPL	9.96	0.00	485.52	
MW-307-150	10/21/2014	495.49	No LNAPL	10.86	0.00	484.63	
MW-307-150	11/19/2014	495.47	No LNAPL	10.50	0.00	484.97	
MW-307-150	12/16/2014	495.48	No LNAPL	10.67	0.00	484.81	
MW-307-150	12/29/2014	495.48	No LNAPL	10.78	0.00	484.70	
MW-307-150	1/21/2015	495.46	No LNAPL	10.83	0.00	484.63	
MW-307-150	2/25/2015	495.48	No LNAPL	10.94	0.00	484.54	
MW-307-150	3/18/2015	495.47	No LNAPL	Frozen	0.00	—	
MW-307-150	3/18/2015	495.47	No LNAPL	Frozen	0.00	—	Depth to ice = 10.85 feet
MW-307-150	3/26/2015	495.47	No LNAPL	Frozen	0.00	—	
MW-307-150	4/16/2015	495.48	--	Frozen	--	—	
MW-307-150	5/21/2015	495.49	No LNAPL	Frozen	0.00	—	Ice at 10.67 feet
MW-307-150	6/10/2015	495.49	No LNAPL	10.56	0.00	484.93	
MW-307-150	8/12/2015	495.50	--	9.51	--	485.99	
MW-307-150	8/19/2015	495.50	No LNAPL	9.78	0.00	485.75	
MW-307-150	10/6/2015	495.48	No LNAPL	10.07	0.00	485.42	
MW-307-150	11/19/2015	495.48	--	10.65	--	484.83	
MW-307-150	1/19/2016	495.46	--	11.11	--	484.31	
MW-307-150	3/22/2016	495.46	No LNAPL	11.38	0.00	484.08	
MW-307-150	5/26/2016	495.48	No LNAPL	10.76	0.00	484.74	
MW-307-150	9/9/2016	495.49	--	9.63	--	485.86	
MW-307-150	9/12/2016	495.49	--	9.66	--	485.83	
MW-307-150	11/15/2016	495.47	No LNAPL	10.26	0.00	485.31	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-307-150	2/8/2017	495.44	No LNAPL	10.67	0.00	484.84	
MW-307-150	3/14/2017	495.44	--	10.71	--	484.73	
MW-307-150	6/13/2017	495.46	No LNAPL	10.03	0.00	485.48	
MW-309-15	7/31/2012	495.10	--	9.56	--	485.54	
MW-309-15	11/1/2012	495.10	--	10.91	--	484.19	
MW-309-15	1/24/2013	495.08	--	10.83	--	484.25	
MW-309-15	4/24/2013	495.22	--	11.12	--	484.10	
MW-309-15	7/23/2013	494.92	--	9.35	--	485.57	
MW-309-15	8/1/2013	494.92	--	9.27	--	485.65	
MW-309-15	8/21/2013	494.92	No LNAPL	9.23	0.00	485.69	
MW-309-15	10/1/2013	494.90	--	10.63	--	484.27	
MW-309-15	1/9/2014	494.95	--	10.87	--	484.08	
MW-309-15	2/5/2014	495.00	--	11.03	--	483.97	
MW-309-15	3/18/2014	495.04	--	11.30	--	483.74	
MW-309-15	3/24/2014	495.04	--	11.28	--	483.76	
MW-309-15	4/18/2014	495.05	--	11.08	--	483.97	
MW-309-15	4/25/2014	495.05	--	10.28	--	484.77	
MW-309-15	5/15/2014	495.04	--	10.73	--	484.31	
MW-309-15	5/20/2014	495.04	--	10.83	--	484.21	
MW-309-15	6/4/2014	495.04	--	10.95	--	484.09	
MW-309-15	6/11/2014	495.04	--	10.84	--	484.20	
MW-309-15	6/19/2014	495.04	--	10.53	--	484.51	
MW-309-15	7/15/2014	495.05	--	9.12	--	485.93	
MW-309-15	8/26/2014	495.05	--	9.79	--	485.26	
MW-309-15	9/9/2014	495.05	--	10.09	--	484.96	
MW-309-15	9/24/2014	495.05	--	10.40	--	484.65	
MW-309-15	10/21/2014	495.04	--	11.30	--	483.74	
MW-309-15	11/19/2014	495.04	No LNAPL	10.91	0.00	484.13	
MW-309-15	12/16/2014	495.05	--	11.14	--	483.91	
MW-309-15	1/21/2015	495.06	--	11.33	--	483.73	
MW-309-15	2/25/2015	495.07	--	11.39	--	483.68	
MW-309-15	3/18/2015	495.06	--	11.47	--	483.59	
MW-309-15	3/26/2015	495.06	--	11.38	--	483.68	
MW-309-15	4/16/2015	495.06	--	11.22	--	483.84	
MW-309-15	5/21/2015	495.05	--	10.96	--	484.09	
MW-309-15	6/10/2015	495.04	--	10.97	--	484.07	
MW-309-15	8/12/2015	495.05	--	9.92	--	485.13	
MW-309-15	8/19/2015	495.05	--	10.15	--	484.90	
MW-309-15	10/6/2015	494.77	--	10.20	--	484.57	Casing was cut down 0.28 feet on 10-1-15
MW-309-15	11/20/2015	494.77	--	10.80	--	483.97	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-309-15	1/19/2016	494.76	--	11.29	--	483.47	
MW-309-15	3/22/2016	494.76	No LNAPL	11.53	0.00	483.23	
MW-309-15	5/26/2016	494.77	--	10.87	--	483.90	
MW-309-15	7/19/2016	494.77	--	9.92	--	484.85	
MW-309-15	9/9/2016	494.77	--	9.45	--	485.32	
MW-309-15	9/13/2016	494.77	--	9.58	--	485.19	
MW-309-15	10/14/2016	494.77	--	10.53	--	484.24	
MW-309-15	11/15/2016	494.77	--	10.04	--	484.73	
MW-309-15	2/8/2017	494.78	--	10.47	--	484.31	
MW-309-15	3/14/2017	494.78	--	10.57	--	484.21	
MW-309-15	6/13/2017	494.77	--	9.74	--	485.03	
MW-309-15	8/8/2017	494.77	--	8.99	--	485.78	
MW-309-15	9/21/2017	494.77	--	10.37	--	484.40	
MW-309-15	3/12/2018	494.77	--	10.74	--	484.03	
MW-309-15	8/7/2018	494.77	--	8.73	--	486.04	
MW-309-15	9/10/2018	494.77	--	9.01	--	485.76	
MW-309-66	7/31/2012	—	--	9.38	--	—	
MW-309-66	11/1/2012	—	--	10.75	--	—	
MW-309-66	1/24/2013	495.05	--	10.71	--	484.34	
MW-309-66	4/24/2013	495.19	--	11.01	--	484.18	
MW-309-66	7/23/2013	495.17	--	9.53	--	485.64	
MW-309-66	8/1/2013	495.17	--	9.44	--	485.73	
MW-309-66	8/21/2013	495.17	No LNAPL	9.42	0.00	485.75	
MW-309-66	10/1/2013	495.15	--	10.85	--	484.30	
MW-309-66	1/9/2014	495.15	--	11.00	--	484.15	
MW-309-66	2/5/2014	495.17	--	11.14	--	484.03	
MW-309-66	3/18/2014	495.20	--	11.42	--	483.78	
MW-309-66	3/24/2014	495.20	--	11.43	--	483.77	
MW-309-66	4/18/2014	495.21	--	11.20	--	484.01	
MW-309-66	4/25/2014	495.21	--	10.46	--	484.75	
MW-309-66	5/15/2014	495.20	--	10.83	--	484.37	
MW-309-66	5/20/2014	495.20	--	10.93	--	484.27	
MW-309-66	6/4/2014	495.19	--	11.08	--	484.11	
MW-309-66	6/11/2014	495.19	--	11.00	--	484.19	
MW-309-66	6/19/2014	495.19	--	10.67	--	484.52	
MW-309-66	7/15/2014	495.19	--	8.94	--	486.25	
MW-309-66	8/26/2014	495.20	--	9.64	--	485.56	
MW-309-66	9/9/2014	495.20	--	9.95	--	485.25	
MW-309-66	9/24/2014	495.19	--	10.27	--	484.92	
MW-309-66	10/21/2014	495.19	--	11.18	--	484.01	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-309-66	11/19/2014	495.18	No LNAPL	10.75	0.00	484.43	
MW-309-66	12/16/2014	495.21	--	10.98	--	484.23	
MW-309-66	1/21/2015	495.20	--	11.15	--	484.05	
MW-309-66	2/25/2015	495.21	--	11.21	--	484.00	
MW-309-66	3/18/2015	495.20	--	11.28	--	483.92	
MW-309-66	3/26/2015	495.20	--	11.18	--	484.02	
MW-309-66	4/16/2015	495.21	--	11.05	--	484.16	
MW-309-66	5/21/2015	495.21	--	10.78	--	484.43	
MW-309-66	6/10/2015	495.19	--	10.81	--	484.38	
MW-309-66	8/12/2015	495.07	--	9.65	--	485.42	
MW-309-66	8/19/2015	495.07	--	9.85	--	485.22	
MW-309-66	10/6/2015	495.05	--	10.22	--	484.83	
MW-309-66	11/20/2015	495.05	--	10.73	--	484.32	
MW-309-66	1/19/2016	495.05	--	11.25	--	483.80	
MW-309-66	3/22/2016	495.06	No LNAPL	11.49	0.00	483.57	
MW-309-66	5/26/2016	495.06	--	10.81	--	484.25	
MW-309-66	7/19/2016	495.06	--	8.91	--	486.15	
MW-309-66	9/9/2016	495.06	--	9.71	--	485.35	
MW-309-66	9/13/2016	495.06	--	9.85	--	485.21	
MW-309-66	11/15/2016	495.06	--	10.29	--	484.77	
MW-309-66	2/8/2017	495.06	--	10.71	--	484.35	
MW-309-66	3/14/2017	495.06	--	10.80	--	484.26	
MW-309-66	6/13/2017	495.06	--	10.03	--	485.03	
MW-310-15	7/31/2012	494.32	--	8.60	--	485.72	
MW-310-15	11/1/2012	494.32	--	10.19	--	484.13	
MW-310-15	1/24/2013	494.32	--	9.75	--	484.57	
MW-310-15	4/24/2013	494.59	--	10.44	--	484.15	
MW-310-15	8/1/2013	494.26	--	8.47	--	485.79	
MW-310-15	10/1/2013	494.26	--	9.92	--	484.34	
MW-310-15	1/9/2014	494.36	--	10.13	--	484.23	
MW-310-15	2/5/2014	494.39	--	10.23	--	484.16	
MW-310-15	3/18/2014	494.48	--	10.66	--	483.82	
MW-310-15	3/24/2014	494.48	--	10.66	--	483.82	
MW-310-15	4/18/2014	494.51	--	10.31	--	484.20	
MW-310-15	4/25/2014	494.51	--	9.86	--	484.65	
MW-310-15	5/15/2014	494.48	--	10.12	--	484.36	
MW-310-15	5/20/2014	494.47	--	10.25	--	484.22	
MW-310-15	6/4/2014	494.45	--	10.42	--	484.03	
MW-310-15	6/11/2014	494.04	--	10.39	--	483.65	
MW-310-15	6/19/2014	494.04	--	10.12	--	483.92	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-310-15	7/15/2014	494.05	--	7.61	--	486.44	
MW-310-15	8/26/2014	494.04	--	8.38	--	485.66	
MW-310-15	9/9/2014	494.04	--	8.70	--	485.34	
MW-310-15	9/24/2014	494.03	--	8.98	--	485.05	
MW-310-15	10/21/2014	494.03	--	9.92	--	484.11	
MW-310-15	11/19/2014	494.11	No LNAPL	9.50	0.00	484.61	
MW-310-15	12/16/2014	494.15	--	9.78	--	484.37	
MW-310-15	1/21/2015	494.23	--	10.03	--	484.20	
MW-310-15	2/25/2015	494.31	--	10.14	--	484.17	
MW-310-15	3/18/2015	494.33	--	10.25	--	484.08	
MW-310-15	3/26/2015	494.33	--	10.15	--	484.18	
MW-310-15	4/16/2015	494.33	--	10.02	--	484.31	
MW-310-15	5/21/2015	494.31	--	9.75	--	484.56	
MW-310-15	6/10/2015	494.30	--	9.75	--	484.55	
MW-310-15	8/12/2015	493.88	--	8.30	--	485.58	
MW-310-15	8/19/2015	493.88	--	8.54	--	485.34	
MW-310-15	10/6/2015	493.87	--	9.05	--	484.82	
MW-310-15	11/19/2015	493.93	--	9.53	--	484.40	
MW-310-15	1/19/2016	494.04	--	10.14	--	483.90	
MW-310-15	2/3/2016	494.04	--	10.25	--	483.79	MW-310-15 DTW tracking for R-well specific capacity estimates
MW-310-15	2/8/2016	494.04	--	10.30	--	483.74	MW-310-15 DTW tracking for R-well specific capacity estimates
MW-310-15	2/12/2016	494.04	No LNAPL	10.33	0.00	483.71	MW-310-15 DTW tracking for R-well specific capacity estimates
MW-310-15	2/23/2016	494.04	--	10.34	--	483.70	MW-310-15 DTW tracking for R-well specific capacity estimates
MW-310-15	2/26/2016	494.04	No LNAPL	10.38	0.00	483.66	MW-310-15 DTW tracking for R-well specific capacity estimates
MW-310-15	3/4/2016	494.04	No LNAPL	10.34	0.00	483.70	MW-310-15 DTW tracking for R-well specific capacity estimates
MW-310-15	3/18/2016	494.04	--	10.43	--	483.61	
MW-310-15	3/22/2016	494.04	No LNAPL	10.48	0.00	483.56	
MW-310-15	3/23/2016	494.04	--	10.48	--	483.56	
MW-310-15	5/26/2016	494.14	--	9.85	--	484.29	
MW-310-15	7/2/2016	494.14	No LNAPL	8.97	0.00	485.17	
MW-310-15	7/4/2016	494.14	No LNAPL	8.74	0.00	485.40	
MW-310-15	7/8/2016	494.14	No LNAPL	8.45	0.00	485.69	
MW-310-15	7/12/2016	494.14	No LNAPL	8.40	0.00	485.74	
MW-310-15	7/16/2016	494.14	No LNAPL	8.32	0.00	485.82	
MW-310-15	7/19/2016	494.14	No LNAPL	8.46	0.00	485.68	
MW-310-15	7/20/2016	494.20	--	7.86	--	486.34	
MW-310-15	7/23/2016	494.14	No LNAPL	7.50	0.00	486.64	
MW-310-15	7/26/2016	494.14	No LNAPL	7.50	0.00	486.64	
MW-310-15	7/30/2016	494.14	No LNAPL	7.58	0.00	486.56	
MW-310-15	8/1/2016	494.14	No LNAPL	7.45	0.00	486.69	

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MW-310-15	8/6/2016	494.14	No LNAPL	7.65	0.00	486.49	
MW-310-15	8/9/2016	494.14	No LNAPL	7.80	0.00	486.34	
MW-310-15	8/13/2016	494.14	No LNAPL	7.92	0.00	486.22	
MW-310-15	8/16/2016	494.14	No LNAPL	—	0.00	—	DTW recorded at 6.1 feet. Suspected to be erroneous based on recent measurements, and was not entered in database.
MW-310-15	8/20/2016	494.14	No LNAPL	8.30	0.00	485.84	
MW-310-15	8/23/2016	494.14	No LNAPL	8.40	0.00	485.74	
MW-310-15	8/27/2016	494.14	No LNAPL	8.48	0.00	485.66	
MW-310-15	8/30/2016	494.14	No LNAPL	8.49	0.00	485.65	
MW-310-15	9/3/2016	494.14	No LNAPL	8.75	0.00	485.39	
MW-310-15	9/6/2016	494.14	No LNAPL	8.83	0.00	485.31	
MW-310-15	9/9/2016	494.14	--	8.90	--	485.24	
MW-310-15	9/10/2016	494.14	No LNAPL	9.00	0.00	485.14	
MW-310-15	9/13/2016	494.14	No LNAPL	9.46	0.00	484.68	
MW-310-15	9/13/2016	494.14	--	9.06	--	485.08	
MW-310-15	9/17/2016	494.14	No LNAPL	9.10	0.00	485.04	
MW-310-15	9/20/2016	494.14	No LNAPL	9.21	0.00	484.93	
MW-310-15	9/24/2016	494.14	No LNAPL	9.35	0.00	484.79	
MW-310-15	9/27/2016	494.14	No LNAPL	9.50	0.00	484.64	
MW-310-15	9/30/2016	494.14	No LNAPL	9.61	0.00	484.53	
MW-310-15	10/4/2016	494.14	No LNAPL	9.72	0.00	484.42	
MW-310-15	10/8/2016	494.14	No LNAPL	9.86	0.00	484.28	
MW-310-15	10/11/2016	494.14	No LNAPL	9.98	0.00	484.16	
MW-310-15	10/15/2016	494.14	No LNAPL	10.46	0.00	483.68	
MW-310-15	10/18/2016	494.14	No LNAPL	10.16	0.00	483.98	
MW-310-15	10/25/2016	494.14	No LNAPL	10.37	0.00	483.77	
MW-310-15	10/28/2016	494.14	No LNAPL	10.28	0.00	483.86	
MW-310-15	11/1/2016	494.20	No LNAPL	9.75	0.00	484.45	
MW-310-15	11/5/2016	494.20	No LNAPL	9.35	0.00	484.85	
MW-310-15	11/8/2016	494.20	No LNAPL	9.75	0.00	484.45	
MW-310-15	11/12/2016	494.20	No LNAPL	9.90	0.00	484.30	
MW-310-15	11/15/2016	494.20	No LNAPL	9.50	0.00	484.70	
MW-310-15	11/15/2016	494.20	--	9.49	--	484.71	
MW-310-15	11/19/2016	494.20	No LNAPL	9.51	0.00	484.69	
MW-310-15	11/22/2016	494.20	No LNAPL	9.61	0.00	484.59	
MW-310-15	11/26/2016	494.20	No LNAPL	9.74	0.00	484.46	
MW-310-15	11/29/2016	494.20	No LNAPL	9.80	0.00	484.40	
MW-310-15	12/3/2016	494.20	No LNAPL	9.91	0.00	484.29	
MW-310-15	12/6/2016	494.20	No LNAPL	9.91	0.00	484.29	
MW-310-15	12/10/2016	494.20	No LNAPL	9.89	0.00	484.31	

Appendix A-1
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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-310-15	12/13/2016	494.20	No LNAPL	9.89	0.00	484.31	
MW-310-15	12/17/2016	494.20	No LNAPL	9.90	0.00	484.30	
MW-310-15	12/20/2016	494.20	No LNAPL	9.92	0.00	484.28	
MW-310-15	12/24/2016	494.20	No LNAPL	9.91	0.00	484.29	
MW-310-15	12/27/2016	494.20	No LNAPL	9.80	0.00	484.40	
MW-310-15	12/31/2016	494.20	No LNAPL	9.96	0.00	484.24	
MW-310-15	1/7/2017	494.20	No LNAPL	9.98	0.00	484.22	
MW-310-15	1/10/2017	494.20	No LNAPL	10.01	0.00	484.19	
MW-310-15	1/15/2017	494.20	No LNAPL	10.01	0.00	484.19	
MW-310-15	1/17/2017	494.20	No LNAPL	10.00	0.00	484.20	
MW-310-15	1/21/2017	494.20	No LNAPL	10.46	0.00	483.74	
MW-310-15	1/24/2017	494.20	No LNAPL	10.09	0.00	484.11	
MW-310-15	1/28/2017	494.38	No LNAPL	10.10	0.00	484.28	
MW-310-15	1/31/2017	494.38	No LNAPL	10.15	0.00	484.23	
MW-310-15	2/4/2017	494.38	No LNAPL	10.15	0.00	484.23	
MW-310-15	2/7/2017	494.38	No LNAPL	10.15	0.00	484.23	
MW-310-15	2/8/2017	494.38	--	10.11	--	484.27	
MW-310-15	2/11/2017	494.38	No LNAPL	10.15	0.00	484.23	
MW-310-15	2/14/2017	494.38	No LNAPL	10.17	0.00	484.21	
MW-310-15	2/18/2017	494.38	No LNAPL	10.20	0.00	484.18	
MW-310-15	2/21/2017	494.38	No LNAPL	10.25	0.00	484.13	
MW-310-15	2/25/2017	494.38	No LNAPL	10.25	0.00	484.13	
MW-310-15	2/28/2017	494.38	No LNAPL	10.21	0.00	484.17	
MW-310-15	3/4/2017	494.38	No LNAPL	10.27	0.00	484.11	
MW-310-15	3/7/2017	494.38	No LNAPL	10.28	0.00	484.10	
MW-310-15	3/11/2017	494.38	No LNAPL	10.28	0.00	484.10	
MW-310-15	3/14/2017	494.38	--	10.28	--	484.10	
MW-310-15	3/14/2017	494.38	No LNAPL	10.31	0.00	484.07	
MW-310-15	3/18/2017	494.38	No LNAPL	10.31	0.00	484.07	
MW-310-15	3/21/2017	494.38	No LNAPL	10.36	0.00	484.02	
MW-310-15	3/24/2017	494.38	No LNAPL	10.37	0.00	484.01	
MW-310-15	3/28/2017	494.38	No LNAPL	10.38	0.00	484.00	
MW-310-15	4/1/2017	494.38	No LNAPL	10.42	0.00	483.96	
MW-310-15	4/4/2017	494.38	No LNAPL	10.35	0.00	484.03	
MW-310-15	4/8/2017	494.38	No LNAPL	10.35	0.00	484.03	
MW-310-15	4/11/2017	494.38	No LNAPL	10.30	0.00	484.08	
MW-310-15	4/15/2017	494.38	No LNAPL	10.18	0.00	484.20	
MW-310-15	4/18/2017	494.38	No LNAPL	10.12	0.00	484.26	
MW-310-15	4/22/2017	494.38	No LNAPL	10.18	0.00	484.20	
MW-310-15	4/25/2017	494.38	No LNAPL	10.04	0.00	484.34	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-310-15	4/29/2017	494.38	No LNAPL	9.80	0.00	484.58	
MW-310-15	5/2/2017	494.38	No LNAPL	9.57	0.00	484.81	
MW-310-15	5/6/2017	494.38	No LNAPL	9.83	0.00	484.55	
MW-310-15	5/9/2017	494.38	No LNAPL	9.70	0.00	484.68	
MW-310-15	5/13/2017	494.45	No LNAPL	9.87	0.00	484.58	
MW-310-15	5/16/2017	494.45	No LNAPL	9.78	0.00	484.67	
MW-310-15	5/20/2017	494.18	No LNAPL	9.75	0.00	484.43	
MW-310-15	5/23/2017	494.45	No LNAPL	9.88	0.00	484.57	
MW-310-15	5/27/2017	494.18	No LNAPL	9.76	0.00	484.42	
MW-310-15	5/30/2017	494.16	No LNAPL	9.89	0.00	484.27	
MW-310-15	6/3/2017	494.16	No LNAPL	10.06	0.00	484.10	
MW-310-15	6/6/2017	494.16	No LNAPL	10.10	0.00	484.06	
MW-310-15	6/10/2017	494.16	No LNAPL	10.08	0.00	484.08	
MW-310-15	6/13/2017	494.16	--	9.47	--	484.69	
MW-310-15	6/13/2017	494.16	No LNAPL	9.52	0.00	484.64	
MW-310-15	6/16/2017	494.16	No LNAPL	9.18	0.00	484.98	
MW-310-15	6/20/2017	494.16	No LNAPL	9.33	0.00	484.83	
MW-310-15	6/24/2017	494.16	No LNAPL	9.42	0.00	484.74	
MW-310-15	6/27/2017	494.16	No LNAPL	9.33	0.00	484.83	
MW-310-15	7/1/2017	494.16	No LNAPL	9.27	0.00	484.89	
MW-310-15	7/4/2017	494.16	No LNAPL	9.15	0.00	485.01	
MW-310-15	7/8/2017	494.16	No LNAPL	8.90	0.00	485.26	
MW-310-15	7/10/2017	494.16	--	8.72	--	485.44	
MW-310-15	9/21/2017	494.16	--	9.95	--	484.21	
MW-310-15	3/12/2018	494.26	--	10.38	--	483.88	
MW-310-15	7/10/2018	494.26	--	8.53	--	485.73	
MW-310-15	9/10/2018	494.26	--	8.67	--	485.59	
MW-310-65	7/31/2012	494.47	--	8.64	--	485.83	
MW-310-65	11/1/2012	494.47	--	10.08	--	484.39	
MW-310-65	1/24/2013	494.48	--	10.09	--	484.39	
MW-310-65	4/24/2013	494.48	--	10.58	--	483.90	
MW-310-65	10/1/2013	494.38	--	10.02	--	484.36	
MW-310-65	3/18/2014	494.54	--	10.67	--	483.87	
MW-310-65	4/25/2014	494.59	--	9.80	--	484.79	
MW-310-65	5/20/2014	494.57	--	10.24	--	484.33	
MW-310-65	6/4/2014	494.57	--	10.41	--	484.16	
MW-310-65	6/11/2014	494.55	--	10.34	--	484.21	
MW-310-65	9/9/2014	494.12	--	8.78	--	485.34	
MW-310-65	11/20/2014	494.12	No LNAPL	9.47	0.00	484.65	
MW-310-65	3/18/2015	493.77	--	10.30	--	483.47	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-310-65	6/10/2015	494.37	--	9.82	--	484.55	
MW-310-65	8/12/2015	494.07	--	8.43	--	485.64	
MW-310-65	11/19/2015	494.09	--	9.58	--	484.51	
MW-310-65	3/22/2016	494.34	No LNAPL	10.59	0.00	483.75	
MW-310-65	7/20/2016	494.00	--	7.90	--	486.10	
MW-310-65	9/13/2016	494.00	--	9.11	--	484.89	
MW-310-65	3/14/2017	494.00	--	9.99	--	484.01	
MW-310-110	7/31/2012	494.27	--	8.43	--	485.84	
MW-310-110	11/1/2012	494.27	--	9.79	--	484.48	
MW-310-110	1/24/2013	494.26	--	9.79	--	484.47	
MW-310-110	4/24/2013	494.40	--	10.93	--	483.47	
MW-310-110	8/1/2013	494.28	--	8.36	--	485.92	
MW-310-110	10/1/2013	494.13	--	9.75	--	484.38	
MW-310-110	1/9/2014	494.15	--	9.88	--	484.27	
MW-310-110	2/5/2014	494.16	--	10.00	--	484.16	
MW-310-110	3/18/2014	494.18	--	10.30	--	483.88	
MW-310-110	3/24/2014	494.18	--	10.29	--	483.89	
MW-310-110	4/18/2014	494.18	--	10.05	--	484.13	
MW-310-110	4/25/2014	494.18	--	9.35	--	484.83	
MW-310-110	5/15/2014	494.15	--	9.70	--	484.45	
MW-310-110	5/20/2014	494.16	--	9.79	--	484.37	
MW-310-110	6/4/2014	494.16	--	9.98	--	484.18	
MW-310-110	6/11/2014	494.15	--	9.89	--	484.26	
MW-310-110	6/19/2014	494.15	--	9.49	--	484.66	
MW-310-110	7/15/2014	494.15	--	7.67	--	486.48	
MW-310-110	8/26/2014	494.15	--	8.42	--	485.73	
MW-310-110	9/9/2014	494.15	--	8.80	--	485.35	
MW-310-110	9/24/2014	494.14	--	9.07	--	485.07	
MW-310-110	10/21/2014	494.14	--	9.99	--	484.15	
MW-310-110	11/19/2014	494.16	No LNAPL	9.52	0.00	484.64	
MW-310-110	12/16/2014	494.16	--	9.75	--	484.41	
MW-310-110	1/21/2015	494.22	--	9.98	--	484.24	
MW-310-110	2/25/2015	494.32	--	10.13	--	484.19	
MW-310-110	3/18/2015	494.32	--	10.22	--	484.10	
MW-310-110	3/26/2015	494.32	--	10.12	--	484.20	
MW-310-110	4/16/2015	494.32	--	9.97	--	484.35	
MW-310-110	5/21/2015	494.30	--	9.72	--	484.58	
MW-310-110	6/10/2015	494.27	--	9.72	--	484.55	
MW-310-110	8/12/2015	494.28	--	8.84	--	485.44	
MW-310-110	8/19/2015	494.28	--	8.88	--	485.40	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-310-110	10/6/2015	493.98	--	9.03	--	484.95	Casing was cut down 0.33 feet on 10-1-15
MW-310-110	11/19/2015	493.97	--	9.43	--	484.54	
MW-310-110	1/19/2016	494.00	--	10.04	--	483.96	
MW-310-110	3/22/2016	494.22	No LNAPL	10.45	0.00	483.77	
MW-310-110	5/26/2016	494.17	--	9.77	--	484.40	
MW-310-110	8/10/2016	494.17	--	7.64	--	486.53	
MW-310-110	9/9/2016	494.17	--	8.78	--	485.39	
MW-310-110	9/13/2016	494.17	--	8.96	--	485.21	
MW-310-110	11/15/2016	494.17	--	9.31	--	484.86	
MW-310-110	2/8/2017	494.27	--	9.84	--	484.43	
MW-310-110	3/14/2017	494.27	--	9.97	--	484.30	
MW-310-110	6/13/2017	494.32	--	9.21	--	485.11	
MW-310-110	9/21/2017	493.83	--	9.45	--	484.38	
MW-310-110	3/12/2018	493.83	--	9.81	--	484.02	
MW-310-110	9/10/2018	493.85	--	8.10	--	485.75	
MW-321-15	11/1/2012	495.62	--	10.05	--	485.57	
MW-321-15	1/24/2013	495.59	--	10.51	--	485.08	
MW-321-15	4/24/2013	495.59	--	10.87	--	484.72	
MW-321-15	8/1/2013	495.59	--	9.18	--	486.41	
MW-321-15	10/1/2013	495.59	--	10.68	--	484.91	
MW-321-15	3/18/2014	495.59	--	11.34	--	484.25	
MW-321-15	6/11/2014	495.86	--	10.89	--	484.97	
MW-321-15	9/9/2014	495.86	--	9.70	--	486.16	
MW-321-15	11/20/2014	495.86	No LNAPL	10.43	0.00	485.43	
MW-321-15	3/19/2015	495.86	--	11.10	--	484.76	
MW-321-15	6/12/2015	495.86	--	10.64	--	485.22	
MW-321-15	8/12/2015	495.75	--	9.25	--	486.50	
MW-321-15	11/19/2015	495.75	--	10.42	--	485.33	
MW-321-15	3/22/2016	495.75	No LNAPL	11.35	0.00	484.40	
MW-321-15	8/11/2016	495.87	--	8.56	--	487.31	
MW-321-15	9/13/2016	495.87	--	9.68	--	486.19	
MW-321-15	3/14/2017	495.87	--	10.78	--	485.09	
MW-321-15	8/8/2017	495.87	--	9.25	--	486.62	
MW-321-15	9/21/2017	495.54	--	10.29	--	485.25	
MW-321-15	11/15/2017	495.54	--	10.45	--	485.09	
MW-321-15	2/15/2018	495.54	--	10.80	--	484.74	
MW-321-15	3/12/2018	495.54	--	10.74	--	484.80	
MW-321-15	3/15/2018	495.27	--	10.44	--	484.83	
MW-321-15	4/10/2018	495.54	--	10.79	--	484.75	
MW-321-15	8/7/2018	495.54	--	8.64	--	486.90	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-321-15	9/10/2018	495.59	--	8.99	--	486.60	
MW-321-65	11/1/2012	495.28	--	10.23	--	485.05	
MW-321-65	1/24/2013	495.26	--	10.26	--	485.00	
MW-321-65	4/24/2013	495.26	--	10.60	--	484.66	
MW-321-65	8/1/2013	495.26	--	8.92	--	486.34	
MW-321-65	10/1/2013	495.26	--	10.40	--	484.86	
MW-321-65	3/18/2014	495.26	--	11.07	--	484.19	
MW-321-65	6/11/2014	495.54	--	10.64	--	484.90	
MW-321-65	9/9/2014	495.54	--	9.45	--	486.09	
MW-321-65	11/20/2014	495.54	No LNAPL	10.19	0.00	485.35	
MW-321-65	3/19/2015	495.54	--	10.88	--	484.66	
MW-321-65	6/12/2015	495.54	--	10.50	--	485.04	
MW-321-65	8/12/2015	495.55	--	9.15	--	486.40	
MW-321-65	11/19/2015	495.55	--	10.29	--	485.26	
MW-321-65	8/11/2016	495.67	--	8.43	--	487.24	
MW-330-20	3/18/2014	500.03	--	15.63	--	484.40	
MW-330-20	6/11/2014	500.03	--	15.21	--	484.82	
MW-330-20	9/9/2014	500.03	--	14.05	--	485.98	
MW-330-20	11/20/2014	500.03	No LNAPL	14.75	0.00	485.28	
MW-330-20	3/19/2015	500.03	--	15.28	--	484.75	
MW-330-20	6/11/2015	500.03	--	14.86	--	485.17	
MW-330-20	8/12/2015	500.06	--	13.95	--	486.11	
MW-330-20	11/19/2015	500.06	--	14.85	--	485.21	
MW-330-20	3/22/2016	500.06	No LNAPL	15.69	0.00	484.37	
MW-330-20	7/20/2016	500.08	--	12.93	--	487.15	
MW-330-20	9/13/2016	500.08	--	14.10	--	485.98	
MW-330-20	10/18/2016	500.08	--	15.21	--	484.87	
MW-330-20	3/14/2017	500.08	--	15.03	--	485.05	
MW-330-20	7/10/2017	500.08	--	13.70	--	486.38	
MW-330-20	1/16/2018	500.08	--	15.10	--	484.98	
MW-330-20	7/10/2018	500.08	--	13.49	--	486.59	
MW-330-65	7/30/2012	499.82	--	13.37	--	486.45	
MW-330-65	11/1/2012	499.82	No LNAPL	14.79	0.00	485.03	
MW-330-65	1/24/2013	499.83	--	14.75	--	485.08	
MW-330-65	4/24/2013	499.83	--	15.10	--	484.73	
MW-330-65	8/1/2013	499.83	--	12.65	--	487.18	
MW-330-65	10/1/2013	499.83	--	14.90	--	484.93	
MW-330-65	3/18/2014	499.83	--	15.43	--	484.40	
MW-330-65	6/11/2014	499.83	--	15.02	--	484.81	
MW-330-65	9/9/2014	499.83	--	13.88	--	485.95	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-330-65	11/20/2014	499.83	No LNAPL	14.56	0.00	485.27	
MW-330-65	3/19/2015	499.83	--	15.09	--	484.74	
MW-330-65	6/11/2015	499.83	--	14.67	--	485.16	
MW-330-65	8/12/2015	499.85	--	13.50	--	486.35	
MW-330-65	11/19/2015	499.85	--	14.86	--	484.99	
MW-330-65	3/22/2016	499.85	No LNAPL	15.51	0.00	484.34	
MW-330-65	7/20/2016	499.87	--	12.52	--	487.35	
MW-330-65	9/13/2016	499.87	--	13.92	--	485.95	
MW-330-65	3/14/2017	499.87	--	14.84	--	485.03	
MW-334-15	9/19/2012	490.82	11.39	12.79	1.40	479.15	Erroneous data for this measurement was reported in 2012 Q3 due to surveying error
MW-334-15	10/15/2012	490.82	11.33	12.74	1.41	479.21	
MW-334-15	10/17/2012	490.82	11.43	12.84	1.41	479.11	Initial levels of first October 2012 baildown test
MW-334-15	10/19/2012	490.82	11.49	12.91	1.42	479.05	Initial levels of second October 2012 baildown test
MW-334-15	11/29/2012	495.87	11.01	12.08	1.07	484.65	
MW-334-15	12/27/2012	495.87	11.32	12.61	1.29	484.29	
MW-334-15	2/26/2013	495.87	11.40	12.84	1.44	484.18	
MW-334-15	3/29/2013	495.82	11.52	12.99	1.47	484.01	R-35R, R-39, and R-40 were offline on this date
MW-334-15	4/24/2013	495.82	11.48	13.04	1.56	484.03	
MW-334-15	5/20/2013	495.93	11.42	13.08	1.66	484.18	
MW-334-15	6/24/2013	495.92	10.83	11.13	0.30	485.03	
MW-334-15	7/23/2013	495.89	10.55	11.41	0.86	485.17	
MW-334-15	8/1/2013	495.89	10.49	11.52	1.03	485.19	
MW-334-15	8/21/2013	495.89	10.41	11.45	1.04	485.27	
MW-334-15	9/30/2013	495.89	11.48	13.07	1.59	484.09	
MW-334-15	10/22/2013	495.90	12.08	13.76	1.68	483.48	
MW-334-15	11/26/2013	496.91	12.11	13.36	1.25	484.55	
MW-334-15	12/18/2013	496.94	12.44	13.74	1.30	484.24	
MW-334-15	1/9/2014	496.96	12.74	14.14	1.40	483.94	
MW-334-15	2/5/2014	496.98	12.96	14.37	1.41	483.74	
MW-334-15	2/25/2014	496.98	13.12	14.56	1.44	483.57	
MW-334-15	3/18/2014	496.97	13.12	14.62	1.50	483.55	
MW-334-15	3/24/2014	496.97	13.20	14.64	1.44	483.48	
MW-334-15	4/18/2014	496.98	13.05	14.46	1.41	483.65	
MW-334-15	5/15/2014	496.98	12.81	12.90	0.09	484.15	Skimmer pump removed to take measurement.
MW-334-15	5/16/2014	496.98	12.85	12.94	0.09	484.11	
MW-334-15	6/11/2014	496.95	12.95	12.96	0.01	484.00	Product skimmer-pump present
MW-334-15	6/19/2014	496.95	12.54	12.57	0.03	484.40	Skimmer pump removed to take measurement.
MW-334-15	7/15/2014	496.95	10.80	10.81	0.01	486.15	
MW-334-15	8/26/2014	496.96	11.51	11.72	0.21	485.41	Product skimmer-pump present

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-334-15	9/9/2014	496.96	11.73	11.97	0.24	485.18	Product skimmer-pump present
MW-334-15	9/24/2014	496.95	12.02	12.20	0.18	484.89	
MW-334-15	10/21/2014	496.94	12.84	13.50	0.66	483.97	
MW-334-15	11/19/2014	496.96	12.48	12.92	0.44	484.39	
MW-334-15	12/16/2014	496.98	12.64	13.49	0.85	484.17	
MW-334-15	12/29/2014	496.98	12.77	13.70	0.93	484.02	
MW-334-15	1/21/2015	497.01	12.88	13.80	0.92	483.95	
MW-334-15	2/25/2015	497.01	13.16	13.86	0.70	483.71	
MW-334-15	3/10/2015	497.00	12.97	13.87	0.90	483.85	
MW-334-15	3/18/2015	497.00	13.04	14.00	0.96	483.77	
MW-334-15	3/26/2015	497.00	12.97	14.02	1.05	483.82	
MW-334-15	4/16/2015	497.02	12.86	13.86	1.00	483.96	
MW-334-15	5/21/2015	497.02	12.64	13.21	0.57	484.27	Skimmer pump present; removed for measurement, and reinstalled after
MW-334-15	6/10/2015	497.03	12.66	13.28	0.62	484.25	Skimmer pump present; removed for measurement, and reinstalled after
MW-334-15	7/22/2015	497.03	11.76	11.92	0.16	485.26	
MW-334-15	8/12/2015	497.02	11.62	11.85	0.23	485.39	
MW-334-15	8/19/2015	497.02	11.90	12.27	0.37	485.12	
MW-334-15	9/30/2015	497.02	12.36	12.74	0.38	484.62	
MW-334-15	10/6/2015	497.02	12.19	12.54	0.35	484.80	
MW-334-15	10/15/2015	497.02	12.59	12.86	0.27	484.42	Skimmer pump present
MW-334-15	11/19/2015	497.02	12.50	13.35	0.85	484.35	
MW-334-15	11/25/2015	497.02	12.51	12.85	0.34	484.47	
MW-334-15	12/16/2015	497.02	12.82	13.31	0.49	484.10	
MW-334-15	1/19/2016	497.01	13.20	13.72	0.52	483.71	
MW-334-15	1/19/2016	497.01	13.20	13.72	0.52	483.71	
MW-334-15	2/25/2016	497.01	11.32	11.83	0.51	485.59	
MW-334-15	3/4/2016	497.01	13.25	13.82	0.57	483.70	
MW-334-15	3/22/2016	497.01	13.46	13.52	0.06	483.54	
MW-334-15	3/25/2016	497.01	13.36	13.96	0.60	483.53	Initial fluid levels and product recovered by SWI during baildown testing
MW-334-15	4/14/2016	497.01	12.62	13.16	0.54	484.28	R-45 and R-40 both not pumping
MW-334-15	5/20/2016	497.03	12.95	13.55	0.60	483.96	
MW-334-15	5/26/2016	497.03	12.78	13.32	0.54	484.16	
MW-334-15	6/14/2016	497.03	12.53	12.54	0.01	484.50	
MW-334-15	7/2/2016	497.03	No LNAPL	12.07	0.00	484.96	
MW-334-15	7/4/2016	497.03	No LNAPL	11.85	0.00	485.18	
MW-334-15	7/8/2016	497.03	No LNAPL	11.59	0.00	485.44	
MW-334-15	7/12/2016	497.03	No LNAPL	11.50	0.00	485.53	
MW-334-15	7/26/2016	497.03	10.40	10.85	0.45	486.54	
MW-334-15	8/18/2016	497.03	11.24	11.53	0.29	485.73	
MW-334-15	8/18/2016	497.00	11.26	11.56	0.30	485.68	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-334-15	9/9/2016	497.01	11.73	11.91	0.18	485.29	Skimmer pump removed prior to measurement
MW-334-15	9/9/2016	497.01	11.73	11.91	0.18	485.29	
MW-334-15	9/12/2016	497.01	11.83	12.05	0.22	485.14	
MW-334-15	10/13/2016	497.01	12.79	12.82	0.03	484.21	
MW-334-15	10/25/2016	497.00	13.14	13.19	0.05	483.85	
MW-334-15	11/15/2016	497.00	Sheen	12.41	Sheen	484.63	
MW-334-15	11/15/2016	497.00	Sheen	12.41	Sheen	484.63	
MW-334-15	12/9/2016	497.00	12.65	12.66	0.01	484.35	
MW-334-15	1/24/2017	496.95	Sheen	12.76	Sheen	484.19	
MW-334-15	2/8/2017	496.95	Sheen	12.81	Sheen	484.21	
MW-334-15	2/8/2017	496.95	Sheen	12.81	Sheen	484.21	
MW-334-15	2/15/2017	496.95	Sheen	12.84	Sheen	484.14	
MW-334-15	3/1/2017	496.95	12.94	12.99	0.05	484.00	
MW-334-15	3/14/2017	496.95	12.84	13.10	0.26	484.06	
MW-334-15	4/18/2017	496.95	12.55	13.43	0.88	484.22	
MW-334-15	4/22/2017	496.95	12.57	13.40	0.83	484.21	
MW-334-15	4/29/2017	496.95	No LNAPL	12.30	0.00	484.65	
MW-334-15	5/6/2017	496.95	12.45	12.46	0.01	484.50	
MW-334-15	5/13/2017	496.95	13.38	13.43	0.05	483.56	
MW-334-15	5/20/2017	496.95	No LNAPL	12.30	0.00	484.65	
MW-334-15	5/25/2017	496.95	Sheen	12.50	Sheen	484.45	Skimmer pump removed for measurement and replaced
MW-334-15	5/27/2017	496.95	12.54	12.56	0.02	484.41	
MW-334-15	6/6/2017	497.01	12.79	13.23	0.44	484.13	
MW-334-15	6/13/2017	497.01	12.19	12.20	0.01	484.88	
MW-334-15	7/1/2017	497.01	12.12	12.13	0.01	484.89	
MW-334-15	7/25/2017	497.01	Sheen	11.21	Sheen	485.80	
MW-334-15	7/27/2017	497.01	No LNAPL	11.22	0.00	485.79	
MW-334-15	8/28/2017	497.01	11.71	11.85	0.14	485.27	
MW-334-15	8/31/2017	497.01	11.77	11.89	0.12	485.12	
MW-334-15	9/20/2017	497.01	12.40	12.51	0.11	484.50	
MW-334-15	9/21/2017	497.01	12.41	12.51	0.10	484.58	
MW-334-15	9/21/2017	497.01	12.41	12.51	0.10	484.58	
MW-334-15	10/25/2017	497.01	Sheen	13.11	Sheen	483.90	
MW-334-15	11/1/2017	497.01	12.85	13.28	0.43	484.07	
MW-334-15	2/13/2018	497.01	12.88	13.30	0.42	484.05	
MW-334-15	3/12/2018	497.01	12.78	13.32	0.54	484.12	
MW-334-15	3/12/2018	497.01	12.78	13.32	0.54	484.12	
MW-334-15	4/3/2018	497.01	12.78	13.34	0.56	484.12	
MW-334-15	6/8/2018	497.01	No LNAPL	12.03	0.00	484.98	
MW-334-15	7/10/2018	497.01	Sheen	11.03	Sheen	485.98	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-334-15	9/10/2018	497.06	11.02	11.27	0.25	485.99	
MW-334-65	11/1/2012	490.76	No LNAPL	11.46	0.00	479.30	
MW-334-65	1/24/2013	495.82	--	11.30	--	484.52	
MW-334-65	4/24/2013	495.76	No LNAPL	11.55	0.00	484.21	
MW-334-65	7/23/2013	495.81	--	10.18	--	485.63	
MW-334-65	8/1/2013	495.81	No LNAPL	10.09	0.00	485.72	
MW-334-65	8/21/2013	495.81	No LNAPL	10.06	0.00	485.75	
MW-334-65	9/30/2013	495.81	No LNAPL	11.33	0.00	484.48	
MW-334-65	1/9/2014	495.83	No LNAPL	11.56	0.00	484.27	
MW-334-65	2/5/2014	495.85	No LNAPL	11.71	0.00	484.14	
MW-334-65	3/18/2014	495.84	No LNAPL	11.97	0.00	483.87	
MW-334-65	3/24/2014	495.84	No LNAPL	11.99	0.00	483.85	
MW-334-65	4/18/2014	495.85	No LNAPL	11.81	0.00	484.04	
MW-334-65	5/15/2014	495.85	--	11.35	--	484.50	
MW-334-65	6/11/2014	495.82	No LNAPL	11.50	0.00	484.32	
MW-334-65	6/19/2014	495.82	No LNAPL	11.16	0.00	484.66	
MW-334-65	7/15/2014	495.83	No LNAPL	9.39	0.00	486.44	
MW-334-65	8/26/2014	495.83	No LNAPL	10.02	0.00	485.81	
MW-334-65	9/9/2014	495.83	No LNAPL	10.28	0.00	485.55	
MW-334-65	9/24/2014	495.81	No LNAPL	10.62	0.00	485.19	
MW-334-65	10/21/2014	495.81	No LNAPL	11.53	0.00	484.28	
MW-334-65	11/19/2014	495.83	No LNAPL	11.15	0.00	484.68	
MW-334-65	12/16/2014	495.83	No LNAPL	11.34	0.00	484.49	
MW-334-65	12/29/2014	495.83	No LNAPL	11.47	0.00	484.36	
MW-334-65	1/21/2015	495.84	No LNAPL	11.53	0.00	484.31	
MW-334-65	2/25/2015	495.85	No LNAPL	11.66	0.00	484.19	
MW-334-65	3/18/2015	495.84	--	11.69	--	484.15	
MW-334-65	3/26/2015	495.84	No LNAPL	11.60	0.00	484.24	
MW-334-65	4/16/2015	495.84	--	11.48	--	484.36	
MW-334-65	5/21/2015	495.85	No LNAPL	11.23	0.00	484.62	
MW-334-65	6/10/2015	495.85	No LNAPL	11.24	0.00	484.61	
MW-334-65	8/12/2015	495.85	--	10.26	--	485.59	
MW-334-65	8/19/2015	495.85	No LNAPL	10.45	0.00	485.43	
MW-334-65	10/6/2015	495.84	No LNAPL	10.75	0.00	485.10	
MW-334-65	11/19/2015	495.84	--	11.30	--	484.54	
MW-334-65	1/19/2016	495.84	--	11.79	--	484.01	
MW-334-65	5/26/2016	495.86	No LNAPL	11.43	0.00	484.45	
MW-334-65	8/12/2016	495.85	--	10.52	--	485.33	
MW-334-65	9/9/2016	495.85	No LNAPL	10.32	0.00	485.57	
MW-334-65	10/20/2016	495.85	--	11.55	--	484.30	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-334-65	11/15/2016	495.85	No LNAPL	10.97	0.00	484.98	
MW-334-65	2/8/2017	495.82	No LNAPL	11.37	0.00	484.52	
MW-334-65	6/13/2017	495.86	No LNAPL	10.72	0.00	485.19	
MW-334-65	8/3/2017	495.86	--	10.03	--	485.83	
MW-334-65	10/19/2017	495.86	--	11.36	--	484.50	
MW-334-65	1/18/2018	495.86	--	11.36	--	484.50	
MW-334-65	4/6/2018	495.86	--	11.69	--	484.17	
MW-334-85	3/18/2014	496.12	No LNAPL	12.20	0.00	483.92	
MW-334-85	5/15/2014	496.13	--	11.59	--	484.54	
MW-334-85	6/11/2014	496.12	No LNAPL	11.77	0.00	484.35	
MW-334-85	6/19/2014	496.12	No LNAPL	11.43	0.00	484.69	
MW-334-85	7/15/2014	496.14	No LNAPL	9.65	0.00	486.49	
MW-334-85	8/26/2014	496.13	No LNAPL	10.29	0.00	485.84	
MW-334-85	9/9/2014	496.13	No LNAPL	10.55	0.00	485.58	
MW-334-85	9/24/2014	496.12	No LNAPL	10.88	0.00	485.24	
MW-334-85	10/21/2014	496.12	No LNAPL	11.80	0.00	484.32	
MW-334-85	11/19/2014	496.14	No LNAPL	11.42	0.00	484.72	
MW-334-85	12/16/2014	496.12	No LNAPL	11.59	0.00	484.53	
MW-334-85	12/29/2014	496.12	No LNAPL	11.70	0.00	484.42	
MW-334-85	1/21/2015	496.12	No LNAPL	11.77	0.00	484.35	
MW-334-85	2/25/2015	496.11	No LNAPL	11.88	0.00	484.23	
MW-334-85	3/18/2015	496.11	--	11.92	--	484.19	
MW-334-85	3/26/2015	496.11	No LNAPL	11.84	0.00	484.27	
MW-334-85	4/16/2015	496.11	--	11.70	--	484.41	
MW-334-85	5/21/2015	496.14	No LNAPL	11.46	0.00	484.68	
MW-334-85	6/10/2015	496.15	No LNAPL	11.49	0.00	484.66	
MW-334-85	8/12/2015	496.14	--	10.44	--	485.70	
MW-334-85	8/19/2015	496.14	No LNAPL	10.70	0.00	485.47	
MW-334-85	10/6/2015	496.14	No LNAPL	11.02	0.00	485.13	
MW-334-85	11/19/2015	496.14	--	11.56	--	484.58	
MW-334-85	1/19/2016	496.11	--	12.05	--	484.02	
MW-334-85	3/22/2016	496.11	No LNAPL	12.29	0.00	483.82	
MW-334-85	5/26/2016	496.15	No LNAPL	11.69	0.00	484.48	
MW-334-85	8/12/2016	496.13	--	10.76	--	485.37	
MW-334-85	9/9/2016	496.14	No LNAPL	10.58	0.00	485.60	
MW-334-85	9/12/2016	496.14	--	10.63	--	485.51	
MW-334-85	11/15/2016	496.13	No LNAPL	11.20	0.00	485.03	
MW-334-85	2/8/2017	496.10	No LNAPL	11.63	0.00	484.54	
MW-334-85	3/14/2017	496.10	--	11.66	--	484.44	
MW-334-85	6/13/2017	496.15	No LNAPL	10.97	0.00	485.23	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-336-15	4/14/2014	492.90	7.45	Frozen	0.32	—	Frozen at 7.77 feet below measuring point
MW-336-15	6/11/2014	492.90	7.13	7.36	0.23	485.72	
MW-336-15	10/30/2014	492.90	7.47	7.58	0.11	485.41	
MW-336-15	3/10/2015	492.90	Sheen	Frozen	Sheen	—	Depth to ice = 6.87 feet
MW-336-15	10/15/2015	492.92	6.75	6.80	0.05	486.20	
MW-336-15	3/4/2016	492.92	Sheen	Frozen	Sheen	—	Ice at 7.45 feet
MW-336-15	8/17/2016	492.91	Sheen	5.11	Sheen	487.80	
MW-336-15	10/13/2016	492.91	6.81	6.82	0.01	486.10	
MW-336-15	10/26/2016	492.91	7.18	7.24	0.06	485.72	
MW-336-15	3/2/2017	492.91	No LNAPL	Frozen	0.00	—	Ice at 6.60 feet BTOC
MW-336-20	3/18/2014	493.32	No LNAPL	Frozen	0.00	—	Frozen at 7.93 feet below measuring point
MW-336-20	6/12/2014	493.32	--	7.84	--	485.48	
MW-336-20	9/9/2014	493.32	No LNAPL	6.31	0.00	487.01	
MW-336-20	11/20/2014	493.32	No LNAPL	7.11	0.00	486.21	
MW-336-20	3/19/2015	493.32	--	Frozen	--	—	Depth to ice = 7.36 feet
MW-336-20	6/11/2015	493.32	No LNAPL	7.42	0.00	485.90	
MW-336-20	8/12/2015	493.34	--	6.02	--	487.32	
MW-336-20	11/20/2015	493.34	--	7.21	--	486.13	
MW-336-20	3/22/2016	493.34	No LNAPL	Frozen	0.00	—	Ice at 7.77 feet
MW-336-20	8/15/2016	493.33	--	5.45	--	487.88	
MW-336-20	9/12/2016	493.33	--	6.24	--	487.09	
MW-336-20	10/21/2016	493.33	--	7.53	--	485.80	
MW-336-20	3/14/2017	493.33	—	—	—	—	Well was inaccessible due to demolition debris. Well was Frozen on 2-23-17
MW-336-20	8/15/2017	493.33	--	5.74	--	487.59	
MW-336-20	9/21/2017	493.33	--	7.23	--	486.10	
MW-336-20	11/15/2017	493.33	--	7.48	--	485.85	
MW-336-20	2/15/2018	493.33	--	7.75	--	485.58	
MW-336-20	3/12/2018	493.33	--	7.69	--	485.64	
MW-336-20	4/11/2018	493.33	--	9.66	--	483.67	
MW-336-20	8/8/2018	493.33	--	5.42	--	487.91	
MW-336-20	9/10/2018	493.26	--	5.80	--	487.46	
MW-336-35	8/15/2016	493.27	--	5.41	--	487.86	
MW-336-35	10/21/2016	493.27	--	7.48	--	485.79	
MW-336-55	3/18/2014	493.29	No LNAPL	Frozen	0.00	—	Frozen at 7.70 feet below measuring point
MW-336-55	6/11/2014	493.29	No LNAPL	Frozen	0.00	—	Water measured at 7.46 feet, Frozen at 8.43 feet below the measuring point
MW-336-55	9/9/2014	493.29	No LNAPL	6.26	0.00	487.03	
MW-336-55	11/20/2014	493.29	No LNAPL	7.05	0.00	486.24	
MW-336-55	3/19/2015	493.29	--	Frozen	--	—	Depth to ice = 7.31 feet
MW-336-55	6/11/2015	493.29	No LNAPL	7.43	0.00	485.86	
MW-336-55	8/12/2015	493.31	--	5.95	--	487.36	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-336-55	11/20/2015	493.31	--	7.14	--	486.17	
MW-336-55	3/22/2016	493.31	No LNAPL	Frozen	0.00	—	Ice at 6.82 feet
MW-336-55	8/15/2016	493.31	--	5.37	--	487.94	
MW-336-55	9/12/2016	493.31	--	6.23	--	487.08	
MW-336-55	3/14/2017	493.31	—	—	—	—	Well was inaccessible due to demolition debris. Well was Frozen on 2-23-17
MW-337-20	8/17/2016	493.02	--	5.23	--	487.79	
MW-337-20	10/21/2016	493.02	--	7.22	--	485.80	
MW-344-15	8/1/2013	493.52	No LNAPL	8.43	0.00	485.09	
MW-344-15	8/21/2013	493.52	No LNAPL	8.24	0.00	485.28	
MW-344-15	1/9/2014	493.51	--	9.86	--	483.65	
MW-344-15	2/5/2014	493.51	--	10.08	--	483.43	
MW-344-15	3/24/2014	493.53	--	9.97	--	483.56	
MW-344-15	4/18/2014	493.52	--	10.15	--	483.37	
MW-344-15	5/15/2014	493.52	--	9.64	--	483.88	
MW-344-15	6/19/2014	493.54	--	9.10	--	484.44	
MW-344-15	7/15/2014	493.50	--	7.72	--	485.78	
MW-344-15	8/26/2014	493.54	--	8.36	--	485.18	
MW-344-15	9/24/2014	493.50	--	8.99	--	484.51	
MW-344-15	10/21/2014	493.51	--	9.92	--	483.59	
MW-344-15	11/19/2014	493.51	--	9.51	--	484.00	
MW-344-15	12/16/2014	493.52	--	9.70	--	483.82	
MW-344-15	1/21/2015	493.51	--	9.95	--	483.56	
MW-344-15	2/25/2015	493.53	--	10.18	--	483.35	
MW-344-15	3/18/2015	493.54	--	10.10	--	483.44	
MW-344-15	3/26/2015	493.54	--	10.08	--	483.46	
MW-344-15	4/16/2015	493.57	--	9.84	--	483.73	
MW-344-15	5/21/2015	493.57	--	9.52	--	484.05	
MW-344-15	6/10/2015	493.54	--	9.56	--	483.98	
MW-344-15	8/19/2015	493.56	--	8.73	--	484.83	
MW-344-15	10/6/2015	493.55	--	9.10	--	484.45	
MW-344-15	1/19/2016	493.54	--	10.15	--	483.39	
MW-344-15	5/26/2016	493.57	--	9.75	--	483.82	
MW-344-15	8/11/2016	493.54	--	7.68	--	485.86	
MW-344-15	9/9/2016	493.56	--	8.47	--	485.09	
MW-344-15	10/19/2016	493.54	--	9.73	--	483.81	
MW-344-15	11/15/2016	493.54	--	9.07	--	484.47	
MW-344-15	2/8/2017	493.54	--	9.48	--	484.06	
MW-344-15	6/13/2017	493.55	--	8.78	--	484.77	
MW-344-15	7/24/2017	493.55	--	7.76	--	485.79	
MW-344-15	8/29/2017	493.55	--	8.33	--	485.22	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-344-15	9/19/2017	493.55	--	9.04	--	484.51	
MW-344-15	10/24/2017	493.55	--	9.41	--	484.14	
MW-344-15	1/18/2018	493.55	--	9.17	--	484.38	
MW-344-15	4/4/2018	493.55	--	9.50	--	484.05	
MW-344-55	2/5/2014	493.94	--	9.89	--	484.05	
MW-344-55	3/24/2014	493.96	--	10.13	--	483.83	
MW-344-55	4/18/2014	493.96	--	9.94	--	484.02	
MW-344-55	5/15/2014	493.94	--	9.52	--	484.42	
MW-344-55	6/19/2014	493.96	--	9.31	--	484.65	
MW-344-55	7/15/2014	493.92	--	7.58	--	486.34	
MW-344-55	8/26/2014	493.95	--	8.28	--	485.67	
MW-344-55	9/24/2014	493.92	--	8.89	--	485.03	
MW-344-55	10/21/2014	493.92	--	9.82	--	484.10	
MW-344-55	11/19/2014	493.92	--	9.40	--	484.52	
MW-344-55	12/16/2014	493.94	--	9.60	--	484.34	
MW-344-55	1/21/2015	493.93	--	9.80	--	484.13	
MW-344-55	2/25/2015	493.93	--	9.86	--	484.07	
MW-344-55	3/18/2015	493.94	--	9.93	--	484.01	
MW-344-55	3/26/2015	493.94	--	9.84	--	484.10	
MW-344-55	4/16/2015	493.96	--	9.69	--	484.27	
MW-344-55	5/21/2015	493.96	--	9.41	--	484.55	
MW-344-55	6/10/2015	493.92	--	9.46	--	484.46	
MW-344-55	8/19/2015	493.95	--	8.64	--	485.31	
MW-344-55	10/6/2015	493.94	--	9.02	--	484.92	
MW-344-55	1/19/2016	493.93	--	10.03	--	483.90	
MW-344-55	5/26/2016	493.94	--	9.63	--	484.31	
MW-344-55	8/11/2016	493.93	--	7.60	--	486.33	
MW-344-55	9/9/2016	493.95	--	8.52	--	485.43	
MW-344-55	10/19/2016	493.93	--	9.76	--	484.17	
MW-344-55	11/15/2016	493.93	--	9.13	--	484.80	
MW-344-55	2/8/2017	493.92	--	9.53	--	484.39	
MW-344-55	6/13/2017	493.93	--	8.85	--	485.08	
MW-344-75	2/5/2014	493.35	--	9.28	--	484.07	
MW-344-75	3/24/2014	493.38	--	9.58	--	483.80	
MW-344-75	4/18/2014	493.36	--	9.34	--	484.02	
MW-344-75	5/15/2014	493.37	--	8.94	--	484.43	
MW-344-75	6/19/2014	493.38	--	8.75	--	484.63	
MW-344-75	7/15/2014	493.35	--	6.97	--	486.38	
MW-344-75	8/26/2014	493.37	--	7.67	--	485.70	
MW-344-75	9/24/2014	493.35	--	8.30	--	485.05	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-344-75	10/21/2014	493.35	--	9.22	--	484.13	
MW-344-75	11/19/2014	493.35	--	8.79	--	484.56	
MW-344-75	12/16/2014	493.35	--	8.98	--	484.37	
MW-344-75	1/21/2015	493.35	--	9.16	--	484.19	
MW-344-75	2/25/2015	493.36	--	9.25	--	484.11	
MW-344-75	3/18/2015	493.35	--	9.32	--	484.03	
MW-344-75	3/26/2015	493.35	--	9.22	--	484.13	
MW-344-75	4/16/2015	493.39	--	9.07	--	484.32	
MW-344-75	5/21/2015	493.38	--	8.82	--	484.56	
MW-344-75	6/10/2015	493.36	--	8.86	--	484.50	
MW-344-75	8/19/2015	493.38	--	8.03	--	485.35	
MW-344-75	10/6/2015	493.35	--	8.42	--	484.93	
MW-344-75	1/19/2016	493.35	--	9.43	--	483.92	
MW-344-75	5/26/2016	493.36	--	9.03	--	484.33	
MW-344-75	8/11/2016	493.36	--	7.01	--	486.35	
MW-344-75	9/9/2016	493.37	--	7.95	--	485.42	
MW-344-75	11/15/2016	493.36	--	8.52	--	484.84	
MW-344-75	2/8/2017	493.35	--	8.93	--	484.42	
MW-344-75	6/13/2017	493.36	--	8.27	--	485.09	
MW-345-15	8/1/2013	495.49	No LNAPL	10.56	0.00	484.93	
MW-345-15	8/21/2013	495.49	No LNAPL	10.44	0.00	485.05	
MW-345-15	1/9/2014	495.51	--	11.48	--	484.03	
MW-345-15	2/5/2014	495.51	--	11.92	--	483.59	
MW-345-15	3/24/2014	495.51	--	12.16	--	483.35	
MW-345-15	4/18/2014	495.52	--	Frozen	--	—	Frozen at 11.50 feet below measuring point
MW-345-15	5/15/2014	495.51	--	Frozen	--	—	Frozen at 11.52 feet below measuring point
MW-345-15	6/19/2014	495.52	--	Frozen	--	—	
MW-345-15	7/15/2014	495.50	No LNAPL	9.77	0.00	485.73	
MW-345-15	8/26/2014	495.51	--	10.42	--	485.09	
MW-345-15	9/24/2014	495.51	--	10.95	--	484.56	
MW-345-15	10/21/2014	495.51	--	11.83	--	483.68	
MW-345-15	11/19/2014	495.54	--	11.47	--	484.07	
MW-345-15	12/16/2014	495.55	--	11.67	--	483.88	
MW-345-15	1/21/2015	495.54	--	11.79	--	483.75	
MW-345-15	2/25/2015	495.54	--	11.86	--	483.68	
MW-345-15	3/18/2015	495.55	--	Frozen	--	—	
MW-345-15	3/26/2015	495.55	--	11.83	--	483.72	
MW-345-15	4/16/2015	495.55	--	11.66	--	483.89	
MW-345-15	5/21/2015	495.54	--	11.80	--	483.74	
MW-345-15	6/10/2015	495.54	--	11.86	--	483.68	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-345-15	8/19/2015	495.54	--	10.95	--	484.59	
MW-345-15	10/6/2015	495.54	--	11.23	--	484.31	
MW-345-15	1/19/2016	495.54	--	12.17	--	483.37	
MW-345-15	5/26/2016	495.54	--	11.75	--	483.79	
MW-345-15	7/22/2016	495.54	--	9.45	--	486.09	
MW-345-15	9/9/2016	495.53	--	10.58	--	484.95	
MW-345-15	10/19/2016	495.54	--	11.84	--	483.70	
MW-345-15	11/15/2016	495.54	--	11.15	--	484.39	
MW-345-15	2/8/2017	495.54	--	11.61	--	483.93	
MW-345-15	2/15/2017	495.54	--	11.62	--	483.92	
MW-345-15	6/13/2017	495.54	--	10.97	--	484.57	
MW-345-15	7/24/2017	495.54	--	9.84	--	485.70	
MW-345-15	7/28/2017	495.54	No LNAPL	9.90	0.00	485.64	
MW-345-15	8/29/2017	495.54	--	10.43	--	485.11	
MW-345-15	9/20/2017	495.54	--	11.07	--	484.47	
MW-345-15	10/24/2017	495.55	--	11.40	--	484.15	
MW-345-15	11/1/2017	495.55	No LNAPL	11.62	0.00	483.93	
MW-345-15	2/12/2018	495.55	--	11.54	--	484.01	
MW-345-15	3/12/2018	495.55	No LNAPL	11.51	0.00	484.04	
MW-345-15	4/4/2018	495.55	--	11.55	--	484.00	
MW-345-15	6/8/2018	495.55	No LNAPL	11.69	0.00	483.86	
MW-345-15	7/19/2018	495.55	--	9.91	--	485.64	
MW-345-55	2/5/2014	496.03	--	11.99	--	484.04	
MW-345-55	3/24/2014	496.01	--	Frozen	--	—	Frozen at 12.19 feet below measuring point
MW-345-55	4/18/2014	496.02	--	Frozen	--	—	Frozen at 12.18 feet below measuring point
MW-345-55	5/15/2014	496.02	--	Frozen	--	—	Frozen at 12.16 feet below measuring point
MW-345-55	6/19/2014	496.04	--	Frozen	--	—	
MW-345-55	7/15/2014	496.02	No LNAPL	9.76	0.00	486.26	
MW-345-55	8/26/2014	496.01	--	10.41	--	485.60	
MW-345-55	9/24/2014	496.01	--	11.01	--	485.00	
MW-345-55	10/21/2014	496.01	--	11.94	--	484.07	
MW-345-55	11/19/2014	496.02	--	11.54	--	484.48	
MW-345-55	12/16/2014	496.05	--	11.76	--	484.29	
MW-345-55	1/21/2015	496.03	--	11.91	--	484.12	
MW-345-55	2/25/2015	496.03	--	11.98	--	484.05	
MW-345-55	3/18/2015	496.03	--	Frozen	--	—	
MW-345-55	3/26/2015	496.03	--	Frozen	--	—	
MW-345-55	4/16/2015	496.03	--	Frozen	--	—	
MW-345-55	5/21/2015	496.03	--	Frozen	--	—	Depth to ice = 11.88 feet
MW-345-55	6/10/2015	496.01	--	Frozen	--	—	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-345-55	8/19/2015	496.02	--	10.76	--	485.26	
MW-345-55	10/6/2015	496.01	--	11.12	--	484.89	
MW-345-55	1/19/2016	496.02	--	12.16	--	483.86	
MW-345-55	5/26/2016	496.01	--	Frozen	--	—	Ice at 11.80 feet
MW-345-55	7/22/2016	496.01	--	9.40	--	486.61	
MW-345-55	9/9/2016	495.99	--	10.65	--	485.34	
MW-345-55	10/19/2016	496.01	--	11.87	--	484.14	
MW-345-55	11/15/2016	496.01	--	11.18	--	484.83	
MW-345-55	2/8/2017	496.01	--	11.67	--	484.34	
MW-345-55	6/13/2017	495.99	--	Frozen	--	—	Depth to ice = 10.67 feet
MW-345-55	7/14/2017	495.99	--	10.18	--	485.81	
MW-345-55	10/20/2017	495.99	--	11.67	--	484.32	
MW-345-55	1/16/2018	495.99	--	11.65	--	484.34	
MW-345-55	4/4/2018	495.99	--	11.94	--	484.05	
MW-345-55	4/6/2018	495.99	--	11.95	--	484.04	
MW-345-55	7/13/2018	495.99	--	10.05	--	485.94	
MW-345-75	2/5/2014	495.65	--	11.58	--	484.07	
MW-345-75	3/24/2014	495.66	--	Frozen	--	—	Frozen at 11.05 feet below measuring point
MW-345-75	4/18/2014	495.67	--	Frozen	--	—	Frozen at 11.78 feet below measuring point
MW-345-75	5/15/2014	495.63	--	Frozen	--	—	Frozen at 11.79 feet below measuring point
MW-345-75	6/19/2014	495.65	--	Frozen	--	—	
MW-345-75	7/15/2014	495.63	No LNAPL	9.28	0.00	486.35	
MW-345-75	8/26/2014	495.62	--	9.93	--	485.69	
MW-345-75	9/24/2014	495.62	--	10.56	--	485.06	
MW-345-75	10/21/2014	495.61	--	11.46	--	484.15	
MW-345-75	11/19/2014	495.64	--	11.08	--	484.56	
MW-345-75	12/16/2014	495.66	--	11.30	--	484.36	
MW-345-75	1/21/2015	495.65	--	11.47	--	484.18	
MW-345-75	2/25/2015	495.64	--	Frozen	--	—	
MW-345-75	3/18/2015	495.65	--	Frozen	--	—	
MW-345-75	3/26/2015	495.65	--	Frozen	--	—	
MW-345-75	4/16/2015	495.65	--	Frozen	--	—	
MW-345-75	5/21/2015	495.62	--	Frozen	--	—	Depth to ice = 11.56 feet
MW-345-75	6/10/2015	495.61	--	Frozen	--	—	
MW-345-75	8/19/2015	495.62	--	10.31	--	485.31	
MW-345-75	10/6/2015	495.62	--	10.67	--	484.95	
MW-345-75	1/19/2016	495.64	--	11.70	--	483.94	
MW-345-75	5/26/2016	495.61	--	Frozen	--	—	Ice at 11.31 feet
MW-345-75	7/22/2016	495.64	--	8.95	--	486.69	
MW-345-75	9/9/2016	495.61	--	10.20	--	485.41	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-345-75	10/19/2016	495.64	--	11.40	--	484.24	
MW-345-75	11/15/2016	495.64	--	10.73	--	484.91	
MW-345-75	2/8/2017	495.64	--	11.24	--	484.40	
MW-345-75	6/13/2017	495.61	--	Frozen	--	—	Depth to ice = 11.22 feet
MW-345-75	7/13/2018	495.61	--	9.71	--	485.90	
MW-348-15	10/29/2014	493.74	8.65	8.97	0.32	485.03	
MW-348-15	3/10/2015	493.74	8.33	8.41	0.08	485.39	
MW-348-15	10/15/2015	493.80	Sheen	8.04	Sheen	485.80	
MW-348-15	3/4/2016	493.80	8.81	8.82	0.01	485.04	
MW-348-15	8/17/2016	493.85	Sheen	6.48	Sheen	487.37	
MW-348-15	10/13/2016	493.85	No LNAPL	8.16	0.00	485.69	
MW-348-15	3/1/2017	493.85	No LNAPL	8.25	0.00	485.60	
MW-348-65	8/11/2016	493.91	--	6.14	--	487.77	
MW-348-65	11/16/2016	493.91	--	7.65	--	486.26	
MW-351-15	1/15/2014	493.42	--	9.50	--	483.92	
MW-351-15	2/5/2014	493.41	--	9.54	--	483.87	
MW-351-15	3/4/2014	493.38	--	9.77	--	483.61	
MW-351-15	3/24/2014	493.36	--	9.83	--	483.53	
MW-351-15	4/18/2014	493.36	--	9.59	--	483.77	
MW-351-15	4/25/2014	493.36	--	8.88	--	484.48	
MW-351-15	5/15/2014	493.40	--	9.23	--	484.17	
MW-351-15	5/20/2014	493.40	--	9.33	--	484.07	
MW-351-15	6/4/2014	493.41	--	9.50	--	483.91	
MW-351-15	6/19/2014	493.45	--	9.12	--	484.33	
MW-351-15	7/8/2014	493.49	--	6.94	--	486.55	
MW-351-15	7/15/2014	493.48	No LNAPL	7.36	0.00	486.12	
MW-351-15	8/26/2014	493.46	--	8.06	--	485.40	
MW-351-15	9/24/2014	493.46	--	8.69	--	484.77	
MW-351-15	10/21/2014	493.45	--	9.60	--	483.85	
MW-351-15	11/19/2014	493.45	--	9.19	--	484.26	
MW-351-15	12/16/2014	493.43	No LNAPL	9.41	0.00	484.02	
MW-351-15	1/21/2015	493.45	--	9.58	--	483.87	
MW-351-15	2/17/2015	493.45	No LNAPL	9.69	0.00	483.76	
MW-351-15	2/25/2015	493.48	--	9.63	--	483.85	
MW-351-15	3/18/2015	493.45	--	9.71	--	483.74	
MW-351-15	3/26/2015	493.45	--	9.61	--	483.84	
MW-351-15	4/16/2015	493.43	--	9.48	--	483.95	
MW-351-15	5/21/2015	493.45	--	9.19	--	484.26	
MW-351-15	6/10/2015	493.46	--	9.24	--	484.22	
MW-351-15	7/22/2015	493.47	--	8.23	--	485.24	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-351-15	8/19/2015	493.44	--	8.43	--	485.01	
MW-351-15	9/30/2015	493.46	--	8.96	--	484.50	
MW-351-15	10/6/2015	493.43	--	8.79	--	484.64	
MW-351-15	10/22/2015	493.45	No LNAPL	9.42	0.00	484.03	
MW-351-15	11/25/2015	493.46	--	9.07	--	484.40	DTW was measured during Datalogger download
MW-351-15	12/11/2015	493.46	--	9.31	--	484.15	
MW-351-15	1/19/2016	493.42	--	9.80	--	483.62	
MW-351-15	1/26/2016	493.47	--	9.85	--	483.62	
MW-351-15	5/26/2016	493.46	--	9.41	--	484.05	
MW-351-15	7/19/2016	493.46	--	7.48	--	485.98	
MW-351-15	9/9/2016	493.46	--	8.31	--	485.15	
MW-351-15	10/19/2016	493.46	--	10.52	--	482.94	
MW-351-15	11/15/2016	493.46	--	8.88	--	484.58	
MW-351-15	2/8/2017	493.48	--	9.31	--	484.17	
MW-351-15	6/13/2017	493.48	--	8.64	--	484.84	
MW-351-15	8/1/2017	493.48	--	8.06	--	485.42	
MW-351-55	1/15/2014	493.55	--	9.57	--	483.98	
MW-351-55	2/5/2014	493.54	--	9.62	--	483.92	
MW-351-55	3/4/2014	493.52	--	9.85	--	483.67	
MW-351-55	3/24/2014	493.51	--	9.92	--	483.59	
MW-351-55	4/18/2014	493.51	--	9.68	--	483.83	
MW-351-55	4/25/2014	493.51	--	8.87	--	484.64	
MW-351-55	5/15/2014	493.54	--	9.33	--	484.21	
MW-351-55	5/20/2014	493.56	--	9.43	--	484.13	
MW-351-55	6/4/2014	493.56	--	9.60	--	483.96	
MW-351-55	6/19/2014	493.62	--	9.19	--	484.43	
MW-351-55	7/8/2014	493.65	--	7.01	--	486.64	
MW-351-55	7/15/2014	493.63	--	7.45	--	486.18	
MW-351-55	8/26/2014	493.59	--	8.13	--	485.46	
MW-351-55	9/24/2014	493.61	--	8.74	--	484.87	
MW-351-55	10/21/2014	493.61	--	9.66	--	483.95	
MW-351-55	11/19/2014	493.61	--	9.24	--	484.37	
MW-351-55	12/16/2014	493.59	No LNAPL	9.44	0.00	484.15	
MW-351-55	1/21/2015	493.61	No LNAPL	9.63	0.00	483.98	
MW-351-55	2/17/2015	493.61	No LNAPL	9.74	0.00	483.87	
MW-351-55	2/25/2015	493.63	--	9.68	--	483.95	
MW-351-55	3/18/2015	493.63	--	9.76	--	483.87	
MW-351-55	3/26/2015	493.63	--	9.67	--	483.96	
MW-351-55	4/16/2015	493.57	--	9.51	--	484.06	
MW-351-55	5/21/2015	493.60	--	9.24	--	484.36	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-351-55	6/10/2015	493.60	--	9.28	--	484.32	
MW-351-55	7/22/2015	493.60	--	8.26	--	485.34	
MW-351-55	8/19/2015	493.58	--	8.46	--	485.12	
MW-351-55	9/30/2015	493.59	--	9.03	--	484.56	
MW-351-55	10/6/2015	493.55	--	8.86	--	484.69	
MW-351-55	10/22/2015	493.59	No LNAPL	9.47	0.00	484.12	
MW-351-55	11/25/2015	493.59	--	9.10	--	484.50	DTW was measured during Datalogger download
MW-351-55	12/11/2015	493.60	--	9.36	--	484.24	
MW-351-55	1/19/2016	493.56	--	9.85	--	483.71	
MW-351-55	1/26/2016	493.61	--	9.90	--	483.71	
MW-351-55	5/26/2016	493.61	--	9.46	--	484.15	
MW-351-55	7/19/2016	493.61	--	7.53	--	486.08	
MW-351-55	9/9/2016	493.62	--	8.39	--	485.23	
MW-351-55	10/19/2016	493.61	--	9.61	--	484.00	
MW-351-55	11/15/2016	493.61	--	8.96	--	484.65	
MW-351-55	2/8/2017	493.62	--	9.38	--	484.24	
MW-351-55	6/13/2017	493.61	--	8.71	--	484.90	
MW-351-75	1/15/2014	493.44	--	9.46	--	483.98	
MW-351-75	2/5/2014	493.42	--	9.51	--	483.91	
MW-351-75	3/24/2014	493.38	--	9.80	--	483.58	
MW-351-75	4/18/2014	493.37	--	9.55	--	483.82	
MW-351-75	4/25/2014	493.37	--	8.85	--	484.52	
MW-351-75	5/15/2014	493.41	--	9.20	--	484.21	
MW-351-75	5/20/2014	493.42	--	9.31	--	484.11	
MW-351-75	6/4/2014	493.43	--	9.47	--	483.96	
MW-351-75	6/19/2014	493.47	--	9.07	--	484.40	
MW-351-75	7/8/2014	493.51	--	6.87	--	486.64	
MW-351-75	7/15/2014	493.49	--	7.28	--	486.21	
MW-351-75	8/26/2014	493.46	--	7.99	--	485.47	
MW-351-75	9/24/2014	493.48	--	8.61	--	484.87	
MW-351-75	10/21/2014	493.47	--	9.53	--	483.94	
MW-351-75	11/19/2014	493.48	No LNAPL	9.09	0.00	484.39	
MW-351-75	12/16/2014	493.46	No LNAPL	9.28	0.00	484.18	
MW-351-75	1/21/2015	493.47	No LNAPL	9.46	0.00	484.01	
MW-351-75	2/17/2015	493.49	No LNAPL	9.61	0.00	483.88	
MW-351-75	2/25/2015	493.48	--	9.53	--	483.95	
MW-351-75	3/18/2015	493.48	--	9.61	--	483.87	
MW-351-75	3/26/2015	493.48	--	9.51	--	483.97	
MW-351-75	4/16/2015	493.44	--	9.38	--	484.06	
MW-351-75	5/21/2015	493.47	--	9.10	--	484.37	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-351-75	6/10/2015	493.48	--	9.15	--	484.33	
MW-351-75	7/22/2015	493.48	--	8.12	--	485.36	
MW-351-75	8/19/2015	493.45	--	8.33	--	485.12	
MW-351-75	9/30/2015	493.46	--	8.91	--	484.55	
MW-351-75	10/6/2015	493.44	--	8.74	--	484.70	
MW-351-75	10/22/2015	493.46	No LNAPL	9.36	0.00	484.10	
MW-351-75	11/25/2015	493.47	--	8.97	--	484.51	DTW was measured during Datalogger download
MW-351-75	12/11/2015	493.49	--	9.25	--	484.24	
MW-351-75	1/19/2016	493.43	--	9.71	--	483.72	
MW-351-75	1/26/2016	493.49	--	9.77	--	483.72	
MW-351-75	5/26/2016	493.48	--	9.32	--	484.16	
MW-351-75	7/19/2016	493.48	--	7.38	--	486.10	
MW-351-75	9/9/2016	493.49	--	8.28	--	485.21	
MW-351-75	10/19/2016	493.48	--	10.50	--	482.98	
MW-351-75	11/15/2016	493.48	--	8.85	--	484.63	
MW-351-75	2/8/2017	493.50	--	9.27	--	484.23	
MW-351-75	6/13/2017	493.48	--	8.58	--	484.90	
MW-351-150	1/15/2014	493.74	--	10.09	--	483.65	
MW-351-150	2/5/2014	493.73	--	10.09	--	483.64	
MW-351-150	3/4/2014	493.70	--	10.11	--	483.59	
MW-351-150	3/24/2014	493.69	--	10.15	--	483.54	
MW-351-150	4/18/2014	493.67	--	9.95	--	483.72	
MW-351-150	4/25/2014	493.67	--	9.19	--	484.48	
MW-351-150	5/15/2014	493.71	--	9.51	--	484.20	
MW-351-150	5/20/2014	493.73	--	9.61	--	484.12	
MW-351-150	6/4/2014	493.73	--	9.77	--	483.96	
MW-351-150	6/19/2014	493.76	--	9.35	--	484.41	
MW-351-150	7/8/2014	493.82	--	7.18	--	486.64	
MW-351-150	7/15/2014	493.81	--	7.79	--	486.02	
MW-351-150	8/26/2014	493.77	--	8.28	--	485.49	
MW-351-150	9/24/2014	493.77	--	8.91	--	484.86	
MW-351-150	10/21/2014	493.79	--	9.82	--	483.97	
MW-351-150	11/19/2014	493.79	--	9.38	--	484.41	
MW-351-150	12/16/2014	493.76	No LNAPL	9.60	0.00	484.16	
MW-351-150	1/21/2015	493.77	No LNAPL	9.74	0.00	484.03	
MW-351-150	2/17/2015	493.77	No LNAPL	9.88	0.00	483.89	
MW-351-150	2/25/2015	493.76	--	9.81	--	483.95	
MW-351-150	3/18/2015	493.77	--	9.89	--	483.88	
MW-351-150	3/26/2015	493.77	--	9.79	--	483.98	
MW-351-150	4/16/2015	493.74	--	9.65	--	484.09	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-351-150	5/21/2015	493.78	--	9.37	--	484.41	
MW-351-150	6/10/2015	493.79	--	9.44	--	484.35	
MW-351-150	7/22/2015	493.79	--	8.42	--	485.37	
MW-351-150	8/19/2015	493.75	--	8.62	--	485.13	
MW-351-150	9/30/2015	493.77	--	9.19	--	484.58	
MW-351-150	10/6/2015	493.75	--	9.03	--	484.72	
MW-351-150	10/22/2015	493.78	No LNAPL	9.64	0.00	484.14	
MW-351-150	11/25/2015	493.78	--	9.26	--	484.53	DTW was measured during Datalogger download
MW-351-150	12/11/2015	493.78	--	9.52	--	484.26	
MW-351-150	1/19/2016	493.73	--	10.01	--	483.72	
MW-351-150	1/26/2016	493.79	--	10.05	--	483.74	
MW-351-150	5/26/2016	493.79	--	9.61	--	484.18	
MW-351-150	7/19/2016	493.78	--	7.72	--	486.06	
MW-351-150	9/9/2016	493.80	--	8.59	--	485.21	
MW-351-150	11/15/2016	493.78	--	9.16	--	484.62	
MW-351-150	2/8/2017	493.79	--	9.56	--	484.23	
MW-351-150	6/13/2017	493.79	--	8.87	--	484.92	
MW-354-15	10/29/2014	496.33	11.48	11.91	0.43	484.76	
MW-354-15	3/10/2015	496.33	11.18	11.39	0.21	485.11	
MW-354-15	5/18/2015	496.33	10.77	11.28	0.51	485.46	
MW-354-15	8/12/2015	496.35	9.79	9.80	0.01	486.60	
MW-354-15	10/15/2015	496.35	10.85	11.05	0.20	485.46	
MW-354-15	3/4/2016	496.35	11.57	11.87	0.30	484.77	
MW-354-15	8/17/2016	496.35	9.29	9.59	0.30	487.00	
MW-354-15	10/13/2016	496.35	10.93	11.30	0.37	485.35	
MW-354-15	3/1/2017	496.35	11.03	11.04	0.01	485.32	
MW-354-35	8/10/2016	496.85	--	9.46	--	487.39	
MW-354-35	7/12/2017	496.85	--	10.23	--	486.62	
MW-354-35	1/16/2018	496.85	--	11.60	--	485.25	
MW-354-35	7/18/2018	496.85	--	10.21	--	486.64	
MW-354-65	8/10/2016	497.71	--	10.28	--	487.43	
MW-355-15	11/20/2014	497.61	No LNAPL	12.17	0.00	485.44	
MW-355-15	3/19/2015	497.61	--	12.75	--	484.86	
MW-355-15	6/11/2015	497.61	--	12.31	--	485.30	
MW-355-15	8/12/2015	497.65	--	11.15	--	486.50	
MW-355-15	11/19/2015	497.65	--	12.31	--	485.34	
MW-355-15	7/20/2016	497.67	--	10.35	--	487.32	
MW-355-15	9/13/2016	497.67	--	11.55	--	486.12	
MW-355-15	10/18/2016	497.67	--	12.67	--	485.00	
MW-355-15	3/14/2017	497.67	--	12.54	--	485.13	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-355-55	11/20/2014	497.46	No LNAPL	12.04	0.00	485.42	
MW-355-55	3/19/2015	497.46	--	12.59	--	484.87	
MW-355-55	6/11/2015	497.46	--	12.18	--	485.28	
MW-355-55	8/12/2015	497.48	--	10.98	--	486.50	
MW-355-55	11/19/2015	497.48	--	12.18	--	485.30	
MW-355-55	3/22/2016	497.48	No LNAPL	13.02	0.00	484.46	
MW-355-55	7/20/2016	497.50	--	10.21	--	487.29	
MW-355-55	9/13/2016	497.50	--	11.44	--	486.06	
MW-355-55	3/14/2017	497.50	--	12.35	--	485.15	
MW-358-15	3/18/2014	495.53	--	12.50	--	483.03	
MW-358-15	6/11/2014	495.53	--	12.09	--	483.44	
MW-358-15	9/9/2014	495.53	--	10.99	--	484.54	
MW-358-15	11/20/2014	495.59	No LNAPL	11.79	0.00	483.80	
MW-358-15	11/25/2014	495.59	No LNAPL	11.95	0.00	483.64	
MW-358-15	12/17/2014	495.58	No LNAPL	12.04	0.00	483.54	
MW-358-15	2/2/2015	495.59	No LNAPL	12.35	0.00	483.24	
MW-358-15	2/16/2015	495.65	No LNAPL	12.36	0.00	483.29	
MW-358-15	3/19/2015	495.63	--	12.36	--	483.27	
MW-358-15	4/14/2015	495.66	--	12.17	--	483.49	
MW-358-15	5/18/2015	495.62	--	11.84	--	483.78	
MW-358-15	6/4/2015	495.63	--	11.65	--	483.98	
MW-358-15	6/10/2015	495.63	--	11.89	--	483.74	
MW-358-15	7/22/2015	495.65	--	10.94	--	484.71	
MW-358-15	8/12/2015	495.60	--	10.84	--	484.76	
MW-358-15	9/30/2015	495.28	--	11.26	--	484.02	
MW-358-15	10/22/2015	495.26	No LNAPL	11.73	0.00	483.53	
MW-358-15	11/19/2015	495.26	--	11.62	--	483.64	
MW-358-15	11/25/2015	495.26	No LNAPL	11.43	0.00	483.86	
MW-358-15	12/11/2015	495.30	--	11.65	--	483.65	
MW-358-15	1/26/2016	495.34	--	12.20	--	483.14	
MW-358-15	7/18/2016	495.34	--	10.05	--	485.29	
MW-358-15	8/1/2017	495.34	--	10.65	--	484.69	
MW-358-20	3/18/2014	495.65	--	12.60	--	483.05	
MW-358-20	6/11/2014	495.65	--	12.20	--	483.45	
MW-358-20	9/9/2014	495.65	--	11.12	--	484.53	
MW-358-20	11/20/2014	495.71	No LNAPL	11.91	0.00	483.80	
MW-358-20	11/25/2014	495.71	No LNAPL	12.06	0.00	483.65	
MW-358-20	12/17/2014	495.70	No LNAPL	12.15	0.00	483.55	
MW-358-20	2/2/2015	495.69	No LNAPL	12.47	0.00	483.22	
MW-358-20	2/16/2015	495.76	No LNAPL	12.47	0.00	483.29	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-358-20	3/19/2015	495.74	--	12.46	--	483.28	
MW-358-20	4/14/2015	495.76	--	12.29	--	483.47	
MW-358-20	5/18/2015	495.74	--	11.96	--	483.78	
MW-358-20	6/4/2015	495.75	--	11.77	--	483.98	
MW-358-20	6/10/2015	495.75	--	12.01	--	483.74	
MW-358-20	7/22/2015	495.77	--	11.06	--	484.71	
MW-358-20	8/12/2015	495.72	--	10.97	--	484.75	
MW-358-20	9/30/2015	495.42	--	11.42	--	484.00	
MW-358-20	10/22/2015	495.39	No LNAPL	11.87	0.00	483.52	
MW-358-20	11/19/2015	495.39	--	11.75	--	483.64	
MW-358-20	11/25/2015	495.39	No LNAPL	11.57	0.00	483.85	Datalogger downloaded
MW-358-20	12/11/2015	495.43	--	11.80	--	483.63	
MW-358-20	1/26/2016	495.47	--	12.32	--	483.15	
MW-358-20	3/22/2016	495.47	No LNAPL	12.53	0.00	482.94	
MW-358-20	7/18/2016	495.47	--	10.20	--	485.27	
MW-358-20	9/13/2016	495.47	--	11.07	--	484.40	
MW-358-20	3/15/2017	495.57	--	12.11	--	483.46	
MW-358-20	8/8/2017	495.57	--	10.69	--	484.88	
MW-358-20	9/21/2017	495.58	--	12.02	--	483.56	
MW-358-20	3/13/2018	495.58	--	12.44	--	483.14	
MW-358-20	8/7/2018	495.58	--	10.45	--	485.13	
MW-358-20	9/10/2018	495.53	--	10.77	--	484.76	
MW-358-40	3/18/2014	495.40	--	12.31	--	483.09	
MW-358-40	6/11/2014	495.40	--	11.95	--	483.45	
MW-358-40	9/9/2014	495.40	--	10.85	--	484.55	
MW-358-40	11/20/2014	495.44	No LNAPL	11.63	0.00	483.81	
MW-358-40	11/25/2014	495.44	No LNAPL	11.80	0.00	483.64	
MW-358-40	12/17/2014	495.42	No LNAPL	11.88	0.00	483.54	
MW-358-40	2/2/2015	495.42	No LNAPL	12.19	0.00	483.23	
MW-358-40	2/16/2015	495.47	No LNAPL	12.20	0.00	483.27	
MW-358-40	3/19/2015	495.46	--	12.19	--	483.27	
MW-358-40	4/14/2015	495.48	--	12.01	--	483.47	
MW-358-40	5/18/2015	495.47	--	11.69	--	483.78	
MW-358-40	6/4/2015	495.47	--	11.49	--	483.98	
MW-358-40	6/10/2015	495.47	--	11.75	--	483.72	
MW-358-40	7/22/2015	495.49	--	10.80	--	484.69	
MW-358-40	8/12/2015	495.44	--	10.69	--	484.75	
MW-358-40	9/30/2015	495.46	--	11.48	--	483.98	
MW-358-40	10/22/2015	495.46	No LNAPL	11.95	0.00	483.51	
MW-358-40	11/19/2015	495.46	--	11.82	--	483.64	

Appendix A-1
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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-358-40	11/25/2015	495.46	No LNAPL	11.63	0.00	483.86	
MW-358-40	12/11/2015	495.49	--	11.88	--	483.61	
MW-358-40	1/26/2016	495.53	--	12.41	--	483.12	
MW-358-40	3/22/2016	495.56	No LNAPL	12.61	0.00	482.95	
MW-358-40	7/18/2016	495.56	--	10.27	--	485.29	
MW-358-40	9/13/2016	495.56	--	11.15	--	484.41	
MW-358-40	3/15/2017	495.56	--	12.19	--	483.37	
MW-358-40	7/11/2017	495.56	--	10.80	--	484.76	
MW-358-40	9/21/2017	495.25	--	11.71	--	483.54	
MW-358-40	3/13/2018	495.25	--	12.12	--	483.13	
MW-358-40	7/11/2018	495.25	--	10.26	--	484.99	
MW-358-40	9/10/2018	495.19	--	10.44	--	484.75	
MW-358-60	3/18/2014	495.46	--	12.44	--	483.02	
MW-358-60	6/11/2014	495.46	--	12.05	--	483.41	
MW-358-60	9/9/2014	495.46	--	10.97	--	484.49	
MW-358-60	11/20/2014	495.55	No LNAPL	11.75	0.00	483.80	
MW-358-60	11/25/2014	495.55	No LNAPL	11.90	0.00	483.65	
MW-358-60	12/17/2014	495.53	No LNAPL	11.99	0.00	483.54	
MW-358-60	2/2/2015	495.54	No LNAPL	12.32	0.00	483.22	
MW-358-60	2/16/2015	495.59	No LNAPL	12.32	0.00	483.27	
MW-358-60	3/19/2015	495.59	--	12.31	--	483.28	
MW-358-60	4/14/2015	495.60	--	12.13	--	483.47	
MW-358-60	5/18/2015	495.57	--	11.80	--	483.77	
MW-358-60	6/4/2015	495.36	--	11.39	--	483.97	
MW-358-60	6/10/2015	495.36	--	11.64	--	483.72	
MW-358-60	7/22/2015	495.38	--	10.69	--	484.69	
MW-358-60	8/12/2015	495.33	--	10.59	--	484.74	
MW-358-60	9/30/2015	495.36	--	11.38	--	483.98	
MW-358-60	10/22/2015	495.35	No LNAPL	11.84	0.00	483.51	
MW-358-60	11/19/2015	495.35	--	11.71	--	483.64	
MW-358-60	11/25/2015	495.35	No LNAPL	11.53	0.00	483.85	
MW-358-60	12/11/2015	495.38	--	11.77	--	483.61	
MW-358-60	1/26/2016	495.43	--	12.30	--	483.13	
MW-358-60	3/22/2016	495.43	No LNAPL	12.50	0.00	482.93	
MW-358-60	7/19/2016	495.43	--	9.98	--	485.45	
MW-358-60	9/13/2016	495.43	--	11.03	--	484.40	
MW-358-60	3/15/2017	495.43	--	12.08	--	483.35	
MW-358-60	7/11/2017	495.43	--	10.76	--	484.67	
MW-358-60	9/21/2017	495.52	--	12.00	--	483.52	
MW-358-60	3/13/2018	495.52	--	12.39	--	483.13	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-358-60	8/2/2018	495.52	--	9.81	--	485.71	
MW-358-60	9/10/2018	495.46	--	10.70	--	484.76	
MW-358-150	3/18/2014	495.43	--	12.39	--	483.04	
MW-358-150	6/11/2014	495.43	--	11.92	--	483.51	
MW-358-150	9/9/2014	495.43	--	10.83	--	484.60	
MW-358-150	11/20/2014	495.45	No LNAPL	11.59	0.00	483.86	
MW-358-150	11/25/2014	495.45	No LNAPL	11.74	0.00	483.71	
MW-358-150	12/17/2014	495.42	No LNAPL	11.83	0.00	483.59	
MW-358-150	2/2/2015	495.44	No LNAPL	12.15	0.00	483.29	
MW-358-150	2/16/2015	495.50	No LNAPL	12.15	0.00	483.35	
MW-358-150	3/19/2015	495.50	--	12.16	--	483.34	
MW-358-150	4/14/2015	495.50	--	11.96	--	483.54	
MW-358-150	5/18/2015	495.42	--	11.59	--	483.83	
MW-358-150	6/4/2015	495.43	--	11.40	--	484.03	
MW-358-150	6/10/2015	495.43	--	11.65	--	483.78	
MW-358-150	7/22/2015	495.45	--	10.68	--	484.77	
MW-358-150	8/12/2015	495.40	--	10.59	--	484.81	
MW-358-150	9/30/2015	495.43	--	11.41	--	484.02	
MW-358-150	10/22/2015	495.44	No LNAPL	11.85	0.00	483.59	
MW-358-150	11/19/2015	495.43	--	11.72	--	483.71	
MW-358-150	11/25/2015	495.43	No LNAPL	11.50	0.00	483.96	
MW-358-150	12/11/2015	495.45	--	11.76	--	483.69	
MW-358-150	1/26/2016	495.49	--	12.29	--	483.20	
MW-358-150	3/22/2016	495.49	No LNAPL	12.51	0.00	482.98	
MW-358-150	7/19/2016	495.49	--	9.95	--	485.54	
MW-358-150	9/13/2016	495.49	--	10.98	--	484.51	
MW-358-150	3/15/2017	495.49	--	11.97	--	483.52	
MW-359-15	3/18/2014	495.05	--	11.99	--	483.06	
MW-359-15	6/11/2014	495.05	--	11.60	--	483.45	
MW-359-15	9/9/2014	495.05	--	10.48	--	484.57	
MW-359-15	11/20/2014	495.07	No LNAPL	11.20	0.00	483.87	
MW-359-15	11/25/2014	495.07	No LNAPL	11.47	0.00	483.60	
MW-359-15	12/17/2014	495.05	No LNAPL	11.56	0.00	483.49	
MW-359-15	2/2/2015	495.05	No LNAPL	11.85	0.00	483.20	
MW-359-15	2/16/2015	495.11	No LNAPL	11.86	0.00	483.25	
MW-359-15	3/19/2015	495.11	--	11.85	--	483.26	
MW-359-15	4/14/2015	495.11	--	11.65	--	483.46	
MW-359-15	5/18/2015	495.07	--	11.33	--	483.74	
MW-359-15	6/4/2015	495.10	--	11.15	--	483.95	
MW-359-15	6/10/2015	495.10	--	11.39	--	483.71	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-359-15	7/22/2015	495.11	--	10.50	--	484.61	
MW-359-15	8/12/2015	495.08	--	10.39	--	484.69	
MW-359-15	9/30/2015	495.11	--	11.08	--	484.03	
MW-359-15	10/22/2015	495.11	No LNAPL	11.55	0.00	483.56	
MW-359-15	11/19/2015	495.09	--	11.53	--	483.56	
MW-359-15	11/25/2015	495.09	No LNAPL	11.31	0.00	483.81	
MW-359-15	12/11/2015	495.11	--	11.52	--	483.59	
MW-359-15	1/26/2016	495.13	--	12.02	--	483.11	
MW-359-15	3/22/2016	495.13	No LNAPL	12.23	0.00	482.90	
MW-359-15	7/14/2016	495.13	--	10.29	--	484.84	
MW-359-15	9/13/2016	495.13	--	10.73	--	484.40	
MW-359-15	10/19/2016	495.13	--	11.77	--	483.36	
MW-359-15	3/15/2017	495.13	--	11.78	--	483.35	
MW-359-15	8/8/2017	495.13	--	10.39	--	484.74	
MW-359-15	9/21/2017	495.20	--	11.66	--	483.54	
MW-359-15	3/13/2018	495.20	--	12.05	--	483.15	
MW-359-15	8/7/2018	495.20	--	10.15	--	485.05	
MW-359-15	9/10/2018	495.16	--	10.37	--	484.79	
MW-359-35	3/18/2014	494.97	--	11.94	--	483.03	
MW-359-35	6/11/2014	494.97	--	11.54	--	483.43	
MW-359-35	9/9/2014	494.97	--	10.42	--	484.55	
MW-359-35	11/20/2014	495.01	No LNAPL	11.26	0.00	483.75	
MW-359-35	11/25/2014	495.01	No LNAPL	11.41	0.00	483.60	
MW-359-35	12/17/2014	495.02	No LNAPL	11.51	0.00	483.51	
MW-359-35	2/2/2015	495.01	No LNAPL	11.81	0.00	483.20	
MW-359-35	2/16/2015	495.07	No LNAPL	11.81	0.00	483.26	
MW-359-35	3/19/2015	495.08	--	11.80	--	483.28	
MW-359-35	4/14/2015	495.08	--	11.61	--	483.47	
MW-359-35	5/18/2015	495.05	--	11.31	--	483.74	
MW-359-35	6/4/2015	495.08	--	11.11	--	483.97	
MW-359-35	6/10/2015	495.08	--	11.36	--	483.72	
MW-359-35	7/22/2015	495.09	--	10.47	--	484.62	
MW-359-35	8/12/2015	495.06	--	10.35	--	484.71	
MW-359-35	9/30/2015	495.08	--	11.07	--	484.01	
MW-359-35	10/22/2015	495.08	No LNAPL	11.53	0.00	483.55	
MW-359-35	11/19/2015	495.07	--	11.45	--	483.62	
MW-359-35	11/25/2015	495.07	No LNAPL	11.27	0.00	483.83	
MW-359-35	12/11/2015	495.10	--	11.50	--	483.60	
MW-359-35	1/26/2016	495.14	--	12.06	--	483.08	
MW-359-35	7/14/2016	494.94	--	10.27	--	484.67	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-359-35	8/8/2017	495.01	--	10.19	--	484.82	
MW-359-35	8/7/2018	495.12	--	9.98	--	485.14	
MW-359-60	3/18/2014	494.92	--	11.87	--	483.05	
MW-359-60	6/11/2014	494.92	--	11.49	--	483.43	
MW-359-60	9/9/2014	494.92	--	10.36	--	484.56	
MW-359-60	11/20/2014	494.96	No LNAPL	11.20	0.00	483.76	
MW-359-60	11/25/2014	494.96	No LNAPL	11.32	0.00	483.64	
MW-359-60	12/17/2014	494.95	No LNAPL	11.40	0.00	483.55	
MW-359-60	2/2/2015	494.94	No LNAPL	11.70	0.00	483.24	
MW-359-60	2/16/2015	495.00	No LNAPL	11.70	0.00	483.30	
MW-359-60	3/19/2015	495.00	--	11.69	--	483.31	
MW-359-60	4/14/2015	495.00	--	11.51	--	483.49	
MW-359-60	5/18/2015	494.97	--	11.19	--	483.78	
MW-359-60	6/4/2015	495.00	--	11.02	--	483.98	
MW-359-60	6/10/2015	495.00	--	11.26	--	483.74	
MW-359-60	7/22/2015	495.00	--	10.34	--	484.66	
MW-359-60	8/12/2015	494.98	--	10.25	--	484.73	
MW-359-60	9/30/2015	495.00	--	10.96	--	484.04	
MW-359-60	10/22/2015	495.00	No LNAPL	11.43	0.00	483.57	
MW-359-60	11/19/2015	494.98	--	11.32	--	483.66	
MW-359-60	11/25/2015	494.98	No LNAPL	11.13	0.00	483.88	
MW-359-60	12/11/2015	494.99	--	11.37	--	483.62	
MW-359-60	1/26/2016	495.01	--	11.88	--	483.13	
MW-359-60	3/22/2016	495.01	No LNAPL	12.07	0.00	482.94	
MW-359-60	7/14/2016	495.01	--	10.14	--	484.87	
MW-359-60	9/13/2016	495.01	--	10.59	--	484.42	
MW-359-60	3/15/2017	495.01	--	11.60	--	483.41	
MW-359-60	7/11/2017	495.01	--	10.32	--	484.69	
MW-359-60	9/21/2017	495.06	--	11.49	--	483.57	
MW-359-60	3/13/2018	495.06	--	11.86	--	483.20	
MW-359-60	8/2/2018	495.06	--	10.37	--	484.69	
MW-359-60	9/10/2018	495.02	--	10.18	--	484.84	
MW-359-80	3/18/2014	495.13	--	12.13	--	483.00	
MW-359-80	6/11/2014	495.13	--	11.73	--	483.40	
MW-359-80	9/9/2014	495.13	--	10.59	--	484.54	
MW-359-80	11/20/2014	495.15	No LNAPL	11.44	0.00	483.71	
MW-359-80	11/25/2014	495.15	No LNAPL	11.57	0.00	483.58	
MW-359-80	12/17/2014	495.15	No LNAPL	11.67	0.00	483.48	
MW-359-80	2/2/2015	495.14	No LNAPL	11.96	0.00	483.18	
MW-359-80	2/16/2015	495.20	No LNAPL	11.97	0.00	483.23	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-359-80	3/19/2015	495.21	--	11.96	--	483.25	
MW-359-80	4/14/2015	495.21	--	11.77	--	483.44	
MW-359-80	5/18/2015	495.16	--	11.46	--	483.70	
MW-359-80	6/4/2015	495.19	--	11.27	--	483.92	
MW-359-80	6/10/2015	495.19	--	11.51	--	483.68	
MW-359-80	7/22/2015	495.20	--	10.60	--	484.60	
MW-359-80	8/12/2015	495.17	--	10.50	--	484.67	
MW-359-80	9/30/2015	495.19	--	11.22	--	483.97	
MW-359-80	10/22/2015	495.19	No LNAPL	11.67	0.00	483.52	
MW-359-80	11/19/2015	495.18	--	11.58	--	483.60	
MW-359-80	11/25/2015	495.18	No LNAPL	11.40	0.00	483.81	Datalogger downloaded
MW-359-80	12/11/2015	495.20	--	11.63	--	483.57	
MW-359-80	1/26/2016	495.23	--	12.14	--	483.09	
MW-359-80	3/22/2016	495.23	No LNAPL	12.35	0.00	482.88	
MW-359-80	7/14/2016	495.02	--	10.39	--	484.63	
MW-359-80	9/13/2016	495.23	--	10.86	--	484.37	
MW-359-80	3/15/2017	495.08	--	11.66	--	483.42	
MW-359-80	7/11/2017	495.08	--	10.38	--	484.70	
MW-359-80	9/21/2017	495.06	--	11.55	--	483.51	
MW-359-80	3/13/2018	495.06	--	11.95	--	483.11	
MW-359-80	9/10/2018	495.02	--	10.26	--	484.76	
MW-359-150	3/18/2014	494.77	--	11.76	--	483.01	
MW-359-150	6/11/2014	494.77	--	11.34	--	483.43	
MW-359-150	9/9/2014	494.77	--	10.22	--	484.55	
MW-359-150	11/20/2014	494.77	No LNAPL	11.02	0.00	483.75	
MW-359-150	11/25/2014	494.77	No LNAPL	11.15	0.00	483.62	
MW-359-150	12/17/2014	494.76	No LNAPL	11.23	0.00	483.53	
MW-359-150	2/2/2015	494.75	No LNAPL	11.52	0.00	483.23	
MW-359-150	2/16/2015	494.81	No LNAPL	11.53	0.00	483.28	
MW-359-150	3/19/2015	494.82	--	11.54	--	483.28	
MW-359-150	4/14/2015	494.81	--	11.34	--	483.47	
MW-359-150	5/18/2015	494.77	--	11.02	--	483.75	
MW-359-150	6/4/2015	494.80	--	10.84	--	483.96	
MW-359-150	6/10/2015	494.80	--	11.09	--	483.71	
MW-359-150	7/22/2015	494.80	--	10.18	--	484.62	
MW-359-150	8/12/2015	494.79	--	10.07	--	484.72	
MW-359-150	9/30/2015	494.80	--	10.79	--	484.01	
MW-359-150	10/22/2015	494.81	No LNAPL	11.25	0.00	483.56	
MW-359-150	11/19/2015	494.79	--	11.14	--	483.65	
MW-359-150	11/25/2015	494.79	No LNAPL	10.95	0.00	483.87	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-359-150	12/11/2015	494.79	--	11.19	--	483.60	
MW-359-150	1/26/2016	494.81	--	11.69	--	483.12	
MW-359-150	7/14/2016	494.83	--	9.92	--	484.91	
MW-360-15	3/18/2014	495.12	--	12.22	--	482.90	
MW-360-15	6/11/2014	495.12	--	11.83	--	483.29	
MW-360-15	9/9/2014	495.12	--	10.68	--	484.44	
MW-360-15	11/21/2014	495.11	No LNAPL	11.50	0.00	483.61	
MW-360-15	11/25/2014	495.11	No LNAPL	11.67	0.00	483.44	
MW-360-15	12/17/2014	495.11	No LNAPL	11.74	0.00	483.37	
MW-360-15	2/2/2015	495.13	No LNAPL	12.06	0.00	483.07	
MW-360-15	2/16/2015	495.20	No LNAPL	12.08	0.00	483.12	
MW-360-15	3/19/2015	495.22	--	12.09	--	483.13	
MW-360-15	4/14/2015	495.22	--	11.91	--	483.31	
MW-360-15	5/18/2015	495.21	--	11.60	--	483.61	
MW-360-15	6/4/2015	494.89	--	11.08	--	483.81	
MW-360-15	6/10/2015	494.89	--	11.30	--	483.59	
MW-360-15	7/22/2015	494.87	--	10.44	--	484.43	
MW-360-15	8/12/2015	494.87	--	10.32	--	484.55	
MW-360-15	9/30/2015	494.87	--	10.97	--	483.90	
MW-360-15	10/22/2015	494.89	No LNAPL	11.46	0.00	483.43	
MW-360-15	11/19/2015	494.87	--	11.39	--	483.48	
MW-360-15	11/25/2015	494.87	No LNAPL	11.25	0.00	483.65	
MW-360-15	12/11/2015	494.89	--	11.43	--	483.46	
MW-360-15	1/26/2016	494.92	--	11.96	--	482.96	
MW-360-15	3/22/2016	494.92	No LNAPL	12.20	0.00	482.72	
MW-360-15	7/14/2016	494.98	--	10.31	--	484.67	
MW-360-15	9/13/2016	494.98	--	10.72	--	484.26	
MW-360-15	3/15/2017	494.98	--	11.83	--	483.15	
MW-360-15	7/11/2017	495.13	--	10.52	--	484.61	
MW-360-15	9/21/2017	495.02	--	11.55	--	483.47	
MW-360-15	3/13/2018	495.02	--	12.30	--	482.72	
MW-360-15	7/11/2018	495.02	--	10.29	--	484.73	
MW-360-15	9/10/2018	494.96	--	10.35	--	484.61	
MW-360-35	3/18/2014	495.23	--	12.43	--	482.80	
MW-360-35	6/11/2014	495.23	--	12.04	--	483.19	
MW-360-35	9/9/2014	495.23	--	10.64	--	484.59	
MW-360-35	11/21/2014	495.06	No LNAPL	11.49	0.00	483.57	
MW-360-35	11/25/2014	495.06	No LNAPL	11.63	0.00	483.43	
MW-360-35	12/17/2014	495.07	No LNAPL	11.70	0.00	483.37	
MW-360-35	2/2/2015	495.09	No LNAPL	12.02	0.00	483.07	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-360-35	2/16/2015	495.16	No LNAPL	12.05	0.00	483.11	
MW-360-35	3/19/2015	495.19	--	12.06	--	483.13	
MW-360-35	4/14/2015	495.19	--	11.88	--	483.31	
MW-360-35	5/18/2015	495.17	--	11.57	--	483.60	
MW-360-35	6/4/2015	495.20	--	11.42	--	483.78	
MW-360-35	6/10/2015	495.20	--	11.64	--	483.56	
MW-360-35	7/22/2015	495.20	--	10.75	--	484.45	
MW-360-35	8/12/2015	495.19	--	10.66	--	484.53	
MW-360-35	9/30/2015	495.19	--	11.32	--	483.87	
MW-360-35	10/22/2015	495.20	No LNAPL	11.78	0.00	483.42	
MW-360-35	11/19/2015	495.19	--	11.71	--	483.48	
MW-360-35	11/25/2015	495.19	No LNAPL	11.55	0.00	483.67	
MW-360-35	12/11/2015	495.20	--	11.76	--	483.44	
MW-360-35	1/26/2016	495.25	--	12.29	--	482.96	
MW-360-35	7/14/2016	495.25	--	10.63	--	484.62	
MW-360-35	7/11/2017	495.25	--	10.50	--	484.75	
MW-360-35	7/11/2018	495.25	--	10.26	--	484.99	
MW-360-50	3/18/2014	494.59	--	11.81	--	482.78	
MW-360-50	6/11/2014	494.59	--	11.43	--	483.16	
MW-360-50	9/9/2014	494.59	--	10.29	--	484.30	
MW-360-50	11/20/2014	494.71	No LNAPL	11.20	0.00	483.51	
MW-360-50	11/25/2014	494.71	No LNAPL	11.28	0.00	483.43	
MW-360-50	12/17/2014	494.72	No LNAPL	11.35	0.00	483.37	
MW-360-50	2/2/2015	494.74	No LNAPL	11.67	0.00	483.07	
MW-360-50	2/16/2015	494.81	No LNAPL	11.69	0.00	483.12	
MW-360-50	3/19/2015	494.83	--	11.71	--	483.12	
MW-360-50	4/14/2015	494.83	--	11.52	--	483.31	
MW-360-50	6/4/2015	494.84	--	11.05	--	483.79	
MW-360-50	6/10/2015	494.84	--	11.29	--	483.55	
MW-360-50	7/22/2015	494.84	--	10.41	--	484.43	
MW-360-50	8/12/2015	494.84	--	10.30	--	484.54	
MW-360-50	9/30/2015	494.84	--	10.97	--	483.87	
MW-360-50	10/22/2015	494.85	No LNAPL	11.43	0.00	483.42	
MW-360-50	11/19/2015	494.83	--	11.36	--	483.47	
MW-360-50	11/25/2015	494.83	No LNAPL	11.19	0.00	483.67	
MW-360-50	12/11/2015	494.84	--	11.39	--	483.45	
MW-360-50	1/26/2016	494.89	--	11.92	--	482.97	
MW-360-50	3/22/2016	494.89	No LNAPL	12.15	0.00	482.74	
MW-360-50	7/14/2016	494.89	--	10.27	--	484.62	
MW-360-50	9/13/2016	494.89	--	10.70	--	484.19	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-360-50	3/15/2017	494.89	--	11.80	--	483.09	
MW-360-50	7/11/2017	494.89	--	10.53	--	484.36	
MW-360-50	9/21/2017	494.94	--	11.54	--	483.40	
MW-360-50	3/13/2018	494.94	--	11.93	--	483.01	
MW-360-50	7/11/2018	494.94	--	10.19	--	484.75	
MW-360-50	9/10/2018	494.86	--	10.25	--	484.61	
MW-360-80	3/18/2014	494.75	--	11.85	--	482.90	
MW-360-80	6/11/2014	494.75	--	11.44	--	483.31	
MW-360-80	9/9/2014	494.75	--	10.29	--	484.46	
MW-360-80	11/20/2014	494.72	No LNAPL	11.15	0.00	483.57	
MW-360-80	11/25/2014	494.72	No LNAPL	11.26	0.00	483.46	
MW-360-80	12/17/2014	494.73	No LNAPL	11.33	0.00	483.40	
MW-360-80	2/2/2015	494.72	No LNAPL	11.63	0.00	483.09	
MW-360-80	2/16/2015	494.80	No LNAPL	11.65	0.00	483.15	
MW-360-80	3/19/2015	494.80	--	11.66	--	483.14	
MW-360-80	4/14/2015	494.78	--	11.47	--	483.31	
MW-360-80	5/18/2015	494.75	--	11.13	--	483.62	
MW-360-80	6/10/2015	494.77	--	11.19	--	483.58	
MW-360-80	7/22/2015	494.76	--	10.31	--	484.45	
MW-360-80	8/12/2015	494.76	--	10.20	--	484.56	
MW-360-80	9/30/2015	494.76	--	10.88	--	483.88	
MW-360-80	10/22/2015	494.77	No LNAPL	11.33	0.00	483.44	
MW-360-80	11/19/2015	494.76	--	11.26	--	483.50	
MW-360-80	11/25/2015	494.76	No LNAPL	11.10	0.00	483.69	
MW-360-80	12/11/2015	494.77	--	11.31	--	483.46	
MW-360-80	1/26/2016	494.81	--	11.82	--	482.99	
MW-360-80	3/22/2016	494.81	No LNAPL	12.06	0.00	482.75	
MW-360-80	7/14/2016	494.81	--	10.01	--	484.80	
MW-360-80	9/13/2016	494.81	--	10.53	--	484.28	
MW-360-80	3/15/2017	494.81	--	11.62	--	483.19	
MW-360-80	7/11/2017	494.81	--	10.36	--	484.45	
MW-360-80	9/21/2017	494.53	--	11.12	--	483.41	
MW-360-80	3/13/2018	494.53	--	11.52	--	483.01	
MW-360-80	9/10/2018	494.46	--	9.88	--	484.58	
MW-360-150	3/18/2014	494.58	--	11.75	--	482.83	
MW-360-150	6/11/2014	494.58	--	11.30	--	483.28	
MW-360-150	9/9/2014	494.58	--	10.16	--	484.42	
MW-360-150	11/21/2014	494.61	No LNAPL	11.02	0.00	483.59	
MW-360-150	11/25/2014	494.61	No LNAPL	11.12	0.00	483.49	
MW-360-150	12/17/2014	494.62	No LNAPL	11.21	0.00	483.41	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-360-150	2/2/2015	494.62	No LNAPL	11.50	0.00	483.12	
MW-360-150	2/16/2015	494.71	No LNAPL	11.53	0.00	483.18	
MW-360-150	3/19/2015	494.71	--	11.54	--	483.17	
MW-360-150	4/14/2015	494.68	--	11.34	--	483.34	
MW-360-150	5/18/2015	494.65	--	10.99	--	483.66	
MW-360-150	6/4/2015	494.65	--	10.83	--	483.82	
MW-360-150	6/10/2015	494.65	--	11.06	--	483.59	
MW-360-150	7/22/2015	494.65	--	10.18	--	484.47	
MW-360-150	8/12/2015	494.65	--	10.06	--	484.59	
MW-360-150	9/30/2015	494.65	--	10.76	--	483.89	
MW-360-150	10/22/2015	494.66	No LNAPL	11.19	0.00	483.47	
MW-360-150	11/19/2015	494.64	--	11.12	--	483.52	
MW-360-150	11/25/2015	494.64	No LNAPL	10.94	0.00	483.73	
MW-360-150	12/11/2015	494.65	--	11.17	--	483.48	
MW-360-150	1/26/2016	494.68	--	11.69	--	482.99	
MW-360-150	3/22/2016	494.68	No LNAPL	11.90	0.00	482.78	
MW-360-150	7/14/2016	494.68	--	9.93	--	484.75	
MW-360-150	9/13/2016	494.68	--	10.38	--	484.30	
MW-360-150	3/15/2017	494.68	--	11.38	--	483.30	
MW-360-150	9/21/2017	494.66	--	11.23	--	483.43	
MW-360-150	3/13/2018	494.66	--	11.60	--	483.06	
MW-360-150	9/10/2018	494.57	--	9.94	--	484.63	
MW-361-15	3/18/2014	496.93	No LNAPL	11.39	0.00	485.54	
MW-361-15	6/11/2014	496.93	No LNAPL	10.91	0.00	486.02	
MW-361-15	9/9/2014	496.93	No LNAPL	9.59	0.00	487.34	
MW-361-15	11/20/2014	496.93	No LNAPL	10.38	0.00	486.55	
MW-361-15	3/18/2015	496.93	--	Frozen	--	—	Depth to ice = 10.85 feet
MW-361-15	6/10/2015	496.93	No LNAPL	10.40	0.00	486.53	
MW-361-15	8/12/2015	496.95	--	9.25	--	487.70	
MW-361-15	11/20/2015	496.95	--	10.46	--	486.49	
MW-361-15	3/22/2016	496.95	No LNAPL	Frozen	0.00	—	Ice at 11.24 feet
MW-361-15	8/15/2016	496.95	--	8.70	--	488.25	
MW-361-15	9/13/2016	496.95	--	9.49	--	487.46	
MW-361-15	10/21/2016	496.95	--	10.77	--	486.18	
MW-361-15	3/15/2017	496.95	--	Frozen	--	—	Depth to ice = 10.52 feet
MW-362-15	3/19/2014	495.49	--	12.31	--	483.18	
MW-362-15	6/11/2014	495.49	--	11.92	--	483.57	
MW-362-15	9/9/2014	495.49	--	10.54	--	484.95	
MW-362-15	11/20/2014	495.11	No LNAPL	11.32	0.00	483.79	
MW-362-15	11/25/2014	495.11	No LNAPL	11.47	0.00	483.64	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-362-15	12/17/2014	495.09	No LNAPL	11.55	0.00	483.54	
MW-362-15	2/2/2015	495.06	No LNAPL	11.89	0.00	483.17	
MW-362-15	2/17/2015	495.08	No LNAPL	11.91	0.00	483.17	
MW-362-15	3/19/2015	495.30	--	11.89	--	483.41	
MW-362-15	4/14/2015	495.29	--	11.69	--	483.60	
MW-362-15	5/18/2015	495.38	--	11.37	--	484.01	
MW-362-15	6/4/2015	495.37	--	11.18	--	484.19	
MW-362-15	7/22/2015	495.39	--	10.42	--	484.97	
MW-362-15	8/12/2015	495.38	--	10.33	--	485.05	
MW-362-15	9/30/2015	495.40	--	11.16	--	484.24	
MW-362-15	10/22/2015	495.38	No LNAPL	11.64	0.00	483.74	
MW-362-15	11/20/2015	495.37	--	11.48	--	483.89	
MW-362-15	11/25/2015	495.37	No LNAPL	11.29	0.00	484.11	
MW-362-15	12/11/2015	495.37	--	11.55	--	483.82	
MW-362-15	1/26/2016	495.33	--	12.10	--	483.23	
MW-362-15	3/22/2016	495.33	No LNAPL	12.30	0.00	483.03	
MW-362-15	7/18/2016	495.33	--	9.85	--	485.48	
MW-362-15	9/13/2016	495.33	--	10.82	--	484.51	
MW-362-15	3/15/2017	495.33	--	11.88	--	483.45	
MW-362-15	8/8/2017	495.33	--	10.38	--	484.95	
MW-362-15	9/21/2017	495.24	--	11.51	--	483.73	
MW-362-15	3/13/2018	495.24	--	11.90	--	483.34	
MW-362-15	8/7/2018	495.24	--	9.84	--	485.40	
MW-362-15	9/10/2018	495.09	--	10.22	--	484.87	
MW-362-25	3/19/2014	495.59	--	12.39	--	483.20	
MW-362-25	6/11/2014	495.59	--	11.99	--	483.60	
MW-362-25	9/9/2014	495.59	--	10.89	--	484.70	
MW-362-25	11/20/2014	495.48	No LNAPL	11.65	0.00	483.83	
MW-362-25	11/25/2014	495.48	No LNAPL	11.82	0.00	483.66	
MW-362-25	12/17/2014	495.46	No LNAPL	11.90	0.00	483.56	
MW-362-25	2/2/2015	495.43	--	12.24	--	483.19	
MW-362-25	2/17/2015	495.45	No LNAPL	12.24	0.00	483.21	
MW-362-25	3/19/2015	495.67	--	12.23	--	483.44	
MW-362-25	4/14/2015	495.66	--	12.04	--	483.62	
MW-362-25	5/18/2015	495.74	--	11.70	--	484.04	
MW-362-25	6/4/2015	495.73	--	11.50	--	484.23	
MW-362-25	6/10/2015	495.73	--	11.76	--	483.97	
MW-362-25	7/22/2015	495.75	--	10.76	--	484.99	
MW-362-25	8/12/2015	495.75	--	10.66	--	485.09	
MW-362-25	9/30/2015	495.76	--	11.52	--	484.24	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-362-25	10/22/2015	495.74	No LNAPL	11.98	0.00	483.76	
MW-362-25	11/20/2015	495.74	--	11.83	--	483.91	
MW-362-25	11/25/2015	495.74	No LNAPL	11.63	0.00	484.14	
MW-362-25	12/11/2015	495.73	--	11.90	--	483.83	
MW-362-25	1/26/2016	495.68	--	12.42	--	483.26	
MW-362-25	7/18/2016	495.68	--	10.18	--	485.50	
MW-362-25	8/9/2017	495.68	--	10.69	--	484.99	
MW-362-25	8/7/2018	495.68	--	10.42	--	485.26	
MW-362-35	3/19/2014	495.31	--	12.07	--	483.24	
MW-362-35	6/11/2014	495.31	--	11.70	--	483.61	
MW-362-35	9/9/2014	495.31	--	10.60	--	484.71	
MW-362-35	11/20/2014	495.18	No LNAPL	11.32	0.00	483.86	
MW-362-35	11/25/2014	495.18	No LNAPL	11.49	0.00	483.69	
MW-362-35	12/17/2014	495.14	No LNAPL	11.58	0.00	483.56	
MW-362-35	2/2/2015	495.07	No LNAPL	11.87	0.00	483.20	
MW-362-35	3/19/2015	495.31	--	11.86	--	483.45	
MW-362-35	4/14/2015	495.30	--	11.68	--	483.62	
MW-362-35	5/18/2015	495.40	--	11.36	--	484.04	
MW-362-35	6/4/2015	495.39	--	11.15	--	484.24	
MW-362-35	6/10/2015	495.39	--	11.42	--	483.97	
MW-362-35	7/22/2015	495.42	--	10.40	--	485.02	
MW-362-35	8/12/2015	495.40	--	10.31	--	485.09	
MW-362-35	9/30/2015	495.42	--	11.19	--	484.23	
MW-362-35	10/22/2015	495.40	No LNAPL	11.63	0.00	483.77	
MW-362-35	11/20/2015	495.39	--	11.46	--	483.93	
MW-362-35	11/25/2015	495.39	No LNAPL	11.27	0.00	484.15	
MW-362-35	12/11/2015	495.38	--	11.53	--	483.85	
MW-362-35	1/26/2016	495.29	--	12.04	--	483.25	
MW-362-35	7/18/2016	495.29	--	9.78	--	485.51	
MW-362-50	3/19/2014	495.10	--	11.85	--	483.25	
MW-362-50	6/11/2014	495.10	--	11.49	--	483.61	
MW-362-50	9/9/2014	495.10	--	10.41	--	484.69	
MW-362-50	11/20/2014	494.96	No LNAPL	11.17	0.00	483.79	
MW-362-50	11/25/2014	494.96	No LNAPL	11.31	0.00	483.65	
MW-362-50	12/17/2014	494.92	No LNAPL	11.39	0.00	483.53	
MW-362-50	2/2/2015	494.85	No LNAPL	11.68	0.00	483.17	
MW-362-50	2/17/2015	494.88	No LNAPL	11.69	0.00	483.19	
MW-362-50	4/14/2015	495.09	--	11.48	--	483.61	
MW-362-50	5/18/2015	495.17	--	11.16	--	484.01	
MW-362-50	6/4/2015	495.17	--	10.97	--	484.20	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-362-50	6/10/2015	495.17	--	11.21	--	483.96	
MW-362-50	7/22/2015	495.19	--	10.21	--	484.98	
MW-362-50	8/12/2015	495.18	--	10.11	--	485.07	
MW-362-50	9/30/2015	495.20	--	10.97	--	484.23	
MW-362-50	10/22/2015	495.18	No LNAPL	11.44	0.00	483.74	
MW-362-50	11/20/2015	495.17	--	11.47	--	483.70	
MW-362-50	11/25/2015	495.17	No LNAPL	11.07	0.00	484.13	
MW-362-50	12/11/2015	495.16	--	11.35	--	483.81	
MW-362-50	1/26/2016	495.08	--	11.85	--	483.23	
MW-362-50	3/22/2016	495.08	No LNAPL	12.04	0.00	483.04	
MW-362-50	7/18/2016	495.08	--	9.59	--	485.49	
MW-362-50	9/13/2016	495.08	--	10.56	--	484.52	
MW-362-50	3/15/2017	495.08	--	11.53	--	483.55	
MW-362-50	7/12/2017	495.08	--	10.14	--	484.94	
MW-362-50	9/21/2017	495.16	--	11.40	--	483.76	
MW-362-50	3/13/2018	495.16	--	11.79	--	483.37	
MW-362-50	9/10/2018	494.99	--	10.11	--	484.88	
MW-362-80	3/19/2014	495.28	--	12.08	--	483.20	
MW-362-80	6/11/2014	495.28	--	11.71	--	483.57	
MW-362-80	9/9/2014	495.28	--	10.64	--	484.64	
MW-362-80	11/20/2014	495.15	No LNAPL	11.43	0.00	483.72	
MW-362-80	11/25/2014	495.15	No LNAPL	11.52	0.00	483.63	
MW-362-80	12/17/2014	495.13	No LNAPL	11.62	0.00	483.51	
MW-362-80	2/2/2015	495.10	No LNAPL	11.94	0.00	483.16	
MW-362-80	2/17/2015	495.13	No LNAPL	11.96	0.00	483.17	
MW-362-80	3/19/2015	495.33	--	11.93	--	483.40	
MW-362-80	4/14/2015	495.30	--	11.74	--	483.56	
MW-362-80	5/18/2015	495.38	--	11.40	--	483.98	
MW-362-80	6/4/2015	495.38	--	11.21	--	484.17	
MW-362-80	6/10/2015	495.38	--	11.46	--	483.92	
MW-362-80	7/22/2015	495.39	--	10.44	--	484.95	
MW-362-80	8/12/2015	495.39	--	10.36	--	485.03	
MW-362-80	9/30/2015	495.16	--	10.98	--	484.18	
MW-362-80	10/22/2015	495.14	No LNAPL	11.44	0.00	483.70	
MW-362-80	11/20/2015	495.13	--	11.29	--	483.84	
MW-362-80	11/25/2015	495.13	No LNAPL	11.06	0.00	484.10	
MW-362-80	12/11/2015	495.12	--	11.34	--	483.78	
MW-362-80	1/26/2016	495.09	--	11.87	--	483.22	
MW-362-80	3/22/2016	495.09	No LNAPL	12.08	0.00	483.01	
MW-362-80	7/19/2016	495.09	--	9.49	--	485.60	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-362-80	9/13/2016	495.09	--	10.60	--	484.49	
MW-362-80	3/15/2017	495.09	--	11.59	--	483.50	
MW-362-150	3/19/2014	495.39	--	12.27	--	483.12	
MW-362-150	6/11/2014	495.39	--	11.82	--	483.57	
MW-362-150	9/9/2014	495.39	--	10.75	--	484.64	
MW-362-150	11/20/2014	495.22	No LNAPL	11.49	0.00	483.73	
MW-362-150	11/25/2014	495.22	No LNAPL	11.63	0.00	483.59	
MW-362-150	12/17/2014	495.21	No LNAPL	11.73	0.00	483.48	
MW-362-150	2/2/2015	495.18	No LNAPL	12.06	0.00	483.12	
MW-362-150	2/17/2015	495.22	No LNAPL	12.08	0.00	483.14	
MW-362-150	3/19/2015	495.44	--	12.08	--	483.36	
MW-362-150	4/14/2015	495.40	--	11.86	--	483.54	
MW-362-150	5/18/2015	495.44	--	11.48	--	483.96	
MW-362-150	6/4/2015	495.43	--	11.30	--	484.13	
MW-362-150	6/10/2015	495.43	--	11.56	--	483.87	
MW-362-150	7/22/2015	495.44	--	10.55	--	484.89	
MW-362-150	8/12/2015	495.44	--	10.47	--	484.97	
MW-362-150	9/30/2015	495.45	--	11.33	--	484.12	
MW-362-150	10/22/2015	495.43	No LNAPL	11.79	0.00	483.64	
MW-362-150	11/20/2015	495.43	--	11.59	--	483.84	
MW-362-150	11/25/2015	495.43	No LNAPL	11.37	0.00	484.09	
MW-362-150	12/11/2015	495.41	--	11.66	--	483.75	
MW-362-150	1/26/2016	495.37	--	12.20	--	483.17	
MW-362-150	3/22/2016	495.37	No LNAPL	12.41	0.00	482.96	
MW-362-150	7/19/2016	495.37	--	9.82	--	485.55	
MW-362-150	9/13/2016	495.37	--	10.90	--	484.47	
MW-362-150	3/15/2017	495.37	--	11.92	--	483.45	
MW-362-150	9/21/2017	495.43	--	11.77	--	483.66	
MW-362-150	3/13/2018	495.43	--	12.10	--	483.33	
MW-362-150	9/10/2018	495.27	--	10.46	--	484.81	
MW-363-15	3/19/2014	495.30	--	12.80	--	482.50	
MW-363-15	6/11/2014	495.30	--	12.34	--	482.96	
MW-363-15	9/9/2014	495.30	--	11.08	--	484.22	
MW-363-15	11/20/2014	495.30	No LNAPL	12.09	0.00	483.21	
MW-363-15	3/18/2015	495.30	--	12.58	--	482.72	
MW-363-15	6/11/2015	495.30	--	12.20	--	483.10	
MW-363-15	8/12/2015	494.70	--	10.59	--	484.11	
MW-363-15	11/19/2015	494.70	--	11.57	--	483.13	
MW-363-15	3/22/2016	494.70	--	12.26	--	482.44	
MW-363-15	7/25/2016	494.73	--	9.76	--	484.97	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-363-15	9/13/2016	494.73	--	10.82	--	483.91	
MW-363-15	3/14/2017	494.73	--	11.88	--	482.85	
MW-364-15	3/19/2014	494.66	--	12.19	--	482.47	
MW-364-15	6/11/2014	494.66	--	11.77	--	482.89	
MW-364-15	9/9/2014	494.66	--	10.65	--	484.01	
MW-364-15	11/20/2014	494.66	No LNAPL	11.55	0.00	483.11	
MW-364-15	3/18/2015	494.66	--	12.10	--	482.56	
MW-364-15	6/11/2015	494.93	--	11.70	--	483.23	
MW-364-15	8/12/2015	493.94	--	9.63	--	484.31	Slight oxidation noted on probe
MW-364-15	11/19/2015	493.94	--	10.68	--	483.26	
MW-364-15	3/22/2016	493.94	--	11.38	--	482.56	
MW-364-15	7/25/2016	493.91	--	8.70	--	485.21	
MW-364-15	9/13/2016	493.91	--	10.00	--	483.91	
MW-364-15	3/14/2017	493.91	--	11.07	--	482.84	
MW-364-15	8/8/2017	493.91	--	9.82	--	484.09	
MW-364-15	9/21/2017	494.16	--	11.00	--	483.16	
MW-364-15	3/13/2018	494.16	--	11.42	--	482.74	
MW-364-15	8/7/2018	494.16	--	9.63	--	484.53	
MW-364-15	9/10/2018	494.23	--	9.76	--	484.47	
MW-364-30	3/19/2014	495.22	--	12.76	--	482.46	
MW-364-30	6/11/2014	495.22	--	12.32	--	482.90	
MW-364-30	9/9/2014	495.22	--	11.18	--	484.04	
MW-364-30	11/20/2014	495.22	No LNAPL	12.11	0.00	483.11	
MW-364-30	3/18/2015	495.22	--	12.83	--	482.39	
MW-364-30	6/11/2015	495.22	--	12.27	--	482.95	
MW-364-30	8/12/2015	494.26	--	9.97	--	484.29	
MW-364-30	11/19/2015	494.26	--	10.97	--	483.29	
MW-364-30	7/25/2016	494.36	--	9.06	--	485.30	
MW-364-30	8/8/2017	494.36	--	10.18	--	484.18	
MW-364-30	8/7/2018	494.36	--	9.97	--	484.39	
MW-364-65	3/19/2014	494.45	--	11.97	--	482.48	
MW-364-65	6/11/2014	494.45	--	11.52	--	482.93	
MW-364-65	9/9/2014	494.45	--	9.77	--	484.68	
MW-364-65	11/20/2014	494.04	No LNAPL	10.65	0.00	483.39	
MW-364-65	3/18/2015	494.04	--	11.13	--	482.91	
MW-364-65	6/11/2015	494.04	--	10.74	--	483.30	
MW-364-65	8/12/2015	494.07	--	9.75	--	484.32	
MW-364-65	11/19/2015	494.07	--	10.82	--	483.25	
MW-364-65	3/22/2016	494.07	--	11.41	--	482.66	
MW-364-65	7/25/2016	494.06	--	8.77	--	485.29	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-364-65	9/13/2016	494.06	--	10.03	--	484.03	
MW-364-65	3/14/2017	494.06	--	10.95	--	483.11	
MW-364-65	7/12/2017	494.06	--	9.52	--	484.54	
MW-364-65	9/21/2017	494.07	--	10.89	--	483.18	
MW-364-65	3/13/2018	494.07	--	11.26	--	482.81	
MW-364-65	9/10/2018	494.09	--	9.60	--	484.49	
MW-364-90	3/19/2014	494.66	--	12.18	--	482.48	
MW-364-90	6/11/2014	494.66	--	11.74	--	482.92	
MW-364-90	9/9/2014	494.66	--	10.30	--	484.36	
MW-364-90	11/20/2014	494.58	No LNAPL	11.21	0.00	483.37	
MW-364-90	3/18/2015	494.58	--	11.74	--	482.84	
MW-364-90	6/11/2015	494.58	--	11.35	--	483.23	
MW-364-90	8/12/2015	494.66	--	10.35	--	484.31	Casing may need to be cut
MW-364-90	11/19/2015	494.66	--	10.48	--	484.18	
MW-364-90	3/22/2016	494.66	--	12.06	--	482.60	
MW-364-90	7/25/2016	494.71	--	9.42	--	485.29	
MW-364-90	9/13/2016	494.71	--	10.68	--	484.03	
MW-364-90	3/14/2017	494.71	--	11.72	--	482.99	
MW-364-90	7/12/2017	494.71	--	10.53	--	484.18	
MW-364-90	9/21/2017	494.25	--	11.07	--	483.18	
MW-364-90	3/13/2018	494.25	--	11.48	--	482.77	
MW-364-90	9/10/2018	494.28	--	9.81	--	484.47	
MW-364-150	3/19/2014	494.40	--	11.92	--	482.48	
MW-364-150	6/11/2014	494.40	--	11.50	--	482.90	
MW-364-150	9/9/2014	494.40	--	10.08	--	484.32	
MW-364-150	11/20/2014	494.32	No LNAPL	10.96	0.00	483.36	
MW-364-150	6/11/2015	494.32	--	11.04	--	483.28	
MW-364-150	8/12/2015	494.36	--	10.05	--	484.31	
MW-364-150	11/19/2015	494.36	--	11.09	--	483.27	
MW-364-150	3/22/2016	494.36	--	11.69	--	482.67	
MW-364-150	7/25/2016	494.35	--	9.08	--	485.27	
MW-364-150	9/13/2016	494.35	--	10.34	--	484.01	
MW-364-150	3/14/2017	494.35	--	11.24	--	483.11	
MW-365-15	3/18/2014	493.96	No LNAPL	8.66	0.00	485.30	
MW-365-15	6/11/2014	493.96	No LNAPL	8.19	0.00	485.77	
MW-365-15	9/9/2014	493.96	No LNAPL	6.96	0.00	487.00	
MW-365-15	11/20/2014	493.96	No LNAPL	7.68	0.00	486.28	
MW-365-15	3/18/2015	493.96	--	8.24	--	485.72	
MW-365-15	6/10/2015	493.96	No LNAPL	7.75	0.00	486.21	
MW-365-15	8/12/2015	494.08	--	6.56	--	487.52	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-365-15	11/20/2015	494.08	--	7.79	--	486.29	
MW-365-15	3/22/2016	494.08	No LNAPL	8.75	0.00	485.33	
MW-365-15	8/17/2016	494.11	--	6.12	--	487.99	
MW-365-15	9/13/2016	494.11	--	6.96	--	487.15	
MW-365-15	3/15/2017	494.11	--	8.01	--	486.10	
MW-366-15	9/29/2014	493.62	7.09	7.30	0.21	486.49	
MW-366-15	10/16/2014	493.62	7.66	7.90	0.24	485.91	
MW-366-15	3/10/2015	493.62	Sheen	Frozen	Sheen	—	Depth to ice = 7.68 feet
MW-366-15	5/18/2015	493.62	No LNAPL	Frozen	0.00	—	Well was frozen with water on top of ice; depth to ice = 7.64 feet
MW-366-15	8/12/2015	493.68	Sheen	6.19	Sheen	487.53	
MW-366-15	10/15/2015	493.68	7.46	7.51	0.05	486.25	
MW-366-15	3/4/2016	493.68	8.10	8.62	0.52	485.53	
MW-366-15	3/24/2016	493.68	8.20	8.65	0.45	485.39	Baildown testing not conducted- insufficient LNAPL thickness
MW-366-15	3/25/2016	493.68	8.15	8.65	0.50	485.43	Initial fluid levels and product recovered by SWI during baildown testing
MW-366-15	6/14/2016	493.68	Sheen	7.16	Sheen	486.52	
MW-366-15	8/17/2016	493.55	Sheen	5.64	Sheen	487.91	
MW-366-15	8/18/2016	493.68	Sheen	5.66	Sheen	488.02	
MW-366-15	10/13/2016	493.55	7.40	7.41	0.01	486.15	
MW-366-15	3/2/2017	493.55	7.39	7.43	0.04	486.15	
MW-366-15	6/6/2017	493.55	7.48	7.68	0.20	486.03	
MW-366-15	9/21/2017	493.59	7.36	7.60	0.24	486.18	
MW-366-15	3/12/2018	493.59	7.83	7.90	0.07	485.75	
MW-366-15	9/10/2018	493.51	No LNAPL	6.02	0.00	487.49	
MW-367-15	3/18/2014	497.37	No LNAPL	12.08	0.00	485.29	
MW-367-15	6/11/2014	497.37	No LNAPL	11.61	0.00	485.76	
MW-367-15	9/9/2014	497.37	No LNAPL	10.33	0.00	487.04	
MW-367-15	11/20/2014	497.37	No LNAPL	11.10	0.00	486.27	
MW-367-15	3/18/2015	497.37	--	11.71	--	485.66	
MW-367-15	6/10/2015	497.37	No LNAPL	11.25	0.00	486.12	
MW-367-15	8/12/2015	497.16	--	9.96	--	487.20	
MW-367-15	11/19/2015	497.16	--	10.82	--	486.34	
MW-367-15	8/15/2016	497.20	--	9.09	--	488.11	
MW-368-15	8/15/2016	496.81	--	8.65	--	488.16	
MW-369-16	6/19/2014	498.54	--	13.84	--	484.70	
MW-369-16	7/15/2014	498.55	--	11.98	--	486.57	
MW-369-16	8/26/2014	498.55	--	12.71	--	485.84	
MW-369-16	9/24/2014	498.54	--	13.31	--	485.23	
MW-369-16	10/21/2014	498.54	--	14.28	--	484.26	
MW-369-16	11/19/2014	498.53	--	13.79	--	484.74	
MW-369-16	12/16/2014	498.56	--	14.05	--	484.51	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-369-16	1/21/2015	498.57	--	14.25	--	484.32	
MW-369-16	2/25/2015	498.57	--	14.11	--	484.46	
MW-369-16	3/18/2015	498.58	--	14.36	--	484.22	
MW-369-16	3/26/2015	498.58	--	14.27	--	484.31	
MW-369-16	4/16/2015	498.57	--	14.12	--	484.45	
MW-369-16	5/21/2015	498.58	--	13.86	--	484.72	
MW-369-16	6/10/2015	498.58	--	13.88	--	484.70	
MW-369-16	8/19/2015	498.58	--	13.05	--	485.53	
MW-369-16	10/6/2015	498.57	--	13.51	--	485.06	
MW-369-16	1/19/2016	498.58	--	14.52	--	484.06	
MW-369-16	5/26/2016	498.64	--	14.13	--	484.51	
MW-369-16	7/20/2016	498.16	--	11.65	--	486.51	
MW-369-16	9/9/2016	498.17	--	12.61	--	485.56	
MW-369-16	10/20/2016	498.16	--	13.89	--	484.27	
MW-369-16	11/15/2016	498.16	--	13.15	--	485.01	
MW-369-16	2/8/2017	498.17	--	13.58	--	484.59	
MW-369-16	6/13/2017	498.19	--	12.98	--	485.21	
MW-369-16	8/9/2017	498.19	--	12.19	--	486.00	
MW-369-16	8/16/2017	498.19	--	12.05	--	486.14	
MW-369-16	11/15/2017	498.19	--	13.86	--	484.33	
MW-369-16	2/15/2018	498.19	--	14.05	--	484.14	
MW-369-16	4/11/2018	498.19	--	14.04	--	484.15	
MW-369-16	8/8/2018	498.19	--	11.78	--	486.41	
MW-369-55	6/19/2014	498.37	--	13.67	--	484.70	
MW-369-55	7/15/2014	498.38	--	11.82	--	486.56	
MW-369-55	8/26/2014	498.38	--	12.56	--	485.82	
MW-369-55	9/24/2014	498.36	--	13.18	--	485.18	
MW-369-55	10/21/2014	498.36	--	14.14	--	484.22	
MW-369-55	11/19/2014	498.36	--	13.66	--	484.70	
MW-369-55	12/16/2014	498.36	--	13.89	--	484.47	
MW-369-55	1/21/2015	498.37	--	14.08	--	484.29	
MW-369-55	2/25/2015	498.36	--	14.30	--	484.06	
MW-369-55	3/18/2015	498.38	--	14.19	--	484.19	
MW-369-55	3/26/2015	498.38	--	14.11	--	484.27	
MW-369-55	4/16/2015	498.37	--	13.96	--	484.41	
MW-369-55	5/21/2015	498.36	--	13.67	--	484.69	
MW-369-55	6/10/2015	498.36	--	13.71	--	484.65	
MW-369-55	8/19/2015	498.36	--	12.88	--	485.48	
MW-369-55	10/6/2015	498.36	--	13.33	--	485.03	
MW-369-55	1/19/2016	498.34	--	14.32	--	484.02	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-369-55	5/26/2016	498.37	--	13.90	--	484.47	
MW-369-55	7/20/2016	498.36	--	11.89	--	486.47	
MW-369-55	9/9/2016	498.38	--	12.85	--	485.53	
MW-369-55	10/20/2016	498.36	--	14.13	--	484.23	
MW-369-55	11/15/2016	498.36	--	13.39	--	484.97	
MW-369-55	2/8/2017	498.37	--	13.84	--	484.53	
MW-369-55	6/13/2017	498.37	--	13.16	--	485.21	
MW-369-75	6/19/2014	498.74	--	14.04	--	484.70	
MW-369-75	7/15/2014	498.76	--	12.19	--	486.57	
MW-369-75	8/26/2014	498.75	--	12.94	--	485.81	
MW-369-75	9/24/2014	498.74	--	13.58	--	485.16	
MW-369-75	10/21/2014	498.74	--	14.51	--	484.23	
MW-369-75	11/19/2014	498.75	--	14.04	--	484.71	
MW-369-75	12/16/2014	498.75	--	14.27	--	484.48	
MW-369-75	1/21/2015	498.75	--	14.45	--	484.30	
MW-369-75	2/25/2015	498.74	--	14.49	--	484.25	
MW-369-75	3/18/2015	498.76	--	14.58	--	484.18	
MW-369-75	3/26/2015	498.76	--	14.47	--	484.29	
MW-369-75	4/16/2015	498.75	--	14.33	--	484.42	
MW-369-75	5/21/2015	498.73	--	14.04	--	484.69	
MW-369-75	6/10/2015	498.73	--	14.08	--	484.65	
MW-369-75	8/19/2015	498.73	--	13.15	--	485.58	
MW-369-75	10/6/2015	498.73	--	13.71	--	485.02	
MW-369-75	1/19/2016	498.72	--	14.69	--	484.03	
MW-369-75	5/26/2016	498.74	--	14.27	--	484.47	
MW-369-75	7/20/2016	498.74	--	12.24	--	486.50	
MW-369-75	9/9/2016	498.75	--	13.22	--	485.53	
MW-369-75	10/20/2016	498.74	--	14.49	--	484.25	
MW-369-75	11/15/2016	498.74	--	13.77	--	484.97	
MW-369-75	2/8/2017	498.75	--	14.21	--	484.54	
MW-369-75	6/13/2017	498.75	--	13.52	--	485.23	
MW-370-15	2/5/2014	495.21	--	11.37	--	483.84	
MW-370-15	3/24/2014	495.22	--	11.46	--	483.76	
MW-370-15	4/18/2014	495.21	--	11.23	--	483.98	
MW-370-15	5/15/2014	495.22	--	10.87	--	484.35	
MW-370-15	6/19/2014	495.21	--	10.74	--	484.47	
MW-370-15	7/15/2014	495.22	--	9.15	--	486.07	
MW-370-15	8/26/2014	495.22	--	9.88	--	485.34	
MW-370-15	9/24/2014	495.22	--	10.50	--	484.72	
MW-370-15	10/21/2014	495.22	--	11.42	--	483.80	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-370-15	11/19/2014	495.22	--	10.99	--	484.23	
MW-370-15	12/16/2014	495.26	--	11.25	--	484.01	
MW-370-15	1/21/2015	495.32	--	11.49	--	483.83	
MW-370-15	2/25/2015	495.33	--	11.54	--	483.79	
MW-370-15	3/18/2015	495.32	--	11.62	--	483.70	
MW-370-15	3/26/2015	495.32	--	11.53	--	483.79	
MW-370-15	4/16/2015	495.33	--	11.39	--	483.94	
MW-370-15	5/21/2015	495.35	--	11.10	--	484.25	
MW-370-15	6/10/2015	495.31	--	11.13	--	484.18	
MW-370-15	8/19/2015	494.82	--	9.83	--	484.99	
MW-370-15	10/6/2015	494.83	--	10.22	--	484.61	
MW-370-15	1/19/2016	494.83	--	11.26	--	483.57	
MW-370-15	5/26/2016	494.85	--	10.85	--	484.00	
MW-370-15	7/19/2016	494.87	--	8.90	--	485.97	
MW-370-15	9/9/2016	494.86	--	9.57	--	485.29	
MW-370-15	10/18/2016	494.87	--	10.78	--	484.09	
MW-370-15	11/15/2016	494.87	--	10.14	--	484.73	
MW-370-15	2/8/2017	494.99	--	10.69	--	484.30	
MW-370-15	6/13/2017	495.00	--	10.05	--	484.95	
MW-370-55	2/5/2014	495.25	--	11.19	--	484.06	
MW-370-55	3/24/2014	495.26	--	11.48	--	483.78	
MW-370-55	4/18/2014	495.26	--	11.25	--	484.01	
MW-370-55	5/15/2014	495.26	--	10.91	--	484.35	
MW-370-55	6/19/2014	495.24	--	10.74	--	484.50	
MW-370-55	7/15/2014	495.25	--	9.05	--	486.20	
MW-370-55	8/26/2014	495.25	--	9.75	--	485.50	
MW-370-55	9/24/2014	495.25	--	10.38	--	484.87	
MW-370-55	10/21/2014	495.25	--	11.24	--	484.01	
MW-370-55	11/19/2014	495.25	--	10.86	--	484.39	
MW-370-55	12/16/2014	495.30	--	11.13	--	484.17	
MW-370-55	1/21/2015	495.37	--	11.39	--	483.98	
MW-370-55	2/25/2015	495.38	--	11.44	--	483.94	
MW-370-55	3/18/2015	495.38	--	11.51	--	483.87	
MW-370-55	3/26/2015	495.38	--	11.42	--	483.96	
MW-370-55	4/16/2015	495.39	--	11.29	--	484.10	
MW-370-55	5/21/2015	495.40	--	11.01	--	484.39	
MW-370-55	6/10/2015	495.36	--	11.04	--	484.32	
MW-370-55	8/19/2015	494.87	--	9.72	--	485.15	
MW-370-55	10/6/2015	494.87	--	10.10	--	484.77	
MW-370-55	1/19/2016	494.86	--	11.14	--	483.72	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-370-55	5/26/2016	494.88	--	10.72	--	484.16	
MW-370-55	7/19/2016	494.90	--	8.76	--	486.14	
MW-370-55	9/9/2016	494.89	--	9.58	--	485.31	
MW-370-55	10/18/2016	494.90	--	10.77	--	484.13	
MW-370-55	11/15/2016	494.90	--	10.16	--	484.74	
MW-370-55	2/8/2017	495.03	--	10.71	--	484.32	
MW-370-55	6/13/2017	495.03	--	10.06	--	484.97	
MW-370-75	2/5/2014	494.96	--	10.90	--	484.06	
MW-370-75	3/24/2014	494.97	--	11.20	--	483.77	
MW-370-75	4/18/2014	494.96	--	10.98	--	483.98	
MW-370-75	5/15/2014	494.96	--	10.60	--	484.36	
MW-370-75	6/19/2014	494.94	--	10.45	--	484.49	
MW-370-75	7/15/2014	494.95	--	8.65	--	486.30	
MW-370-75	8/26/2014	494.96	--	9.38	--	485.58	
MW-370-75	9/24/2014	494.95	--	10.00	--	484.95	
MW-370-75	10/21/2014	494.95	--	10.93	--	484.02	
MW-370-75	11/19/2014	494.96	--	10.50	--	484.46	
MW-370-75	12/16/2014	494.99	--	10.73	--	484.26	
MW-370-75	1/21/2015	494.99	--	10.91	--	484.08	
MW-370-75	2/25/2015	494.99	--	10.97	--	484.02	
MW-370-75	3/18/2015	494.98	--	11.03	--	483.95	
MW-370-75	3/26/2015	494.98	--	10.95	--	484.03	
MW-370-75	4/16/2015	494.99	--	10.81	--	484.18	
MW-370-75	5/21/2015	494.99	--	10.52	--	484.47	
MW-370-75	6/10/2015	494.95	--	10.55	--	484.40	
MW-370-75	8/19/2015	494.46	--	9.23	--	485.23	
MW-370-75	10/6/2015	494.47	--	9.65	--	484.82	
MW-370-75	1/19/2016	494.45	--	10.65	--	483.80	
MW-370-75	5/26/2016	494.47	--	10.23	--	484.24	
MW-370-75	7/19/2016	494.48	--	8.28	--	486.20	
MW-370-75	9/9/2016	494.48	--	9.17	--	485.31	
MW-370-75	11/15/2016	494.48	--	9.73	--	484.75	
MW-370-75	2/8/2017	494.63	--	10.31	--	484.32	
MW-370-75	6/13/2017	494.62	--	9.64	--	484.98	
MW-371-15	6/19/2014	495.16	--	10.83	--	484.33	
MW-371-15	7/15/2014	495.16	--	9.03	--	486.13	
MW-371-15	8/26/2014	495.16	--	9.75	--	485.41	
MW-371-15	9/24/2014	495.14	--	10.34	--	484.80	
MW-371-15	10/21/2014	495.15	--	11.25	--	483.90	
MW-371-15	11/19/2014	495.16	--	10.88	--	484.28	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-371-15	12/16/2014	495.16	--	11.07	--	484.09	
MW-371-15	1/21/2015	495.17	--	11.21	--	483.96	
MW-371-15	2/25/2015	495.20	--	11.31	--	483.89	
MW-371-15	3/18/2015	495.16	--	11.39	--	483.77	
MW-371-15	3/26/2015	495.16	--	11.30	--	483.86	
MW-371-15	4/16/2015	495.17	--	11.15	--	484.02	
MW-371-15	5/21/2015	495.18	--	10.87	--	484.31	
MW-371-15	6/10/2015	495.20	--	10.93	--	484.27	
MW-371-15	8/19/2015	495.18	--	10.13	--	485.05	
MW-371-15	10/6/2015	495.17	--	10.46	--	484.71	
MW-371-15	1/19/2016	495.17	--	11.53	--	483.64	
MW-371-15	5/26/2016	496.07	--	11.99	--	484.08	
MW-371-15	7/15/2016	496.11	--	10.59	--	485.52	
MW-371-15	9/9/2016	496.07	--	10.90	--	485.17	
MW-371-15	10/19/2016	496.11	--	12.12	--	483.99	
MW-371-15	11/15/2016	496.11	--	11.55	--	484.56	
MW-371-15	2/8/2017	496.14	--	11.99	--	484.15	
MW-371-15	6/13/2017	496.19	--	11.31	--	484.88	
MW-371-15	7/11/2017	496.19	--	10.72	--	485.47	
MW-371-15	8/3/2018	496.19	--	10.83	--	485.36	
MW-371-55	6/19/2014	495.54	--	11.16	--	484.38	
MW-371-55	7/15/2014	495.55	--	9.39	--	486.16	
MW-371-55	8/26/2014	495.55	--	10.11	--	485.44	
MW-371-55	9/24/2014	495.53	--	10.71	--	484.82	
MW-371-55	10/21/2014	495.53	--	11.60	--	483.93	
MW-371-55	11/19/2014	495.54	--	11.12	--	484.42	
MW-371-55	12/16/2014	495.53	--	11.42	--	484.11	
MW-371-55	1/21/2015	495.54	--	11.60	--	483.94	
MW-371-55	2/25/2015	495.55	--	11.66	--	483.89	
MW-371-55	3/18/2015	495.53	--	11.72	--	483.81	
MW-371-55	3/26/2015	495.53	--	11.64	--	483.89	
MW-371-55	4/16/2015	495.52	--	11.49	--	484.03	
MW-371-55	5/21/2015	495.54	--	11.21	--	484.33	
MW-371-55	6/10/2015	495.55	--	11.27	--	484.28	
MW-371-55	8/19/2015	495.53	--	10.47	--	485.06	
MW-371-55	10/6/2015	495.51	--	10.80	--	484.71	
MW-371-55	1/19/2016	495.48	--	11.84	--	483.64	
MW-371-55	5/26/2016	495.53	--	11.44	--	484.09	
MW-371-55	7/15/2016	495.54	--	10.03	--	485.51	
MW-371-55	9/9/2016	495.54	--	10.36	--	485.18	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
MW-371-55	10/19/2016	495.54	--	11.57	--	483.97	
MW-371-55	11/15/2016	495.54	--	10.96	--	484.58	
MW-371-55	2/8/2017	495.58	--	11.40	--	484.18	
MW-371-55	6/13/2017	495.58	--	10.69	--	484.89	
MW-371-75	6/19/2014	495.92	--	11.54	--	484.38	
MW-371-75	7/15/2014	495.92	--	9.78	--	486.14	
MW-371-75	8/26/2014	495.92	--	10.46	--	485.46	
MW-371-75	9/24/2014	495.90	--	11.07	--	484.83	
MW-371-75	10/21/2014	495.90	--	11.97	--	483.93	
MW-371-75	11/19/2014	495.91	--	11.58	--	484.33	
MW-371-75	12/16/2014	495.90	--	11.79	--	484.11	
MW-371-75	1/21/2015	495.91	--	11.96	--	483.95	
MW-371-75	2/25/2015	495.95	--	12.03	--	483.92	
MW-371-75	3/18/2015	495.92	--	12.10	--	483.82	
MW-371-75	3/26/2015	495.92	--	12.03	--	483.89	
MW-371-75	4/16/2015	495.92	--	11.87	--	484.05	
MW-371-75	5/21/2015	495.90	--	11.58	--	484.32	
MW-371-75	6/10/2015	495.92	--	11.64	--	484.28	
MW-371-75	8/19/2015	495.89	--	10.82	--	485.07	
MW-371-75	10/6/2015	495.88	--	11.17	--	484.71	
MW-371-75	1/19/2016	495.86	--	12.20	--	483.66	
MW-371-75	5/26/2016	495.91	--	11.80	--	484.11	
MW-371-75	7/15/2016	495.91	--	10.35	--	485.56	
MW-371-75	9/9/2016	495.91	--	10.74	--	485.17	
MW-371-75	10/19/2016	495.91	--	11.94	--	483.97	
MW-371-75	11/15/2016	495.91	--	11.34	--	484.57	
MW-371-75	2/8/2017	495.95	--	11.77	--	484.18	
MW-371-75	6/13/2017	495.94	--	11.04	--	484.90	
MW-371-125	6/19/2014	495.47	--	11.09	--	484.38	
MW-371-125	7/15/2014	495.47	--	9.29	--	486.18	
MW-371-125	8/26/2014	495.47	--	10.00	--	485.47	
MW-371-125	9/24/2014	495.43	--	10.60	--	484.83	
MW-371-125	10/21/2014	495.46	--	11.50	--	483.96	
MW-371-125	11/19/2014	495.48	--	11.21	--	484.27	
MW-371-125	12/16/2014	495.48	--	11.33	--	484.15	
MW-371-125	1/21/2015	495.50	--	11.53	--	483.97	
MW-371-125	2/25/2015	495.52	--	11.61	--	483.91	
MW-371-125	3/18/2015	495.51	--	11.67	--	483.84	
MW-371-125	3/26/2015	495.51	--	11.59	--	483.92	
MW-371-125	4/16/2015	495.52	--	11.44	--	484.08	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
MW-371-125	5/21/2015	495.51	--	11.16	--	484.35	
MW-371-125	6/10/2015	495.51	--	11.21	--	484.30	
MW-371-125	8/19/2015	495.48	--	10.40	--	485.08	
MW-371-125	10/6/2015	495.47	--	10.75	--	484.72	
MW-371-125	1/19/2016	495.45	--	11.78	--	483.67	
MW-371-125	5/26/2016	495.95	--	11.83	--	484.12	
MW-371-125	7/15/2016	495.97	--	10.42	--	485.55	
MW-371-125	9/9/2016	495.96	--	10.79	--	485.17	
MW-371-125	11/15/2016	495.97	--	11.40	--	484.57	
MW-371-125	2/8/2017	496.03	--	11.85	--	484.18	
MW-371-125	6/13/2017	496.00	--	11.10	--	484.90	
MW-372-15	3/22/2016	500.29	No LNAPL	15.94	0.00	484.35	
MW-372-15	7/27/2016	500.37	--	12.87	--	487.50	
MW-372-15	9/13/2016	500.37	--	14.33	--	486.04	
MW-372-15	10/18/2016	500.37	--	15.46	--	484.91	
MW-372-15	3/14/2017	500.37	--	15.35	--	485.02	
MW-372-15	7/10/2017	500.37	--	13.95	--	486.42	
MW-372-15	1/16/2018	500.37	--	15.40	--	484.97	
MW-372-15	8/8/2018	500.37	--	13.35	--	487.02	
MW-373-15	3/22/2016	500.61	No LNAPL	16.02	0.00	484.59	
MW-373-15	7/27/2016	500.70	--	12.87	--	487.83	
MW-373-15	9/13/2016	500.70	--	14.37	--	486.33	
MW-373-15	10/18/2016	500.70	--	15.52	--	485.18	
MW-373-15	3/14/2017	500.70	--	15.35	--	485.35	
North Gravel Pit	2/16/2012	492.81	--	9.00	--	483.81	
North Gravel Pit	3/20/2012	492.81	--	9.01	--	483.80	
North Gravel Pit	4/18/2012	492.81	--	8.45	--	484.36	
North Gravel Pit	7/31/2012	492.81	--	7.12	--	485.69	
North Gravel Pit	11/2/2012	492.81	--	8.58	--	484.23	
North Gravel Pit	1/24/2013	492.81	--	8.29	--	484.52	
North Gravel Pit	4/24/2013	492.81	--	8.65	--	484.16	
North Gravel Pit	8/1/2013	492.81	--	7.02	--	485.79	
North Gravel Pit	10/1/2013	492.81	--	8.51	--	484.30	
North Gravel Pit	1/9/2014	492.78	--	8.57	--	484.21	
North Gravel Pit	2/5/2014	492.76	--	8.66	--	484.10	
North Gravel Pit	3/18/2014	492.78	--	9.04	--	483.74	
North Gravel Pit	3/24/2014	492.78	--	9.03	--	483.75	
North Gravel Pit	4/18/2014	492.78	--	8.53	--	484.25	
North Gravel Pit	4/25/2014	492.78	--	8.20	--	484.58	
North Gravel Pit	5/15/2014	492.78	--	8.46	--	484.32	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
North Gravel Pit	5/20/2014	492.78	--	8.60	--	484.18	
North Gravel Pit	6/4/2014	492.78	--	8.80	--	483.98	
North Gravel Pit	6/11/2014	492.78	--	8.74	--	484.04	
North Gravel Pit	6/19/2014	492.78	--	8.47	--	484.31	
North Gravel Pit	7/15/2014	492.78	--	6.38	--	486.40	
North Gravel Pit	8/26/2014	492.78	--	7.14	--	485.64	
North Gravel Pit	9/9/2014	492.78	--	7.47	--	485.31	
North Gravel Pit	9/24/2014	492.78	--	7.76	--	485.02	
North Gravel Pit	10/21/2014	492.78	--	8.68	--	484.10	
North Gravel Pit	11/19/2014	492.78	No LNAPL	8.18	0.00	484.60	
North Gravel Pit	11/20/2014	492.78	No LNAPL	8.18	0.00	484.60	
North Gravel Pit	12/16/2014	492.78	--	8.43	--	484.35	
North Gravel Pit	12/29/2014	492.78	No LNAPL	8.57	0.00	484.21	
North Gravel Pit	1/21/2015	492.78	--	8.61	--	484.17	
North Gravel Pit	2/25/2015	492.78	--	8.66	--	484.12	
North Gravel Pit	3/18/2015	492.78	--	8.74	--	484.04	
North Gravel Pit	3/18/2015	492.78	--	8.73	--	484.05	
North Gravel Pit	3/26/2015	492.78	--	8.65	--	484.13	
North Gravel Pit	4/16/2015	492.78	--	8.52	--	484.26	
North Gravel Pit	5/21/2015	492.78	--	8.27	--	484.51	
North Gravel Pit	6/10/2015	492.78	--	8.23	--	484.55	
North Gravel Pit	8/13/2015	492.78	--	7.18	--	485.60	
North Gravel Pit	8/19/2015	492.78	--	7.47	--	485.31	
North Gravel Pit	10/6/2015	492.78	--	8.03	--	484.75	
North Gravel Pit	11/19/2015	492.78	--	8.48	--	484.30	
North Gravel Pit	1/19/2016	492.78	--	8.90	--	483.88	
North Gravel Pit	3/22/2016	492.78	No LNAPL	9.15	0.00	483.63	
North Gravel Pit	5/26/2016	492.78	--	8.55	--	484.23	
North Gravel Pit	9/9/2016	492.78	--	7.61	--	485.17	
North Gravel Pit	9/13/2016	492.78	--	7.76	--	485.02	
North Gravel Pit	11/15/2016	492.78	--	8.15	--	484.63	
North Gravel Pit	2/8/2017	492.78	--	8.59	--	484.19	
North Gravel Pit	2/15/2017	492.78	--	8.63	--	484.15	
North Gravel Pit	3/14/2017	492.78	--	8.78	--	484.00	DTW field measurement incorrectly recorded as 9.78 ft, confirmed with datalogger measurement.
North Gravel Pit	6/13/2017	492.78	--	8.20	--	484.58	
North Gravel Pit	9/21/2017	492.78	--	8.64	--	484.14	
North Gravel Pit	3/12/2018	492.78	--	9.00	--	483.78	
North Gravel Pit	9/10/2018	492.78	--	7.24	--	485.54	
O-1	5/6/2011	497.19	No LNAPL	Frozen	0.00	—	Frozen at 10.91 ft BTOC

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-1	5/16/2011	497.19	No LNAPL	Frozen	0.00	—	Frozen at 10.90 ft BTOC
O-1	5/24/2011	497.19	Sheen	10.00	Sheen	487.19	
O-1	6/21/2011	497.19	No LNAPL	10.82	0.00	486.37	
O-1	7/15/2011	497.19	No LNAPL	10.08	0.00	487.11	
O-1	8/23/2011	497.19	No LNAPL	10.41	0.00	486.78	
O-1	9/22/2011	497.19	No LNAPL	11.59	0.00	485.60	
O-1	10/21/2011	497.19	No LNAPL	12.37	0.00	484.82	
O-1	12/2/2011	497.15	No LNAPL	12.05	0.00	485.10	
O-1	1/11/2012	497.15	No LNAPL	12.17	0.00	484.98	
O-1	2/7/2012	497.15	No LNAPL	Frozen	0.00	—	Frozen at 12.26 ft BTOC
O-1	2/16/2012	497.15	No LNAPL	Frozen	0.00	—	Frozen at 12.24 ft BTOC
O-1	3/13/2012	497.15	No LNAPL	Frozen	0.00	—	Frozen at 12.22 ft BTOC
O-1	4/10/2012	497.15	No LNAPL	Frozen	0.00	—	Frozen at 12.23 ft BTOC
O-1	4/19/2012	497.15	No LNAPL	Frozen	0.00	—	Frozen at 12.24 ft BTOC
O-1	5/9/2012	497.15	No LNAPL	8.45	0.00	488.70	Water at 8.45 feet, ice/bottom at 11.24 feet
O-1	6/12/2012	497.15	No LNAPL	9.89	0.00	487.26	
O-1	7/18/2012	497.15	No LNAPL	10.51	0.00	486.64	
O-1	7/30/2012	497.15	No LNAPL	10.11	0.00	487.04	
O-1	8/21/2012	497.15	No LNAPL	10.91	0.00	486.24	
O-1	9/18/2012	497.15	No LNAPL	11.62	0.00	485.53	
O-1	10/16/2012	497.15	No LNAPL	11.65	0.00	485.50	
O-1	11/1/2012	497.15	No LNAPL	11.62	0.00	485.53	
O-1	11/29/2012	497.14	No LNAPL	11.18	0.00	485.96	
O-1	12/27/2012	497.14	No LNAPL	11.50	0.00	485.64	
O-1	1/24/2013	497.14	No LNAPL	11.48	0.00	485.66	
O-1	2/26/2013	497.14	No LNAPL	Frozen	0.00	—	Frozen at 11.53 ft BTOC
O-1	3/28/2013	497.14	No LNAPL	Frozen	0.00	—	Frozen at 11.53 ft BTOC. R-35R, R-39, and R-40 were offline on this date
O-1	4/24/2013	497.14	No LNAPL	Frozen	0.00	—	Frozen at 11.53 ft BTOC
O-1	5/29/2013	497.14	No LNAPL	9.64	0.00	487.50	
O-1	6/25/2013	497.14	No LNAPL	10.46	0.00	486.68	
O-1	8/2/2013	497.14	No LNAPL	10.07	0.00	487.07	
O-1	10/1/2013	497.14	No LNAPL	11.54	0.00	485.60	
O-1	10/29/2013	497.14	No LNAPL	12.30	0.00	484.84	
O-1	11/19/2013	497.14	No LNAPL	11.80	0.00	485.34	
O-1	12/20/2013	497.14	No LNAPL	11.50	0.00	485.64	
O-1	10/15/2015	497.18	No LNAPL	11.28	0.00	485.90	
O-1	8/11/2016	497.18	--	9.35	--	487.83	
O-1	7/12/2017	497.18	--	10.08	--	487.10	
O-1	1/16/2018	497.18	--	11.48	--	485.70	
O-1	7/18/2018	497.18	--	10.12	--	487.06	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-2	3/18/2011	496.84	12.30	12.85	0.55	484.44	
O-2	5/4/2011	496.84	11.52	11.95	0.43	485.24	
O-2	5/13/2011	496.84	12.31	12.82	0.51	484.43	
O-2	5/16/2011	496.84	12.46	12.92	0.46	484.29	
O-2	5/24/2011	496.84	12.10	12.59	0.49	484.65	
O-2	6/21/2011	496.84	12.52	13.04	0.52	484.22	
O-2	7/15/2011	496.84	11.83	12.17	0.34	484.95	
O-2	8/23/2011	496.84	Sheen	11.43	Sheen	485.41	
O-2	9/22/2011	496.84	Sheen	12.51	Sheen	484.33	
O-2	10/21/2011	496.84	14.25	14.87	0.62	482.47	
O-2	12/7/2011	497.57	13.52	13.83	0.31	483.99	
O-2	2/17/2012	497.57	13.05	13.32	0.27	484.47	
O-2	3/14/2012	497.57	13.06	13.41	0.35	484.44	
O-2	4/12/2012	497.57	12.94	13.26	0.32	484.57	
O-2	4/19/2012	497.57	12.36	12.78	0.42	485.13	
O-2	5/7/2012	497.57	12.66	13.09	0.43	484.83	
O-2	6/13/2012	497.57	11.77	12.17	0.40	485.72	
O-2	7/17/2012	497.57	11.41	11.99	0.58	486.05	
O-2	7/30/2012	497.57	11.14	11.43	0.29	486.38	
O-2	8/21/2012	497.57	11.83	12.48	0.65	485.62	
O-2	9/18/2012	497.57	12.53	12.87	0.34	484.98	
O-2	10/15/2012	497.57	12.44	12.86	0.42	485.05	
O-2	11/1/2012	497.57	12.52	12.81	0.29	485.00	
O-2	11/29/2012	497.54	12.04	12.51	0.47	485.41	
O-2	12/28/2012	497.54	12.43	12.83	0.40	485.03	
O-2	1/24/2013	497.54	12.39	12.78	0.39	485.08	
O-2	2/26/2013	497.54	12.53	12.93	0.40	484.93	
O-2	3/29/2013	497.54	12.71	13.03	0.32	484.77	R-35R, R-39, and R-40 were offline on this date
O-2	4/24/2013	497.54	12.66	12.95	0.29	484.83	
O-2	5/21/2013	496.89	12.68	13.01	0.33	484.15	
O-2	6/24/2013	496.89	11.82	12.22	0.40	484.99	
O-2	7/23/2013	496.90	11.56	11.60	0.04	485.33	
O-2	8/1/2013	496.90	11.53	11.66	0.13	485.35	
O-2	8/21/2013	496.90	11.47	11.57	0.10	485.41	
O-2	9/24/2013	496.89	12.40	12.78	0.38	484.42	
O-2	9/30/2013	496.89	12.65	12.93	0.28	484.19	
O-2	10/22/2013	496.88	13.27	13.60	0.33	483.55	
O-2	11/26/2013	496.88	12.29	12.75	0.46	484.50	
O-2	12/18/2013	496.91	12.68	13.27	0.59	484.12	
O-2	1/9/2014	496.92	12.90	13.33	0.43	483.94	

Appendix A-1
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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-2	2/5/2014	496.95	13.06	13.49	0.43	483.81	
O-2	3/18/2014	496.96	—	—	—	—	Well was inaccessible due to soil vapor extraction work
O-2	3/24/2014	496.96	13.33	13.75	0.42	483.55	
O-2	4/18/2014	496.96	13.25	13.62	0.37	483.64	
O-2	5/15/2014	496.97	12.77	13.25	0.48	484.11	
O-2	6/11/2014	496.96	12.85	13.25	0.40	484.03	
O-2	6/19/2014	496.96	12.47	12.93	0.46	484.40	
O-2	7/15/2014	496.95	Sheen	10.87	Sheen	486.08	
O-2	8/26/2014	496.95	11.49	11.50	0.01	485.46	
O-2	9/9/2014	496.95	11.71	12.01	0.30	485.18	
O-2	9/24/2014	496.96	12.03	12.45	0.42	484.85	
O-2	10/16/2014	496.94	12.83	13.05	0.22	484.07	
O-2	10/21/2014	496.94	12.97	13.20	0.23	483.93	
O-2	11/19/2014	496.96	12.58	12.80	0.22	484.34	
O-2	12/16/2014	497.02	12.83	13.03	0.20	484.15	
O-2	12/29/2014	497.02	12.95	13.19	0.24	484.02	
O-2	1/21/2015	497.02	12.99	13.19	0.20	483.99	
O-2	2/25/2015	497.02	13.08	13.30	0.22	483.90	
O-2	3/10/2015	497.04	12.97	13.18	0.21	484.03	
O-2	3/18/2015	497.04	13.07	13.33	0.26	483.92	
O-2	3/26/2015	497.04	13.03	13.25	0.22	483.97	
O-2	4/16/2015	497.02	12.88	13.09	0.21	484.10	
O-2	5/21/2015	497.02	12.67	12.86	0.19	484.31	
O-2	6/10/2015	497.04	12.72	12.92	0.20	484.28	
O-2	8/12/2015	497.03	11.66	11.75	0.09	485.39	
O-2	8/19/2015	497.03	11.89	12.31	0.42	485.13	
O-2	10/6/2015	497.03	12.24	12.45	0.21	484.79	
O-2	10/15/2015	497.03	12.64	12.89	0.25	484.38	
O-2	11/19/2015	497.03	12.75	12.97	0.22	484.24	
O-2	1/19/2016	497.05	13.30	13.58	0.28	483.70	
O-2	3/4/2016	497.05	13.40	13.69	0.29	483.65	
O-2	5/26/2016	497.08	12.89	13.20	0.31	484.15	
O-2	8/17/2016	497.10	Sheen	11.29	Sheen	485.81	
O-2	9/9/2016	497.08	11.71	12.30	0.59	485.31	
O-2	10/13/2016	497.08	12.78	13.08	0.30	484.24	
O-2	10/15/2016	497.08	12.90	13.07	0.17	484.15	
O-2	10/22/2016	497.08	13.09	13.21	0.12	483.97	
O-2	10/25/2016	497.10	13.19	13.32	0.13	483.89	
O-2	10/28/2016	497.08	13.04	13.12	0.08	484.02	
O-2	11/5/2016	497.10	12.30	12.35	0.05	484.79	

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Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-2	11/15/2016	497.10	12.43	12.55	0.12	484.69	
O-2	2/8/2017	497.15	12.90	13.07	0.17	484.29	
O-2	2/15/2017	497.15	12.94	13.10	0.16	484.21	
O-2	3/1/2017	497.15	12.95	13.12	0.17	484.17	
O-2	6/6/2017	497.15	12.95	13.21	0.26	484.15	
O-2	6/13/2017	497.15	12.28	12.30	0.02	484.93	
O-2	7/24/2017	497.15	Sheen	11.49	Sheen	485.66	
O-2	7/27/2017	497.15	No LNAPL	11.46	0.00	485.69	
O-2	8/29/2017	497.15	11.95	11.96	0.01	485.19	
O-2	9/20/2017	497.15	12.66	12.68	0.02	484.47	
O-2	10/25/2017	497.15	Sheen	13.17	Sheen	483.98	
O-2	11/1/2017	497.15	13.15	13.31	0.16	483.97	
O-2	1/19/2018	497.15	12.78	12.99	0.21	484.33	
O-2	3/12/2018	497.15	13.10	13.27	0.17	484.02	
O-2	4/3/2018	497.15	13.10	13.28	0.18	484.02	
O-2	6/8/2018	497.15	12.25	12.35	0.10	484.88	
O-2	7/10/2018	497.15	Sheen	11.34	Sheen	485.81	
O-3	3/18/2011	497.67	No LNAPL	13.28	0.00	484.39	
O-3	5/4/2011	497.67	No LNAPL	12.50	0.00	485.17	
O-3	5/16/2011	497.67	No LNAPL	13.39	0.00	484.28	
O-3	5/24/2011	497.67	No LNAPL	13.01	0.00	484.66	
O-3	6/21/2011	497.67	No LNAPL	13.74	0.00	483.93	
O-3	7/15/2011	497.67	No LNAPL	12.07	0.00	485.60	
O-3	8/23/2011	497.67	No LNAPL	12.40	0.00	485.27	
O-3	9/22/2011	497.67	No LNAPL	13.40	0.00	484.27	
O-3	10/21/2011	497.67	No LNAPL	14.09	0.00	483.58	
O-3	12/7/2011	497.74	No LNAPL	13.74	0.00	484.00	
O-3	1/10/2012	497.74	No LNAPL	14.01	0.00	483.73	
O-3	2/6/2012	497.74	No LNAPL	14.10	0.00	483.64	
O-3	2/16/2012	497.74	No LNAPL	14.03	0.00	483.71	
O-3	3/13/2012	497.74	No LNAPL	14.03	0.00	483.71	
O-3	4/10/2012	497.74	No LNAPL	13.93	0.00	483.81	
O-3	4/19/2012	497.74	No LNAPL	13.43	0.00	484.31	
O-3	5/8/2012	497.74	No LNAPL	13.65	0.00	484.09	
O-3	6/13/2012	497.74	No LNAPL	12.72	0.00	485.02	
O-3	7/17/2012	497.74	No LNAPL	12.45	0.00	485.29	
O-3	7/30/2012	497.74	No LNAPL	12.16	0.00	485.58	
O-3	8/21/2012	497.74	No LNAPL	12.87	0.00	484.87	
O-3	9/18/2012	497.74	No LNAPL	13.49	0.00	484.25	
O-3	10/16/2012	497.74	No LNAPL	13.50	0.00	484.24	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-3	11/1/2012	497.74	No LNAPL	13.58	0.00	484.16	
O-3	11/29/2012	497.76	No LNAPL	13.08	0.00	484.68	
O-3	12/27/2012	497.76	No LNAPL	13.42	0.00	484.34	
O-3	1/23/2013	497.76	No LNAPL	13.38	0.00	484.38	
O-3	2/26/2013	497.76	No LNAPL	13.53	0.00	484.23	
O-3	3/29/2013	497.76	No LNAPL	13.68	0.00	484.08	R-35R, R-39, and R-40 were offline on this date
O-3	4/24/2013	497.76	No LNAPL	13.65	0.00	484.11	
O-3	5/20/2013	497.83	No LNAPL	13.31	0.00	484.52	
O-3	6/25/2013	497.83	No LNAPL	12.47	0.00	485.36	
O-3	7/23/2013	497.83	--	12.16	--	485.67	
O-3	8/1/2013	497.83	--	12.15	--	485.68	
O-3	8/21/2013	497.83	No LNAPL	12.14	0.00	485.69	
O-3	9/30/2013	497.83	No LNAPL	13.29	0.00	484.54	
O-3	10/22/2013	497.82	No LNAPL	13.94	0.00	483.88	
O-3	11/26/2013	497.82	No LNAPL	13.27	0.00	484.55	
O-3	12/18/2013	497.84	No LNAPL	13.35	0.00	484.49	
O-3	1/9/2014	497.85	No LNAPL	13.63	0.00	484.22	
O-3	2/5/2014	497.86	No LNAPL	13.78	0.00	484.08	
O-3	3/18/2014	497.88	No LNAPL	14.01	0.00	483.87	
O-3	3/24/2014	497.88	No LNAPL	14.05	0.00	483.83	
O-3	4/18/2014	497.89	No LNAPL	13.86	0.00	484.03	
O-3	5/15/2014	497.89	--	13.44	--	484.45	
O-3	6/11/2014	497.87	No LNAPL	13.59	0.00	484.28	
O-3	6/19/2014	497.87	No LNAPL	13.26	0.00	484.61	
O-3	7/15/2014	497.89	No LNAPL	11.46	0.00	486.43	
O-3	8/26/2014	497.89	No LNAPL	12.09	0.00	485.80	
O-3	9/9/2014	497.89	No LNAPL	12.30	0.00	485.59	
O-3	9/24/2014	497.87	No LNAPL	12.66	0.00	485.21	
O-3	10/21/2014	497.87	No LNAPL	13.56	0.00	484.31	
O-3	11/19/2014	497.88	No LNAPL	13.25	0.00	484.63	
O-3	12/16/2014	497.92	No LNAPL	13.45	0.00	484.47	
O-3	12/29/2014	497.92	No LNAPL	13.58	0.00	484.34	
O-3	1/21/2015	497.94	No LNAPL	13.65	0.00	484.29	
O-3	2/25/2015	497.95	No LNAPL	13.78	0.00	484.17	
O-3	3/10/2015	497.96	No LNAPL	13.70	0.00	484.26	
O-3	3/18/2015	497.96	--	13.80	--	484.16	
O-3	3/26/2015	497.96	No LNAPL	13.72	0.00	484.24	
O-3	4/16/2015	497.96	--	13.57	--	484.39	
O-3	5/21/2015	497.96	No LNAPL	13.33	0.00	484.63	
O-3	6/10/2015	497.95	No LNAPL	13.36	0.00	484.59	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-3	8/12/2015	497.95	No LNAPL	12.35	0.00	485.64	
O-3	8/19/2015	497.95	No LNAPL	12.59	0.00	485.39	
O-3	10/6/2015	497.96	No LNAPL	12.85	0.00	485.12	
O-3	10/15/2015	497.96	No LNAPL	13.26	0.00	484.70	
O-3	11/19/2015	497.96	--	13.44	--	484.52	
O-3	1/19/2016	497.97	--	13.94	--	483.99	
O-3	3/4/2016	497.97	No LNAPL	14.11	0.00	483.86	
O-3	5/26/2016	498.01	No LNAPL	13.61	0.00	484.42	
O-3	6/14/2016	498.01	No LNAPL	13.27	0.00	484.74	
O-3	8/15/2016	498.00	--	11.83	--	486.17	
O-3	8/18/2016	498.01	No LNAPL	12.00	0.00	486.01	
O-3	9/9/2016	498.00	No LNAPL	12.47	0.00	485.57	
O-3	10/13/2016	498.00	No LNAPL	13.49	0.00	484.51	
O-3	11/15/2016	498.00	No LNAPL	13.15	0.00	484.95	
O-3	2/8/2017	498.07	No LNAPL	13.64	0.00	484.50	
O-3	3/1/2017	498.07	No LNAPL	13.70	0.00	484.37	
O-3	6/6/2017	498.07	No LNAPL	13.65	0.00	484.42	
O-3	6/13/2017	498.07	No LNAPL	12.94	0.00	485.18	
O-3	8/2/2017	498.07	--	12.32	--	485.75	
O-3	8/7/2018	498.07	--	11.79	--	486.28	
O-4	3/18/2011	496.48	No LNAPL	12.12	0.00	484.36	
O-4	5/6/2011	496.48	No LNAPL	11.46	0.00	485.02	
O-4	5/16/2011	496.48	No LNAPL	12.23	0.00	484.25	
O-4	5/24/2011	496.48	No LNAPL	11.93	0.00	484.55	
O-4	6/21/2011	496.48	No LNAPL	11.55	0.00	484.93	
O-4	7/14/2011	496.48	No LNAPL	10.77	0.00	485.71	
O-4	8/23/2011	496.48	No LNAPL	11.15	0.00	485.33	
O-4	9/22/2011	496.48	No LNAPL	10.15	0.00	486.33	
O-4	10/21/2011	496.48	No LNAPL	12.95	0.00	483.53	
O-4	12/2/2011	496.47	No LNAPL	12.63	0.00	483.84	
O-4	1/10/2012	496.47	No LNAPL	12.79	0.00	483.68	
O-4	2/6/2012	496.47	No LNAPL	12.88	0.00	483.59	
O-4	2/15/2012	496.47	No LNAPL	12.81	0.00	483.66	
O-4	3/13/2012	496.47	No LNAPL	12.79	0.00	483.68	
O-4	4/10/2012	496.47	No LNAPL	12.70	0.00	483.77	
O-4	4/19/2012	496.47	--	12.15	--	484.32	
O-4	5/8/2012	496.47	No LNAPL	12.50	0.00	483.97	
O-4	6/12/2012	496.47	No LNAPL	11.61	0.00	484.86	
O-4	7/17/2012	496.47	No LNAPL	11.20	0.00	485.27	
O-4	7/30/2012	496.47	No LNAPL	10.88	0.00	485.59	

Appendix A-1
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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-4	8/21/2012	496.47	No LNAPL	11.63	0.00	484.84	
O-4	9/18/2012	496.47	No LNAPL	12.30	0.00	484.17	
O-4	10/16/2012	496.47	No LNAPL	12.30	0.00	484.17	
O-4	11/1/2012	496.47	No LNAPL	12.26	0.00	484.21	
O-4	11/29/2012	496.50	No LNAPL	11.83	0.00	484.67	
O-4	12/27/2012	496.50	No LNAPL	12.18	0.00	484.32	
O-4	1/23/2013	496.50	No LNAPL	12.16	0.00	484.34	
O-4	2/26/2013	496.50	No LNAPL	12.31	0.00	484.19	
O-4	3/28/2013	496.50	No LNAPL	12.46	0.00	484.04	R-35R, R-39, and R-40 were offline on this date
O-4	4/24/2013	496.50	No LNAPL	12.43	0.00	484.07	
O-4	5/21/2013	496.54	No LNAPL	12.28	0.00	484.26	
O-4	6/25/2013	496.55	No LNAPL	11.38	0.00	485.17	
O-4	7/23/2013	496.54	--	11.10	--	485.44	
O-4	8/1/2013	496.54	--	11.03	--	485.51	
O-4	8/21/2013	496.54	No LNAPL	11.01	0.00	485.53	
O-4	10/1/2013	496.53	--	12.34	--	484.19	
O-4	10/29/2013	496.53	No LNAPL	13.05	0.00	483.48	
O-4	11/26/2013	496.53	No LNAPL	12.08	0.00	484.45	
O-4	12/18/2013	496.53	No LNAPL	12.26	0.00	484.27	
O-4	1/9/2014	496.54	--	12.52	--	484.02	
O-4	2/5/2014	496.54	--	12.64	--	483.90	
O-4	3/18/2014	496.55	--	12.88	--	483.67	
O-4	3/24/2014	496.55	--	12.91	--	483.64	
O-4	4/18/2014	496.57	--	12.74	--	483.83	
O-4	5/15/2014	496.56	--	12.33	--	484.23	
O-4	6/11/2014	496.57	--	12.47	--	484.10	
O-4	6/19/2014	496.57	--	12.16	--	484.41	
O-4	7/15/2014	496.54	No LNAPL	10.41	0.00	486.13	
O-4	8/26/2014	496.55	--	11.08	--	485.47	
O-4	9/9/2014	496.55	--	11.33	--	485.22	
O-4	9/24/2014	496.55	--	11.65	--	484.90	
O-4	10/21/2014	496.55	--	12.53	--	484.02	
O-4	11/19/2014	496.55	No LNAPL	12.17	0.00	484.38	
O-4	12/16/2014	496.54	--	12.39	--	484.15	
O-4	1/21/2015	496.54	--	12.55	--	483.99	
O-4	2/25/2015	496.55	--	12.62	--	483.93	
O-4	3/10/2015	496.57	No LNAPL	12.57	0.00	484.00	
O-4	3/18/2015	496.57	--	12.67	--	483.90	
O-4	3/26/2015	496.57	--	12.61	--	483.96	
O-4	4/16/2015	496.57	--	12.44	--	484.13	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-4	5/18/2015	496.57	No LNAPL	12.19	0.00	484.38	
O-4	5/21/2015	496.57	--	12.18	--	484.39	
O-4	6/10/2015	496.55	--	12.25	--	484.30	
O-4	8/12/2015	496.56	No LNAPL	11.21	0.00	485.39	
O-4	8/19/2015	496.56	--	11.43	--	485.13	
O-4	10/6/2015	496.55	--	11.77	--	484.78	
O-4	10/15/2015	496.55	No LNAPL	12.23	0.00	484.32	
O-4	11/19/2015	496.55	--	12.31	--	484.24	
O-4	1/19/2016	496.55	--	12.83	--	483.72	
O-4	3/4/2016	496.55	No LNAPL	12.94	0.00	483.61	
O-4	5/26/2016	496.56	--	12.42	--	484.14	
O-4	6/14/2016	496.56	No LNAPL	12.08	0.00	484.48	
O-4	8/4/2016	496.55	--	10.19	--	486.36	
O-4	8/18/2016	496.56	No LNAPL	10.83	0.00	485.73	
O-4	9/9/2016	496.55	--	11.38	--	485.17	
O-4	10/13/2016	496.55	No LNAPL	12.36	0.00	484.19	
O-4	10/14/2016	496.55	--	12.35	--	484.20	
O-4	11/15/2016	496.55	--	11.90	--	484.65	
O-4	2/8/2017	496.56	--	12.36	--	484.20	
O-4	2/15/2017	496.56	--	12.37	--	484.19	
O-4	3/1/2017	496.56	No LNAPL	12.45	0.00	484.11	
O-4	6/6/2017	496.57	No LNAPL	12.47	0.00	484.10	
O-4	6/13/2017	496.57	--	11.70	--	484.87	
O-4	7/14/2017	496.57	--	10.88	--	485.69	
O-4	11/1/2017	496.58	No LNAPL	12.74	0.00	483.84	
O-4	7/19/2018	496.58	--	11.02	--	485.56	
O-4	11/6/2018	496.58	No LNAPL	12.37	0.00	484.21	
O-5	10/21/2011	—	No LNAPL	12.41	0.00	—	New well
O-5	12/2/2011	496.05	No LNAPL	12.11	0.00	483.94	
O-5	2/6/2012	496.05	No LNAPL	12.42	0.00	483.63	
O-5	2/15/2012	496.05	No LNAPL	12.34	0.00	483.71	
O-5	3/13/2012	496.05	No LNAPL	12.33	0.00	483.72	
O-5	4/10/2012	496.05	No LNAPL	12.25	0.00	483.80	
O-5	4/19/2012	496.05	--	11.69	--	484.36	
O-5	5/8/2012	496.05	No LNAPL	12.04	0.00	484.01	
O-5	6/12/2012	496.05	No LNAPL	11.14	0.00	484.91	
O-5	7/17/2012	496.05	No LNAPL	10.72	0.00	485.33	
O-5	7/30/2012	496.05	No LNAPL	10.40	0.00	485.65	
O-5	8/21/2012	496.05	No LNAPL	11.17	0.00	484.88	
O-5	9/18/2012	496.05	No LNAPL	11.84	0.00	484.21	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-5	10/16/2012	496.05	No LNAPL	11.84	0.00	484.21	
O-5	11/1/2012	496.05	No LNAPL	11.85	0.00	484.20	
O-5	11/29/2012	496.11	No LNAPL	11.36	0.00	484.75	
O-5	12/27/2012	496.11	No LNAPL	11.74	0.00	484.37	
O-5	1/23/2013	496.11	No LNAPL	11.72	0.00	484.39	
O-5	2/26/2013	496.11	No LNAPL	11.88	0.00	484.23	
O-5	3/28/2013	496.11	No LNAPL	12.03	0.00	484.08	R-35R, R-39, and R-40 were offline on this date
O-5	4/24/2013	496.11	No LNAPL	12.00	0.00	484.11	
O-5	5/21/2013	496.21	No LNAPL	11.84	0.00	484.37	
O-5	6/25/2013	496.21	No LNAPL	10.93	0.00	485.28	
O-5	7/23/2013	496.21	--	10.64	--	485.57	
O-5	7/25/2013	496.21	--	10.68	--	485.53	
O-5	8/1/2013	496.21	--	10.57	--	485.64	
O-5	8/21/2013	496.21	No LNAPL	10.53	0.00	485.68	
O-5	10/1/2013	496.19	--	11.87	--	484.32	
O-5	10/22/2013	496.20	No LNAPL	12.42	0.00	483.78	
O-5	11/26/2013	496.20	No LNAPL	11.60	0.00	484.60	
O-5	12/18/2013	496.22	No LNAPL	11.79	0.00	484.43	
O-5	1/9/2014	496.23	--	12.68	--	483.55	
O-5	2/5/2014	496.22	--	12.23	--	483.99	
O-5	3/18/2014	496.25	--	12.44	--	483.81	
O-5	3/24/2014	496.25	--	12.47	--	483.78	
O-5	4/18/2014	496.27	--	12.35	--	483.92	
O-5	5/15/2014	496.25	--	11.91	--	484.34	
O-5	6/11/2014	496.01	--	12.04	--	483.97	
O-5	6/19/2014	496.01	--	11.70	--	484.31	
O-5	7/15/2014	495.98	--	9.70	--	486.28	
O-5	8/26/2014	496.00	--	10.39	--	485.61	
O-5	9/9/2014	496.00	--	10.66	--	485.34	
O-5	9/24/2014	495.98	--	10.96	--	485.02	
O-5	10/21/2014	495.98	--	11.90	--	484.08	
O-5	11/19/2014	495.98	No LNAPL	11.51	0.00	484.47	
O-5	12/16/2014	496.04	--	11.74	--	484.30	
O-5	1/21/2015	496.06	--	11.96	--	484.10	
O-5	2/25/2015	496.07	--	12.04	--	484.03	
O-5	3/10/2015	496.08	No LNAPL	11.98	0.00	484.10	
O-5	3/18/2015	496.08	--	12.09	--	483.99	
O-5	3/26/2015	496.08	--	12.02	--	484.06	
O-5	4/16/2015	496.09	--	11.84	--	484.25	
O-5	5/21/2015	496.09	--	11.60	--	484.49	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-5	6/10/2015	496.07	--	11.67	--	484.40	
O-5	8/12/2015	496.08	--	10.55	--	485.53	
O-5	8/19/2015	496.08	--	10.83	--	485.25	
O-5	10/6/2015	496.07	--	11.20	--	484.87	
O-5	10/15/2015	496.07	No LNAPL	11.64	0.00	484.43	
O-5	11/19/2015	496.07	--	11.71	--	484.36	
O-5	1/19/2016	496.10	--	12.25	--	483.85	
O-5	3/4/2016	496.10	No LNAPL	12.42	0.00	483.68	
O-5	5/26/2016	496.13	--	11.89	--	484.24	
O-5	8/4/2016	495.69	--	9.18	--	486.51	
O-5	9/9/2016	495.66	--	10.29	--	485.37	
O-5	10/13/2016	495.66	No LNAPL	11.35	0.00	484.31	
O-5	10/14/2016	495.69	--	11.35	--	484.34	
O-5	11/15/2016	495.69	--	10.90	--	484.79	
O-5	2/8/2017	495.75	--	11.37	--	484.38	
O-5	2/15/2017	495.75	--	11.40	--	484.35	
O-5	3/1/2017	495.75	No LNAPL	11.50	0.00	484.25	
O-5	6/13/2017	495.76	--	10.73	--	485.03	
O-5	11/3/2017	495.77	No LNAPL	11.81	0.00	483.96	
O-5	11/6/2018	495.83	No LNAPL	11.43	0.00	484.40	
O-5-65	7/25/2013	495.67	--	10.01	--	485.66	
O-5-65	8/1/2013	495.67	--	9.88	--	485.79	
O-5-65	8/21/2013	495.67	No LNAPL	9.85	0.00	485.82	
O-5-65	1/9/2014	495.69	--	11.89	--	483.80	
O-5-65	2/5/2014	495.67	--	11.56	--	484.11	
O-5-65	3/24/2014	495.71	--	11.82	--	483.89	
O-5-65	4/18/2014	495.70	--	11.65	--	484.05	
O-5-65	5/15/2014	495.68	--	11.21	--	484.47	
O-5-65	6/19/2014	495.67	--	11.02	--	484.65	
O-5-65	7/15/2014	495.66	--	9.22	--	486.44	
O-5-65	8/26/2014	495.68	--	9.93	--	485.75	
O-5-65	9/24/2014	495.65	--	10.54	--	485.11	
O-5-65	10/21/2014	495.65	--	11.46	--	484.19	
O-5-65	11/19/2014	495.65	--	11.03	--	484.62	
O-5-65	12/16/2014	495.68	--	11.25	--	484.43	
O-5-65	1/21/2015	495.69	--	11.45	--	484.24	
O-5-65	2/25/2015	495.69	--	11.53	--	484.16	
O-5-65	3/18/2015	495.70	--	11.59	--	484.11	
O-5-65	3/26/2015	495.70	--	11.50	--	484.20	
O-5-65	4/16/2015	495.70	--	11.35	--	484.35	

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O-5-65	5/21/2015	495.68	--	11.06	--	484.62	
O-5-65	6/10/2015	495.65	--	11.10	--	484.55	
O-5-65	8/19/2015	495.66	--	10.28	--	485.38	
O-5-65	10/6/2015	495.65	--	10.65	--	485.00	
O-5-65	1/19/2016	495.66	--	11.68	--	483.98	
O-5-65	5/26/2016	495.67	--	11.24	--	484.43	
O-5-65	8/4/2016	495.67	--	9.03	--	486.64	
O-5-65	9/9/2016	495.67	--	10.18	--	485.49	
O-5-65	10/18/2016	495.67	--	11.39	--	484.28	
O-5-65	11/15/2016	495.67	--	10.76	--	484.91	
O-5-65	2/8/2017	495.68	--	11.20	--	484.48	
O-5-65	6/13/2017	495.66	--	10.50	--	485.16	
O-6	10/21/2011	—	No LNAPL	10.64	0.00	—	New well
O-6	12/2/2011	494.52	No LNAPL	10.34	0.00	484.18	
O-6	2/6/2012	494.52	No LNAPL	10.73	0.00	483.79	
O-6	2/15/2012	494.52	No LNAPL	10.68	0.00	483.84	
O-6	3/13/2012	494.52	No LNAPL	10.70	0.00	483.82	
O-6	4/10/2012	494.52	No LNAPL	10.61	0.00	483.91	
O-6	4/19/2012	494.52	--	10.05	--	484.47	
O-6	5/8/2012	494.52	No LNAPL	10.42	0.00	484.10	
O-6	6/12/2012	494.52	No LNAPL	9.49	0.00	485.03	
O-6	7/17/2012	494.52	No LNAPL	9.07	0.00	485.45	
O-6	7/30/2012	494.52	No LNAPL	8.74	0.00	485.78	
O-6	8/21/2012	494.52	No LNAPL	9.50	0.00	485.02	
O-6	9/18/2012	494.52	No LNAPL	10.20	0.00	484.32	
O-6	10/16/2012	494.52	No LNAPL	10.20	0.00	484.32	
O-6	11/1/2012	494.52	No LNAPL	10.17	0.00	484.35	
O-6	11/29/2012	494.73	No LNAPL	9.79	0.00	484.94	
O-6	12/27/2012	494.73	No LNAPL	10.25	0.00	484.48	
O-6	1/23/2013	494.73	No LNAPL	10.28	0.00	484.45	
O-6	2/26/2013	494.73	No LNAPL	10.44	0.00	484.29	
O-6	3/28/2013	494.73	No LNAPL	10.61	0.00	484.12	R-35R, R-39, and R-40 were offline on this date
O-6	4/24/2013	494.73	No LNAPL	10.59	0.00	484.14	
O-6	5/29/2013	495.04	No LNAPL	9.49	0.00	485.55	
O-6	6/25/2013	495.04	No LNAPL	9.42	0.00	485.62	
O-6	7/23/2013	495.05	--	9.12	--	485.93	
O-6	8/1/2013	495.05	--	9.02	--	486.03	
O-6	8/21/2013	495.05	No LNAPL	8.99	0.00	486.06	
O-6	10/1/2013	495.02	--	10.42	--	484.60	
O-6	10/22/2013	495.03	No LNAPL	10.95	0.00	484.08	

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O-6	11/26/2013	495.03	No LNAPL	10.22	0.00	484.81	
O-6	12/18/2013	495.06	No LNAPL	10.31	0.00	484.75	
O-6	1/9/2014	495.06	--	10.42	--	484.64	
O-6	2/5/2014	495.14	--	10.81	--	484.33	
O-6	3/18/2014	495.24	--	11.15	--	484.09	
O-6	3/24/2014	495.24	--	11.18	--	484.06	
O-6	4/18/2014	495.24	--	10.99	--	484.25	
O-6	5/15/2014	495.25	--	10.59	--	484.66	
O-6	6/11/2014	495.20	--	10.74	--	484.46	
O-6	6/20/2014	495.20	--	10.01	--	485.19	
O-6	7/15/2014	495.18	--	8.54	--	486.64	
O-6	8/26/2014	495.20	--	9.26	--	485.94	
O-6	9/9/2014	495.20	--	9.57	--	485.63	
O-6	9/24/2014	495.19	--	9.87	--	485.32	
O-6	10/21/2014	494.80	--	10.43	--	484.37	
O-6	11/19/2014	494.81	No LNAPL	10.00	0.00	484.81	
O-6	12/16/2014	494.84	--	10.24	--	484.60	
O-6	1/21/2015	494.96	--	10.53	--	484.43	
O-6	2/25/2015	495.07	--	10.72	--	484.35	
O-6	3/10/2015	495.10	No LNAPL	10.68	0.00	484.42	
O-6	3/18/2015	495.10	--	10.80	--	484.30	
O-6	3/26/2015	495.10	--	10.74	--	484.36	
O-6	4/16/2015	495.14	--	10.57	--	484.57	
O-6	5/21/2015	495.14	--	10.29	--	484.85	
O-6	6/10/2015	495.12	--	10.34	--	484.78	
O-6	8/12/2015	495.13	--	9.25	--	485.88	
O-6	8/19/2015	495.13	--	9.52	--	485.61	
O-6	10/6/2015	495.14	--	9.91	--	485.23	
O-6	10/15/2015	495.14	No LNAPL	10.37	0.00	484.77	
O-6	11/19/2015	495.14	--	10.43	--	484.71	
O-6	1/19/2016	495.12	--	10.96	--	484.16	
O-6	5/26/2016	495.22	--	10.62	--	484.60	
O-6	8/8/2016	494.74	--	8.07	--	486.67	
O-6	9/9/2016	494.75	--	9.02	--	485.73	
O-6	10/18/2016	494.74	--	10.24	--	484.50	
O-6	11/15/2016	494.74	--	9.60	--	485.14	
O-6	2/8/2017	494.97	--	10.30	--	484.67	
O-6	2/15/2017	494.97	--	10.33	--	484.64	
O-6	6/13/2017	495.04	--	9.68	--	485.36	
O-7	10/21/2011	—	11.67	12.14	0.47	—	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-7	12/7/2011	495.95	11.18	12.14	0.96	484.57	
O-7	2/17/2012	495.95	11.37	12.91	1.54	484.25	
O-7	3/15/2012	495.95	11.39	12.97	1.58	484.23	
O-7	4/12/2012	495.95	11.30	12.64	1.34	484.37	
O-7	5/7/2012	495.95	11.22	11.69	0.47	484.63	
O-7	5/15/2012	495.95	11.47	11.96	0.49	484.38	Initial levels of May 2012 baildown test
O-7	6/12/2012	495.95	Sheen	10.53	Sheen	485.42	
O-7	7/17/2012	495.95	Sheen	10.10	Sheen	485.85	
O-7	8/21/2012	495.95	Sheen	10.54	Sheen	485.41	
O-7	9/18/2012	495.95	11.16	11.20	0.04	484.78	
O-7	10/15/2012	495.95	11.13	11.14	0.01	484.82	
O-7	11/29/2012	496.01	Sheen	10.85	Sheen	485.16	
O-7	12/28/2012	496.01	11.19	11.20	0.01	484.82	
O-7	2/26/2013	496.01	11.27	11.28	0.01	484.74	
O-7	3/28/2013	496.01	11.36	11.38	0.02	484.65	R-35R, R-39, and R-40 were offline on this date
O-7	4/24/2013	496.01	11.37	11.38	0.01	484.64	
O-7	5/31/2013	496.01	Sheen	10.15	Sheen	485.86	
O-7	6/24/2013	496.01	No LNAPL	10.21	0.00	485.80	
O-7	7/23/2013	496.01	No LNAPL	10.02	0.00	485.99	
O-7	8/21/2013	496.01	No LNAPL	9.94	0.00	486.07	
O-7	9/24/2013	496.01	Sheen	10.81	Sheen	485.20	
O-7	10/29/2013	496.01	11.87	11.90	0.03	484.13	
O-7	11/19/2013	496.01	11.22	11.69	0.47	484.69	
O-7	12/20/2013	496.01	11.19	11.21	0.02	484.82	
O-7	1/14/2014	496.01	No LNAPL	11.47	0.00	484.54	
O-7	2/25/2014	496.01	11.81	11.87	0.06	484.19	
O-7	3/24/2014	496.01	11.89	11.93	0.04	484.11	
O-7	4/14/2014	496.21	11.89	11.98	0.09	484.30	
O-7	5/16/2014	496.21	Sheen	11.23	Sheen	484.98	
O-7	6/20/2014	496.21	Sheen	10.81	Sheen	485.40	
O-7	7/19/2014	496.21	No LNAPL	9.59	0.00	486.62	
O-7	8/28/2014	496.21	No LNAPL	9.85	0.00	486.36	
O-7	9/29/2014	496.21	Sheen	10.66	Sheen	485.55	
O-7	10/16/2014	496.21	Sheen	11.21	Sheen	485.00	
O-7	3/10/2015	496.21	Sheen	11.47	Sheen	484.74	
O-7	10/15/2015	496.33	No LNAPL	11.07	0.00	485.30	
O-7	6/14/2016	496.33	Sheen	11.08	Sheen	485.25	
O-7	8/18/2016	496.33	No LNAPL	9.76	0.00	486.57	
O-7	11/1/2017	496.48	11.86	11.88	0.02	484.62	
O-7	11/6/2018	496.47	No LNAPL	11.52	0.00	484.95	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-8	10/21/2011	—	No LNAPL	11.96	0.00	—	New well
O-8	12/2/2011	496.71	No LNAPL	11.67	0.00	485.04	
O-8	2/7/2012	496.71	No LNAPL	11.88	0.00	484.83	
O-8	2/16/2012	496.71	No LNAPL	11.82	0.00	484.89	
O-8	3/13/2012	496.71	No LNAPL	11.79	0.00	484.92	
O-8	4/10/2012	496.71	No LNAPL	11.38	0.00	485.33	
O-8	4/19/2012	496.71	No LNAPL	11.10	0.00	485.61	
O-8	5/9/2012	496.71	No LNAPL	11.48	0.00	485.23	
O-8	6/12/2012	496.71	No LNAPL	10.53	0.00	486.18	
O-8	7/18/2012	496.71	No LNAPL	10.16	0.00	486.55	
O-8	7/30/2012	496.71	No LNAPL	9.77	0.00	486.94	
O-8	8/21/2012	496.71	No LNAPL	10.56	0.00	486.15	
O-8	9/18/2012	496.71	No LNAPL	11.24	0.00	485.47	
O-8	10/16/2012	496.71	No LNAPL	11.26	0.00	485.45	
O-8	11/1/2012	496.71	No LNAPL	11.26	0.00	485.45	
O-8	11/29/2012	496.72	No LNAPL	10.77	0.00	485.95	
O-8	12/27/2012	496.72	No LNAPL	11.14	0.00	485.58	
O-8	1/24/2013	496.72	No LNAPL	11.11	0.00	485.61	
O-8	2/26/2013	496.72	No LNAPL	11.25	0.00	485.47	
O-8	3/28/2013	496.72	No LNAPL	11.41	0.00	485.31	R-35R, R-39, and R-40 were offline on this date
O-8	4/24/2013	496.72	No LNAPL	11.38	0.00	485.34	
O-8	5/29/2013	496.72	No LNAPL	10.27	0.00	486.45	
O-8	6/25/2013	496.72	No LNAPL	10.14	0.00	486.58	
O-8	8/2/2013	496.72	No LNAPL	9.74	0.00	486.98	
O-8	10/1/2013	496.72	No LNAPL	11.14	0.00	485.58	
O-8	10/29/2013	496.72	No LNAPL	11.91	0.00	484.81	
O-8	11/19/2013	496.72	No LNAPL	11.26	0.00	485.46	
O-8	12/20/2013	496.72	No LNAPL	11.12	0.00	485.60	
O-8	3/18/2014	496.72	No LNAPL	11.77	0.00	484.95	
O-8	6/11/2014	496.76	No LNAPL	11.33	0.00	485.43	
O-8	9/9/2014	496.76	No LNAPL	10.00	0.00	486.76	
O-8	11/20/2014	496.76	No LNAPL	10.84	0.00	485.92	
O-8	3/19/2015	496.76	--	11.32	--	485.44	
O-8	6/11/2015	496.76	No LNAPL	10.91	0.00	485.85	
O-8	8/12/2015	496.76	--	9.75	--	487.01	
O-8	10/15/2015	496.76	No LNAPL	10.87	0.00	485.89	
O-8	11/19/2015	496.76	--	10.98	--	485.78	
O-8	10/13/2016	496.76	No LNAPL	10.99	0.00	485.77	
O-8	3/1/2017	496.76	No LNAPL	11.03	0.00	485.73	
O-9	10/21/2011	—	12.10	13.44	1.34	—	

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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-9	12/7/2011	496.89	—	—	—	—	Unable to open
O-9	2/17/2012	496.89	11.90	13.91	2.01	484.63	
O-9	3/15/2012	496.89	11.91	14.05	2.14	484.60	
O-9	4/12/2012	496.89	11.57	13.68	2.11	484.94	
O-9	5/7/2012	496.89	11.66	13.01	1.35	484.99	
O-9	5/15/2012	496.89	11.85	13.42	1.57	484.76	Initial levels of first May 2012 baildown test
O-9	5/16/2012	496.89	12.02	12.81	0.79	484.73	Initial levels of second May 2012 baildown test
O-9	6/12/2012	496.89	Sheen	11.06	Sheen	485.83	
O-9	7/17/2012	496.89	Sheen	10.63	Sheen	486.26	
O-9	8/21/2012	496.89	Sheen	11.08	Sheen	485.81	
O-9	9/18/2012	496.89	11.71	11.85	0.14	485.15	
O-9	10/15/2012	496.89	11.69	11.78	0.09	485.18	
O-9	11/29/2012	496.95	Sheen	11.37	Sheen	485.58	
O-9	12/28/2012	496.95	11.74	11.76	0.02	485.21	
O-9	2/26/2013	496.95	11.85	11.87	0.02	485.10	
O-9	3/28/2013	496.95	11.91	12.25	0.34	484.98	R-35R, R-39, and R-40 were offline on this date
O-9	4/24/2013	496.95	11.85	12.46	0.61	484.99	
O-9	5/31/2013	496.95	No LNAPL	10.68	0.00	486.27	
O-9	6/24/2013	496.95	No LNAPL	10.76	0.00	486.19	
O-9	7/23/2013	496.95	No LNAPL	10.52	0.00	486.43	
O-9	8/21/2013	496.95	Sheen	10.44	Sheen	486.51	
O-9	9/25/2013	496.95	11.40	11.42	0.02	485.55	
O-9	10/29/2013	496.95	12.31	13.19	0.88	484.48	
O-9	11/19/2013	496.95	11.69	12.70	1.01	485.08	
O-9	12/20/2013	496.95	11.69	12.12	0.43	485.18	
O-9	1/14/2014	496.95	11.92	12.71	0.79	484.89	
O-9	2/25/2014	496.95	12.20	13.33	1.13	484.55	
O-9	3/24/2014	496.95	12.34	13.11	0.77	484.47	
O-9	4/14/2014	497.16	12.27	13.53	1.26	484.66	
O-9	5/16/2014	497.16	11.70	12.20	0.50	485.37	
O-9	6/20/2014	497.16	11.35	11.36	0.01	485.81	
O-9	7/19/2014	497.16	Sheen	10.15	Sheen	487.01	
O-9	8/28/2014	497.16	10.41	10.47	0.06	486.74	
O-9	9/29/2014	497.16	11.22	11.36	0.14	485.91	
O-9	10/16/2014	497.16	11.78	11.94	0.16	485.35	
O-9	3/10/2015	497.16	11.97	12.27	0.30	485.14	
O-9	5/18/2015	497.16	11.66	11.75	0.09	485.48	
O-9	8/12/2015	497.28	Sheen	10.64	Sheen	486.68	
O-9	10/15/2015	497.28	11.67	11.68	0.01	485.65	
O-9	3/4/2016	497.28	12.47	12.87	0.40	484.79	

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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-9	10/13/2016	497.36	11.87	11.88	0.01	485.49	
O-9	3/1/2017	497.36	12.06	12.08	0.02	485.30	
O-10	10/21/2011	—	11.56	11.94	0.38	—	
O-10	12/7/2011	496.21	11.05	12.02	0.97	484.99	
O-10	2/17/2012	496.21	11.39	12.70	1.31	484.59	
O-10	3/15/2012	496.21	11.42	12.83	1.41	484.54	
O-10	4/12/2012	496.21	11.26	12.87	1.61	484.66	
O-10	5/7/2012	496.21	11.04	12.64	1.60	484.88	
O-10	5/11/2012	496.21	11.20	12.61	1.41	484.76	Initial levels of first May 2012 baildown test
O-10	5/14/2012	496.21	11.32	12.62	1.30	484.66	Initial levels of second May 2012 baildown test
O-10	6/12/2012	496.21	10.03	12.33	2.30	485.77	
O-10	7/18/2012	496.21	9.88	10.88	1.00	486.15	
O-10	8/21/2012	496.21	10.39	10.69	0.30	485.77	
O-10	9/18/2012	496.21	11.00	11.73	0.73	485.08	
O-10	10/15/2012	496.21	10.97	11.68	0.71	485.11	
O-10	10/22/2012	496.21	11.15	12.40	1.25	484.84	Initial levels of first October 2012 baildown test
O-10	10/24/2012	496.21	11.33	12.26	0.93	484.71	Initial levels of second October 2012 baildown test
O-10	11/29/2012	496.36	10.62	11.51	0.89	485.58	
O-10	12/28/2012	496.36	11.04	12.00	0.96	485.15	
O-10	2/26/2013	496.36	11.09	12.48	1.39	485.02	
O-10	3/28/2013	496.36	11.20	12.74	1.54	484.88	R-35R, R-39, and R-40 were offline on this date
O-10	4/24/2013	496.36	11.20	12.71	1.51	484.89	
O-10	5/31/2013	496.36	10.03	10.91	0.88	486.17	
O-10	6/24/2013	496.36	10.18	10.76	0.58	486.08	
O-10	7/23/2013	496.36	10.03	10.04	0.01	486.33	
O-10	8/21/2013	496.36	Sheen	9.87	Sheen	486.49	
O-10	9/25/2013	496.36	10.94	11.03	0.09	485.40	
O-10	10/29/2013	496.36	12.00	12.04	0.04	484.35	
O-10	11/19/2013	496.36	Sheen	11.36	Sheen	485.00	
O-10	12/20/2013	496.36	11.24	11.34	0.10	485.10	
O-10	1/14/2014	496.36	11.55	11.68	0.13	484.79	
O-10	2/24/2014	496.36	11.92	12.07	0.15	484.41	
O-10	3/24/2014	496.36	12.03	12.16	0.13	484.31	
O-10	4/14/2014	496.78	11.93	12.92	0.99	484.67	
O-10	5/16/2014	496.78	11.37	11.57	0.20	485.37	
O-10	6/20/2014	496.78	10.77	11.47	0.70	485.88	
O-10	7/19/2014	496.78	9.27	10.12	0.85	487.36	
O-10	8/28/2014	496.78	9.85	10.80	0.95	486.76	
O-10	9/29/2014	496.78	10.78	11.10	0.32	485.94	
O-10	10/16/2014	496.61	11.40	11.48	0.08	485.20	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-10	3/10/2015	496.61	11.55	11.58	0.03	485.05	
O-10	5/18/2015	496.61	11.18	11.31	0.13	485.41	
O-10	8/12/2015	496.75	10.07	10.16	0.09	486.70	
O-10	10/15/2015	496.75	11.08	11.48	0.40	485.64	
O-10	3/4/2016	496.75	11.67	12.64	0.97	484.96	
O-10	6/14/2016	496.75	10.89	11.23	0.34	485.80	
O-10	7/2/2016	496.75	10.44	10.70	0.26	486.26	
O-10	7/9/2016	496.75	9.92	10.13	0.21	486.79	
O-10	8/18/2016	496.75	9.52	10.06	0.54	487.13	
O-10	9/10/2016	496.70	10.10	10.71	0.61	486.49	
O-10	9/17/2016	496.70	10.25	10.55	0.30	486.40	
O-10	9/24/2016	496.70	10.50	10.65	0.15	486.17	
O-10	9/30/2016	496.70	10.80	10.83	0.03	485.89	
O-10	10/8/2016	496.70	11.00	11.02	0.02	485.70	
O-10	10/13/2016	496.70	11.20	11.23	0.03	485.49	
O-10	10/15/2016	496.70	11.34	11.37	0.03	485.35	
O-10	10/22/2016	496.70	11.51	11.55	0.04	485.18	
O-10	10/28/2016	496.70	No LNAPL	11.45	0.00	485.25	
O-10	11/5/2016	496.70	No LNAPL	10.65	0.00	486.05	
O-10	3/1/2017	496.70	11.48	11.51	0.03	485.21	
O-10	6/6/2017	496.70	11.40	11.44	0.04	485.29	
O-11	10/21/2011	—	14.25	14.87	0.62	—	
O-11	12/7/2011	497.86	13.89	14.71	0.82	483.83	
O-11	2/17/2012	497.86	14.18	14.43	0.25	483.64	
O-11	3/14/2012	497.86	14.24	14.25	0.01	483.62	
O-11	4/12/2012	497.86	14.11	14.12	0.01	483.75	
O-11	5/7/2012	497.86	13.68	14.81	1.13	483.99	
O-11	5/11/2012	497.86	11.82	12.29	0.47	485.96	Initial levels of first May 2012 baildown test
O-11	5/31/2012	497.86	13.30	13.93	0.63	484.45	Initial levels of second May 2012 baildown test
O-11	6/13/2012	497.86	Sheen	12.97	Sheen	484.89	
O-11	7/17/2012	497.86	12.65	12.66	0.01	485.21	
O-11	8/21/2012	497.86	13.07	13.10	0.03	484.78	
O-11	9/18/2012	497.86	13.67	14.01	0.34	484.13	
O-11	10/15/2012	497.86	13.52	14.45	0.93	484.18	
O-11	10/23/2012	497.86	13.82	14.81	0.99	483.87	Initial levels of October 2012 baildown test
O-11	11/29/2012	497.87	13.18	13.62	0.44	484.62	
O-11	12/28/2012	497.87	13.45	14.34	0.89	484.27	
O-11	2/26/2013	497.87	13.54	14.41	0.87	484.18	
O-11	3/29/2013	497.87	13.71	14.48	0.77	484.03	R-35R, R-39, and R-40 were offline on this date
O-11	4/24/2013	497.87	13.63	14.56	0.93	484.08	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-11	5/21/2013	497.89	13.45	14.59	1.14	484.25	
O-11	6/24/2013	497.89	12.77	12.82	0.05	485.11	
O-11	7/23/2013	497.90	No LNAPL	12.52	0.00	485.38	
O-11	8/1/2013	497.90	12.45	12.46	0.01	485.45	
O-11	8/21/2013	497.90	Sheen	12.41	Sheen	485.49	
O-11	9/24/2013	497.90	13.33	13.71	0.38	484.51	
O-11	10/22/2013	497.88	14.10	15.08	0.98	483.61	
O-11	11/26/2013	497.88	13.36	14.04	0.68	484.40	
O-11	12/18/2013	497.89	13.51	14.36	0.85	484.24	
O-11	1/9/2014	497.89	13.77	14.45	0.68	484.00	
O-11	2/5/2014	497.90	13.92	14.55	0.63	483.87	
O-11	3/24/2014	497.89	14.27	14.33	0.06	483.61	
O-11	4/18/2014	497.90	14.11	14.19	0.08	483.78	
O-11	5/15/2014	497.90	13.55	14.32	0.77	484.22	
O-11	6/19/2014	497.90	13.42	13.84	0.42	484.41	
O-11	7/15/2014	497.89	Sheen	11.73	Sheen	486.16	
O-11	8/26/2014	497.88	12.40	12.41	0.01	485.48	
O-11	9/24/2014	497.90	13.00	13.02	0.02	484.90	
O-11	10/16/2014	497.87	13.74	13.86	0.12	484.11	
O-11	10/21/2014	497.87	13.89	14.02	0.13	483.96	
O-11	11/19/2014	497.88	13.49	13.66	0.17	484.36	
O-11	12/16/2014	497.89	13.64	14.22	0.58	484.15	
O-11	12/29/2014	497.89	13.74	14.40	0.66	484.04	
O-11	1/21/2015	497.88	13.77	14.51	0.74	483.98	
O-11	2/25/2015	497.88	13.95	14.19	0.24	483.89	
O-11	3/10/2015	497.89	13.79	14.30	0.51	484.01	
O-11	3/18/2015	497.89	13.96	14.14	0.18	483.90	
O-11	3/26/2015	497.89	13.87	14.29	0.42	483.95	
O-11	4/16/2015	497.88	13.72	14.28	0.56	484.06	
O-11	5/21/2015	497.90	13.52	13.73	0.21	484.34	
O-11	6/10/2015	497.92	13.58	13.68	0.10	484.32	
O-11	8/12/2015	497.92	No LNAPL	12.54	0.00	485.42	
O-11	8/19/2015	497.92	12.82	12.83	0.01	485.17	
O-11	10/6/2015	497.90	Sheen	13.14	Sheen	484.80	
O-11	10/15/2015	497.90	13.55	13.56	0.01	484.39	
O-11	1/19/2016	497.89	14.09	14.59	0.50	483.72	
O-11	3/4/2016	497.89	14.23	14.41	0.18	483.68	
O-11	3/24/2016	497.89	14.34	14.55	0.21	483.51	Baildown testing not conducted- insufficient LNAPL thickness
O-11	3/25/2016	497.89	14.31	14.53	0.22	483.54	Baildown testing not conducted- insufficient LNAPL thickness
O-11	3/31/2016	497.89	14.19	14.33	0.14	483.68	Baildown testing not conducted- insufficient LNAPL thickness

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-11	5/26/2016	497.91	13.68	14.14	0.46	484.17	
O-11	6/14/2016	497.91	13.39	13.45	0.06	484.51	
O-11	8/18/2016	497.91	Sheen	12.16	Sheen	485.75	
O-11	9/9/2016	497.91	Sheen	12.66	Sheen	485.30	
O-11	10/13/2016	497.91	Sheen	13.68	Sheen	484.23	
O-11	11/15/2016	497.92	13.30	13.31	0.01	484.66	
O-11	2/8/2017	497.91	13.72	13.75	0.03	484.25	
O-11	2/15/2017	497.91	13.75	13.77	0.02	484.19	
O-11	3/1/2017	497.91	13.76	13.79	0.03	484.14	
O-11	6/6/2017	497.92	13.76	13.81	0.05	484.15	
O-11	6/13/2017	497.92	No LNAPL	13.05	0.00	484.93	
O-11	8/2/2017	497.92	Sheen	12.39	Sheen	485.53	
O-11	10/18/2017	497.92	Sheen	13.60	Sheen	484.32	
O-11	11/1/2017	497.92	14.05	14.16	0.11	483.85	
O-11	1/15/2018	497.92	--	13.80	--	484.12	
O-11	4/3/2018	497.92	13.89	14.28	0.39	483.96	
O-11	7/10/2018	497.92	No LNAPL	12.14	0.00	485.78	
O-11	11/6/2018	497.91	13.69	13.73	0.04	484.21	
O-12	10/21/2011	—	No LNAPL	12.59	0.00	—	New well
O-12	12/2/2011	496.12	No LNAPL	12.34	0.00	483.78	
O-12	1/10/2012	496.12	No LNAPL	12.45	0.00	483.67	
O-12	2/6/2012	496.12	No LNAPL	12.57	0.00	483.55	
O-12	2/16/2012	496.12	No LNAPL	12.49	0.00	483.63	
O-12	3/13/2012	496.12	No LNAPL	12.48	0.00	483.64	
O-12	4/10/2012	496.12	No LNAPL	12.40	0.00	483.72	
O-12	4/19/2012	496.12	No LNAPL	11.85	0.00	484.27	
O-12	5/8/2012	496.12	No LNAPL	12.17	0.00	483.95	
O-12	6/13/2012	496.12	No LNAPL	11.24	0.00	484.88	
O-12	7/17/2012	496.12	No LNAPL	10.92	0.00	485.20	
O-12	7/30/2012	496.12	No LNAPL	10.63	0.00	485.49	
O-12	8/21/2012	496.12	No LNAPL	11.35	0.00	484.77	
O-12	9/18/2012	496.12	No LNAPL	12.01	0.00	484.11	
O-12	10/16/2012	496.12	No LNAPL	11.99	0.00	484.13	
O-12	11/1/2012	496.12	No LNAPL	12.01	0.00	484.11	
O-12	11/29/2012	496.17	No LNAPL	11.55	0.00	484.62	
O-12	12/28/2012	496.17	No LNAPL	11.91	0.00	484.26	
O-12	1/23/2013	496.17	No LNAPL	11.86	0.00	484.31	
O-12	2/26/2013	496.17	No LNAPL	12.03	0.00	484.14	
O-12	3/29/2013	496.26	No LNAPL	12.21	0.00	484.05	R-35R, R-39, and R-40 were offline on this date
O-12	4/24/2013	496.26	No LNAPL	12.16	0.00	484.10	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-12	5/20/2013	496.28	No LNAPL	11.94	0.00	484.34	
O-12	6/25/2013	496.28	No LNAPL	11.13	0.00	485.15	
O-12	7/23/2013	496.29	--	10.88	--	485.41	
O-12	7/25/2013	496.29	--	10.92	--	485.37	
O-12	8/1/2013	496.29	--	10.79	--	485.50	
O-12	8/21/2013	496.29	No LNAPL	10.77	0.00	485.52	
O-12	9/30/2013	496.28	No LNAPL	12.00	0.00	484.28	
O-12	10/22/2013	496.27	No LNAPL	12.61	0.00	483.66	
O-12	11/26/2013	496.27	No LNAPL	11.88	0.00	484.39	
O-12	12/18/2013	496.32	No LNAPL	12.06	0.00	484.26	
O-12	1/9/2014	496.32	No LNAPL	12.29	0.00	484.03	
O-12	2/5/2014	496.33	No LNAPL	12.42	0.00	483.91	
O-12	3/18/2014	496.37	No LNAPL	12.70	0.00	483.67	
O-12	3/24/2014	496.37	No LNAPL	12.73	0.00	483.64	
O-12	4/18/2014	496.37	No LNAPL	12.55	0.00	483.82	
O-12	5/15/2014	496.39	--	12.08	--	484.31	
O-12	6/11/2014	496.38	No LNAPL	12.27	0.00	484.11	
O-12	6/19/2014	496.38	No LNAPL	11.88	0.00	484.50	
O-12	7/15/2014	496.37	No LNAPL	10.16	0.00	486.21	
O-12	8/26/2014	496.37	No LNAPL	10.81	0.00	485.56	
O-12	9/9/2014	496.37	No LNAPL	11.06	0.00	485.31	
O-12	9/24/2014	496.37	No LNAPL	11.40	0.00	484.97	
O-12	10/21/2014	496.37	No LNAPL	12.32	0.00	484.05	
O-12	11/19/2014	496.40	No LNAPL	12.02	0.00	484.38	
O-12	12/16/2014	496.42	No LNAPL	12.19	0.00	484.23	
O-12	12/29/2014	496.42	No LNAPL	12.31	0.00	484.11	
O-12	1/21/2015	496.43	No LNAPL	12.36	0.00	484.07	
O-12	2/25/2015	496.47	No LNAPL	12.50	0.00	483.97	
O-12	3/10/2015	496.48	No LNAPL	12.42	0.00	484.06	
O-12	3/18/2015	496.48	--	12.54	--	483.94	
O-12	3/26/2015	496.48	No LNAPL	12.46	0.00	484.02	
O-12	4/16/2015	496.47	--	12.31	--	484.16	
O-12	5/18/2015	496.48	No LNAPL	12.05	0.00	484.43	
O-12	5/21/2015	496.48	No LNAPL	12.07	0.00	484.41	
O-12	6/10/2015	496.51	No LNAPL	12.11	0.00	484.40	
O-12	8/12/2015	496.48	No LNAPL	11.09	0.00	485.43	
O-12	8/19/2015	496.48	No LNAPL	11.33	0.00	485.18	
O-12	10/6/2015	496.21	No LNAPL	11.36	0.00	484.86	Casing was cut down 0.28 feet on 10-1-15
O-12	10/15/2015	496.21	No LNAPL	11.78	0.00	484.43	
O-12	11/19/2015	496.19	--	11.90	--	484.29	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-12	1/19/2016	496.24	--	12.44	--	483.76	
O-12	3/4/2016	496.24	No LNAPL	12.60	0.00	483.64	
O-12	5/26/2016	496.28	No LNAPL	12.11	0.00	484.19	
O-12	6/14/2016	496.28	No LNAPL	11.75	0.00	484.53	
O-12	8/10/2016	496.33	--	10.05	--	486.28	
O-12	8/18/2016	496.28	No LNAPL	10.52	0.00	485.76	
O-12	9/9/2016	496.28	No LNAPL	11.00	0.00	485.32	
O-12	10/13/2016	496.28	No LNAPL	12.02	0.00	484.26	
O-12	10/21/2016	496.33	--	12.24	--	484.09	
O-12	11/15/2016	496.33	No LNAPL	11.69	0.00	484.74	
O-12	2/8/2017	496.35	No LNAPL	12.15	0.00	484.27	
O-12	2/15/2017	496.35	No LNAPL	12.16	0.00	484.24	
O-12	3/1/2017	496.35	No LNAPL	12.20	0.00	484.15	
O-12	6/6/2017	496.39	No LNAPL	12.21	0.00	484.18	
O-12	6/13/2017	496.39	No LNAPL	11.48	0.00	484.96	
O-12	8/2/2017	496.39	--	10.84	--	485.55	
O-12	10/19/2017	496.39	--	12.60	--	483.79	
O-12	11/1/2017	496.39	No LNAPL	12.56	0.00	483.83	
O-12	1/15/2018	496.39	--	12.21	--	484.18	
O-12	4/5/2018	496.39	--	12.52	--	483.87	
O-12	11/6/2018	496.44	No LNAPL	12.21	0.00	484.23	
O-12-65	7/25/2013	495.78	--	10.34	--	485.44	
O-12-65	8/1/2013	495.78	--	10.22	--	485.56	
O-12-65	8/21/2013	495.78	No LNAPL	10.20	0.00	485.58	
O-12-65	1/9/2014	495.79	No LNAPL	11.68	0.00	484.11	
O-12-65	2/5/2014	495.80	No LNAPL	11.83	0.00	483.97	
O-12-65	3/24/2014	495.84	No LNAPL	12.12	0.00	483.72	
O-12-65	4/18/2014	495.83	No LNAPL	11.93	0.00	483.90	
O-12-65	5/15/2014	495.84	--	11.48	--	484.36	
O-12-65	6/19/2014	495.82	No LNAPL	11.30	0.00	484.52	
O-12-65	7/15/2014	495.82	No LNAPL	9.54	0.00	486.28	
O-12-65	8/26/2014	495.81	No LNAPL	10.19	0.00	485.62	
O-12-65	9/24/2014	495.82	No LNAPL	10.78	0.00	485.04	
O-12-65	10/21/2014	495.80	No LNAPL	11.68	0.00	484.12	
O-12-65	11/19/2014	495.81	No LNAPL	11.33	0.00	484.48	
O-12-65	12/16/2014	495.83	No LNAPL	11.51	0.00	484.32	
O-12-65	12/29/2014	495.83	No LNAPL	11.63	0.00	484.20	
O-12-65	1/21/2015	495.84	No LNAPL	11.70	0.00	484.14	
O-12-65	2/25/2015	495.87	No LNAPL	11.82	0.00	484.05	
O-12-65	3/18/2015	495.89	No LNAPL	11.88	0.00	484.01	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-12-65	3/26/2015	495.89	No LNAPL	11.81	0.00	484.08	
O-12-65	4/16/2015	495.88	--	11.66	--	484.22	
O-12-65	5/21/2015	495.89	No LNAPL	11.40	0.00	484.49	
O-12-65	6/10/2015	495.88	No LNAPL	11.45	0.00	484.43	
O-12-65	8/19/2015	495.88	No LNAPL	10.66	0.00	485.25	
O-12-65	10/6/2015	495.89	No LNAPL	10.97	0.00	484.93	
O-12-65	1/19/2016	495.88	--	12.00	--	483.84	
O-12-65	5/26/2016	495.89	No LNAPL	11.64	0.00	484.27	
O-12-65	8/9/2016	495.90	--	9.59	--	486.31	
O-12-65	9/9/2016	495.89	No LNAPL	10.56	0.00	485.37	
O-12-65	11/15/2016	495.90	No LNAPL	11.18	0.00	484.82	
O-12-65	2/8/2017	495.92	No LNAPL	11.82	0.00	484.17	
O-12-65	2/15/2017	495.92	No LNAPL	11.66	0.00	484.31	
O-12-65	6/13/2017	495.95	No LNAPL	10.97	0.00	485.03	
O-13	10/21/2011	—	11.57	11.91	0.34	—	
O-13	12/2/2011	495.35	11.30	12.70	1.40	483.81	
O-13	2/17/2012	495.35	11.14	12.91	1.77	483.91	
O-13	3/14/2012	495.35	11.56	12.44	0.88	483.64	
O-13	4/12/2012	495.35	11.38	12.38	1.00	483.80	
O-13	5/7/2012	495.35	11.20	11.77	0.57	484.05	
O-13	5/11/2012	495.35	11.36	11.78	0.42	483.92	Initial levels of May 2012 baildown test
O-13	6/13/2012	495.35	10.43	10.53	0.10	484.90	
O-13	7/17/2012	495.35	9.97	10.72	0.75	485.25	
O-13	8/21/2012	495.35	10.42	11.12	0.70	484.81	
O-13	9/18/2012	495.35	Sheen	11.07	Sheen	484.28	
O-13	10/15/2012	495.35	11.06	11.45	0.39	484.22	
O-13	10/23/2012	495.35	11.35	11.89	0.54	483.91	Initial levels of first October 2012 baildown test
O-13	10/29/2012	495.35	11.52	12.21	0.69	483.71	Initial levels of second October 2012 baildown test
O-13	11/29/2012	495.37	10.70	10.90	0.20	484.64	
O-13	12/28/2012	495.37	11.03	11.19	0.16	484.31	
O-13	2/26/2013	495.37	11.12	11.22	0.10	484.23	
O-13	3/29/2013	495.37	11.25	11.47	0.22	484.08	R-35R, R-39, and R-40 were offline on this date
O-13	4/24/2013	495.37	11.20	11.40	0.20	484.14	
O-13	5/21/2013	495.37	11.03	11.10	0.07	484.33	
O-13	6/24/2013	495.37	10.17	10.21	0.04	485.19	
O-13	7/23/2013	495.38	Sheen	9.95	Sheen	485.43	
O-13	8/1/2013	495.38	Sheen	9.89	Sheen	485.49	
O-13	8/21/2013	495.38	Sheen	9.84	Sheen	485.54	
O-13	9/24/2013	495.38	10.73	11.11	0.38	484.59	
O-13	10/22/2013	495.37	11.54	12.35	0.81	483.69	

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O-13	11/26/2013	495.37	10.92	11.10	0.18	484.42	
O-13	12/18/2013	495.39	11.03	11.35	0.32	484.31	
O-13	1/9/2014	495.39	11.25	11.66	0.41	484.07	
O-13	2/5/2014	495.38	11.36	11.97	0.61	483.92	
O-13	3/24/2014	495.38	11.62	12.24	0.62	483.65	
O-13	4/18/2014	495.38	11.46	11.90	0.44	483.85	
O-13	5/15/2014	495.39	11.04	11.26	0.22	484.31	
O-13	5/29/2014	495.39	11.35	11.63	0.28	483.99	
O-13	6/19/2014	495.38	10.89	11.05	0.16	484.46	
O-13	7/15/2014	495.38	9.09	9.33	0.24	486.25	
O-13	8/26/2014	495.38	9.70	10.19	0.49	485.60	
O-13	9/24/2014	495.38	10.28	10.86	0.58	485.00	
O-13	10/16/2014	495.37	11.07	11.47	0.40	484.23	
O-13	10/21/2014	495.37	11.23	11.64	0.41	484.07	
O-13	11/19/2014	495.38	10.91	11.03	0.12	484.45	
O-13	12/16/2014	495.38	11.12	11.31	0.19	484.23	
O-13	12/29/2014	495.38	11.22	11.43	0.21	484.12	
O-13	1/21/2015	495.38	11.25	11.51	0.26	484.09	
O-13	2/25/2015	495.37	11.35	11.62	0.27	483.97	
O-13	3/10/2015	495.38	11.25	11.49	0.24	484.09	
O-13	3/18/2015	495.38	11.36	11.65	0.29	483.97	
O-13	3/26/2015	495.38	11.31	11.56	0.25	484.03	
O-13	4/16/2015	495.37	11.18	11.41	0.23	484.15	
O-13	5/18/2015	495.39	10.92	11.06	0.14	484.45	
O-13	5/21/2015	495.39	10.95	11.05	0.10	484.42	
O-13	6/10/2015	495.39	10.99	11.10	0.11	484.38	
O-13	8/12/2015	495.39	9.91	10.07	0.16	485.49	
O-13	8/19/2015	495.39	10.16	10.50	0.34	485.24	
O-13	10/6/2015	495.39	10.47	10.68	0.21	484.92	
O-13	10/15/2015	495.39	10.86	11.21	0.35	484.51	
O-13	1/19/2016	495.40	11.50	12.10	0.60	483.80	
O-13	3/4/2016	495.40	11.57	12.22	0.65	483.77	
O-13	3/24/2016	495.40	11.67	12.33	0.66	483.62	Initial fluid levels and product recovered by SWI during baildown testing
O-13	5/26/2016	495.40	11.15	11.31	0.16	484.24	
O-13	6/14/2016	495.40	No LNAPL	10.83	0.00	484.57	
O-13	8/18/2016	495.40	9.51	9.88	0.37	485.83	
O-13	9/9/2016	495.40	9.99	10.43	0.44	485.39	
O-13	10/13/2016	495.40	11.04	11.30	0.26	484.32	
O-13	11/15/2016	495.41	10.72	10.76	0.04	484.72	
O-13	2/8/2017	495.40	11.12	11.22	0.10	484.33	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-13	2/15/2017	495.40	11.15	11.25	0.10	484.26	
O-13	3/1/2017	495.40	11.17	11.27	0.10	484.21	
O-13	6/6/2017	495.41	11.16	11.17	0.01	484.25	
O-13	6/13/2017	495.41	Sheen	10.48	Sheen	484.99	
O-13	8/2/2017	495.41	9.83	9.98	0.15	485.43	
O-13	10/18/2017	495.41	Sheen	11.22	Sheen	484.19	
O-13	1/19/2018	495.41	11.14	11.17	0.03	484.26	
O-13	4/3/2018	495.41	11.35	11.70	0.35	484.00	
O-14	10/21/2011	—	No LNAPL	9.85	0.00	—	New well
O-14	12/7/2011	494.89	—	—	—	—	Access unavailable per NPT operator
O-14	2/7/2012	494.89	No LNAPL	9.76	0.00	485.13	
O-14	2/17/2012	494.89	Sheen	9.71	Sheen	485.18	
O-14	3/13/2012	494.89	No LNAPL	Frozen	0.00	—	Frozen at 9.68 ft BTOC
O-14	4/10/2012	494.89	No LNAPL	Frozen	0.00	—	Frozen at 9.69 ft BTOC
O-14	4/19/2012	494.89	No LNAPL	Frozen	0.00	—	Frozen at 9.68 ft BTOC
O-14	5/9/2012	494.89	No LNAPL	Frozen	0.00	—	Frozen at 9.67 ft BTOC
O-14	6/13/2012	494.89	No LNAPL	8.45	0.00	486.44	
O-14	7/18/2012	494.89	No LNAPL	8.06	0.00	486.83	
O-14	7/30/2012	494.89	No LNAPL	7.71	0.00	487.18	
O-14	8/21/2012	494.89	No LNAPL	8.46	0.00	486.43	
O-14	9/18/2012	494.89	No LNAPL	9.13	0.00	485.76	
O-14	10/16/2012	494.89	No LNAPL	9.16	0.00	485.73	
O-14	11/1/2012	494.89	No LNAPL	9.21	0.00	485.68	
O-14	11/29/2012	494.90	No LNAPL	8.70	0.00	486.20	
O-14	12/27/2012	494.90	No LNAPL	9.06	0.00	485.84	
O-14	1/24/2013	494.90	No LNAPL	9.03	0.00	485.87	
O-14	2/26/2013	494.90	No LNAPL	Frozen	0.00	—	Frozen at 9.09 ft BTOC
O-14	3/28/2013	494.90	No LNAPL	Frozen	0.00	—	Frozen at 9.09 ft BTOC. R-35R, R-39, and R-40 were offline on this date
O-14	4/24/2013	494.90	No LNAPL	Frozen	0.00	—	Frozen at 9.05 ft BTOC
O-14	5/30/2013	494.90	No LNAPL	Frozen	0.00	—	Frozen at 9.05 ft BTOC
O-14	6/25/2013	494.90	No LNAPL	8.06	0.00	486.84	
O-14	8/2/2013	494.90	No LNAPL	7.68	0.00	487.22	
O-14	10/1/2013	494.90	No LNAPL	9.04	0.00	485.86	
O-14	10/29/2013	494.90	No LNAPL	9.81	0.00	485.09	
O-14	11/25/2013	494.90	No LNAPL	9.01	0.00	485.89	
O-14	12/20/2013	494.90	No LNAPL	9.04	0.00	485.86	
O-14	3/18/2014	494.90	No LNAPL	9.71	0.00	485.19	
O-14	6/11/2014	494.93	No LNAPL	Frozen	0.00	—	Frozen at 8.93 feet below the measuring point
O-14	9/9/2014	494.93	No LNAPL	7.88	0.00	487.05	
O-14	11/20/2014	494.93	No LNAPL	8.74	0.00	486.19	

Appendix A-1
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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-14	3/18/2015	494.93	--	9.22	--	485.71	
O-14	6/11/2015	494.93	No LNAPL	8.80	0.00	486.13	
O-14	8/12/2015	494.94	--	7.70	--	487.24	
O-14	10/15/2015	494.94	No LNAPL	8.76	0.00	486.18	
O-14	11/19/2015	494.94	--	8.88	--	486.06	
O-14	3/22/2016	494.94	No LNAPL	Frozen	0.00	—	Ice at 9.64 feet
O-14	8/17/2016	494.93	--	7.18	--	487.75	
O-14	9/12/2016	494.93	--	7.85	--	487.08	
O-14	3/14/2017	494.93	—	—	—	—	Unable to locate well. Well was frozen on 2-23-17.
O-15	10/21/2011	—	No LNAPL	13.18	0.00	—	New well
O-15	12/2/2011	498.62	No LNAPL	13.88	0.00	484.74	
O-15	2/7/2012	498.62	No LNAPL	13.13	0.00	485.49	
O-15	2/16/2012	498.62	No LNAPL	13.08	0.00	485.54	
O-15	3/13/2012	498.62	No LNAPL	13.07	0.00	485.55	
O-15	4/10/2012	498.62	No LNAPL	12.95	0.00	485.67	
O-15	4/19/2012	498.62	No LNAPL	12.40	0.00	486.22	
O-15	5/9/2012	498.62	No LNAPL	12.78	0.00	485.84	
O-15	6/12/2012	498.62	No LNAPL	11.85	0.00	486.77	
O-15	7/17/2012	498.62	No LNAPL	11.31	0.00	487.31	
O-15	7/30/2012	498.62	No LNAPL	11.00	0.00	487.62	
O-15	8/21/2012	498.62	No LNAPL	11.78	0.00	486.84	
O-15	9/18/2012	498.62	No LNAPL	12.50	0.00	486.12	
O-15	10/16/2012	498.62	No LNAPL	12.52	0.00	486.10	
O-15	11/1/2012	498.62	No LNAPL	12.54	0.00	486.08	
O-15	11/29/2012	498.70	No LNAPL	12.09	0.00	486.61	
O-15	12/27/2012	498.70	No LNAPL	12.50	0.00	486.20	
O-15	1/24/2013	498.70	No LNAPL	12.51	0.00	486.19	
O-15	2/26/2013	498.70	No LNAPL	12.64	0.00	486.06	
O-15	3/28/2013	498.70	No LNAPL	12.81	0.00	485.89	R-35R, R-39, and R-40 were offline on this date
O-15	4/24/2013	498.70	No LNAPL	12.75	0.00	485.95	
O-15	5/29/2013	498.70	No LNAPL	11.69	0.00	487.01	
O-15	6/25/2013	498.70	No LNAPL	11.47	0.00	487.23	
O-15	8/2/2013	498.70	No LNAPL	11.05	0.00	487.65	
O-15	10/1/2013	498.70	No LNAPL	12.50	0.00	486.20	
O-15	10/29/2013	498.70	No LNAPL	13.30	0.00	485.40	
O-15	11/19/2013	498.70	No LNAPL	12.62	0.00	486.08	
O-15	12/20/2013	498.70	No LNAPL	12.52	0.00	486.18	
O-15	3/18/2014	498.70	No LNAPL	13.26	0.00	485.44	
O-15	6/11/2014	498.87	No LNAPL	12.76	0.00	486.11	
O-15	9/9/2014	498.87	No LNAPL	11.08	0.00	487.79	

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O-15	11/20/2014	498.52	No LNAPL	11.93	0.00	486.59	
O-15	3/18/2015	498.52	--	12.50	--	486.02	
O-15	6/10/2015	498.52	No LNAPL	12.01	0.00	486.51	
O-15	8/12/2015	498.62	--	10.95	--	487.67	
O-15	10/15/2015	498.62	No LNAPL	12.07	0.00	486.55	
O-15	11/19/2015	498.62	--	12.13	--	486.49	
O-15	8/10/2017	498.62	--	10.96	--	487.66	
O-15	8/16/2017	498.62	--	10.77	--	487.85	
O-15	11/16/2017	498.62	--	12.11	--	486.51	
O-15	2/15/2018	498.62	--	12.54	--	486.08	
O-15	4/11/2018	498.62	--	12.55	--	486.07	
O-15	8/7/2018	498.62	--	10.40	--	488.22	
O-16	10/21/2011	—	No LNAPL	8.28	0.00	—	New well
O-16	12/7/2011	493.05	—	—	—	—	Access unavailable per NPT operator
O-16	3/13/2012	493.05	No LNAPL	8.10	0.00	484.95	
O-16	4/10/2012	493.05	No LNAPL	7.95	0.00	485.10	
O-16	5/9/2012	493.05	No LNAPL	7.84	0.00	485.21	
O-16	6/12/2012	493.05	No LNAPL	6.82	0.00	486.23	
O-16	7/17/2012	493.05	No LNAPL	6.34	0.00	486.71	
O-16	8/21/2012	493.05	No LNAPL	6.77	0.00	486.28	
O-16	9/18/2012	493.05	No LNAPL	7.54	0.00	485.51	
O-16	10/16/2012	493.05	No LNAPL	7.55	0.00	485.50	
O-16	11/29/2012	493.09	No LNAPL	7.06	0.00	486.03	
O-16	12/27/2012	493.09	No LNAPL	7.46	0.00	485.63	
O-16	1/23/2013	493.09	No LNAPL	7.40	0.00	485.69	
O-16	2/26/2013	493.09	No LNAPL	7.61	0.00	485.48	
O-16	3/28/2013	493.09	No LNAPL	Frozen	0.00	—	Frozen at 7.61 ft BTOC. R-35R, R-39, and R-40 were offline on this date
O-16	4/24/2013	493.09	No LNAPL	Frozen	0.00	—	Frozen at 7.55 ft BTOC
O-16	5/31/2013	493.09	No LNAPL	Frozen	0.00	—	*This measurement is probably to water on top of ice based on April and June 2013 measurements.
O-16	6/25/2013	493.09	No LNAPL	Frozen	0.00	—	*Frozen at 7.57 ft BTOC below the measuring point
O-16	10/29/2013	493.09	No LNAPL	8.28	0.00	484.81	
O-16	11/19/2013	493.09	No LNAPL	7.49	0.00	485.60	
O-16	12/20/2013	493.09	No LNAPL	7.46	0.00	485.63	
O-16	10/15/2015	493.23	No LNAPL	7.38	0.00	485.85	
O-16	8/16/2016	493.24	--	5.68	--	487.56	
O-16	10/13/2016	493.24	No LNAPL	7.50	0.00	485.74	
O-16	3/2/2017	493.24	No LNAPL	7.50	0.00	485.74	
O-17	10/21/2011	—	No LNAPL	9.05	0.00	—	New well
O-17	12/2/2011	493.23	No LNAPL	8.74	0.00	484.49	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-17	1/11/2012	493.23	No LNAPL	8.93	0.00	484.30	
O-17	2/7/2012	493.23	No LNAPL	9.01	0.00	484.22	
O-17	2/16/2012	493.23	No LNAPL	8.93	0.00	484.30	
O-17	3/13/2012	493.23	No LNAPL	8.93	0.00	484.30	
O-17	4/10/2012	493.23	No LNAPL	8.81	0.00	484.42	
O-17	4/19/2012	493.23	No LNAPL	8.25	0.00	484.98	
O-17	5/9/2012	493.23	No LNAPL	8.65	0.00	484.58	
O-17	6/12/2012	493.23	No LNAPL	7.68	0.00	485.55	
O-17	7/17/2012	493.23	No LNAPL	7.26	0.00	485.97	
O-17	7/30/2012	493.23	No LNAPL	6.91	0.00	486.32	
O-17	8/21/2012	493.23	No LNAPL	6.70	0.00	486.53	
O-17	9/19/2012	493.23	No LNAPL	8.41	0.00	484.82	
O-17	10/16/2012	493.23	No LNAPL	8.41	0.00	484.82	
O-17	11/1/2012	493.23	No LNAPL	8.38	0.00	484.85	
O-17	11/29/2012	493.26	No LNAPL	7.95	0.00	485.31	
O-17	12/27/2012	493.26	No LNAPL	8.34	0.00	484.92	
O-17	1/23/2013	493.26	No LNAPL	8.31	0.00	484.95	
O-17	2/26/2013	493.26	No LNAPL	6.48	0.00	486.78	
O-17	3/28/2013	493.26	No LNAPL	8.63	0.00	484.63	R-35R, R-39, and R-40 were offline on this date
O-17	4/24/2013	493.26	No LNAPL	8.91	0.00	484.35	
O-17	5/31/2013	493.26	No LNAPL	7.26	0.00	486.00	
O-17	6/25/2013	493.26	No LNAPL	7.39	0.00	485.87	
O-17	8/2/2013	493.26	No LNAPL	6.96	0.00	486.30	
O-17	10/1/2013	493.26	No LNAPL	8.42	0.00	484.84	
O-17	10/29/2013	493.26	No LNAPL	9.17	0.00	484.09	
O-17	11/26/2013	493.26	No LNAPL	8.24	0.00	485.02	
O-17	12/20/2013	493.26	—	—	—	—	Well was buried under snow berm, and was inaccessible.
O-17	3/18/2014	493.26	No LNAPL	9.05	0.00	484.21	
O-17	5/14/2014	493.40	--	Frozen	--	—	Frozen at 3.88 feet below measuring point
O-17	6/11/2014	493.18	No LNAPL	8.61	0.00	484.57	
O-17	6/19/2014	493.18	--	7.97	--	485.21	
O-17	7/15/2014	493.16	No LNAPL	6.14	0.00	487.02	
O-17	8/26/2014	493.18	--	6.83	--	486.35	
O-17	9/9/2014	493.18	No LNAPL	7.15	0.00	486.03	
O-17	9/24/2014	493.18	--	7.46	--	485.72	
O-17	10/21/2014	493.18	--	8.41	--	484.77	
O-17	11/19/2014	493.20	No LNAPL	7.99	0.00	485.21	
O-17	12/16/2014	493.26	No LNAPL	8.20	0.00	485.06	
O-17	12/29/2014	493.26	No LNAPL	8.33	0.00	484.93	
O-17	1/21/2015	493.29	No LNAPL	8.40	0.00	484.89	

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O-17	2/25/2015	493.26	No LNAPL	8.51	0.00	484.75	
O-17	3/18/2015	493.26	--	8.54	--	484.72	
O-17	3/26/2015	493.26	No LNAPL	8.46	0.00	484.80	
O-17	4/16/2015	493.27	--	8.32	--	484.95	
O-17	5/21/2015	493.27	No LNAPL	8.06	0.00	485.21	
O-17	6/10/2015	493.27	No LNAPL	8.09	0.00	485.18	
O-17	8/12/2015	493.27	--	6.96	--	486.31	
O-17	8/19/2015	493.27	No LNAPL	7.28	0.00	486.02	
O-17	10/6/2015	493.26	No LNAPL	7.66	0.00	485.61	
O-17	10/15/2015	493.26	No LNAPL	8.10	0.00	485.16	
O-17	11/20/2015	493.26	--	8.14	--	485.12	
O-17	1/19/2016	493.36	--	8.77	--	484.55	
O-17	5/26/2016	493.35	No LNAPL	8.38	0.00	484.99	
O-17	8/17/2016	493.40	--	6.64	--	486.76	
O-17	9/9/2016	493.35	No LNAPL	7.28	0.00	486.11	
O-17	10/13/2016	493.35	No LNAPL	8.33	0.00	485.02	
O-17	11/15/2016	493.40	No LNAPL	7.90	0.00	485.60	
O-17	2/8/2017	493.44	No LNAPL	8.40	0.00	485.11	
O-17	2/15/2017	493.44	--	8.36	--	485.08	
O-17	3/2/2017	493.44	No LNAPL	8.46	0.00	484.98	
O-17	6/13/2017	493.39	No LNAPL	7.66	0.00	485.78	
O-18	10/21/2011	—	No LNAPL	8.26	0.00	—	New well
O-18	12/2/2011	492.66	No LNAPL	7.99	0.00	484.67	
O-18	1/11/2012	492.66	No LNAPL	8.17	0.00	484.49	
O-18	2/7/2012	492.66	No LNAPL	8.24	0.00	484.42	
O-18	2/16/2012	492.66	No LNAPL	8.15	0.00	484.51	
O-18	3/13/2012	492.66	No LNAPL	8.15	0.00	484.51	
O-18	4/10/2012	492.66	No LNAPL	8.04	0.00	484.62	
O-18	4/19/2012	492.66	No LNAPL	7.48	0.00	485.18	
O-18	5/9/2012	492.66	No LNAPL	7.89	0.00	484.77	
O-18	6/12/2012	492.66	No LNAPL	7.87	0.00	484.79	
O-18	7/17/2012	492.66	No LNAPL	6.45	0.00	486.21	
O-18	7/30/2012	492.66	No LNAPL	5.08	0.00	487.58	
O-18	8/21/2012	492.66	No LNAPL	6.89	0.00	485.77	
O-18	9/19/2012	492.66	No LNAPL	7.62	0.00	485.04	
O-18	10/24/2012	492.66	No LNAPL	8.01	0.00	484.65	
O-18	11/1/2012	492.66	No LNAPL	7.59	0.00	485.07	
O-18	11/29/2012	492.70	No LNAPL	7.21	0.00	485.49	
O-18	12/27/2012	492.70	No LNAPL	7.59	0.00	485.11	
O-18	1/23/2013	492.70	No LNAPL	7.54	0.00	485.16	

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O-18	2/26/2013	492.70	No LNAPL	7.70	0.00	485.00	
O-18	3/28/2013	492.70	No LNAPL	7.87	0.00	484.83	R-35R, R-39, and R-40 were offline on this date
O-18	4/24/2013	492.70	No LNAPL	7.83	0.00	484.87	
O-18	5/31/2013	492.70	No LNAPL	6.47	0.00	486.23	
O-18	6/25/2013	492.70	No LNAPL	6.56	0.00	486.14	
O-18	8/2/2013	492.70	No LNAPL	6.13	0.00	486.57	
O-18	10/1/2013	492.70	No LNAPL	7.64	0.00	485.06	
O-18	10/29/2013	492.70	No LNAPL	8.39	0.00	484.31	
O-18	11/19/2013	492.70	No LNAPL	7.65	0.00	485.05	
O-18	12/20/2013	492.70	No LNAPL	7.63	0.00	485.07	
O-18	3/18/2014	492.70	No LNAPL	8.30	0.00	484.40	
O-18	5/15/2014	492.86	--	7.68	--	485.18	
O-18	6/11/2014	492.59	No LNAPL	7.88	0.00	484.71	
O-18	6/19/2014	492.59	--	7.18	--	485.41	
O-18	7/15/2014	492.58	No LNAPL	5.32	0.00	487.26	
O-18	8/26/2014	492.59	--	6.03	--	486.56	
O-18	9/9/2014	492.59	No LNAPL	6.36	0.00	486.23	
O-18	9/24/2014	492.59	--	6.68	--	485.91	
O-18	10/21/2014	492.58	--	7.63	--	484.95	
O-18	11/19/2014	492.63	No LNAPL	7.22	0.00	485.41	
O-18	12/16/2014	492.68	No LNAPL	7.43	0.00	485.25	
O-18	12/29/2014	492.68	No LNAPL	7.56	0.00	485.12	
O-18	1/21/2015	492.71	No LNAPL	7.62	0.00	485.09	
O-18	2/25/2015	492.70	No LNAPL	7.73	0.00	484.97	
O-18	3/18/2015	492.70	--	7.79	--	484.91	
O-18	3/26/2015	492.70	No LNAPL	7.70	0.00	485.00	
O-18	4/16/2015	492.70	--	7.51	--	485.19	
O-18	5/21/2015	492.69	No LNAPL	7.28	0.00	485.41	
O-18	6/10/2015	492.69	No LNAPL	7.30	0.00	485.39	
O-18	8/12/2015	492.69	--	6.21	--	486.48	
O-18	8/19/2015	492.69	No LNAPL	6.47	0.00	486.25	
O-18	10/6/2015	492.69	No LNAPL	6.90	0.00	485.80	
O-18	10/15/2015	492.69	No LNAPL	7.35	0.00	485.34	
O-18	11/20/2015	492.69	--	7.36	--	485.33	
O-18	1/19/2016	492.75	--	7.98	--	484.73	
O-18	5/26/2016	492.75	No LNAPL	7.57	0.00	485.20	
O-18	8/17/2016	492.79	--	5.77	--	487.02	
O-18	9/9/2016	492.75	No LNAPL	6.46	0.00	486.33	
O-18	10/13/2016	492.75	No LNAPL	7.55	0.00	485.20	
O-18	11/15/2016	492.79	No LNAPL	7.07	0.00	485.82	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-18	2/8/2017	492.88	No LNAPL	7.62	0.00	485.33	
O-18	2/15/2017	492.88	--	7.61	--	485.27	
O-18	3/2/2017	492.88	No LNAPL	7.68	0.00	485.20	
O-19	10/21/2011	—	12.15	14.28	2.13	—	
O-19	12/7/2011	496.44	11.85	13.41	1.56	484.29	
O-19	2/16/2012	496.44	12.08	14.03	1.95	483.99	
O-19	3/15/2012	496.44	12.09	14.15	2.06	483.96	
O-19	4/12/2012	496.44	11.96	13.91	1.95	484.11	
O-19	5/7/2012	496.44	11.79	13.40	1.61	484.34	
O-19	5/14/2012	496.44	12.01	13.50	1.49	484.15	Initial levels of May 2012 baildown test
O-19	6/12/2012	496.44	11.24	11.26	0.02	485.20	
O-19	7/18/2012	496.44	10.82	11.11	0.29	485.56	
O-19	8/21/2012	496.44	11.21	11.56	0.35	485.16	
O-19	9/19/2012	496.44	11.83	12.37	0.54	484.51	
O-19	10/15/2012	496.44	11.80	12.36	0.56	484.53	
O-19	10/22/2012	496.44	12.07	12.64	0.57	484.26	Initial levels of first October 2012 baildown test
O-19	10/24/2012	496.44	12.18	12.65	0.47	484.17	Initial levels of second October 2012 baildown test
O-19	11/29/2012	496.48	11.44	11.65	0.21	485.00	
O-19	12/28/2012	496.48	11.80	11.97	0.17	484.65	
O-19	2/26/2013	496.48	11.87	12.24	0.37	484.54	
O-19	3/28/2013	496.48	11.92	12.41	0.49	484.47	R-35R, R-39, and R-40 were offline on this date
O-19	4/24/2013	496.48	11.79	13.01	1.22	484.46	
O-19	5/21/2013	496.51	11.71	12.28	0.57	484.69	
O-19	6/24/2013	496.51	Sheen	10.91	Sheen	485.60	
O-19	7/23/2013	496.49	Sheen	10.66	Sheen	485.83	
O-19	8/1/2013	496.49	Sheen	10.55	Sheen	485.94	
O-19	8/21/2013	496.49	No LNAPL	10.52	0.00	485.97	
O-19	9/30/2013	496.50	11.80	11.88	0.08	484.68	
O-19	10/22/2013	496.50	12.19	13.50	1.31	484.06	
O-19	11/26/2013	496.50	11.65	11.73	0.08	484.83	
O-19	12/18/2013	496.51	11.75	12.11	0.36	484.69	
O-19	1/9/2014	496.52	11.97	12.58	0.61	484.43	
O-19	2/5/2014	496.53	12.07	12.95	0.88	484.29	
O-19	3/24/2014	496.51	12.28	13.43	1.15	484.01	
O-19	4/18/2014	496.52	12.07	13.44	1.37	484.19	
O-19	5/15/2014	496.53	11.80	12.10	0.30	484.67	
O-19	5/16/2014	496.53	11.82	12.15	0.33	484.65	
O-19	6/19/2014	496.52	11.70	11.71	0.01	484.82	
O-19	7/15/2014	496.54	No LNAPL	9.88	0.00	486.66	
O-19	8/26/2014	496.54	Sheen	10.53	Sheen	486.01	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-19	9/24/2014	496.53	No LNAPL	11.15	0.00	485.38	
O-19	10/21/2014	496.52	12.06	12.07	0.01	484.46	
O-19	11/19/2014	496.54	11.65	11.73	0.08	484.87	
O-19	12/16/2014	496.57	11.88	11.95	0.07	484.68	
O-19	12/29/2014	496.57	11.97	12.18	0.21	484.56	
O-19	1/21/2015	496.55	12.02	12.32	0.30	484.47	
O-19	2/25/2015	496.55	12.08	12.61	0.53	484.37	
O-19	3/10/2015	496.50	12.02	12.27	0.25	484.43	
O-19	3/18/2015	496.50	12.10	12.51	0.41	484.32	
O-19	3/26/2015	496.50	12.05	12.44	0.39	484.38	
O-19	4/16/2015	496.52	11.93	12.27	0.34	484.53	
O-19	5/21/2015	496.55	11.72	11.74	0.02	484.83	
O-19	6/10/2015	496.57	Sheen	11.76	Sheen	484.81	
O-19	8/12/2015	496.56	No LNAPL	10.68	0.00	485.92	
O-19	8/19/2015	496.56	Sheen	10.95	Sheen	485.64	
O-19	10/6/2015	496.56	No LNAPL	11.32	0.00	485.28	
O-19	10/15/2015	496.56	Sheen	11.74	Sheen	484.86	
O-19	1/19/2016	496.58	12.33	12.65	0.32	484.19	
O-19	3/4/2016	496.58	12.25	13.60	1.35	484.12	
O-19	5/26/2016	496.59	11.93	12.17	0.24	484.63	
O-19	6/14/2016	496.59	No LNAPL	11.61	0.00	484.98	
O-19	8/18/2016	496.59	Sheen	10.01	Sheen	486.58	
O-19	8/18/2016	496.58	Sheen	10.34	Sheen	486.24	
O-19	9/9/2016	496.60	Sheen	10.84	Sheen	485.80	
O-19	10/13/2016	496.60	11.87	11.88	0.01	484.73	
O-19	10/25/2016	496.58	12.25	12.26	0.01	484.33	
O-19	11/15/2016	496.58	Sheen	11.48	Sheen	485.20	
O-19	2/8/2017	496.60	Sheen	11.92	Sheen	484.75	
O-19	2/15/2017	496.60	Sheen	11.95	Sheen	484.70	
O-19	3/1/2017	496.60	Sheen	11.98	Sheen	484.62	
O-19	6/6/2017	496.63	No LNAPL	12.00	0.00	484.63	
O-19	6/13/2017	496.63	No LNAPL	11.26	0.00	485.42	
O-19	7/13/2017	496.63	No LNAPL	10.55	0.00	486.08	
O-19	10/18/2017	496.63	Sheen	11.83	Sheen	484.80	
O-19	1/19/2018	496.63	Sheen	11.93	Sheen	484.70	
O-19	4/3/2018	496.63	12.15	12.60	0.45	484.39	
O-19-55	1/9/2014	496.56	No LNAPL	12.07	0.00	484.49	
O-19-55	2/5/2014	496.57	No LNAPL	12.21	0.00	484.36	
O-19-55	3/24/2014	496.56	No LNAPL	12.47	0.00	484.09	
O-19-55	4/18/2014	496.56	No LNAPL	12.29	0.00	484.27	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-19-55	5/15/2014	496.58	--	11.83	--	484.75	
O-19-55	6/19/2014	496.57	No LNAPL	11.68	0.00	484.89	
O-19-55	7/15/2014	496.59	No LNAPL	9.86	0.00	486.73	
O-19-55	8/26/2014	496.59	No LNAPL	10.52	0.00	486.07	
O-19-55	9/24/2014	496.58	No LNAPL	11.13	0.00	485.45	
O-19-55	10/21/2014	496.57	No LNAPL	12.05	0.00	484.52	
O-19-55	11/19/2014	496.56	No LNAPL	11.65	0.00	484.91	
O-19-55	12/16/2014	496.58	No LNAPL	11.83	0.00	484.75	
O-19-55	12/29/2014	496.58	No LNAPL	11.95	0.00	484.63	
O-19-55	1/21/2015	496.57	No LNAPL	12.00	0.00	484.57	
O-19-55	2/25/2015	496.56	No LNAPL	12.11	0.00	484.45	
O-19-55	3/18/2015	496.52	No LNAPL	12.14	0.00	484.38	
O-19-55	3/26/2015	496.52	No LNAPL	12.06	0.00	484.46	
O-19-55	4/16/2015	496.54	--	11.92	--	484.62	
O-19-55	5/21/2015	496.56	No LNAPL	11.67	0.00	484.89	
O-19-55	6/10/2015	496.59	No LNAPL	11.71	0.00	484.88	
O-19-55	8/19/2015	496.58	No LNAPL	10.91	0.00	485.70	
O-19-55	10/6/2015	496.58	No LNAPL	11.26	0.00	485.33	
O-19-55	1/19/2016	496.57	--	12.29	--	484.24	
O-19-55	5/26/2016	496.58	No LNAPL	11.91	0.00	484.69	
O-19-55	8/15/2016	496.56	--	10.10	--	486.46	
O-19-55	9/9/2016	496.60	No LNAPL	10.80	0.00	485.84	
O-19-55	10/20/2016	496.56	--	12.04	--	484.52	
O-19-55	11/15/2016	496.56	No LNAPL	11.41	0.00	485.25	
O-19-55	2/8/2017	496.57	No LNAPL	11.84	0.00	484.80	
O-19-55	6/13/2017	496.60	No LNAPL	11.18	0.00	485.47	
O-19-90	1/9/2014	496.38	No LNAPL	11.90	0.00	484.48	
O-19-90	2/5/2014	496.39	No LNAPL	12.03	0.00	484.36	
O-19-90	3/24/2014	496.38	No LNAPL	12.29	0.00	484.09	
O-19-90	4/18/2014	496.38	No LNAPL	12.11	0.00	484.27	
O-19-90	5/15/2014	496.40	--	11.65	--	484.75	
O-19-90	6/19/2014	496.40	No LNAPL	11.51	0.00	484.89	
O-19-90	7/15/2014	496.41	No LNAPL	9.69	0.00	486.72	
O-19-90	8/26/2014	496.41	No LNAPL	10.35	0.00	486.06	
O-19-90	9/24/2014	496.40	No LNAPL	10.96	0.00	485.44	
O-19-90	10/21/2014	496.39	No LNAPL	11.88	0.00	484.51	
O-19-90	11/19/2014	496.38	No LNAPL	11.47	0.00	484.91	
O-19-90	12/16/2014	496.40	No LNAPL	11.65	0.00	484.75	
O-19-90	12/29/2014	496.40	No LNAPL	11.77	0.00	484.63	
O-19-90	1/21/2015	496.38	No LNAPL	11.82	0.00	484.56	

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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-19-90	2/25/2015	496.38	No LNAPL	11.93	0.00	484.45	
O-19-90	3/18/2015	496.34	No LNAPL	11.97	0.00	484.37	
O-19-90	3/26/2015	496.34	No LNAPL	11.88	0.00	484.46	
O-19-90	4/16/2015	496.36	--	11.74	--	484.62	
O-19-90	5/21/2015	496.38	No LNAPL	11.50	0.00	484.88	
O-19-90	6/10/2015	496.40	No LNAPL	11.53	0.00	484.87	
O-19-90	8/19/2015	496.40	No LNAPL	10.73	0.00	485.70	
O-19-90	10/6/2015	496.39	No LNAPL	11.08	0.00	485.32	
O-19-90	1/19/2016	496.39	--	12.11	--	484.24	
O-19-90	5/26/2016	496.19	No LNAPL	11.52	0.00	484.69	
O-19-90	8/15/2016	496.17	--	9.72	--	486.45	
O-19-90	9/9/2016	496.20	No LNAPL	10.40	0.00	485.84	
O-19-90	11/15/2016	496.17	No LNAPL	11.00	0.00	485.27	
O-19-90	2/8/2017	496.16	No LNAPL	11.44	0.00	484.79	
O-19-90	6/13/2017	496.19	No LNAPL	10.77	0.00	485.47	
O-19-90	8/3/2017	496.19	--	10.10	--	486.09	
O-19-90	10/19/2017	496.19	--	11.46	--	484.73	
O-19-90	1/18/2018	496.19	--	11.48	--	484.71	
O-19-90	4/5/2018	496.19	--	11.78	--	484.41	
O-20	10/21/2011	—	No LNAPL	12.49	0.00	—	New well
O-20	12/2/2011	497.42	No LNAPL	12.16	0.00	485.26	
O-20	1/11/2012	497.42	No LNAPL	12.32	0.00	485.10	
O-20	2/7/2012	497.42	No LNAPL	12.38	0.00	485.04	
O-20	3/13/2012	497.42	No LNAPL	12.30	0.00	485.12	
O-20	4/10/2012	497.42	No LNAPL	12.17	0.00	485.25	
O-20	5/9/2012	497.42	No LNAPL	12.00	0.00	485.42	
O-20	6/12/2012	497.42	No LNAPL	11.01	0.00	486.41	
O-20	7/18/2012	497.42	No LNAPL	10.64	0.00	486.78	
O-20	8/21/2012	497.42	No LNAPL	11.04	0.00	486.38	
O-20	9/18/2012	497.42	No LNAPL	11.75	0.00	485.67	
O-20	10/16/2012	497.42	No LNAPL	11.77	0.00	485.65	
O-20	11/29/2012	497.41	No LNAPL	11.28	0.00	486.13	
O-20	12/27/2012	497.41	No LNAPL	11.65	0.00	485.76	
O-20	1/24/2013	497.41	No LNAPL	11.61	0.00	485.80	
O-20	2/26/2013	497.41	No LNAPL	11.76	0.00	485.65	
O-20	3/28/2013	497.41	No LNAPL	11.95	0.00	485.46	R-35R, R-39, and R-40 were offline on this date
O-20	4/24/2013	497.41	No LNAPL	11.84	0.00	485.57	
O-20	5/29/2013	497.41	No LNAPL	10.79	0.00	486.62	
O-20	6/25/2013	497.41	No LNAPL	10.64	0.00	486.77	
O-20	10/29/2013	497.41	No LNAPL	12.44	0.00	484.97	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-20	11/19/2013	497.41	No LNAPL	11.76	0.00	485.65	
O-20	12/20/2013	497.41	No LNAPL	11.63	0.00	485.78	
O-20	10/15/2015	497.45	No LNAPL	11.40	0.00	486.05	
O-20	8/11/2016	497.43	--	9.45	--	487.98	
O-20	10/13/2016	497.43	No LNAPL	11.50	0.00	485.93	
O-20	3/1/2017	497.43	No LNAPL	Frozen	0.00	—	Ice at 11.59 feet BTOC
O-21	10/21/2011	—	No LNAPL	8.00	0.00	—	New well
O-21	12/7/2011	493.12	—	—	—	—	Access unavailable per NPT operator
O-21	2/8/2012	493.12	No LNAPL	9.83	0.00	483.29	
O-21	2/17/2012	493.12	7.81	7.90	0.09	485.30	
O-21	3/13/2012	493.12	7.84	7.85	0.01	485.28	
O-21	4/10/2012	493.12	Sheen	7.68	Sheen	485.44	
O-21	5/14/2012	493.12	Sheen	7.75	Sheen	485.37	
O-21	6/13/2012	493.12	Sheen	6.43	Sheen	486.69	
O-21	7/18/2012	493.12	No LNAPL	6.55	0.00	486.57	
O-21	8/21/2012	493.12	6.51	6.55	0.04	486.60	
O-21	9/18/2012	493.12	7.26	7.31	0.05	485.85	
O-21	10/16/2012	493.12	7.28	7.33	0.05	485.83	
O-21	11/29/2012	493.12	6.80	6.81	0.01	486.32	
O-21	12/28/2012	493.12	7.14	7.16	0.02	485.98	
O-21	1/24/2013	493.12	No LNAPL	Frozen	0.00	—	Frozen at 7.16 ft BTOC
O-21	2/26/2013	493.12	No LNAPL	Frozen	0.00	—	Frozen at 7.14 ft BTOC
O-21	3/28/2013	493.12	No LNAPL	Frozen	0.00	—	Frozen at 7.12 ft BTOC. R-35R, R-39, and R-40 were offline on this date
O-21	4/24/2013	493.12	Sheen	7.26	Sheen	485.86	
O-21	5/30/2013	493.12	No LNAPL	6.16	0.00	486.96	
O-21	6/24/2013	493.12	6.10	6.11	0.01	487.02	
O-21	7/23/2013	493.12	Sheen	5.80	Sheen	487.32	
O-21	8/21/2013	493.12	No LNAPL	5.66	0.00	487.46	
O-21	9/24/2013	493.12	6.79	6.91	0.12	486.31	
O-21	10/29/2013	493.12	7.90	8.18	0.28	485.18	
O-21	11/19/2013	493.12	7.20	7.25	0.05	485.91	
O-21	12/20/2013	493.12	Sheen	7.11	Sheen	486.01	
O-21	1/14/2014	493.12	7.42	7.45	0.03	485.70	
O-21	2/25/2014	493.12	7.75	7.83	0.08	485.36	
O-21	3/18/2014	493.12	7.73	8.04	0.31	485.35	
O-21	4/14/2014	493.14	7.82	8.21	0.39	485.26	
O-21	5/29/2014	493.14	7.41	7.77	0.36	485.68	
O-21	6/19/2014	493.14	—	—	—	—	Well is submerged
O-21	8/28/2014	493.14	5.65	6.03	0.38	487.44	
O-21	9/29/2014	493.14	6.51	7.03	0.52	486.56	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-21	10/16/2014	493.14	7.11	7.50	0.39	485.97	
O-21	3/10/2015	493.14	6.97	8.25	1.28	485.99	
O-21	5/18/2015	493.14	6.83	6.87	0.04	486.30	
O-21	8/12/2015	493.16	5.71	5.72	0.01	487.49	
O-21	10/15/2015	493.16	6.87	7.17	0.30	486.29	
O-21	3/4/2016	493.16	7.55	8.21	0.66	485.57	
O-21	6/14/2016	493.16	6.65	6.67	0.02	486.51	
O-21	8/18/2016	493.16	No LNAPL	5.28	0.00	487.88	
O-21	10/13/2016	493.13	6.95	7.13	0.18	486.15	
O-21	3/1/2017	493.13	6.81	Frozen	0.86	—	Ice at 7.67 feet BTOC
O-21	3/11/2017	493.13	6.80	7.70	0.90	486.20	
O-21	3/18/2017	493.13	6.95	Frozen	0.08	—	Depth to ice = 7.03 feet
O-21	3/24/2017	493.13	6.95	Frozen	0.13	—	Depth to ice = 7.08 feet
O-21	4/1/2017	493.13	6.90	7.05	0.15	486.21	
O-21	4/8/2017	493.13	No LNAPL	4.95	0.00	488.18	
O-21	4/15/2017	493.13	No LNAPL	4.45	0.00	488.68	
O-21	6/6/2017	493.13	Sheen	Frozen	Sheen	—	DTW = 6.90 feet BTOC. Ice at 7.07 feet BTOC
O-22	12/2/2011	496.73	No LNAPL	12.29	0.00	484.44	New well
O-22	2/7/2012	496.73	No LNAPL	12.52	0.00	484.21	
O-22	2/16/2012	496.73	No LNAPL	12.45	0.00	484.28	
O-22	3/13/2012	496.73	No LNAPL	12.43	0.00	484.30	
O-22	4/10/2012	496.73	No LNAPL	12.34	0.00	484.39	
O-22	4/19/2012	496.73	No LNAPL	11.81	0.00	484.92	
O-22	5/9/2012	496.73	No LNAPL	12.12	0.00	484.61	
O-22	6/12/2012	496.73	No LNAPL	11.25	0.00	485.48	
O-22	7/17/2012	496.73	No LNAPL	10.82	0.00	485.91	
O-22	7/30/2012	496.73	No LNAPL	10.57	0.00	486.16	
O-22	8/21/2012	496.73	No LNAPL	11.25	0.00	485.48	
O-22	9/18/2012	496.73	No LNAPL	11.87	0.00	484.86	
O-22	10/16/2012	496.73	No LNAPL	11.89	0.00	484.84	
O-22	11/1/2012	496.73	No LNAPL	11.98	0.00	484.75	
O-22	11/29/2012	496.76	No LNAPL	11.45	0.00	485.31	
O-22	12/27/2012	496.76	No LNAPL	11.79	0.00	484.97	
O-22	1/23/2013	496.76	No LNAPL	11.79	0.00	484.97	
O-22	2/26/2013	496.76	No LNAPL	11.72	0.00	485.04	
O-22	3/28/2013	496.76	No LNAPL	12.04	0.00	484.72	R-35R, R-39, and R-40 were offline on this date
O-22	4/24/2013	496.76	No LNAPL	12.05	0.00	484.71	
O-22	5/29/2013	496.76	—	—	—	—	Depth to water measurement was not recorded
O-22	6/25/2013	496.76	No LNAPL	10.88	0.00	485.88	
O-22	8/2/2013	496.76	No LNAPL	10.55	0.00	486.21	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-22	10/1/2013	496.76	No LNAPL	11.77	0.00	484.99	
O-22	10/29/2013	496.76	No LNAPL	12.53	0.00	484.23	
O-22	11/19/2013	496.76	No LNAPL	11.98	0.00	484.78	
O-22	12/20/2013	496.76	No LNAPL	11.82	0.00	484.94	
O-22	3/18/2014	496.76	No LNAPL	12.45	0.00	484.31	
O-22	6/11/2014	496.82	No LNAPL	11.98	0.00	484.84	
O-22	9/9/2014	496.82	No LNAPL	10.63	0.00	486.19	
O-22	11/20/2014	496.82	No LNAPL	11.56	0.00	485.26	
O-22	3/18/2015	496.82	--	12.07	--	484.75	
O-22	6/11/2015	496.82	No LNAPL	11.65	0.00	485.17	
O-22	8/12/2015	496.86	--	10.64	--	486.22	
O-22	10/15/2015	496.86	No LNAPL	11.52	0.00	485.34	
O-22	11/19/2015	496.86	--	11.71	--	485.15	
O-23	1/10/2012	495.83	No LNAPL	11.82	0.00	484.01	
O-23	2/6/2012	495.83	No LNAPL	11.89	0.00	483.94	
O-23	2/15/2012	495.83	No LNAPL	11.82	0.00	484.01	
O-23	3/13/2012	495.83	No LNAPL	11.79	0.00	484.04	
O-23	4/10/2012	495.83	No LNAPL	11.71	0.00	484.12	
O-23	4/19/2012	495.83	--	11.21	--	484.62	
O-23	5/8/2012	495.83	No LNAPL	11.45	0.00	484.38	
O-23	6/12/2012	495.83	No LNAPL	10.66	0.00	485.17	
O-23	7/17/2012	495.83	No LNAPL	10.25	0.00	485.58	
O-23	7/30/2012	495.83	No LNAPL	10.01	0.00	485.82	
O-23	8/21/2012	495.83	No LNAPL	10.67	0.00	485.16	
O-23	9/18/2012	495.83	No LNAPL	11.28	0.00	484.55	
O-23	10/16/2012	495.83	No LNAPL	11.28	0.00	484.55	
O-23	11/1/2012	495.83	No LNAPL	11.34	0.00	484.49	
O-23	11/29/2012	495.83	No LNAPL	10.89	0.00	484.94	
O-23	12/27/2012	495.83	No LNAPL	11.21	0.00	484.62	
O-23	1/23/2013	495.83	No LNAPL	11.15	0.00	484.68	
O-23	2/26/2013	495.83	No LNAPL	11.27	0.00	484.56	
O-23	3/28/2013	495.83	No LNAPL	11.40	0.00	484.43	R-35R, R-39, and R-40 were offline on this date
O-23	4/24/2013	495.83	No LNAPL	11.40	0.00	484.43	
O-23	5/29/2013	495.83	No LNAPL	10.46	0.00	485.37	
O-23	6/25/2013	495.83	No LNAPL	10.27	0.00	485.56	
O-23	8/2/2013	495.83	No LNAPL	9.97	0.00	485.86	
O-23	10/1/2013	495.83	--	11.13	--	484.70	
O-23	10/29/2013	495.83	No LNAPL	11.89	0.00	483.94	
O-23	11/19/2013	495.83	No LNAPL	11.35	0.00	484.48	
O-23	12/20/2013	495.83	No LNAPL	11.20	0.00	484.63	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-23	3/18/2014	495.83	--	11.81	--	484.02	
O-23	6/11/2014	495.83	--	11.35	--	484.48	
O-23	9/9/2014	495.83	--	10.00	--	485.83	
O-23	11/20/2014	495.83	No LNAPL	10.95	0.00	484.88	
O-23	3/18/2015	495.83	--	11.45	--	484.38	
O-23	6/11/2015	495.83	--	11.04	--	484.79	
O-23	8/12/2015	495.85	--	10.25	--	485.64	
O-23	10/15/2015	495.85	No LNAPL	10.91	0.00	484.94	
O-23	11/19/2015	495.85	--	11.14	--	484.71	
O-23	10/13/2016	495.86	No LNAPL	11.08	0.00	484.78	
O-23	3/1/2017	495.86	No LNAPL	11.24	0.00	484.62	
O-24	12/2/2011	496.86	No LNAPL	13.05	0.00	483.81	New well
O-24	1/10/2012	496.86	No LNAPL	13.17	0.00	483.69	
O-24	2/6/2012	496.86	No LNAPL	13.27	0.00	483.59	
O-24	2/16/2012	496.86	No LNAPL	13.18	0.00	483.68	
O-24	3/13/2012	496.86	No LNAPL	13.17	0.00	483.69	
O-24	4/10/2012	496.86	No LNAPL	13.10	0.00	483.76	
O-24	4/19/2012	496.86	No LNAPL	12.55	0.00	484.31	
O-24	5/8/2012	496.86	No LNAPL	12.84	0.00	484.02	
O-24	6/13/2012	496.86	No LNAPL	11.91	0.00	484.95	
O-24	7/17/2012	496.86	No LNAPL	11.61	0.00	485.25	
O-24	7/30/2012	496.86	No LNAPL	11.33	0.00	485.53	
O-24	8/21/2012	496.86	No LNAPL	12.04	0.00	484.82	
O-24	9/18/2012	496.86	No LNAPL	12.66	0.00	484.20	
O-24	10/16/2012	496.86	No LNAPL	12.66	0.00	484.20	
O-24	11/1/2012	496.86	No LNAPL	12.70	0.00	484.16	
O-24	11/29/2012	496.87	No LNAPL	12.23	0.00	484.64	
O-24	12/27/2012	496.87	No LNAPL	12.54	0.00	484.33	
O-24	1/23/2013	496.87	No LNAPL	12.51	0.00	484.36	
O-24	2/26/2013	496.87	No LNAPL	12.67	0.00	484.20	
O-24	3/29/2013	496.87	No LNAPL	12.83	0.00	484.04	R-35R, R-39, and R-40 were offline on this date
O-24	4/24/2013	496.87	No LNAPL	12.81	0.00	484.06	
O-24	5/29/2013	496.87	No LNAPL	11.76	0.00	485.11	
O-24	6/25/2013	496.87	No LNAPL	11.67	0.00	485.20	
O-24	7/23/2013	496.87	--	11.44	--	485.43	
O-24	8/2/2013	496.87	No LNAPL	11.32	0.00	485.55	
O-24	8/21/2013	496.87	No LNAPL	11.31	0.00	485.56	
O-24	9/30/2013	496.89	No LNAPL	12.53	0.00	484.36	
O-24	10/22/2013	496.89	No LNAPL	13.14	0.00	483.75	
O-24	11/26/2013	496.89	No LNAPL	12.49	0.00	484.40	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-24	12/18/2013	496.92	No LNAPL	12.56	0.00	484.36	
O-24	1/9/2014	496.93	No LNAPL	12.84	0.00	484.09	
O-24	2/5/2014	496.93	No LNAPL	12.97	0.00	483.96	
O-24	3/18/2014	496.95	No LNAPL	13.21	0.00	483.74	
O-24	3/24/2014	496.95	No LNAPL	13.24	0.00	483.71	
O-24	4/18/2014	496.96	No LNAPL	13.05	0.00	483.91	
O-24	5/15/2014	496.95	--	12.57	--	484.38	
O-24	6/11/2014	496.92	No LNAPL	12.75	0.00	484.17	
O-24	6/19/2014	496.92	No LNAPL	12.43	0.00	484.49	
O-24	7/15/2014	496.93	No LNAPL	10.67	0.00	486.26	
O-24	8/26/2014	496.94	No LNAPL	11.30	0.00	485.64	
O-24	9/9/2014	496.94	No LNAPL	11.52	0.00	485.42	
O-24	9/24/2014	496.92	No LNAPL	11.87	0.00	485.05	
O-24	10/21/2014	496.93	No LNAPL	12.77	0.00	484.16	
O-24	11/19/2014	496.96	No LNAPL	12.48	0.00	484.48	
O-24	12/16/2014	496.97	No LNAPL	12.66	0.00	484.31	
O-24	12/29/2014	496.97	No LNAPL	12.77	0.00	484.20	
O-24	1/21/2015	496.99	No LNAPL	12.83	0.00	484.16	
O-24	2/25/2015	497.00	No LNAPL	12.96	0.00	484.04	
O-24	3/10/2015	497.01	No LNAPL	12.88	0.00	484.13	
O-24	3/18/2015	497.01	--	12.98	--	484.03	
O-24	3/26/2015	497.01	No LNAPL	12.91	0.00	484.10	
O-24	4/16/2015	497.01	--	12.76	--	484.25	
O-24	5/21/2015	497.00	No LNAPL	12.51	0.00	484.49	
O-24	6/10/2015	496.98	No LNAPL	12.52	0.00	484.46	
O-24	8/12/2015	496.98	No LNAPL	11.52	0.00	485.50	
O-24	8/19/2015	496.98	No LNAPL	11.76	0.00	485.25	
O-24	10/6/2015	496.98	No LNAPL	12.02	0.00	484.97	
O-24	10/15/2015	496.98	No LNAPL	12.44	0.00	484.54	
O-24	11/19/2015	496.98	--	12.60	--	484.38	
O-24	1/19/2016	497.02	--	13.12	--	483.86	
O-24	3/4/2016	497.02	No LNAPL	13.29	0.00	483.73	
O-24	5/26/2016	497.03	No LNAPL	12.78	0.00	484.27	
O-24	6/14/2016	497.03	No LNAPL	12.42	0.00	484.61	
O-24	8/15/2016	497.07	--	11.01	--	486.06	
O-24	8/18/2016	497.03	No LNAPL	11.19	0.00	485.84	
O-24	9/9/2016	497.03	No LNAPL	11.67	0.00	485.40	
O-24	10/13/2016	497.03	No LNAPL	12.67	0.00	484.36	
O-24	10/21/2016	497.07	--	12.90	--	484.17	
O-24	11/15/2016	497.07	No LNAPL	12.37	0.00	484.80	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-24	2/8/2017	497.11	No LNAPL	12.81	0.00	484.37	
O-24	3/1/2017	497.11	No LNAPL	12.87	0.00	484.24	
O-24	6/6/2017	497.09	No LNAPL	12.81	0.00	484.28	
O-24	6/13/2017	497.09	No LNAPL	12.14	0.00	485.00	
O-24	7/10/2017	497.09	--	11.63	--	485.46	
O-24	11/1/2017	497.09	No LNAPL	13.15	0.00	483.94	
O-24	1/15/2018	497.09	--	12.87	--	484.22	
O-24	7/19/2018	497.14	--	11.49	--	485.65	
O-24	11/6/2018	497.15	No LNAPL	12.84	0.00	484.31	
O-24-65	1/9/2014	497.03	No LNAPL	12.91	0.00	484.12	
O-24-65	2/5/2014	497.03	No LNAPL	13.05	0.00	483.98	
O-24-65	3/24/2014	497.06	No LNAPL	13.32	0.00	483.74	
O-24-65	4/18/2014	497.07	No LNAPL	13.13	0.00	483.94	
O-24-65	5/15/2014	497.07	--	12.67	--	484.40	
O-24-65	6/19/2014	497.04	No LNAPL	12.52	0.00	484.52	
O-24-65	7/15/2014	497.05	No LNAPL	10.77	0.00	486.28	
O-24-65	8/26/2014	497.04	No LNAPL	11.39	0.00	485.65	
O-24-65	9/24/2014	497.04	No LNAPL	11.97	0.00	485.07	
O-24-65	10/21/2014	497.04	No LNAPL	12.87	0.00	484.17	
O-24-65	11/19/2014	497.07	No LNAPL	12.55	0.00	484.52	
O-24-65	12/16/2014	497.09	No LNAPL	12.75	0.00	484.34	
O-24-65	12/29/2014	497.09	No LNAPL	12.85	0.00	484.24	
O-24-65	1/21/2015	497.11	No LNAPL	12.93	0.00	484.18	
O-24-65	2/25/2015	497.13	No LNAPL	13.06	0.00	484.07	
O-24-65	3/18/2015	497.13	No LNAPL	13.08	0.00	484.05	
O-24-65	3/26/2015	497.13	No LNAPL	13.01	0.00	484.12	
O-24-65	4/16/2015	497.14	--	12.87	--	484.27	
O-24-65	5/21/2015	497.13	No LNAPL	12.62	0.00	484.51	
O-24-65	6/10/2015	497.12	No LNAPL	12.65	0.00	484.47	
O-24-65	8/19/2015	497.11	No LNAPL	11.88	0.00	485.26	
O-24-65	10/6/2015	497.12	No LNAPL	12.15	0.00	484.98	
O-24-65	1/19/2016	497.15	--	13.23	--	483.88	
O-24-65	5/26/2016	497.18	No LNAPL	12.90	0.00	484.30	
O-24-65	8/15/2016	497.19	--	11.16	--	486.03	
O-24-65	9/9/2016	497.18	No LNAPL	11.80	0.00	485.42	
O-24-65	11/15/2016	497.19	No LNAPL	12.46	0.00	484.83	
O-24-65	2/8/2017	497.24	No LNAPL	12.91	0.00	484.40	
O-24-65	6/13/2017	497.25	No LNAPL	12.27	0.00	485.03	
O-25	12/2/2011	497.74	No LNAPL	14.03	0.00	483.71	New well
O-25	1/10/2012	497.74	No LNAPL	14.13	0.00	483.61	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-25	2/6/2012	497.74	No LNAPL	14.23	0.00	483.51	
O-25	3/13/2012	497.74	No LNAPL	14.13	0.00	483.61	
O-25	4/10/2012	497.74	No LNAPL	14.05	0.00	483.69	
O-25	5/8/2012	497.74	No LNAPL	13.81	0.00	483.93	
O-25	6/13/2012	497.74	No LNAPL	13.92	0.00	483.82	
O-25	7/17/2012	497.74	No LNAPL	12.57	0.00	485.17	
O-25	8/21/2012	497.74	No LNAPL	13.00	0.00	484.74	
O-25	9/18/2012	497.74	No LNAPL	13.62	0.00	484.12	
O-25	10/16/2012	497.74	No LNAPL	13.62	0.00	484.12	
O-25	11/29/2012	497.75	No LNAPL	13.15	0.00	484.60	
O-25	12/27/2012	497.75	No LNAPL	13.51	0.00	484.24	
O-25	1/23/2013	497.75	No LNAPL	13.47	0.00	484.28	
O-25	2/26/2013	497.75	No LNAPL	13.63	0.00	484.12	
O-25	3/29/2013	497.75	No LNAPL	13.79	0.00	483.96	R-35R, R-39, and R-40 were offline on this date
O-25	4/24/2013	497.75	No LNAPL	13.74	0.00	484.01	
O-25	5/29/2013	497.75	No LNAPL	12.78	0.00	484.97	
O-25	6/25/2013	497.75	No LNAPL	12.64	0.00	485.11	
O-25	10/29/2013	497.75	No LNAPL	14.26	0.00	483.49	
O-25	11/19/2013	497.75	No LNAPL	13.69	0.00	484.06	
O-25	12/20/2013	497.75	No LNAPL	13.69	0.00	484.06	
O-25	3/10/2015	497.79	No LNAPL	13.81	0.00	483.98	
O-25	5/18/2015	497.79	No LNAPL	13.41	0.00	484.38	
O-25	8/12/2015	497.79	No LNAPL	12.45	0.00	485.38	
O-25	10/15/2015	497.79	No LNAPL	13.38	0.00	484.41	
O-25	3/4/2016	497.79	No LNAPL	14.19	0.00	483.60	
O-25	6/14/2016	497.79	No LNAPL	13.32	0.00	484.47	
O-25	8/18/2016	497.81	No LNAPL	12.08	0.00	485.73	
O-25	10/13/2016	497.81	No LNAPL	13.58	0.00	484.23	
O-25	3/1/2017	497.81	No LNAPL	13.74	0.00	484.07	
O-25	6/6/2017	497.81	No LNAPL	13.68	0.00	484.13	
O-25	11/1/2017	497.85	No LNAPL	14.62	0.00	483.23	
O-25	11/6/2018	497.86	No LNAPL	13.70	0.00	484.16	
O-26	12/2/2011	496.79	No LNAPL	13.10	0.00	483.69	New well
O-26	1/10/2012	496.79	No LNAPL	13.21	0.00	483.58	
O-26	2/6/2012	496.79	No LNAPL	13.31	0.00	483.48	
O-26	2/16/2012	496.79	No LNAPL	13.22	0.00	483.57	
O-26	3/13/2012	496.79	No LNAPL	13.21	0.00	483.58	
O-26	4/10/2012	496.79	No LNAPL	13.16	0.00	483.63	
O-26	4/19/2012	496.79	No LNAPL	12.61	0.00	484.18	
O-26	5/8/2012	496.79	No LNAPL	12.93	0.00	483.86	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-26	6/13/2012	496.79	No LNAPL	11.99	0.00	484.80	
O-26	7/17/2012	496.79	No LNAPL	11.66	0.00	485.13	
O-26	7/30/2012	496.79	No LNAPL	11.37	0.00	485.42	
O-26	8/21/2012	496.79	No LNAPL	12.08	0.00	484.71	
O-26	9/18/2012	496.79	No LNAPL	12.72	0.00	484.07	
O-26	10/16/2012	496.79	No LNAPL	12.73	0.00	484.06	
O-26	11/1/2012	496.79	No LNAPL	12.75	0.00	484.04	
O-26	11/29/2012	496.82	No LNAPL	12.27	0.00	484.55	
O-26	12/27/2012	496.82	No LNAPL	12.62	0.00	484.20	
O-26	1/23/2013	496.82	No LNAPL	12.58	0.00	484.24	
O-26	2/26/2013	496.82	No LNAPL	12.74	0.00	484.08	
O-26	3/29/2013	496.82	No LNAPL	12.92	0.00	483.90	R-35R, R-39, and R-40 were offline on this date
O-26	4/24/2013	496.82	No LNAPL	12.89	0.00	483.93	
O-26	5/29/2013	496.82	No LNAPL	11.87	0.00	484.95	
O-26	6/25/2013	496.82	No LNAPL	11.78	0.00	485.04	
O-26	8/2/2013	496.82	No LNAPL	11.40	0.00	485.42	
O-26	10/1/2013	496.82	No LNAPL	12.70	0.00	484.12	
O-26	10/29/2013	496.82	No LNAPL	13.41	0.00	483.41	
O-26	11/19/2013	496.82	No LNAPL	12.78	0.00	484.04	
O-26	12/20/2013	496.82	No LNAPL	12.71	0.00	484.11	
O-26	3/18/2014	496.82	No LNAPL	13.31	0.00	483.51	
O-26	6/11/2014	496.41	No LNAPL	12.88	0.00	483.53	
O-26	9/9/2014	496.41	No LNAPL	11.69	0.00	484.72	
O-26	11/20/2014	496.41	No LNAPL	12.57	0.00	483.84	
O-26	3/10/2015	496.41	No LNAPL	13.00	0.00	483.41	
O-26	3/19/2015	496.41	--	13.09	--	483.32	
O-26	5/18/2015	496.41	No LNAPL	12.60	0.00	483.81	
O-26	6/10/2015	496.41	No LNAPL	12.64	0.00	483.77	
O-26	8/12/2015	496.41	No LNAPL	11.63	0.00	484.82	
O-26	10/15/2015	496.41	No LNAPL	12.59	0.00	483.82	
O-26	11/19/2015	496.41	--	12.72	--	483.69	
O-26	3/4/2016	496.41	No LNAPL	13.39	0.00	483.02	
O-26	6/14/2016	496.41	No LNAPL	12.49	0.00	483.92	
O-26	8/10/2016	496.94	--	10.78	--	486.16	
O-26	8/18/2016	496.94	No LNAPL	11.27	0.00	485.67	
O-26	10/13/2016	496.94	No LNAPL	12.78	0.00	484.16	
O-26	10/21/2016	496.94	--	12.99	--	483.95	
O-26	3/1/2017	496.94	No LNAPL	12.94	0.00	484.00	
O-26	6/6/2017	496.94	No LNAPL	12.89	0.00	484.05	
O-26	7/10/2017	496.97	--	11.66	--	485.31	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-26	11/1/2017	496.98	No LNAPL	13.22	0.00	483.76	
O-26	1/15/2018	496.98	--	12.90	--	484.08	
O-26	7/10/2018	496.99	--	11.36	--	485.63	
O-26	11/6/2018	497.00	No LNAPL	12.91	0.00	484.09	
O-26-65	8/10/2016	496.61	--	10.47	--	486.14	
O-26-65	7/10/2017	496.60	--	11.31	--	485.29	
O-26-65	7/18/2018	496.59	--	11.17	--	485.42	
O-27	12/2/2011	496.84	No LNAPL	13.04	0.00	483.80	New well
O-27	1/10/2012	496.84	No LNAPL	13.20	0.00	483.64	
O-27	2/6/2012	496.84	No LNAPL	13.29	0.00	483.55	
O-27	2/15/2012	496.84	No LNAPL	13.22	0.00	483.62	
O-27	3/13/2012	496.84	No LNAPL	13.20	0.00	483.64	
O-27	4/19/2012	496.84	12.51	12.82	0.31	484.28	
O-27	5/8/2012	496.84	12.75	13.77	1.02	483.92	
O-27	6/12/2012	496.84	12.03	12.10	0.07	484.80	
O-27	7/17/2012	496.84	11.55	11.94	0.39	485.22	
O-27	7/30/2012	496.84	11.26	11.37	0.11	485.56	
O-27	8/21/2012	496.84	12.00	12.28	0.28	484.79	
O-27	9/18/2012	496.84	12.59	13.30	0.71	484.13	
O-27	10/15/2012	496.84	12.50	13.41	0.91	484.19	
O-27	10/17/2012	496.84	12.57	13.56	0.99	484.10	Initial levels of first October 2012 baildown test
O-27	10/29/2012	496.84	13.06	13.74	0.68	483.66	Initial levels of second October 2012 baildown test
O-27	11/1/2012	496.84	12.68	12.70	0.02	484.16	
O-27	11/29/2012	496.86	12.19	12.42	0.23	484.63	
O-27	12/28/2012	496.86	12.52	12.97	0.45	484.26	
O-27	1/24/2013	496.86	12.50	12.88	0.38	484.30	
O-27	2/26/2013	496.86	12.62	13.16	0.54	484.15	
O-27	3/28/2013	496.86	12.76	13.25	0.49	484.02	R-35R, R-39, and R-40 were offline on this date
O-27	4/24/2013	496.86	12.80	12.91	0.11	484.04	
O-27	5/29/2013	496.86	11.82	11.83	0.01	485.04	
O-27	6/24/2013	496.86	12.74	12.80	0.06	484.11	
O-27	7/23/2013	496.86	11.46	11.49	0.03	485.39	
O-27	8/2/2013	496.86	11.34	11.35	0.01	485.52	
O-27	8/21/2013	496.86	11.35	11.36	0.01	485.51	
O-27	9/24/2013	496.86	12.37	12.41	0.04	484.48	
O-27	10/1/2013	496.86	12.67	12.72	0.05	484.18	
O-27	10/29/2013	496.86	13.37	13.48	0.11	483.47	
O-27	11/19/2013	496.86	Sheen	12.73	Sheen	484.13	
O-27	12/20/2013	496.86	12.65	12.66	0.01	484.21	
O-27	1/15/2014	496.86	No LNAPL	12.96	0.00	483.90	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-27	2/25/2014	496.86	Sheen	13.23	Sheen	483.63	
O-27	3/18/2014	496.86	Sheen	13.26	Sheen	483.60	
O-27	4/14/2014	496.93	13.28	13.29	0.01	483.65	
O-27	5/16/2014	496.93	Sheen	12.72	Sheen	484.21	
O-27	6/11/2014	496.93	Sheen	12.86	Sheen	484.07	
O-27	7/15/2014	496.93	No LNAPL	10.75	0.00	486.18	
O-27	8/28/2014	496.93	11.42	11.43	0.01	485.51	
O-27	9/9/2014	496.93	11.69	11.70	0.01	485.24	
O-27	10/16/2014	496.93	Sheen	12.77	Sheen	484.16	
O-27	11/20/2014	496.93	No LNAPL	12.46	0.00	484.47	
O-27	3/10/2015	496.93	12.95	12.97	0.02	483.98	
O-27	3/18/2015	496.93	13.02	13.14	0.12	483.89	
O-27	6/10/2015	496.93	12.62	12.66	0.04	484.30	
O-27	8/12/2015	496.88	Sheen	11.56	Sheen	485.36	
O-27	10/15/2015	496.88	12.58	12.59	0.01	484.34	
O-27	11/19/2015	496.88	12.66	12.75	0.09	484.20	
O-27	3/4/2016	496.88	13.19	13.84	0.65	483.63	
O-27	3/24/2016	496.88	13.37	13.69	0.32	483.46	Baildown testing not conducted- insufficient LNAPL thickness
O-27	3/25/2016	496.88	13.35	13.65	0.30	483.48	Baildown testing not conducted- insufficient LNAPL thickness
O-27	3/31/2016	496.88	13.21	13.45	0.24	483.63	Baildown testing not conducted- insufficient LNAPL thickness
O-27	6/14/2016	496.88	Sheen	12.43	Sheen	484.45	
O-27	8/17/2016	496.94	Sheen	11.41	Sheen	485.53	
O-27	8/18/2016	496.94	No LNAPL	11.19	0.00	485.75	
O-27	10/13/2016	496.94	12.72	12.73	0.01	484.22	
O-27	10/25/2016	496.94	13.03	13.30	0.27	483.86	
O-27	3/1/2017	496.94	12.73	13.31	0.58	484.11	
O-27	3/10/2017	496.94	12.77	13.41	0.64	484.06	Initial fluid levels prior to Q1 2017 transmissivity testing
O-27	3/11/2017	496.94	12.80	13.02	0.22	484.10	
O-27	3/18/2017	496.94	12.82	13.15	0.33	484.06	
O-27	3/24/2017	496.94	12.92	13.28	0.36	483.96	
O-27	4/1/2017	496.94	12.85	13.33	0.48	484.01	
O-27	4/8/2017	496.94	12.85	13.01	0.16	484.06	
O-27	4/15/2017	496.94	12.65	12.78	0.13	484.27	
O-27	6/6/2017	496.94	12.80	13.04	0.24	484.10	
O-27	7/13/2017	496.94	No LNAPL	11.37	0.00	485.57	
O-27	10/18/2017	496.97	Sheen	12.86	Sheen	484.11	
O-27	11/1/2017	496.97	12.91	13.99	1.08	483.88	
O-27	2/13/2018	496.97	12.97	13.77	0.80	483.86	
O-27	4/3/2018	496.97	12.88	13.70	0.82	483.95	
O-27	7/17/2018	496.97	11.39	11.40	0.01	485.58	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-27	11/6/2018	496.91	12.74	12.88	0.14	484.15	
O-27-65	7/28/2016	497.44	--	11.11	--	486.33	
O-27-65	10/18/2016	497.44	--	13.34	--	484.10	
O-27-65	7/10/2017	497.44	--	12.00	--	485.44	
O-27-65	7/13/2018	497.44	--	11.71	--	485.73	
O-27-150	7/28/2016	497.62	--	11.32	--	486.30	
O-28	12/2/2011	494.62	No LNAPL	9.37	0.00	485.25	New well
O-28	1/11/2012	494.62	No LNAPL	9.55	0.00	485.07	
O-28	2/8/2012	494.62	No LNAPL	9.59	0.00	485.03	
O-28	2/16/2012	494.62	No LNAPL	9.54	0.00	485.08	
O-28	3/13/2012	494.62	No LNAPL	9.54	0.00	485.08	
O-28	4/10/2012	494.62	No LNAPL	9.39	0.00	485.23	
O-28	4/19/2012	494.62	No LNAPL	8.93	0.00	485.69	
O-28	5/9/2012	494.62	No LNAPL	Frozen	0.00	—	Frozen at 9.22 ft BTOC
O-28	6/12/2012	494.62	No LNAPL	8.15	0.00	486.47	
O-28	7/17/2012	494.62	No LNAPL	7.71	0.00	486.91	
O-28	7/30/2012	494.62	No LNAPL	7.31	0.00	487.31	
O-28	8/21/2012	494.62	No LNAPL	8.15	0.00	486.47	
O-28	9/19/2012	494.62	No LNAPL	9.02	0.00	485.60	
O-28	10/16/2012	494.62	No LNAPL	9.00	0.00	485.62	
O-28	11/1/2012	494.62	No LNAPL	8.88	0.00	485.74	
O-28	11/29/2012	494.65	No LNAPL	8.45	0.00	486.20	
O-28	12/27/2012	494.65	No LNAPL	8.86	0.00	485.79	
O-28	1/23/2013	494.65	No LNAPL	8.81	0.00	485.84	
O-28	2/26/2013	494.65	No LNAPL	8.99	0.00	485.66	
O-28	3/28/2013	494.65	No LNAPL	9.17	0.00	485.48	R-35R, R-39, and R-40 were offline on this date
O-28	4/24/2013	494.65	No LNAPL	9.14	0.00	485.51	
O-28	5/29/2013	494.65	No LNAPL	7.91	0.00	486.74	
O-28	6/25/2013	494.65	No LNAPL	7.78	0.00	486.87	
O-28	8/2/2013	494.65	No LNAPL	7.23	0.00	487.42	
O-28	10/1/2013	494.65	--	8.91	--	485.74	
O-28	10/29/2013	494.65	No LNAPL	9.70	0.00	484.95	
O-28	11/19/2013	494.65	No LNAPL	8.85	0.00	485.80	
O-28	12/20/2013	494.65	No LNAPL	8.84	0.00	485.81	
O-28	3/18/2014	494.65	--	9.54	--	485.11	
O-28	6/11/2014	494.76	--	9.08	--	485.68	
O-28	9/9/2014	494.76	--	7.88	--	486.88	
O-28	11/20/2014	494.76	No LNAPL	8.60	0.00	486.16	
O-28	3/19/2015	494.76	--	9.13	--	485.63	
O-28	6/11/2015	494.76	--	8.68	--	486.08	

Appendix A-1
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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-28	8/12/2015	494.82	--	7.45	--	487.37	
O-28	10/15/2015	494.82	No LNAPL	8.80	0.00	486.02	
O-28	11/19/2015	494.82	--	8.69	--	486.13	Added casing cap, no cap upon arrival
O-29	12/2/2011	498.59	No LNAPL	13.93	0.00	484.66	New well
O-29	2/7/2012	498.59	No LNAPL	14.12	0.00	484.47	
O-29	2/16/2012	498.59	No LNAPL	14.04	0.00	484.55	
O-29	3/13/2012	498.59	No LNAPL	14.05	0.00	484.54	
O-29	4/10/2012	498.59	No LNAPL	13.96	0.00	484.63	
O-29	4/19/2012	498.59	No LNAPL	13.43	0.00	485.16	
O-29	5/9/2012	498.59	No LNAPL	13.73	0.00	484.86	
O-29	6/12/2012	498.59	No LNAPL	12.90	0.00	485.69	
O-29	7/17/2012	498.59	No LNAPL	12.42	0.00	486.17	
O-29	7/30/2012	498.59	No LNAPL	12.14	0.00	486.45	
O-29	8/21/2012	498.59	No LNAPL	12.86	0.00	485.73	
O-29	9/18/2012	498.59	No LNAPL	13.50	0.00	485.09	
O-29	10/16/2012	498.59	No LNAPL	13.51	0.00	485.08	
O-29	11/1/2012	498.59	No LNAPL	13.60	0.00	484.99	
O-29	11/29/2012	498.61	No LNAPL	13.10	0.00	485.51	
O-29	12/27/2012	498.61	No LNAPL	13.42	0.00	485.19	
O-29	1/23/2013	498.61	No LNAPL	13.39	0.00	485.22	
O-29	2/26/2013	498.61	No LNAPL	13.53	0.00	485.08	
O-29	3/28/2013	498.61	No LNAPL	13.66	0.00	484.95	R-35R, R-39, and R-40 were offline on this date
O-29	4/24/2013	498.61	No LNAPL	13.64	0.00	484.97	
O-29	5/29/2013	498.61	No LNAPL	12.66	0.00	485.95	
O-29	6/25/2013	498.61	No LNAPL	12.46	0.00	486.15	
O-29	8/2/2013	498.61	No LNAPL	12.11	0.00	486.50	
O-29	10/1/2013	498.61	No LNAPL	13.38	0.00	485.23	
O-29	10/29/2013	498.61	No LNAPL	14.15	0.00	484.46	
O-29	11/19/2013	498.61	No LNAPL	13.58	0.00	485.03	
O-29	12/20/2013	498.61	No LNAPL	13.41	0.00	485.20	
O-29	10/15/2015	498.68	No LNAPL	13.12	0.00	485.56	
O-29	10/13/2016	498.65	No LNAPL	13.26	0.00	485.39	
O-29	3/1/2017	498.65	No LNAPL	13.38	0.00	485.27	
O-30	2/26/2013	497.97	No LNAPL	12.54	0.00	485.43	
O-30	3/28/2013	497.97	No LNAPL	Frozen	0.00	—	Frozen at 12.65 ft BTOC. R-35R, R-39, and R-40 were offline on this date
O-30	4/24/2013	497.97	No LNAPL	12.03	0.00	485.94	
O-30	6/25/2013	497.97	No LNAPL	11.46	0.00	486.51	
O-30	8/2/2013	497.97	No LNAPL	11.12	0.00	486.85	
O-30	10/1/2013	497.97	No LNAPL	12.40	0.00	485.57	
O-30	10/29/2013	497.97	No LNAPL	13.26	0.00	484.71	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-30	3/18/2014	497.97	No LNAPL	13.07	0.00	484.90	
O-30	6/11/2014	498.01	No LNAPL	12.61	0.00	485.40	
O-30	9/9/2014	498.01	No LNAPL	11.25	0.00	486.76	
O-30	11/20/2014	498.01	No LNAPL	12.14	0.00	485.87	
O-30	3/18/2015	498.01	--	12.63	--	485.38	
O-30	6/11/2015	498.01	No LNAPL	12.21	0.00	485.80	
O-30	8/12/2015	498.02	--	11.18	--	486.84	
O-30	10/15/2015	498.02	No LNAPL	12.11	0.00	485.91	
O-30	11/19/2015	498.02	--	12.28	--	485.74	
O-30	10/13/2016	498.01	No LNAPL	12.22	0.00	485.79	
O-30	3/1/2017	498.01	No LNAPL	12.33	0.00	485.68	
O-31	9/24/2013	—	11.38	12.12	0.74	—	
O-31	10/29/2013	496.11	12.43	13.11	0.68	483.54	
O-31	11/25/2013	496.11	11.46	12.99	1.53	484.34	
O-31	12/20/2013	496.13	11.63	12.87	1.24	484.25	
O-31	1/15/2014	496.13	11.93	13.06	1.13	483.97	
O-31	2/5/2014	496.13	11.98	13.14	1.16	483.92	
O-31	3/24/2014	496.13	12.27	13.29	1.02	483.66	
O-31	4/14/2014	496.13	12.25	13.39	1.14	483.65	
O-31	5/29/2014	496.13	11.91	13.10	1.19	483.98	
O-31	6/20/2014	496.13	Sheen	11.05	Sheen	485.08	
O-31	7/30/2014	496.13	10.11	11.19	1.08	485.80	
O-31	8/28/2014	496.13	10.28	11.57	1.29	485.59	
O-31	9/24/2014	496.13	11.02	11.47	0.45	485.02	
O-31	10/16/2014	496.13	11.79	12.15	0.36	484.27	
O-31	3/10/2015	496.13	11.84	12.81	0.97	484.10	
O-31	5/18/2015	496.13	11.54	12.24	0.70	484.45	
O-31	8/12/2015	496.14	10.62	10.90	0.28	485.50	
O-31	10/15/2015	496.14	11.56	11.99	0.43	484.53	
O-31	3/4/2016	496.14	12.27	13.04	0.77	483.77	
O-31	3/24/2016	496.14	12.35	13.14	0.79	483.63	Initial fluid levels and product recovered by SWI during baildown testing
O-31	6/14/2016	496.14	11.41	12.25	0.84	484.56	
O-31	7/2/2016	496.14	11.05	11.33	0.28	485.03	
O-31	7/8/2016	496.14	No LNAPL	10.61	0.00	485.53	
O-31	7/16/2016	496.14	No LNAPL	10.48	0.00	485.66	
O-31	7/23/2016	496.14	No LNAPL	9.60	0.00	486.54	
O-31	7/30/2016	496.14	No LNAPL	9.80	0.00	486.34	
O-31	8/6/2016	496.14	No LNAPL	9.84	0.00	486.30	
O-31	8/17/2016	496.14	10.21	10.57	0.36	485.86	
O-31	8/18/2016	496.14	10.22	10.63	0.41	485.84	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
O-31	10/13/2016	496.14	11.73	12.11	0.38	484.33	
O-31	3/1/2017	496.14	11.82	12.21	0.39	484.24	
O-31	3/10/2017	496.14	11.86	12.27	0.41	484.20	Baildown testing not conducted-- insufficient LNAPL thickness
O-31	6/6/2017	496.14	11.82	12.21	0.39	484.24	
O-31	7/13/2017	496.14	10.54	10.59	0.05	485.55	
O-31	7/27/2017	496.14	10.48	10.76	0.28	485.60	
O-31	8/28/2017	496.14	10.96	11.36	0.40	485.10	
O-31	9/21/2017	496.15	11.64	12.08	0.44	484.42	
O-31	10/18/2017	496.15	Sheen	12.20	Sheen	483.95	
O-31	11/1/2017	496.15	12.12	12.51	0.39	483.95	
O-31	1/19/2018	496.15	11.80	12.15	0.35	484.28	
O-31	3/12/2018	496.15	12.20	12.70	0.50	483.85	
O-31	4/3/2018	496.15	12.00	12.71	0.71	484.01	
O-31	6/8/2018	496.15	11.21	11.70	0.49	484.84	
O-31	11/6/2018	496.14	11.82	11.92	0.10	484.30	
O-32	9/24/2013	—	--	11.85	--	—	
O-32	10/29/2013	496.36	No LNAPL	12.87	0.00	483.49	
O-32	11/19/2013	496.36	No LNAPL	12.19	0.00	484.17	
O-32	12/20/2013	496.36	No LNAPL	12.15	0.00	484.21	
O-32	1/14/2014	496.36	11.76	12.71	0.95	484.41	
O-32	2/5/2014	496.40	No LNAPL	12.49	0.00	483.91	
O-32	3/24/2014	496.41	No LNAPL	12.76	0.00	483.65	
O-32	4/18/2014	496.42	No LNAPL	12.65	0.00	483.77	
O-32	5/15/2014	496.40	--	12.15	--	484.25	
O-32	5/16/2014	496.40	No LNAPL	12.23	0.00	484.17	
O-32	6/19/2014	496.40	No LNAPL	11.92	0.00	484.48	
O-32	6/20/2014	496.40	No LNAPL	11.55	0.00	484.85	
O-32	7/15/2014	496.41	No LNAPL	10.15	0.00	486.26	
O-32	8/26/2014	496.41	No LNAPL	10.84	0.00	485.57	
O-32	9/24/2014	496.40	No LNAPL	11.42	0.00	484.98	
O-32	10/21/2014	496.39	No LNAPL	12.34	0.00	484.05	
O-32	11/19/2014	496.40	No LNAPL	11.97	0.00	484.43	
O-32	12/16/2014	496.42	No LNAPL	12.15	0.00	484.27	
O-32	12/29/2014	496.42	No LNAPL	12.27	0.00	484.15	
O-32	1/21/2015	496.43	No LNAPL	12.32	0.00	484.11	
O-32	2/25/2015	496.43	No LNAPL	12.46	0.00	483.97	
O-32	3/10/2015	496.43	No LNAPL	12.37	0.00	484.06	
O-32	3/18/2015	496.43	No LNAPL	12.47	0.00	483.96	
O-32	3/26/2015	496.43	No LNAPL	12.40	0.00	484.03	
O-32	4/16/2015	496.45	--	12.26	--	484.19	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-32	5/21/2015	496.46	No LNAPL	12.02	0.00	484.44	
O-32	6/10/2015	496.46	No LNAPL	12.06	0.00	484.40	
O-32	8/19/2015	496.45	No LNAPL	11.27	0.00	485.21	
O-32	10/6/2015	496.44	No LNAPL	11.56	0.00	484.89	
O-32	10/15/2015	496.44	No LNAPL	11.98	0.00	484.46	
O-32	1/19/2016	496.46	--	12.62	--	483.80	
O-32	3/4/2016	496.46	No LNAPL	12.78	0.00	483.68	
O-32	5/26/2016	496.49	No LNAPL	12.28	0.00	484.23	
O-32	8/18/2016	496.49	Sheen	10.65	Sheen	485.84	
O-32	9/9/2016	496.48	No LNAPL	11.14	0.00	485.38	
O-32	10/13/2016	496.48	No LNAPL	12.18	0.00	484.30	
O-32	11/15/2016	496.49	No LNAPL	11.81	0.00	484.78	
O-32	2/8/2017	496.50	No LNAPL	12.26	0.00	484.31	
O-32	3/1/2017	496.50	No LNAPL	12.33	0.00	484.17	
O-32	6/13/2017	496.55	No LNAPL	11.56	0.00	485.04	
O-33	9/24/2013	—	11.41	11.48	0.07	—	
O-33	10/29/2013	496.53	12.41	12.75	0.34	484.05	
O-33	11/19/2013	496.53	11.64	12.45	0.81	484.73	
O-33	12/20/2013	496.53	11.56	12.33	0.77	484.82	
O-33	1/14/2014	496.53	10.31	10.66	0.35	486.15	
O-33	2/24/2014	496.53	12.06	13.07	1.01	484.27	
O-33	3/24/2014	496.53	12.30	12.44	0.14	484.20	
O-33	4/14/2014	496.53	12.23	12.80	0.57	484.19	
O-33	5/16/2014	496.53	11.59	12.15	0.56	484.83	
O-33	6/20/2014	496.53	11.13	11.36	0.23	485.35	
O-33	7/19/2014	496.53	9.71	9.86	0.15	486.79	
O-33	8/28/2014	496.53	10.31	10.56	0.25	486.17	
O-33	9/29/2014	496.53	11.12	11.43	0.31	485.35	
O-33	10/16/2014	496.53	11.67	11.97	0.30	484.80	
O-33	3/10/2015	496.53	11.88	12.08	0.20	484.61	
O-33	5/18/2015	496.53	11.43	11.96	0.53	484.99	
O-33	8/12/2015	496.57	10.45	10.61	0.16	486.13	
O-33	10/15/2015	496.57	11.50	11.69	0.19	485.07	
O-33	3/4/2016	496.57	12.01	13.62	1.61	484.29	
O-33	3/24/2016	496.57	12.24	13.23	0.99	484.13	Initial fluid levels and product recovered by SWI during baildown testing
O-33	6/14/2016	496.57	11.43	11.52	0.09	485.12	
O-33	8/16/2016	496.62	10.05	10.15	0.10	486.55	
O-33	8/18/2016	496.57	10.12	10.23	0.11	486.43	
O-33	10/13/2016	496.62	11.70	11.78	0.08	484.90	
O-33	3/1/2017	496.62	11.85	12.20	0.35	484.70	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-33	6/6/2017	496.62	11.90	12.08	0.18	484.68	
O-34	9/24/2013	—	--	10.87	--	—	
O-34	10/29/2013	496.31	11.31	13.72	2.41	484.52	
O-34	11/19/2013	496.31	10.97	11.42	0.45	485.25	
O-34	12/20/2013	496.31	10.88	11.30	0.42	485.35	
O-34	1/14/2014	496.31	10.91	12.78	1.87	485.03	
O-34	2/25/2014	496.31	11.11	13.71	2.60	484.68	
O-34	3/24/2014	496.31	11.16	13.85	2.69	484.61	
O-34	4/14/2014	496.31	11.19	13.90	2.71	484.58	
O-34	5/16/2014	496.31	10.86	11.46	0.60	485.33	
O-34	6/20/2014	496.31	10.39	10.60	0.21	485.88	
O-34	7/19/2014	496.31	Sheen	9.98	Sheen	486.33	
O-34	8/28/2014	496.31	9.60	9.61	0.01	486.71	
O-34	9/29/2014	496.31	10.44	10.47	0.03	485.86	
O-34	10/16/2014	496.31	11.00	11.06	0.06	485.30	
O-34	3/10/2015	496.31	11.04	11.47	0.43	485.18	
O-34	5/18/2015	496.31	10.70	11.04	0.34	485.54	
O-34	8/12/2015	496.33	9.67	9.68	0.01	486.70	
O-34	10/15/2015	496.33	10.80	10.81	0.01	485.57	
O-34	3/4/2016	496.33	11.28	13.38	2.10	484.68	
O-34	6/14/2016	496.33	10.66	10.76	0.10	485.65	
O-34	7/2/2016	496.33	No LNAPL	10.16	0.00	486.17	
O-34	7/9/2016	496.33	No LNAPL	9.67	0.00	486.66	
O-34	8/16/2016	496.43	Sheen	9.28	Sheen	487.15	
O-34	8/18/2016	496.33	Sheen	9.36	Sheen	486.97	
O-34	10/13/2016	496.43	10.99	11.00	0.01	485.44	
O-34	3/2/2017	496.43	11.14	11.15	0.01	485.29	
O-34	6/6/2017	496.43	11.15	11.16	0.01	485.28	
O-34	7/13/2017	496.43	Sheen	9.75	Sheen	486.68	
O-34	9/21/2017	496.52	Sheen	11.03	Sheen	485.49	
O-34	1/19/2018	496.52	Sheen	11.23	Sheen	485.29	
O-34	3/12/2018	496.52	11.57	11.58	0.01	484.95	
O-34	7/17/2018	496.52	No LNAPL	9.89	0.00	486.63	
O-34	9/10/2018	496.56	No LNAPL	9.74	0.00	486.82	
O-35	9/24/2013	—	--	11.02	--	—	
O-35	10/29/2013	496.88	12.11	12.12	0.01	484.77	
O-35	11/19/2013	496.88	11.37	11.38	0.01	485.51	
O-35	12/20/2013	496.88	11.29	11.31	0.02	485.59	
O-35	1/14/2014	496.88	11.58	11.68	0.10	485.28	
O-35	2/25/2014	496.88	11.97	12.11	0.14	484.88	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-35	3/24/2014	496.88	12.05	12.20	0.15	484.80	
O-35	4/14/2014	496.88	12.08	12.34	0.26	484.75	
O-35	5/16/2014	496.88	11.38	11.42	0.04	485.49	
O-35	6/20/2014	496.88	Sheen	10.82	Sheen	486.06	
O-35	7/19/2014	496.88	9.72	9.75	0.03	487.15	
O-35	8/28/2014	496.88	10.00	10.14	0.14	486.85	
O-35	9/29/2014	496.88	10.83	10.97	0.14	486.02	
O-35	10/16/2014	496.88	11.38	11.71	0.33	485.43	
O-35	3/10/2015	496.88	11.61	11.81	0.20	485.23	
O-35	10/15/2015	496.88	11.30	11.38	0.08	485.60	
O-35	3/4/2016	496.88	12.12	12.50	0.38	484.73	
O-35	8/16/2016	497.16	9.70	9.81	0.11	487.44	
O-35	10/13/2016	497.16	11.45	11.57	0.12	485.69	
O-35	3/1/2017	497.16	11.48	11.50	0.02	485.68	
O-36	9/24/2013	—	11.27	11.28	0.01	—	
O-36	10/29/2013	496.49	12.32	12.33	0.01	484.17	
O-36	11/19/2013	496.49	11.51	12.54	1.03	484.77	
O-36	12/20/2013	496.49	11.51	11.95	0.44	484.89	
O-36	1/14/2014	496.49	11.77	12.22	0.45	484.63	
O-36	2/25/2014	496.49	12.11	12.55	0.44	484.29	
O-36	3/24/2014	496.49	12.15	12.64	0.49	484.24	
O-36	4/14/2014	496.49	12.10	12.82	0.72	484.25	
O-36	5/16/2014	496.49	11.50	11.85	0.35	484.92	
O-36	6/20/2014	496.49	11.14	11.17	0.03	485.34	
O-36	7/30/2014	496.49	Sheen	9.96	Sheen	486.53	
O-36	8/28/2014	496.49	Sheen	10.25	Sheen	486.24	
O-36	9/29/2014	496.49	Sheen	11.04	Sheen	485.45	
O-36	10/16/2014	496.49	11.58	11.60	0.02	484.91	
O-36	3/10/2015	496.49	Sheen	11.79	Sheen	484.70	
O-36	10/15/2015	496.53	Sheen	11.37	Sheen	485.20	
O-36	3/4/2016	496.53	No LNAPL	12.16	0.00	484.42	
O-36	8/18/2016	496.52	10.00	10.01	0.01	486.52	
O-36	10/13/2016	496.52	Sheen	11.48	Sheen	485.04	
O-36	3/1/2017	496.52	No LNAPL	11.60	0.00	484.92	
O-37	9/24/2013	—	10.92	11.20	0.28	—	
O-37	10/29/2013	496.42	12.00	12.20	0.20	484.38	
O-37	11/19/2013	496.42	11.36	11.64	0.28	485.00	
O-37	12/20/2013	496.42	11.27	11.55	0.28	485.09	
O-37	1/14/2014	496.42	11.57	11.81	0.24	484.80	
O-37	2/25/2014	496.42	11.93	12.15	0.22	484.45	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-37	3/24/2014	496.42	12.02	12.25	0.23	484.35	
O-37	4/14/2014	496.42	12.04	12.25	0.21	484.34	
O-37	5/16/2014	496.42	11.34	11.58	0.24	485.03	
O-37	6/20/2014	496.42	No LNAPL	10.90	0.00	485.52	
O-37	7/19/2014	496.42	9.68	10.02	0.34	486.67	
O-37	8/28/2014	496.42	9.96	10.25	0.29	486.40	
O-37	9/29/2014	496.42	10.79	11.04	0.25	485.58	
O-37	10/16/2014	496.35	Sheen	11.38	Sheen	484.97	
O-37	3/10/2015	496.35	Sheen	11.62	Sheen	484.73	
O-37	10/15/2015	496.48	Sheen	11.09	Sheen	485.43	
O-37	3/4/2016	496.48	11.95	11.99	0.04	484.57	
O-37	8/18/2016	496.54	9.69	9.93	0.24	486.80	
O-37	10/13/2016	496.54	11.24	11.37	0.13	485.27	
O-37	10/19/2016	496.54	11.42	11.46	0.04	485.11	0.01 gallons of LNAPL recovered during well redevelopment
O-37	3/1/2017	496.54	11.50	11.51	0.01	485.04	
O-38	9/24/2013	—	10.91	10.93	0.02	—	
O-38	10/29/2013	496.60	11.82	12.77	0.95	484.59	
O-38	11/19/2013	496.60	11.10	12.72	1.62	485.18	
O-38	12/20/2013	496.60	11.14	12.11	0.97	485.27	
O-38	1/14/2014	496.60	11.37	12.62	1.25	484.98	
O-38	2/25/2014	496.60	11.63	13.65	2.02	484.57	
O-38	3/18/2014	496.60	11.76	13.00	1.24	484.59	
O-38	4/14/2014	496.60	11.68	13.56	1.88	484.54	
O-38	5/16/2014	496.60	11.17	11.97	0.80	485.27	
O-38	6/11/2014	496.60	11.24	12.78	1.54	485.05	
O-38	7/19/2014	496.60	9.65	9.79	0.14	486.92	
O-38	8/28/2014	496.60	9.92	10.03	0.11	486.66	
O-38	9/9/2014	496.60	10.18	10.30	0.12	486.40	
O-38	10/16/2014	496.60	11.25	11.64	0.39	485.27	
O-38	11/20/2014	496.60	11.06	11.53	0.47	485.45	
O-38	3/10/2015	496.60	11.46	11.85	0.39	485.06	
O-38	3/19/2015	496.60	11.53	12.26	0.73	484.92	
O-38	5/18/2015	496.60	11.12	11.35	0.23	485.43	
O-38	6/11/2015	496.60	11.15	11.45	0.30	485.39	
O-38	8/12/2015	496.81	Sheen	10.13	Sheen	486.72	
O-38	10/15/2015	496.81	11.16	11.21	0.05	485.68	
O-38	11/19/2015	496.81	11.24	11.83	0.59	485.45	
O-38	3/4/2016	496.81	11.92	12.75	0.83	484.77	
O-38	6/14/2016	496.81	11.12	11.32	0.20	485.65	
O-38	7/2/2016	496.81	No LNAPL	10.70	0.00	486.11	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
O-38	7/9/2016	496.81	No LNAPL	10.18	0.00	486.63	
O-38	8/18/2016	496.81	No LNAPL	9.82	0.00	486.99	
O-38	8/18/2016	496.89	Sheen	9.84	Sheen	487.05	
O-38	10/13/2016	496.89	11.37	11.38	0.01	485.52	
O-38	3/1/2017	496.89	Sheen	11.50	Sheen	485.39	
O-38	6/6/2017	496.89	11.53	11.58	0.05	485.35	
PZ-1-15	4/25/2014	498.08	--	13.01	--	485.07	
PZ-1-15	5/20/2014	498.10	--	13.43	--	484.67	
PZ-1-15	6/4/2014	498.12	--	13.63	--	484.49	
PZ-1-20	4/25/2014	500.62	--	15.64	--	484.98	
PZ-1-20	5/20/2014	500.58	--	16.07	--	484.51	
PZ-1-20	6/4/2014	500.65	--	16.25	--	484.40	
PZ-1-45	4/25/2014	500.39	--	15.41	--	484.98	
PZ-1-45	5/20/2014	500.35	--	15.85	--	484.50	
PZ-1-45	6/4/2014	500.42	--	16.03	--	484.39	
PZ-1-65	4/25/2014	500.41	--	15.40	--	485.01	
PZ-1-65	5/20/2014	500.36	--	15.83	--	484.53	
PZ-1-65	6/4/2014	500.44	--	16.03	--	484.41	
PZ-2-15	4/25/2014	498.20	--	13.10	--	485.10	
PZ-2-15	5/20/2014	498.21	--	11.85	--	486.36	
PZ-2-15	6/4/2014	498.21	--	11.66	--	486.55	
PZ-2-15	11/20/2014	498.19	No LNAPL	11.84	0.00	486.35	
PZ-2-15	3/19/2015	498.19	--	13.48	--	484.71	
PZ-2-15	6/11/2015	498.19	No LNAPL	12.02	0.00	486.17	
PZ-2-15	8/12/2015	498.27	--	10.60	--	487.67	
PZ-2-15	11/19/2015	498.27	--	11.76	--	486.51	
PZ-3-15	4/25/2014	498.20	--	12.95	--	485.25	
PZ-3-15	5/20/2014	498.18	--	12.14	--	486.04	
PZ-3-15	6/4/2014	498.19	--	12.29	--	485.90	
PZ-3-15	11/20/2014	498.15	No LNAPL	11.45	0.00	486.70	
PZ-3-15	3/19/2015	498.15	--	12.77	--	485.38	
PZ-3-15	6/11/2015	498.15	No LNAPL	10.98	0.00	487.17	
PZ-3-15	8/12/2015	498.16	--	9.18	--	488.98	
PZ-3-15	11/19/2015	498.16	--	11.92	--	486.24	
PZ-4-13	4/25/2014	489.73	--	Frozen	--	—	Frozen at 5.37 feet below measuring point
PZ-4-13	5/20/2014	489.70	--	Frozen	--	—	Water at 5.62 feet, frozen at 8.89 feet below measuring point
PZ-4-13	6/4/2014	489.68	--	5.83	--	483.85	
PZ-4-20	4/25/2014	489.65	--	Frozen	--	—	Frozen at 5.67 feet below measuring point
PZ-4-20	5/20/2014	489.63	--	Frozen	--	—	Water at 5.68 feet, frozen at 9.33 feet below measuring point
PZ-4-20	6/4/2014	489.61	--	5.75	--	483.86	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
PZ-4-45	4/25/2014	489.75	--	Frozen	--	—	Frozen at 5.73 feet below measuring point
PZ-4-45	5/20/2014	489.72	--	Frozen	--	—	Water at 5.95 feet, frozen at 9.07 feet below measuring point
PZ-4-45	6/4/2014	489.69	--	5.88	--	483.81	
PZ-4-65	4/25/2014	489.60	--	Frozen	--	—	Frozen at 5.32 feet below measuring point
PZ-4-65	5/20/2014	489.57	--	Frozen	--	—	Water at 5.54 feet, frozen at 8.46 feet below measuring point
PZ-4-65	6/4/2014	489.53	--	5.71	--	483.82	
PZ-5-15	4/25/2014	491.91	--	Frozen	--	—	Frozen at 8.34 feet below measuring point
PZ-5-15	5/20/2014	491.87	--	Frozen	--	—	Frozen at 8.30 feet below measuring point
PZ-5-15	6/4/2014	491.87	--	Frozen	--	—	Water at 8.09 feet, frozen at 8.31 feet below measuring point
PZ-5-20	4/25/2014	492.03	--	Frozen	--	—	Frozen at 8.49 feet below measuring point
PZ-5-20	5/20/2014	492.00	--	Frozen	--	—	Frozen at 8.29 feet below measuring point
PZ-5-20	6/4/2014	492.00	--	Frozen	--	—	Frozen at 8.30 feet below measuring point
PZ-5-45	4/25/2014	491.78	--	Frozen	--	—	Frozen at 8.10 feet below measuring point
PZ-5-45	5/20/2014	491.75	--	Frozen	--	—	Frozen at 8.07 feet below measuring point
PZ-5-45	6/4/2014	491.74	--	Frozen	--	—	Water at 7.97 feet, frozen at 8.05 feet below measuring point
PZ-5-65	4/25/2014	491.98	--	Frozen	--	—	Frozen at 8.37 feet below measuring point
PZ-5-65	5/20/2014	491.92	--	Frozen	--	—	Frozen at 8.15 feet below measuring point
PZ-5-65	6/4/2014	491.91	--	Frozen	--	—	Frozen at 8.40 feet below measuring point
R-3	9/2/2008	—	No LNAPL	5.91	0.00	—	
R-3	8/17/2009	—	No LNAPL	5.97	0.00	—	
R-3	4/25/2011	493.98	No LNAPL	Frozen	0.00	—	Frozen
R-3	5/24/2011	493.98	No LNAPL	Frozen	0.00	—	Frozen at 7.38 ft BTOC
R-3	7/15/2011	493.98	No LNAPL	5.89	0.00	488.09	
R-3	10/21/2011	493.98	No LNAPL	Dry	0.00	—	Well is dry
R-3	2/17/2012	494.20	No LNAPL	Frozen	0.00	—	Frozen at 7.42 ft BTOC
R-3	4/10/2012	494.20	No LNAPL	Frozen	0.00	—	Frozen at 7.41 ft BTOC
R-3	7/17/2012	494.20	No LNAPL	6.69	0.00	487.51	
R-3	8/21/2012	494.20	No LNAPL	6.42	0.00	487.78	
R-3	9/18/2012	494.20	No LNAPL	6.52	0.00	487.68	
R-3	10/16/2012	494.20	No LNAPL	6.53	0.00	487.67	
R-3	11/29/2012	494.08	No LNAPL	7.41	0.00	486.67	
R-3	12/27/2012	494.08	No LNAPL	7.58	0.00	486.50	
R-3	1/24/2013	494.08	No LNAPL	Frozen	0.00	—	Frozen at 7.52 ft BTOC
R-3	2/26/2013	494.08	No LNAPL	Frozen	0.00	—	Frozen at 7.40 ft BTOC
R-3	5/31/2013	494.08	No LNAPL	6.72	0.00	487.36	
R-3	10/29/2013	494.08	No LNAPL	Dry	0.00	—	Well was dry--bottom at 7.32 feet below measuring point
R-3	10/15/2015	494.03	No LNAPL	5.62	0.00	488.41	
R-4	8/18/2009	494.88	--	7.09	--	487.79	
R-4	4/25/2011	494.88	--	Frozen	--	—	Frozen
R-4	5/24/2011	494.88	--	8.27	--	486.61	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-4	7/15/2011	494.88	Sheen	7.27	Sheen	487.61	
R-4	10/21/2011	494.88	No LNAPL	Dry	0.00	—	
R-5	8/17/2009	—	7.75	7.92	0.17	—	
R-5	4/26/2011	495.33	Sheen	Frozen	Sheen	—	Frozen at 8.60 ft BTOC
R-5	5/24/2011	495.33	No LNAPL	Frozen	0.00	—	Frozen at 8.70 ft BTOC
R-5	7/15/2011	495.33	7.80	7.85	0.05	487.52	
R-5	10/21/2011	495.33	10.15	10.31	0.16	485.15	
R-5	2/17/2012	495.29	10.26	Frozen	0.09	—	Frozen at 10.35 ft BTOC
R-5	4/12/2012	495.29	10.08	Frozen	0.23	—	Frozen at 10.31 ft BTOC
R-5	7/18/2012	495.29	8.19	8.20	0.01	487.10	
R-5	8/21/2012	495.29	8.85	9.11	0.26	486.39	
R-5	9/18/2012	495.29	9.23	9.54	0.31	486.00	
R-5	10/16/2012	495.29	9.47	9.72	0.25	485.77	
R-5	11/29/2012	495.33	8.85	Frozen	0.28	—	
R-5	12/28/2012	495.33	8.96	Frozen	0.02	—	Frozen at 8.98 ft BTOC
R-5	2/26/2013	495.33	Sheen	Frozen	Sheen	—	Frozen at 9.01 ft BTOC
R-5	3/28/2013	495.33	Sheen	Frozen	Sheen	—	Frozen at 8.96 ft BTOC. R-35R, R-39, and R-40 were offline on this date
R-14	8/17/2009	—	8.18	8.19	0.01	—	
R-14	4/29/2011	494.01	8.81	Dry	0.08	—	Dry; bottom of well 8.89 ft BTOC
R-14	5/24/2011	494.01	No LNAPL	Dry	0.00	—	Dry; bottom of well 8.95 ft BTOC
R-14	6/21/2011	494.01	No LNAPL	Dry	0.00	—	Dry
R-14	7/15/2011	494.01	Sheen	8.38	Sheen	485.63	
R-14	8/23/2011	494.01	8.59	8.79	0.20	485.38	
R-14	9/22/2011	494.01	No LNAPL	Dry	0.00	—	Dry
R-14	10/21/2011	494.01	No LNAPL	Dry	0.00	—	Dry
R-14A	9/2/2008	—	8.28	8.37	0.09	—	
R-14A	8/17/2009	—	No LNAPL	8.38	0.00	—	
R-14A	4/29/2011	494.12	No LNAPL	8.97	0.00	485.15	
R-14A	5/24/2011	494.12	9.45	9.68	0.23	484.63	
R-14A	6/21/2011	494.12	9.15	9.26	0.11	484.95	
R-14A	7/15/2011	494.12	No LNAPL	8.45	0.00	485.67	
R-14A	8/23/2011	494.12	8.65	8.89	0.24	485.42	
R-14A	9/22/2011	494.12	9.63	10.59	0.96	484.31	
R-14A	10/21/2011	494.12	10.44	10.94	0.50	483.59	
R-14A	12/2/2011	494.09	11.50	11.98	0.48	482.50	
R-14A	2/17/2012	494.09	10.31	10.70	0.39	483.71	
R-14A	3/14/2012	494.09	10.34	10.78	0.44	483.67	
R-14A	4/12/2012	494.09	10.21	10.54	0.33	483.82	
R-14A	4/19/2012	494.09	9.71	9.78	0.07	484.37	
R-14A	5/7/2012	494.09	9.88	10.72	0.84	484.05	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-14A	6/13/2012	494.09	9.08	9.31	0.23	484.97	
R-14A	7/17/2012	494.09	8.79	8.87	0.08	485.28	
R-14A	7/30/2012	494.09	11.47	11.48	0.01	482.62	
R-14A	8/21/2012	494.09	9.10	9.82	0.72	484.85	
R-14A	9/18/2012	494.09	9.71	10.72	1.01	484.19	
R-14A	10/15/2012	494.09	9.70	10.51	0.81	484.24	
R-14A	10/23/2012	494.09	10.04	10.82	0.78	483.90	Initial levels of October 2012 baildown test
R-14A	11/1/2012	494.09	9.82	10.10	0.28	484.22	
R-14A	11/29/2012	494.09	9.37	9.63	0.26	484.67	
R-14A	12/28/2012	494.09	9.67	10.25	0.58	484.31	
R-14A	1/24/2013	494.09	9.66	10.00	0.34	484.37	
R-14A	2/26/2013	494.09	9.25	10.42	1.17	484.62	
R-14A	3/29/2013	494.09	9.93	10.48	0.55	484.06	R-35R, R-39, and R-40 were offline on this date
R-14A	4/24/2013	494.09	9.87	10.46	0.59	484.11	
R-14A	5/21/2013	494.11	9.82	10.22	0.40	484.21	
R-14A	6/24/2013	494.12	Sheen	9.03	Sheen	485.09	
R-14A	7/23/2013	494.13	Sheen	8.69	Sheen	485.44	
R-14A	8/1/2013	494.13	Sheen	8.69	Sheen	485.44	
R-14A	8/21/2013	494.13	Sheen	8.64	Sheen	485.49	
R-14A	9/24/2013	494.13	9.62	9.71	0.09	484.49	
R-14A	9/30/2013	494.13	9.87	10.03	0.16	484.23	
R-14A	10/22/2013	494.11	10.44	10.84	0.40	483.59	
R-14A	11/26/2013	494.11	9.62	9.63	0.01	484.49	
R-14A	12/18/2013	494.13	9.76	10.47	0.71	484.24	
R-14A	1/9/2014	494.13	9.99	10.75	0.76	484.00	
R-14A	2/5/2014	494.13	10.15	10.77	0.62	483.86	
R-14A	3/18/2014	494.13	10.40	10.73	0.33	483.67	
R-14A	3/24/2014	494.13	10.47	10.80	0.33	483.60	
R-14A	4/18/2014	494.12	10.36	10.58	0.22	483.72	
R-14A	5/15/2014	494.14	9.85	10.39	0.54	484.19	
R-14A	6/11/2014	494.14	9.98	10.41	0.43	484.08	
R-14A	6/19/2014	494.14	9.68	9.76	0.08	484.44	
R-14A	7/15/2014	494.13	7.93	8.17	0.24	486.15	
R-14A	8/26/2014	494.12	8.63	8.64	0.01	485.49	
R-14A	9/9/2014	494.12	8.90	8.91	0.01	485.22	
R-14A	9/24/2014	494.12	9.23	9.24	0.01	484.89	
R-14A	10/16/2014	494.09	9.98	10.04	0.06	484.10	
R-14A	10/21/2014	494.09	10.13	10.22	0.09	483.94	
R-14A	11/19/2014	494.13	9.75	9.76	0.01	484.38	
R-14A	12/16/2014	494.14	9.93	10.10	0.17	484.18	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-14A	12/29/2014	494.14	10.03	10.27	0.24	484.06	
R-14A	1/21/2015	494.13	10.07	10.38	0.31	484.00	
R-14A	2/25/2015	494.13	10.13	10.57	0.44	483.92	
R-14A	3/10/2015	494.14	10.03	10.38	0.35	484.04	
R-14A	3/18/2015	494.14	10.12	10.59	0.47	483.93	
R-14A	3/26/2015	494.14	10.09	10.49	0.40	483.97	
R-14A	4/16/2015	494.12	9.94	10.16	0.22	484.14	
R-14A	5/21/2015	494.13	9.78	9.79	0.01	484.35	
R-14A	6/10/2015	494.15	Sheen	9.83	Sheen	484.32	
R-14A	8/12/2015	494.15	No LNAPL	8.76	0.00	485.43	
R-14A	8/19/2015	494.15	Sheen	9.05	Sheen	485.17	
R-14A	10/6/2015	494.14	Sheen	9.37	Sheen	484.81	
R-14A	10/15/2015	494.14	9.78	9.80	0.02	484.40	
R-14A	11/19/2015	494.14	9.88	9.99	0.11	484.24	
R-14A	1/19/2016	494.14	10.35	10.75	0.40	483.71	
R-14A	3/4/2016	494.14	10.47	10.64	0.17	483.69	
R-14A	5/26/2016	494.14	9.97	10.07	0.10	484.17	
R-14A	9/9/2016	494.15	8.87	8.88	0.01	485.33	
R-14A	10/13/2016	494.15	9.90	9.91	0.01	484.25	
R-14A	11/15/2016	494.16	No LNAPL	9.51	0.00	484.69	
R-14A	2/8/2017	494.15	Sheen	9.95	Sheen	484.27	
R-14A	2/15/2017	494.15	Sheen	9.95	Sheen	484.23	
R-14A	3/1/2017	494.15	No LNAPL	9.98	0.00	484.17	
R-14A	6/13/2017	494.15	No LNAPL	9.25	0.00	484.96	
R-18	8/17/2009	—	13.21	13.37	0.16	—	
R-18	4/26/2011	499.61	14.06	14.33	0.27	485.49	
R-18	7/15/2011	499.61	13.38	13.51	0.13	486.20	
R-18	10/21/2011	499.61	15.40	16.17	0.77	484.05	
R-18	2/16/2012	499.67	15.18	16.57	1.39	484.20	
R-18	4/12/2012	499.67	15.11	16.31	1.20	484.31	
R-18	5/7/2012	499.67	14.95	15.70	0.75	484.56	
R-18	7/18/2012	499.67	13.85	13.97	0.12	485.79	
R-18	8/21/2012	499.67	Sheen	14.19	Sheen	485.48	
R-18	9/19/2012	499.67	14.84	15.36	0.52	484.72	
R-18	10/15/2012	499.67	14.82	15.19	0.37	484.77	
R-18	11/29/2012	499.76	14.47	14.69	0.22	485.24	
R-18	12/28/2012	499.76	14.79	15.21	0.42	484.88	
R-18	2/26/2013	499.76	14.94	15.23	0.29	484.76	
R-18	3/28/2013	499.76	14.99	15.40	0.41	484.68	R-35R, R-39, and R-40 were offline on this date
R-18	4/24/2013	499.76	15.04	15.44	0.40	484.64	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-18	7/23/2013	499.82	13.69	13.71	0.02	486.13	
R-18	8/1/2013	499.82	13.59	13.60	0.01	486.23	
R-18	8/21/2013	499.82	Sheen	13.56	Sheen	486.26	
R-18	10/22/2013	499.85	15.40	15.81	0.41	484.36	
R-18	1/9/2014	499.83	15.00	15.58	0.58	484.71	
R-18	2/5/2014	499.86	15.15	15.73	0.58	484.59	
R-18	3/24/2014	499.87	15.47	15.94	0.47	484.30	
R-18	4/18/2014	499.87	15.26	15.78	0.52	484.50	
R-18	5/15/2014	499.87	14.82	15.11	0.29	484.99	
R-18	5/16/2014	499.87	14.82	15.11	0.29	484.99	
R-18	6/19/2014	499.88	14.71	14.88	0.17	485.13	
R-18	6/20/2014	499.88	14.39	14.45	0.06	485.48	
R-18	7/15/2014	499.88	Sheen	12.89	Sheen	486.99	
R-18	8/26/2014	499.87	Sheen	13.54	Sheen	486.33	
R-18	9/24/2014	499.88	Sheen	14.18	Sheen	485.70	
R-18	10/16/2014	499.87	14.91	15.06	0.15	484.93	
R-18	10/21/2014	499.87	15.06	15.27	0.21	484.77	
R-18	11/19/2014	499.87	14.68	14.69	0.01	485.19	
R-18	12/16/2014	499.87	14.89	14.95	0.06	484.97	
R-18	12/29/2014	499.87	15.00	15.09	0.09	484.85	
R-18	1/21/2015	499.88	15.05	15.30	0.25	484.78	
R-18	2/25/2015	499.90	15.14	15.53	0.39	484.68	
R-18	3/10/2015	499.90	15.07	15.49	0.42	484.74	
R-18	3/18/2015	499.90	15.15	15.61	0.46	484.65	
R-18	3/26/2015	499.90	15.09	15.58	0.49	484.71	
R-18	4/16/2015	499.93	14.97	15.41	0.44	484.87	
R-18	5/21/2015	499.93	14.74	14.90	0.16	485.16	
R-18	6/10/2015	499.93	14.77	14.94	0.17	485.12	
R-18	8/12/2015	499.93	13.71	13.75	0.04	486.25	
R-18	8/19/2015	499.93	14.01	14.05	0.04	485.98	
R-18	10/6/2015	499.93	14.31	14.51	0.20	485.62	
R-18	10/15/2015	499.93	14.71	14.96	0.25	485.21	
R-18	1/19/2016	499.91	15.37	15.73	0.36	484.46	
R-18	3/4/2016	499.91	15.44	15.95	0.51	484.41	
R-18	3/24/2016	499.91	15.57	16.02	0.45	484.24	Baildown testing not conducted- insufficient LNAPL thickness
R-18	3/25/2016	499.91	15.53	15.99	0.46	484.28	Baildown testing not conducted- insufficient LNAPL thickness
R-18	3/28/2016	499.91	15.50	15.96	0.46	484.31	Baildown testing not conducted- insufficient LNAPL thickness
R-18	3/31/2016	499.91	15.39	15.87	0.48	484.42	Baildown testing not conducted- insufficient LNAPL thickness
R-18	4/6/2016	499.91	15.02	15.52	0.50	484.78	Initial fluid levels and product recovered by SWI during baildown testing
R-18	5/26/2016	499.95	14.97	15.29	0.32	484.93	

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R-18	6/14/2016	499.95	14.62	14.71	0.09	485.31	
R-18	8/18/2016	499.95	No LNAPL	13.34	0.00	486.61	
R-18	9/9/2016	499.94	Sheen	13.85	Sheen	486.14	
R-18	10/13/2016	499.94	14.89	14.95	0.06	485.04	
R-18	11/15/2016	499.95	Sheen	14.49	Sheen	485.50	
R-18	2/8/2017	499.96	Sheen	14.95	Sheen	485.08	
R-18	3/1/2017	499.96	14.99	15.04	0.05	484.96	
R-18	6/6/2017	500.00	Sheen	15.04	Sheen	484.96	
R-18	6/13/2017	500.00	14.29	14.30	0.01	485.77	
R-20R	7/15/2011	—	No LNAPL	12.00	0.00	—	
R-20R	10/21/2011	—	14.29	14.30	0.01	—	
R-20R	2/17/2012	498.77	14.13	14.15	0.02	484.64	
R-20R	3/15/2012	498.77	14.14	14.41	0.27	484.58	
R-20R	4/12/2012	498.77	14.03	14.04	0.01	484.74	
R-20R	5/14/2012	498.77	13.85	14.73	0.88	484.75	
R-20R	6/12/2012	498.77	12.88	12.96	0.08	485.87	
R-20R	7/18/2012	498.77	12.53	12.61	0.08	486.22	
R-20R	8/21/2012	498.77	12.81	13.43	0.62	485.84	
R-20R	9/18/2012	498.77	13.55	14.01	0.46	485.13	
R-20R	10/15/2012	498.77	13.59	13.66	0.07	485.17	
R-20R	11/29/2012	498.74	13.13	13.23	0.10	485.59	
R-20R	12/28/2012	498.74	13.49	13.60	0.11	485.23	
R-20R	2/26/2013	498.74	13.62	13.68	0.06	485.11	
R-20R	3/28/2013	498.74	13.71	14.01	0.30	484.97	R-35R, R-39, and R-40 were offline on this date
R-20R	4/24/2013	498.74	13.75	13.81	0.06	484.98	
R-20R	5/31/2013	498.74	12.40	12.41	0.01	486.34	
R-20R	6/24/2013	498.74	12.44	12.75	0.31	486.24	
R-20R	7/23/2013	498.74	12.18	12.47	0.29	486.51	
R-20R	8/21/2013	498.74	12.03	12.42	0.39	486.64	
R-20R	9/30/2013	498.74	13.45	13.55	0.10	485.27	
R-20R	10/29/2013	498.74	14.30	14.35	0.05	484.43	
R-20R	11/19/2013	498.74	13.57	13.66	0.09	485.15	
R-20R	12/20/2013	498.74	13.33	14.13	0.80	485.26	
R-20R	1/14/2014	498.74	13.73	13.83	0.10	484.99	
R-20R	2/24/2014	498.74	14.05	14.15	0.10	484.67	
R-20R	3/24/2014	498.74	14.12	14.22	0.10	484.60	
R-20R	4/14/2014	498.79	14.13	14.24	0.11	484.64	
R-20R	5/16/2014	498.79	13.48	13.52	0.04	485.30	
R-20R	6/20/2014	498.79	Sheen	12.99	Sheen	485.80	
R-20R	7/19/2014	498.79	11.87	11.91	0.04	486.91	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-20R	8/28/2014	498.79	12.07	12.41	0.34	486.66	
R-20R	9/29/2014	498.79	12.94	13.00	0.06	485.84	
R-20R	10/16/2014	498.79	13.49	13.57	0.08	485.28	
R-20R	3/10/2015	498.79	13.46	14.33	0.87	485.17	
R-20R	5/21/2015	498.79	13.25	13.61	0.36	485.47	Skimmer pump present; removed for measurement, and reinstalled after
R-20R	8/12/2015	498.79	12.19	12.21	0.02	486.64	
R-20R	10/15/2015	498.80	13.18	13.82	0.64	485.54	Skimmer pump present
R-20R	3/4/2016	498.80	13.94	14.42	0.48	484.82	
R-20R	3/24/2016	498.80	14.10	14.20	0.10	484.68	Baildown testing not conducted- insufficient LNAPL thickness
R-20R	3/25/2016	498.80	14.07	14.19	0.12	484.71	Baildown testing not conducted- insufficient LNAPL thickness
R-20R	3/28/2016	498.80	14.03	14.19	0.16	484.74	Baildown testing not conducted- insufficient LNAPL thickness
R-20R	3/31/2016	498.80	13.92	14.08	0.16	484.85	Baildown testing not conducted- insufficient LNAPL thickness
R-20R	4/28/2016	498.80	13.90	14.30	0.40	484.82	Baildown testing not conducted- insufficient LNAPL thickness
R-20R	4/29/2016	498.80	13.83	14.31	0.48	484.88	Baildown testing not conducted- insufficient LNAPL thickness
R-20R	5/2/2016	498.80	13.84	14.53	0.69	484.83	Initial fluid levels and product recovered by SWI during baildown testing
R-20R	6/14/2016	498.80	13.10	13.18	0.08	485.68	
R-20R	7/2/2016	498.80	No LNAPL	12.61	0.00	486.19	
R-20R	7/4/2016	498.80	No LNAPL	12.41	0.00	486.39	
R-20R	7/9/2016	498.80	No LNAPL	12.08	0.00	486.72	
R-20R	7/12/2016	498.80	No LNAPL	12.10	0.00	486.70	
R-20R	8/18/2016	498.80	Sheen	11.78	Sheen	487.02	
R-20R	10/13/2016	498.80	13.32	13.65	0.33	485.42	
R-20R	3/1/2017	498.80	13.42	13.52	0.10	485.36	
R-20R	6/6/2017	498.80	13.35	14.10	0.75	485.31	
R-20R	7/8/2017	498.80	12.28	12.30	0.02	486.52	
R-21	1/15/2007	495.09	10.95	10.97	0.02	484.14	
R-21	4/23/2007	495.09	11.20	11.22	0.02	483.89	
R-21	8/17/2009	495.09	10.95	11.24	0.29	484.09	
R-21	4/18/2011	495.06	13.98	15.75	1.77	480.75	
R-21	5/18/2011	495.06	14.23	15.34	1.11	480.63	
R-21	6/21/2011	495.06	12.81	14.29	1.48	481.98	
R-21	7/14/2011	495.06	12.36	13.11	0.75	482.56	
R-21	8/23/2011	495.06	9.46	9.51	0.05	485.59	
R-21	9/22/2011	495.06	11.97	13.65	1.68	482.78	
R-21	10/21/2011	495.06	13.28	15.16	1.88	481.43	
R-21	12/2/2011	495.53	12.44	14.78	2.34	482.66	
R-21	2/17/2012	495.53	12.45	14.00	1.55	482.79	
R-21	3/14/2012	495.53	Sheen	12.84	Sheen	482.69	
R-21	4/12/2012	495.53	12.65	12.66	0.01	482.88	
R-21	4/19/2012	495.53	11.91	12.21	0.30	483.56	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-21	5/7/2012	495.53	12.18	12.89	0.71	483.22	
R-21	6/12/2012	495.53	11.66	11.67	0.01	483.87	
R-21	7/18/2012	495.53	11.18	11.78	0.60	484.24	
R-21	7/30/2012	495.53	10.73	11.19	0.46	484.72	
R-21	8/21/2012	495.53	11.76	11.83	0.07	483.76	
R-21	9/19/2012	495.53	12.56	12.59	0.03	482.96	
R-21	10/15/2012	495.53	12.43	12.53	0.10	483.08	
R-21	11/1/2012	495.53	12.40	12.47	0.07	483.12	
R-21	11/29/2012	495.52	11.87	11.95	0.08	483.64	
R-21	12/28/2012	495.52	12.15	12.22	0.07	483.36	
R-21	1/24/2013	495.52	12.63	12.89	0.26	482.84	
R-21	2/26/2013	495.52	12.78	12.87	0.09	482.72	
R-21	3/29/2013	495.52	12.66	13.35	0.69	482.73	R-35R, R-39, and R-40 were offline on this date
R-21	4/24/2013	495.52	12.94	13.00	0.06	482.57	
R-21	5/20/2013	495.54	12.19	12.53	0.34	483.29	
R-21	6/24/2013	495.53	11.70	12.01	0.31	483.77	
R-21	7/23/2013	495.54	11.25	11.44	0.19	484.26	
R-21	8/1/2013	495.54	11.31	11.51	0.20	484.19	
R-21	8/21/2013	495.54	11.13	11.36	0.23	484.37	
R-21	9/24/2013	495.54	12.20	12.58	0.38	483.27	
R-21	10/1/2013	495.54	12.50	12.62	0.12	483.02	
R-21	10/29/2013	495.54	13.70	13.78	0.08	481.83	
R-21	11/19/2013	495.54	12.60	13.55	0.95	482.77	
R-21	12/20/2013	495.54	12.58	12.65	0.07	482.95	
R-21	1/15/2014	495.54	13.14	13.24	0.10	482.38	
R-21	2/5/2014	495.54	12.97	13.81	0.84	482.42	
R-21	3/18/2014	495.54	12.74	13.07	0.33	482.74	
R-21	4/14/2014	495.52	13.08	15.23	2.15	482.04	
R-21	5/16/2014	495.52	12.87	12.96	0.09	482.63	
R-21	6/11/2014	495.52	12.78	12.88	0.10	482.72	
R-21	7/15/2014	495.52	10.54	10.78	0.24	484.94	
R-21	8/26/2014	495.52	10.99	11.27	0.28	484.48	
R-21	9/9/2014	495.52	11.41	11.81	0.40	484.04	
R-21	9/24/2014	495.52	11.39	11.51	0.12	484.11	
R-21	10/21/2014	495.52	11.82	11.94	0.12	483.68	
R-21	11/19/2014	495.52	11.55	11.68	0.13	483.95	
R-21	12/16/2014	495.52	12.23	12.39	0.16	483.26	
R-21	1/21/2015	495.53	12.79	12.88	0.09	482.72	Flow rate = 47.6 gpm
R-21	2/25/2015	495.53	13.03	13.35	0.32	482.44	Flow rate = 50.1 gpm
R-21	3/10/2015	495.53	12.71	14.31	1.60	482.53	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-21	3/18/2015	495.53	12.88	13.91	1.03	482.46	
R-21	3/26/2015	495.53	12.90	14.98	2.08	482.25	
R-21	4/16/2015	495.53	12.78	13.54	0.76	482.61	
R-21	5/21/2015	495.53	12.34	12.61	0.27	483.14	
R-21	6/10/2015	495.53	12.49	13.04	0.55	482.94	
R-21	7/22/2015	495.53	11.57	11.64	0.07	483.97	
R-21	8/12/2015	495.53	11.37	11.62	0.25	484.15	
R-21	8/19/2015	495.53	11.77	12.14	0.37	483.76	
R-21	9/30/2015	495.53	12.13	12.57	0.44	483.36	
R-21	10/6/2015	495.53	12.18	12.88	0.70	483.26	
R-21	10/15/2015	495.53	12.60	12.96	0.36	482.90	
R-21	11/19/2015	495.53	12.90	13.70	0.80	482.48	
R-21	11/25/2015	495.53	12.56	13.23	0.67	482.88	
R-21	12/16/2015	495.53	13.10	13.31	0.21	482.39	
R-21	1/19/2016	495.53	13.66	13.91	0.25	481.82	
R-21	1/19/2016	495.53	13.66	13.91	0.25	481.82	
R-21	2/25/2016	495.53	13.40	16.37	2.97	481.58	Flow rate not recorded.
R-21	3/4/2016	495.53	13.31	16.66	3.35	481.65	
R-21	4/14/2016	495.53	13.14	13.25	0.11	482.37	
R-21	5/20/2016	495.53	13.40	13.44	0.04	482.12	Automated skimmer pump was active
R-21	5/26/2016	495.53	12.97	14.49	1.52	482.30	
R-21	6/14/2016	495.53	12.70	12.81	0.11	482.81	
R-21	7/2/2016	495.53	12.00	12.84	0.84	483.38	
R-21	7/4/2016	495.53	11.82	12.51	0.69	483.58	
R-21	7/8/2016	495.53	11.61	12.02	0.41	483.84	
R-21	7/12/2016	495.53	11.48	12.17	0.69	483.92	
R-21	7/16/2016	495.53	11.45	11.62	0.17	484.05	
R-21	7/19/2016	495.53	11.10	11.45	0.35	484.37	
R-21	7/23/2016	495.53	10.45	11.62	1.17	484.86	
R-21	7/26/2016	495.53	10.75	11.11	0.36	484.71	
R-21	7/26/2016	495.53	10.75	11.15	0.40	484.71	
R-21	7/30/2016	495.53	10.71	11.25	0.54	484.72	
R-21	8/1/2016	495.53	10.65	10.85	0.20	484.84	
R-21	8/6/2016	495.53	10.94	11.23	0.29	484.54	
R-21	8/9/2016	495.53	10.90	11.31	0.41	484.55	
R-21	8/13/2016	495.53	11.05	11.45	0.40	484.41	
R-21	8/16/2016	495.53	11.30	11.80	0.50	484.14	
R-21	8/18/2016	495.53	11.32	11.93	0.61	484.10	
R-21	8/20/2016	495.53	11.40	12.09	0.69	484.00	
R-21	8/23/2016	495.54	11.63	11.70	0.07	483.90	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-21	8/27/2016	495.54	11.62	11.79	0.17	483.89	
R-21	8/30/2016	495.54	11.69	11.95	0.26	483.80	
R-21	9/3/2016	495.54	11.36	11.69	0.33	484.12	
R-21	9/6/2016	495.54	11.42	11.73	0.31	484.06	
R-21	9/9/2016	495.54	11.48	11.84	0.36	484.04	
R-21	9/9/2016	495.54	11.48	11.84	0.36	484.04	
R-21	9/10/2016	495.54	11.60	11.95	0.35	483.88	
R-21	9/13/2016	495.54	11.65	12.10	0.45	483.81	Transcription error corrected: DTP/DTW entered vice-versa
R-21	9/17/2016	495.54	11.65	12.20	0.55	483.79	Transcription error corrected: DTP/DTW entered vice-versa
R-21	9/24/2016	495.54	10.28	10.29	0.01	485.26	All recovery wells shutdown for sand filter media changeout
R-21	9/27/2016	495.54	12.10	12.13	0.03	483.43	
R-21	9/30/2016	495.54	12.18	12.27	0.09	483.34	
R-21	10/4/2016	495.54	12.32	12.43	0.11	483.20	
R-21	10/8/2016	495.54	12.40	12.60	0.20	483.10	
R-21	10/11/2016	495.54	12.55	12.80	0.25	482.94	
R-21	10/13/2016	495.54	12.58	12.82	0.24	482.92	
R-21	10/15/2016	495.54	12.65	12.92	0.27	482.84	
R-21	10/18/2016	495.54	12.82	13.07	0.25	482.67	
R-21	10/22/2016	495.54	12.95	13.27	0.32	482.53	
R-21	10/25/2016	495.54	13.01	13.32	0.31	482.47	
R-21	10/28/2016	495.54	12.87	13.23	0.36	482.60	
R-21	11/1/2016	495.54	12.25	12.71	0.46	483.21	
R-21	11/5/2016	495.54	12.05	12.16	0.11	483.47	
R-21	11/8/2016	495.54	12.20	12.35	0.15	483.31	
R-21	11/12/2016	495.54	12.20	12.40	0.20	483.30	
R-21	11/15/2016	495.54	12.21	12.42	0.21	483.33	
R-21	11/15/2016	495.54	12.20	12.38	0.18	483.31	
R-21	11/15/2016	495.54	12.21	12.42	0.21	483.33	
R-21	11/19/2016	495.54	12.16	12.41	0.25	483.33	
R-21	11/22/2016	495.54	12.30	12.58	0.28	483.19	
R-21	11/26/2016	495.54	12.35	12.68	0.33	483.13	
R-21	11/29/2016	495.54	12.43	12.80	0.37	483.04	
R-21	12/3/2016	495.54	12.54	12.91	0.37	482.93	
R-21	12/6/2016	495.54	12.55	12.60	0.05	482.98	
R-21	12/9/2016	495.54	12.56	12.62	0.06	482.97	
R-21	12/10/2016	495.54	12.50	12.62	0.12	483.02	
R-21	12/13/2016	495.54	12.50	12.58	0.08	483.03	
R-21	12/17/2016	495.54	12.50	12.60	0.10	483.02	
R-21	12/20/2016	495.54	12.51	12.67	0.16	483.00	
R-21	12/24/2016	495.54	12.52	12.66	0.14	482.99	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-21	12/27/2016	495.54	12.55	12.73	0.18	482.96	
R-21	12/31/2016	495.54	12.56	12.81	0.25	482.93	
R-21	1/7/2017	495.54	12.50	12.82	0.32	482.98	
R-21	1/10/2017	495.54	12.57	12.96	0.39	482.90	
R-21	1/15/2017	495.54	12.55	13.15	0.60	482.88	
R-21	1/17/2017	495.54	12.60	12.70	0.10	482.92	
R-21	1/21/2017	495.54	12.63	12.85	0.22	482.87	
R-21	1/24/2017	495.54	12.65	12.98	0.33	482.83	
R-21	1/24/2017	495.54	12.60	12.95	0.35	482.88	
R-21	1/28/2017	495.54	12.67	13.08	0.41	482.79	
R-21	1/31/2017	495.54	12.50	13.00	0.50	482.95	
R-21	2/4/2017	495.54	12.65	13.20	0.55	482.79	
R-21	2/7/2017	495.54	12.68	12.75	0.07	482.85	
R-21	2/8/2017	495.54	12.68	12.80	0.12	482.91	
R-21	2/8/2017	495.54	12.68	12.80	0.12	482.91	
R-21	2/11/2017	495.54	12.69	12.95	0.26	482.80	
R-21	2/14/2017	495.54	12.68	13.08	0.40	482.79	
R-21	2/18/2017	495.54	12.73	13.23	0.50	482.72	
R-21	2/21/2017	495.54	12.85	13.00	0.15	482.66	
R-21	2/25/2017	495.54	12.80	13.09	0.29	482.69	
R-21	2/28/2017	495.54	12.73	13.31	0.58	482.70	
R-21	3/1/2017	495.54	12.81	12.83	0.02	482.73	
R-21	3/4/2017	495.54	12.88	12.91	0.03	482.65	
R-21	3/7/2017	495.54	12.81	13.05	0.24	482.69	
R-21	3/11/2017	495.54	13.79	14.10	0.31	481.69	
R-21	3/14/2017	495.54	12.72	13.23	0.51	482.73	
R-21	3/18/2017	495.54	12.86	12.88	0.02	482.68	
R-21	3/21/2017	495.54	11.90	12.03	0.13	483.62	
R-21	3/24/2017	495.54	12.90	13.17	0.27	482.59	
R-21	3/28/2017	495.54	12.98	13.37	0.39	482.49	
R-21	4/1/2017	495.54	12.90	13.29	0.39	482.57	
R-21	4/4/2017	495.54	12.86	13.32	0.46	482.60	
R-21	4/8/2017	495.54	12.75	13.41	0.66	482.67	
R-21	4/11/2017	495.54	12.80	12.97	0.17	482.71	
R-21	4/15/2017	495.54	12.55	13.08	0.53	482.89	
R-21	4/18/2017	495.54	12.74	12.88	0.14	482.77	
R-21	4/18/2017	495.54	12.85	12.90	0.05	482.68	
R-21	4/22/2017	495.54	12.70	13.21	0.51	482.75	
R-21	4/25/2017	495.54	12.53	12.72	0.19	482.98	
R-21	4/29/2017	495.54	12.20	12.73	0.53	483.24	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-21	5/2/2017	495.54	12.05	12.51	0.46	483.41	
R-21	5/6/2017	495.54	12.30	13.12	0.82	483.09	
R-21	5/9/2017	495.54	12.50	12.65	0.15	483.01	
R-21	5/13/2017	495.54	13.33	13.61	0.28	482.16	
R-21	5/16/2017	495.54	12.25	12.60	0.35	483.23	
R-21	5/20/2017	495.54	12.20	13.10	0.90	483.17	
R-21	5/23/2017	495.54	12.46	12.74	0.28	483.03	
R-21	5/25/2017	495.54	12.48	12.87	0.39	482.99	
R-21	5/27/2017	495.54	12.50	13.10	0.60	482.93	
R-21	5/30/2017	495.54	12.75	13.05	0.30	482.73	
R-21	6/3/2017	495.54	12.90	13.50	0.60	482.53	
R-21	6/6/2017	495.54	12.99	13.24	0.25	482.50	
R-21	6/6/2017	495.54	13.00	13.22	0.22	482.50	
R-21	6/10/2017	495.54	12.87	13.56	0.69	482.54	
R-21	6/13/2017	495.54	12.08	12.34	0.26	483.47	
R-21	6/13/2017	495.54	12.10	12.45	0.35	483.38	
R-21	6/16/2017	495.54	11.85	13.06	1.21	483.47	
R-21	6/20/2017	495.54	12.22	12.40	0.18	483.29	
R-21	6/24/2017	495.54	12.20	12.65	0.45	483.26	
R-21	6/27/2017	495.54	12.13	12.80	0.67	483.29	
R-21	7/1/2017	495.54	12.20	12.40	0.20	483.30	
R-21	7/4/2017	495.54	12.00	12.55	0.55	483.44	
R-21	7/8/2017	495.54	11.68	12.63	0.95	483.69	
R-21	7/26/2017	495.54	9.62	9.65	0.03	485.89	
R-21	7/27/2017	495.54	9.68	9.70	0.02	485.86	
R-21	8/28/2017	495.54	10.25	10.27	0.02	485.29	
R-21	8/29/2017	495.54	10.19	10.21	0.02	485.33	
R-21	9/19/2017	495.54	10.87	10.92	0.05	484.62	
R-21	9/21/2017	495.55	10.91	10.94	0.03	484.63	
R-21	10/20/2017	495.55	11.05	11.10	0.05	484.50	
R-21	10/26/2017	495.55	11.32	11.39	0.07	484.16	
R-21	11/1/2017	495.55	11.42	11.47	0.05	484.12	
R-21	2/13/2018	495.55	11.40	11.42	0.02	484.15	
R-21	3/12/2018	495.55	11.32	11.35	0.03	484.22	
R-21	4/4/2018	495.55	11.36	11.39	0.03	484.18	
R-21	6/8/2018	495.55	10.48	10.50	0.02	485.07	
R-22	7/23/2013	495.59	Sheen	10.19	Sheen	485.40	
R-22	8/1/2013	495.59	Sheen	10.12	Sheen	485.47	
R-22	8/21/2013	495.59	Sheen	10.08	Sheen	485.51	
R-22	1/9/2014	495.60	Sheen	11.57	Sheen	484.03	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-22	2/5/2014	495.60	Sheen	11.68	Sheen	483.92	
R-22	3/24/2014	495.61	11.96	12.07	0.11	483.63	
R-22	4/18/2014	495.58	11.79	12.01	0.22	483.75	
R-22	5/15/2014	495.60	11.37	11.38	0.01	484.23	
R-22	6/19/2014	495.60	11.14	11.15	0.01	484.46	
R-22	7/15/2014	495.62	Sheen	9.42	Sheen	486.20	
R-22	8/26/2014	495.61	Sheen	10.07	Sheen	485.54	
R-22	9/24/2014	495.60	Sheen	10.66	Sheen	484.94	
R-22	10/21/2014	495.62	Sheen	11.57	Sheen	484.05	
R-22	11/19/2014	495.60	No LNAPL	11.17	0.00	484.43	
R-22	12/16/2014	495.61	Sheen	11.39	Sheen	484.22	
R-22	12/29/2014	495.61	Sheen	11.48	Sheen	484.13	
R-22	1/21/2015	495.61	No LNAPL	11.53	0.00	484.08	
R-22	2/25/2015	495.63	No LNAPL	11.67	0.00	483.96	
R-22	3/18/2015	495.57	Sheen	11.65	Sheen	483.92	
R-22	3/26/2015	495.57	Sheen	11.57	Sheen	484.00	
R-22	4/16/2015	495.57	Sheen	11.45	Sheen	484.12	
R-22	5/21/2015	495.59	Sheen	11.18	Sheen	484.41	
R-22	6/10/2015	495.60	Sheen	11.22	Sheen	484.38	
R-22	8/19/2015	495.60	Sheen	10.47	Sheen	485.20	
R-22	10/6/2015	495.60	No LNAPL	10.77	0.00	484.84	
R-22	1/19/2016	495.62	No LNAPL	11.87	0.00	483.75	
R-22	5/26/2016	495.60	11.45	11.46	0.01	484.17	
R-22	9/9/2016	495.60	Sheen	10.30	Sheen	485.35	
R-22	10/13/2016	495.60	Sheen	11.36	Sheen	484.24	
R-22	11/15/2016	495.60	No LNAPL	10.97	0.00	484.73	
R-22	2/8/2017	495.58	Sheen	11.39	Sheen	484.26	
R-22	2/15/2017	495.58	Sheen	11.42	Sheen	484.21	
R-22	3/1/2017	495.58	Sheen	11.43	Sheen	484.15	
R-22	6/13/2017	495.60	Sheen	10.68	Sheen	484.97	
R-32	8/17/2009	—	7.66	8.15	0.49	—	
R-32	4/18/2011	494.24	8.89	Frozen	0.31	—	Frozen or bottom of well at 9.20 ft BTOC
R-32	5/24/2011	494.24	8.87	9.04	0.17	485.34	
R-32	7/15/2011	494.24	7.76	7.82	0.06	486.47	
R-32	10/21/2011	494.24	9.64	11.04	1.40	484.34	
R-32	2/16/2012	494.28	9.55	11.23	1.68	484.42	
R-32	3/15/2012	494.28	9.55	11.10	1.55	484.44	
R-32	4/12/2012	494.28	9.45	10.75	1.30	484.59	
R-32	5/14/2012	494.28	9.70	10.46	0.76	484.44	
R-32	6/12/2012	494.28	8.59	8.69	0.10	485.67	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-32	7/18/2012	494.28	8.18	9.14	0.96	485.92	
R-32	8/21/2012	494.28	8.61	8.65	0.04	485.66	
R-32	9/19/2012	494.28	9.29	9.31	0.02	484.99	
R-32	10/15/2012	494.28	9.24	9.27	0.03	485.03	
R-32	11/29/2012	494.33	8.88	9.13	0.25	485.40	
R-32	12/28/2012	494.33	9.11	9.60	0.49	485.13	
R-32	2/26/2013	494.33	9.26	9.36	0.10	485.05	
R-32	3/28/2013	494.33	9.23	10.12	0.89	484.93	R-35R, R-39, and R-40 were offline on this date
R-32	4/24/2013	494.33	9.24	10.08	0.84	484.93	
R-32	5/31/2013	494.33	8.06	8.08	0.02	486.27	
R-32	6/24/2013	494.33	8.18	8.23	0.05	486.14	
R-32	7/23/2013	494.33	Sheen	7.93	Sheen	486.40	
R-32	8/21/2013	494.33	7.78	7.85	0.07	486.54	
R-32	9/24/2013	494.33	8.84	8.93	0.09	485.47	
R-32	10/29/2013	494.33	9.80	10.52	0.72	484.40	
R-32	11/19/2013	494.33	9.12	10.04	0.92	485.04	
R-32	12/20/2013	494.33	9.05	9.69	0.64	485.16	
R-32	10/21/2014	494.31	9.17	9.25	0.08	485.13	
R-32	3/10/2015	494.31	9.26	9.45	0.19	485.01	
R-32	5/18/2015	494.31	8.91	9.05	0.14	485.37	
R-32	8/12/2015	494.30	No LNAPL	10.16	0.00	484.18	
R-32	10/15/2015	494.30	8.91	9.24	0.33	485.37	
R-32	3/4/2016	494.30	9.60	10.28	0.68	484.62	
R-32	6/14/2016	494.30	8.79	8.86	0.07	485.50	
R-32	7/2/2016	494.30	8.30	8.35	0.05	485.99	
R-32	8/18/2016	494.30	7.45	7.54	0.09	486.83	
R-32	10/13/2016	494.30	9.05	9.15	0.10	485.23	
R-32	10/22/2016	494.30	9.35	9.46	0.11	484.93	
R-32	11/12/2016	494.30	8.55	8.70	0.15	485.72	
R-32	3/2/2017	494.30	9.12	9.20	0.08	485.17	
R-32	3/11/2017	494.30	9.10	9.22	0.12	485.18	
R-32	3/18/2017	494.30	9.20	Frozen	0.05	—	Depth to ice = 9.25 feet
R-32	3/24/2017	494.30	9.20	Frozen	0.10	—	Depth to ice = 9.30 feet
R-32	6/6/2017	494.30	9.11	9.33	0.22	485.15	
R-32R	9/24/2013	—	11.11	11.22	0.11	—	
R-32R	10/29/2013	496.55	12.08	12.85	0.77	484.32	
R-32R	11/19/2013	496.55	11.45	11.92	0.47	485.01	
R-32R	12/20/2013	496.55	11.33	11.94	0.61	485.10	
R-32R	1/14/2014	496.55	11.66	11.85	0.19	484.85	
R-32R	2/24/2014	496.55	11.42	11.92	0.50	485.03	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-32R	3/24/2014	496.55	12.00	12.47	0.47	484.46	
R-32R	4/14/2014	496.56	11.97	12.75	0.78	484.43	
R-32R	5/16/2014	496.56	11.39	11.62	0.23	485.12	
R-32R	6/20/2014	496.56	10.93	10.94	0.01	485.63	
R-32R	7/19/2014	496.56	Sheen	9.46	Sheen	487.10	
R-32R	8/28/2014	496.56	10.08	10.10	0.02	486.48	
R-32R	9/29/2014	496.56	10.80	11.45	0.65	485.63	
R-32R	10/16/2014	496.56	11.46	11.62	0.16	485.07	
R-32R	3/10/2015	496.56	11.50	11.90	0.40	484.98	
R-32R	5/18/2015	496.56	11.14	11.57	0.43	485.33	
R-32R	8/12/2015	496.55	7.84	8.05	0.21	488.71	
R-32R	10/15/2015	496.55	11.20	11.44	0.24	485.34	
R-32R	3/4/2016	496.55	11.90	12.72	0.82	484.54	
R-32R	3/24/2016	496.55	12.00	12.83	0.83	484.38	Initial fluid levels and product recovered by SWI during baildown testing
R-32R	6/14/2016	496.55	No LNAPL	11.10	0.00	485.45	
R-32R	7/2/2016	496.55	No LNAPL	10.62	0.00	485.93	
R-32R	7/9/2016	496.55	No LNAPL	10.11	0.00	486.44	
R-32R	8/16/2016	496.59	Sheen	9.70	Sheen	486.89	
R-32R	8/18/2016	496.55	No LNAPL	9.78	0.00	486.77	
R-32R	10/13/2016	496.59	11.28	11.84	0.56	485.20	
R-32R	10/22/2016	496.59	11.60	12.18	0.58	484.87	
R-32R	11/12/2016	496.59	No LNAPL	10.89	0.00	485.70	
R-32R	11/19/2016	496.59	No LNAPL	10.93	0.00	485.66	
R-32R	11/26/2016	496.59	11.13	11.14	0.01	485.46	
R-32R	12/3/2016	496.59	No LNAPL	11.30	0.00	485.29	
R-32R	12/10/2016	496.59	No LNAPL	11.24	0.00	485.35	Transcription error corrected: DTW entered as 31.24 on ops gauging sheet
R-32R	3/2/2017	496.59	11.30	12.35	1.05	485.08	
R-32R	3/11/2017	496.59	11.30	12.50	1.20	485.05	
R-32R	3/18/2017	496.59	11.33	12.59	1.26	485.01	
R-32R	3/24/2017	496.59	11.32	12.73	1.41	484.99	
R-32R	4/1/2017	496.59	11.32	12.90	1.58	484.95	
R-32R	4/8/2017	496.59	11.30	12.70	1.40	485.01	
R-32R	4/15/2017	496.59	11.18	12.11	0.93	485.22	
R-32R	4/22/2017	496.59	11.20	11.95	0.75	485.24	
R-32R	4/29/2017	496.59	10.76	11.27	0.51	485.73	
R-32R	5/6/2017	496.59	10.98	11.35	0.37	485.54	
R-32R	5/13/2017	496.59	10.90	11.28	0.38	485.61	
R-32R	5/20/2017	496.59	10.84	11.15	0.31	485.69	
R-32R	5/27/2017	496.59	11.10	11.45	0.35	485.42	
R-32R	6/6/2017	496.59	11.38	11.94	0.56	485.10	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-32R	7/1/2017	496.59	10.66	10.70	0.04	485.92	
R-32R	7/8/2017	496.59	No LNAPL	10.33	0.00	486.26	
R-33	9/2/2008	—	8.49	8.60	0.11	—	
R-33	8/17/2009	—	8.43	8.71	0.28	—	
R-33	4/26/2011	495.80	9.37	9.44	0.07	486.42	
R-33	5/24/2011	495.80	No LNAPL	Frozen	0.00	—	Frozen at 9.38 ft BTOC
R-33	7/15/2011	495.80	8.51	8.61	0.10	487.27	
R-33	10/21/2011	495.80	10.91	11.03	0.12	484.87	
R-33	2/17/2012	495.77	10.68	Frozen	0.27	—	Depth to bottom/ice 10.95 feet
R-33	3/15/2012	495.77	10.70	Frozen	0.28	—	Depth to bottom/ice 10.98 feet
R-33	4/12/2012	495.77	10.54	Frozen	0.45	—	Frozen at 10.99 ft BTOC
R-33	5/16/2012	495.77	10.36	10.77	0.41	485.34	
R-33	6/13/2012	495.77	Sheen	9.33	Sheen	486.44	
R-33	7/18/2012	495.77	Sheen	9.07	Sheen	486.70	
R-33	8/21/2012	495.77	9.44	9.47	0.03	486.33	
R-33	9/18/2012	495.77	10.15	10.17	0.02	485.62	
R-33	10/16/2012	495.77	10.23	10.35	0.12	485.52	
R-33	11/29/2012	495.82	9.74	9.85	0.11	486.06	
R-33	12/28/2012	495.82	10.08	Frozen	0.16	—	Frozen at 10.24 ft BTOC
R-33	2/26/2013	495.82	Sheen	Frozen	Sheen	—	Frozen at 10.12 ft BTOC
R-33	3/28/2013	495.82	Sheen	Frozen	Sheen	—	Frozen at 10.12 ft BTOC. R-35R, R-39, and R-40 were offline on this date
R-33	4/24/2013	495.82	No LNAPL	10.12	0.00	485.70	
R-33	5/30/2013	495.82	Sheen	9.02	Sheen	486.80	
R-33	6/24/2013	495.82	9.07	9.08	0.01	486.75	
R-33	7/23/2013	495.82	Sheen	8.71	Sheen	487.11	
R-33	8/21/2013	495.82	8.62	8.63	0.01	487.20	
R-33	9/24/2013	495.82	9.80	9.85	0.05	486.01	
R-33	10/29/2013	495.82	10.87	11.02	0.15	484.93	
R-33	11/19/2013	495.82	10.02	10.27	0.25	485.76	
R-33	12/20/2013	495.82	10.03	10.20	0.17	485.76	
R-33	1/15/2014	495.82	10.37	10.55	0.18	485.42	
R-33	2/25/2014	495.82	10.68	10.92	0.24	485.10	
R-33	3/24/2014	495.82	10.71	10.96	0.25	485.07	
R-33	4/14/2014	495.81	10.76	11.00	0.24	485.01	
R-33	5/29/2014	495.81	10.38	10.54	0.16	485.40	
R-33	6/20/2014	495.81	9.49	9.63	0.14	486.30	
R-33	7/31/2014	495.81	8.52	8.53	0.01	487.29	
R-33	8/28/2014	495.81	8.74	8.75	0.01	487.07	
R-33	9/29/2014	495.81	9.54	9.58	0.04	486.26	
R-33	10/16/2014	495.81	10.10	10.13	0.03	485.71	

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R-33	3/10/2015	495.81	10.11	Frozen	0.19	—	Depth to ice = 10.30 feet
R-33	10/15/2015	495.81	9.86	9.91	0.05	485.98	
R-33	3/4/2016	495.81	10.52	10.95	0.43	485.27	
R-33	10/13/2016	495.83	9.96	9.99	0.03	485.87	
R-33	3/2/2017	495.83	9.94	Frozen	0.05	—	Ice at 9.99 feet BTOC
R-34	1/15/2007	496.41	13.30	13.55	0.25	483.06	
R-34	4/23/2007	496.41	13.10	13.53	0.43	483.23	
R-34	8/17/2009	496.41	No LNAPL	8.66	0.00	487.75	
R-34	4/26/2011	495.17	9.40	9.58	0.18	485.74	
R-34	7/15/2011	495.17	Sheen	8.70	Sheen	486.47	
R-34	10/21/2011	495.17	10.63	12.14	1.51	484.26	
R-34	2/16/2012	495.15	10.58	11.55	0.97	484.39	
R-34	4/12/2012	495.15	10.51	11.21	0.70	484.51	
R-34	7/18/2012	495.15	Sheen	9.14	Sheen	486.01	
R-34	8/21/2012	495.15	Sheen	9.53	Sheen	485.62	
R-34	9/19/2012	495.15	10.22	10.23	0.01	484.93	
R-34	10/15/2012	495.15	Sheen	10.21	Sheen	484.94	
R-34	11/29/2012	495.20	9.77	9.78	0.01	485.43	
R-34	12/28/2012	495.20	10.14	10.15	0.01	485.06	
R-34	2/26/2013	495.20	10.23	10.31	0.08	484.96	
R-34	3/28/2013	495.20	10.22	10.81	0.59	484.87	R-35R, R-39, and R-40 were offline on this date
R-34	4/24/2013	495.20	10.27	10.64	0.37	484.86	
R-34	7/23/2013	495.20	Sheen	8.85	Sheen	486.35	
R-34	10/29/2013	495.20	10.80	11.29	0.49	484.31	
R-34	1/15/2014	495.20	10.35	10.74	0.39	484.78	
R-34	2/24/2014	495.20	10.52	11.44	0.92	484.51	
R-34	4/14/2014	495.20	10.67	11.27	0.60	484.42	
R-34	7/19/2014	495.20	8.14	8.15	0.01	487.06	
R-34	10/16/2014	495.20	Sheen	10.15	Sheen	485.05	
R-34	3/10/2015	495.20	10.21	10.48	0.27	484.94	
R-34	5/18/2015	495.20	9.84	10.14	0.30	485.30	
R-34	8/12/2015	495.20	8.83	8.86	0.03	486.40	
R-34	10/15/2015	495.20	9.92	9.93	0.01	485.32	
R-34	3/4/2016	495.20	10.53	11.28	0.75	484.58	
R-34	6/14/2016	495.20	9.66	10.06	0.40	485.47	
R-34	8/18/2016	495.20	No LNAPL	8.42	0.00	486.78	
R-34	10/13/2016	495.18	Sheen	10.02	Sheen	485.16	
R-34	3/2/2017	495.18	Sheen	10.07	Sheen	485.11	
R-34	6/6/2017	495.18	No LNAPL	10.10	0.00	485.08	
R-35R	7/14/2011	—	11.71	12.10	0.39	—	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-35R	8/23/2011	—	12.45	12.46	0.01	—	
R-35R	9/22/2011	—	13.24	15.31	2.07	—	
R-35R	10/21/2011	—	14.12	17.65	3.53	—	
R-35R	12/7/2011	494.74	—	—	—	—	Unable to measure due to active product recovery
R-35R	2/16/2012	494.74	15.18	15.28	0.10	479.54	
R-35R	3/15/2012	494.74	15.57	16.73	1.16	478.92	
R-35R	4/12/2012	494.74	15.02	19.29	4.27	478.81	
R-35R	4/19/2012	494.74	Sheen	15.15	Sheen	479.59	
R-35R	5/14/2012	494.74	14.37	14.47	0.10	480.35	
R-35R	6/12/2012	494.74	14.52	14.53	0.01	480.22	
R-35R	7/18/2012	494.74	Sheen	14.33	Sheen	480.41	
R-35R	7/30/2012	494.74	No LNAPL	13.01	0.00	481.73	
R-35R	8/21/2012	494.74	Sheen	15.47	Sheen	479.27	
R-35R	9/19/2012	494.74	17.96	18.05	0.09	476.76	
R-35R	10/15/2012	494.74	Sheen	18.72	Sheen	476.02	
R-35R	11/1/2012	494.74	19.19	19.20	0.01	475.55	
R-35R	11/29/2012	494.72	Sheen	18.09	Sheen	476.63	
R-35R	12/28/2012	494.72	Sheen	19.29	Sheen	475.43	
R-35R	1/24/2013	494.72	Sheen	19.95	Sheen	474.77	
R-35R	2/26/2013	494.72	Sheen	20.40	Sheen	474.32	
R-35R	3/28/2013	494.72	Sheen	10.15	Sheen	484.57	R-35R, R-39, and R-40 were offline on this date
R-35R	4/24/2013	494.72	No LNAPL	20.66	0.00	474.06	
R-35R	5/21/2013	494.71	No LNAPL	13.12	0.00	481.59	
R-35R	6/24/2013	494.70	No LNAPL	12.40	0.00	482.30	
R-35R	7/23/2013	494.71	No LNAPL	10.64	0.00	484.07	
R-35R	8/1/2013	494.71	No LNAPL	11.80	0.00	482.91	
R-35R	8/21/2013	494.71	No LNAPL	13.14	0.00	481.57	
R-35R	9/24/2013	494.71	No LNAPL	16.82	0.00	477.89	
R-35R	10/1/2013	494.71	No LNAPL	16.65	0.00	478.06	
R-35R	10/29/2013	494.71	No LNAPL	20.71	0.00	474.00	
R-35R	11/19/2013	494.71	No LNAPL	16.05	0.00	478.66	
R-35R	12/20/2013	494.71	No LNAPL	19.67	0.00	475.04	
R-35R	1/14/2014	494.71	No LNAPL	23.98	0.00	470.73	
R-35R	2/24/2014	494.71	No LNAPL	31.76	0.00	462.95	
R-35R	3/18/2014	494.71	No LNAPL	27.20	0.00	467.51	
R-35R	4/14/2014	494.72	No LNAPL	32.03	0.00	462.69	
R-35R	5/16/2014	494.72	Sheen	33.81	Sheen	460.91	
R-35R	6/11/2014	494.72	No LNAPL	29.65	0.00	465.07	
R-35R	7/15/2014	494.72	No LNAPL	20.35	0.00	474.37	
R-35R	8/26/2014	494.72	No LNAPL	21.78	0.00	472.94	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-35R	9/9/2014	494.72	No LNAPL	23.03	0.00	471.69	
R-35R	9/24/2014	494.72	No LNAPL	18.61	0.00	476.11	
R-35R	10/21/2014	494.72	No LNAPL	31.81	0.00	462.91	
R-35R	11/19/2014	494.72	No LNAPL	31.31	0.00	463.41	
R-35R	12/16/2014	494.72	No LNAPL	37.75	0.00	456.97	
R-35R	1/21/2015	494.24	No LNAPL	33.11	0.00	461.13	Flow rate = 54.5 gpm
R-35R	2/25/2015	494.24	No LNAPL	27.59	0.00	466.65	Flow rate = 47.2 gpm
R-35R	3/10/2015	494.24	No LNAPL	31.78	0.00	462.46	
R-35R	3/18/2015	494.24	--	30.94	--	463.30	
R-35R	3/26/2015	494.24	No LNAPL	31.57	0.00	462.67	
R-35R	4/16/2015	494.24	No LNAPL	31.93	0.00	462.31	
R-35R	5/21/2015	494.24	No LNAPL	28.35	0.00	465.89	
R-35R	6/10/2015	494.24	No LNAPL	35.23	0.00	459.01	
R-35R	7/22/2015	494.29	No LNAPL	28.10	0.00	466.21	
R-35R	8/12/2015	494.29	No LNAPL	25.09	0.00	469.24	
R-35R	8/19/2015	494.29	No LNAPL	28.55	0.00	465.77	
R-35R	9/30/2015	494.29	No LNAPL	32.95	0.00	461.38	
R-35R	10/6/2015	494.29	No LNAPL	36.42	0.00	457.88	DTW was initially 36.60 feet at 14:34 and air bubbles were visible in the purgewater during the GW treatment sampling.
R-35R	10/15/2015	494.29	No LNAPL	30.87	0.00	463.46	
R-35R	11/19/2015	494.29	13.51	13.80	0.29	480.72	
R-35R	11/25/2015	494.29	Sheen	13.55	Sheen	480.77	
R-35R	12/16/2015	494.29	No LNAPL	15.20	0.00	479.09	
R-35R	1/19/2016	494.29	Sheen	16.61	Sheen	477.68	
R-35R	1/19/2016	494.29	Sheen	16.61	Sheen	477.68	
R-35R	2/25/2016	494.29	No LNAPL	18.58	0.00	475.71	
R-35R	3/4/2016	494.29	No LNAPL	18.65	0.00	475.64	
R-35R	4/14/2016	494.29	No LNAPL	16.27	0.00	478.02	
R-35R	5/20/2016	494.29	No LNAPL	16.95	0.00	477.34	
R-35R	5/26/2016	494.29	No LNAPL	16.86	0.00	477.45	
R-35R	6/14/2016	494.29	No LNAPL	17.15	0.00	477.14	
R-35R	7/2/2016	494.29	No LNAPL	14.40	0.00	479.89	
R-35R	7/4/2016	494.29	No LNAPL	13.75	0.00	480.54	
R-35R	7/8/2016	494.29	No LNAPL	14.28	0.00	480.01	
R-35R	7/12/2016	494.29	No LNAPL	14.15	0.00	480.14	
R-35R	7/16/2016	494.29	No LNAPL	20.51	0.00	473.78	
R-35R	7/19/2016	494.29	No LNAPL	19.42	0.00	474.87	
R-35R	7/23/2016	494.29	No LNAPL	16.87	0.00	477.42	
R-35R	7/26/2016	494.29	No LNAPL	17.34	0.00	476.95	
R-35R	7/26/2016	494.29	No LNAPL	17.20	0.00	477.09	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-35R	7/30/2016	494.29	No LNAPL	20.22	0.00	474.07	
R-35R	8/1/2016	494.29	No LNAPL	18.79	0.00	475.50	
R-35R	8/6/2016	494.29	No LNAPL	21.87	0.00	472.42	
R-35R	8/9/2016	494.29	No LNAPL	21.68	0.00	472.61	
R-35R	8/13/2016	494.29	No LNAPL	19.31	0.00	474.98	
R-35R	8/16/2016	494.29	No LNAPL	19.33	0.00	474.96	
R-35R	8/18/2016	494.29	No LNAPL	19.14	0.00	475.15	
R-35R	8/20/2016	494.29	No LNAPL	19.20	0.00	475.09	
R-35R	8/23/2016	494.14	No LNAPL	19.24	0.00	474.90	
R-35R	8/27/2016	494.14	No LNAPL	20.87	0.00	473.27	
R-35R	8/30/2016	494.14	No LNAPL	20.57	0.00	473.57	
R-35R	9/3/2016	494.14	No LNAPL	21.35	0.00	472.79	
R-35R	9/6/2016	494.14	No LNAPL	23.41	0.00	470.73	
R-35R	9/9/2016	494.14	No LNAPL	23.85	0.00	470.33	
R-35R	9/9/2016	494.14	No LNAPL	23.85	0.00	470.33	
R-35R	9/10/2016	494.14	No LNAPL	23.74	0.00	470.40	
R-35R	9/13/2016	494.14	No LNAPL	18.60	0.00	475.54	
R-35R	9/17/2016	494.14	No LNAPL	18.60	0.00	475.54	
R-35R	9/24/2016	494.14	No LNAPL	8.63	0.00	485.51	All recovery wells shutdown for sand filter media changeout
R-35R	9/27/2016	494.14	No LNAPL	21.09	0.00	473.05	
R-35R	9/30/2016	494.14	No LNAPL	19.51	0.00	474.63	
R-35R	10/4/2016	494.14	No LNAPL	22.05	0.00	472.09	
R-35R	10/8/2016	494.14	No LNAPL	21.82	0.00	472.32	
R-35R	10/11/2016	494.14	No LNAPL	22.20	0.00	471.94	
R-35R	10/13/2016	494.14	No LNAPL	22.35	0.00	471.79	
R-35R	10/15/2016	494.14	No LNAPL	22.90	0.00	471.24	
R-35R	10/18/2016	494.14	No LNAPL	21.72	0.00	472.42	
R-35R	10/22/2016	494.14	No LNAPL	21.96	0.00	472.18	
R-35R	10/25/2016	494.14	No LNAPL	22.05	0.00	472.09	
R-35R	10/28/2016	494.14	No LNAPL	20.12	0.00	474.02	
R-35R	11/1/2016	494.14	No LNAPL	19.00	0.00	475.14	
R-35R	11/5/2016	494.14	No LNAPL	18.42	0.00	475.72	
R-35R	11/8/2016	494.14	No LNAPL	18.87	0.00	475.27	
R-35R	11/12/2016	494.14	No LNAPL	19.82	0.00	474.32	
R-35R	11/15/2016	494.14	No LNAPL	19.30	0.00	474.94	
R-35R	11/15/2016	494.14	No LNAPL	19.28	0.00	474.86	
R-35R	11/15/2016	494.14	No LNAPL	19.30	0.00	474.94	
R-35R	11/19/2016	494.14	No LNAPL	19.03	0.00	475.11	
R-35R	11/22/2016	494.14	No LNAPL	19.15	0.00	474.99	
R-35R	11/26/2016	494.14	No LNAPL	18.65	0.00	475.49	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-35R	11/29/2016	494.14	No LNAPL	18.90	0.00	475.24	
R-35R	12/3/2016	494.14	No LNAPL	19.50	0.00	474.64	
R-35R	12/6/2016	494.14	No LNAPL	19.56	0.00	474.58	
R-35R	12/9/2016	494.14	No LNAPL	19.51	0.00	474.63	
R-35R	12/10/2016	494.14	No LNAPL	16.95	0.00	477.19	
R-35R	12/13/2016	494.14	No LNAPL	19.75	0.00	474.39	
R-35R	12/17/2016	494.14	No LNAPL	19.60	0.00	474.54	
R-35R	12/20/2016	494.14	No LNAPL	19.51	0.00	474.63	
R-35R	12/24/2016	494.14	No LNAPL	20.05	0.00	474.09	
R-35R	12/27/2016	494.14	No LNAPL	20.42	0.00	473.72	
R-35R	12/31/2016	494.14	No LNAPL	19.51	0.00	474.63	
R-35R	1/7/2017	494.14	No LNAPL	19.87	0.00	474.27	
R-35R	1/10/2017	494.14	No LNAPL	19.93	0.00	474.21	
R-35R	1/15/2017	494.14	No LNAPL	20.49	0.00	473.65	
R-35R	1/17/2017	494.14	No LNAPL	20.37	0.00	473.77	
R-35R	1/21/2017	494.14	No LNAPL	20.80	0.00	473.34	
R-35R	1/24/2017	494.14	No LNAPL	20.88	0.00	473.26	
R-35R	1/24/2017	494.14	No LNAPL	21.03	0.00	473.11	
R-35R	1/28/2017	494.14	No LNAPL	21.37	0.00	472.77	
R-35R	1/31/2017	494.14	No LNAPL	21.48	0.00	472.66	
R-35R	2/4/2017	494.14	No LNAPL	21.55	0.00	472.59	
R-35R	2/7/2017	494.14	No LNAPL	21.69	0.00	472.45	
R-35R	2/8/2017	494.14	No LNAPL	21.75	0.00	472.46	
R-35R	2/8/2017	494.14	No LNAPL	21.75	0.00	472.46	
R-35R	2/11/2017	494.14	No LNAPL	21.65	0.00	472.49	
R-35R	2/14/2017	494.14	No LNAPL	21.65	0.00	472.49	
R-35R	2/18/2017	494.14	No LNAPL	21.70	0.00	472.44	
R-35R	2/21/2017	494.14	No LNAPL	21.83	0.00	472.31	
R-35R	2/25/2017	494.14	No LNAPL	24.63	0.00	469.51	
R-35R	2/28/2017	494.14	No LNAPL	22.54	0.00	471.60	
R-35R	3/1/2017	494.14	No LNAPL	22.90	0.00	471.24	
R-35R	3/4/2017	494.14	No LNAPL	22.93	0.00	471.21	
R-35R	3/7/2017	494.14	No LNAPL	22.72	0.00	471.42	
R-35R	3/11/2017	494.14	No LNAPL	24.05	0.00	470.09	
R-35R	3/14/2017	494.14	No LNAPL	23.96	0.00	470.18	
R-35R	3/18/2017	494.14	No LNAPL	23.95	0.00	470.19	
R-35R	3/21/2017	494.14	No LNAPL	24.05	0.00	470.09	
R-35R	3/24/2017	494.14	No LNAPL	23.98	0.00	470.16	
R-35R	3/28/2017	494.14	No LNAPL	23.98	0.00	470.16	
R-35R	4/1/2017	494.14	No LNAPL	25.60	0.00	468.54	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-35R	4/4/2017	494.14	No LNAPL	24.03	0.00	470.11	
R-35R	4/8/2017	494.14	No LNAPL	23.98	0.00	470.16	
R-35R	4/11/2017	494.14	No LNAPL	24.20	0.00	469.94	
R-35R	4/15/2017	494.14	No LNAPL	23.63	0.00	470.51	
R-35R	4/18/2017	494.14	No LNAPL	23.20	0.00	470.94	
R-35R	4/18/2017	494.14	No LNAPL	23.19	0.00	470.95	
R-35R	4/22/2017	494.14	No LNAPL	23.59	0.00	470.55	
R-35R	4/25/2017	494.14	No LNAPL	22.99	0.00	471.15	
R-35R	4/29/2017	494.14	No LNAPL	22.12	0.00	472.02	
R-35R	5/2/2017	494.14	No LNAPL	21.48	0.00	472.66	
R-35R	5/6/2017	494.14	No LNAPL	22.58	0.00	471.56	
R-35R	5/9/2017	494.14	No LNAPL	22.94	0.00	471.20	
R-35R	5/13/2017	494.14	No LNAPL	22.41	0.00	471.73	
R-35R	5/16/2017	494.14	No LNAPL	22.05	0.00	472.09	
R-35R	5/20/2017	494.14	No LNAPL	22.10	0.00	472.04	
R-35R	5/23/2017	494.14	No LNAPL	22.63	0.00	471.51	
R-35R	5/25/2017	494.14	No LNAPL	22.75	0.00	471.39	
R-35R	5/27/2017	494.14	No LNAPL	22.98	0.00	471.16	
R-35R	5/30/2017	494.14	No LNAPL	23.77	0.00	470.37	
R-35R	6/3/2017	494.14	No LNAPL	24.32	0.00	469.82	
R-35R	6/6/2017	494.14	No LNAPL	24.90	0.00	469.24	
R-35R	6/6/2017	494.14	No LNAPL	24.81	0.00	469.33	
R-35R	6/10/2017	494.14	No LNAPL	25.10	0.00	469.04	
R-35R	6/13/2017	494.14	No LNAPL	24.35	0.00	469.84	
R-35R	6/13/2017	494.14	No LNAPL	24.55	0.00	469.59	
R-35R	6/16/2017	494.14	No LNAPL	22.42	0.00	471.72	
R-35R	6/20/2017	494.14	No LNAPL	22.91	0.00	471.23	
R-35R	6/24/2017	494.14	No LNAPL	23.05	0.00	471.09	
R-35R	6/27/2017	494.14	No LNAPL	22.69	0.00	471.45	
R-35R	7/1/2017	494.14	No LNAPL	22.78	0.00	471.36	
R-35R	7/4/2017	494.14	No LNAPL	22.95	0.00	471.19	
R-35R	7/8/2017	494.14	No LNAPL	21.18	0.00	472.96	
R-35R	7/27/2017	494.14	Sheen	8.01	Sheen	486.13	
R-35R	7/28/2017	494.14	No LNAPL	8.05	0.00	486.09	
R-35R	8/30/2017	494.14	Sheen	8.55	Sheen	485.59	
R-35R	9/20/2017	494.14	Sheen	9.24	Sheen	484.90	
R-35R	10/20/2017	494.12	Sheen	9.39	Sheen	484.73	
R-35R	10/25/2017	494.12	Sheen	9.67	Sheen	484.45	
R-35R	11/1/2017	494.12	Sheen	9.76	Sheen	484.36	
R-35R	2/13/2018	494.12	No LNAPL	9.72	0.00	484.40	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-35R	3/12/2018	494.12	Sheen	9.65	Sheen	484.47	
R-35R	4/4/2018	494.12	Sheen	9.69	Sheen	484.43	
R-35R	6/8/2018	494.12	No LNAPL	8.79	0.00	485.33	
R-38	8/18/2009	498.67	No LNAPL	11.71	0.00	486.96	
R-38	4/25/2011	498.67	No LNAPL	Frozen	0.00	—	Frozen
R-38	5/24/2011	498.67	No LNAPL	6.66	0.00	492.01	
R-38	7/15/2011	498.67	No LNAPL	12.20	0.00	486.47	
R-38	10/21/2011	498.67	No LNAPL	11.01	0.00	487.66	
R-38	1/11/2012	498.65	No LNAPL	Frozen	0.00	—	Frozen at 10.18 ft BTOC
R-38	2/7/2012	498.65	No LNAPL	Frozen	0.00	—	Frozen at 10.01 ft BTOC
R-38	4/10/2012	498.65	No LNAPL	Frozen	0.00	—	Frozen at 10.02 ft BTOC
R-38	7/17/2012	498.65	No LNAPL	8.76	0.00	489.89	
R-38	8/21/2012	498.65	No LNAPL	12.03	0.00	486.62	
R-38	9/18/2012	498.65	No LNAPL	11.62	0.00	487.03	
R-38	10/16/2012	498.65	No LNAPL	11.21	0.00	487.44	
R-38	11/29/2012	498.64	No LNAPL	11.21	0.00	487.43	
R-38	12/27/2012	498.64	No LNAPL	Frozen	0.00	—	Frozen at 11.03 ft BTOC
R-38	1/24/2013	498.64	No LNAPL	Frozen	0.00	—	Frozen at 10.77 ft BTOC
R-38	2/26/2013	498.64	No LNAPL	Frozen	0.00	—	Frozen at 10.74 ft BTOC
R-38	4/24/2013	498.64	No LNAPL	Frozen	0.00	—	Frozen at 10.24 ft BTOC
R-39	1/15/2007	495.29	12.95	12.97	0.02	482.34	
R-39	4/23/2007	495.29	12.88	12.89	0.01	482.41	
R-39	8/17/2009	495.29	12.70	12.73	0.03	482.58	
R-39	4/26/2011	495.29	No LNAPL	17.79	0.00	477.50	
R-39	5/18/2011	495.29	Sheen	18.92	Sheen	476.37	
R-39	6/21/2011	495.29	No LNAPL	17.57	0.00	477.72	
R-39	8/23/2011	495.29	14.01	14.02	0.01	481.28	
R-39	9/22/2011	495.29	15.20	15.21	0.01	480.09	
R-39	10/21/2011	495.29	15.86	17.54	1.68	479.04	
R-39	12/7/2011	495.27	16.11	16.91	0.80	478.97	
R-39	2/17/2012	495.27	16.86	17.06	0.20	478.36	
R-39	3/15/2012	495.27	16.85	16.87	0.02	478.42	
R-39	4/12/2012	495.27	15.93	16.68	0.75	479.17	
R-39	4/19/2012	495.27	15.39	15.61	0.22	479.83	
R-39	5/14/2012	495.27	Sheen	13.02	Sheen	482.25	
R-39	6/12/2012	495.27	Sheen	11.86	Sheen	483.41	
R-39	7/18/2012	495.27	15.11	15.12	0.01	480.16	
R-39	7/30/2012	495.27	Sheen	14.33	Sheen	480.94	
R-39	8/21/2012	495.27	Sheen	15.36	Sheen	479.91	
R-39	9/18/2012	495.27	16.58	16.59	0.01	478.69	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-39	10/15/2012	495.27	17.25	17.26	0.01	478.02	
R-39	11/1/2012	495.27	Sheen	17.39	Sheen	477.88	
R-39	11/29/2012	495.05	Sheen	17.22	Sheen	477.83	
R-39	12/28/2012	495.05	Sheen	17.78	Sheen	477.27	
R-39	1/24/2013	495.05	Sheen	18.52	Sheen	476.53	
R-39	2/26/2013	495.05	Sheen	18.44	Sheen	476.61	
R-39	3/28/2013	495.05	Sheen	10.67	Sheen	484.38	R-35R, R-39, and R-40 were offline on this date
R-39	4/24/2013	495.05	Sheen	19.31	Sheen	475.74	
R-39	5/21/2013	495.04	Sheen	10.93	Sheen	484.11	
R-39	6/24/2013	495.05	Sheen	10.02	Sheen	485.03	
R-39	7/23/2013	495.05	No LNAPL	9.79	0.00	485.26	
R-39	8/1/2013	495.05	No LNAPL	9.70	0.00	485.35	
R-39	8/21/2013	495.05	No LNAPL	9.63	0.00	485.42	
R-39	9/30/2013	495.06	No LNAPL	10.46	0.00	484.60	
R-39	10/22/2013	495.09	No LNAPL	11.36	0.00	483.73	
R-39	11/26/2013	495.09	No LNAPL	10.80	0.00	484.29	
R-39	12/18/2013	495.07	No LNAPL	10.87	0.00	484.20	
R-39	1/9/2014	495.08	No LNAPL	11.10	0.00	483.98	
R-39	2/5/2014	495.08	No LNAPL	11.29	0.00	483.79	
R-39	3/18/2014	495.08	No LNAPL	11.40	0.00	483.68	
R-39	3/24/2014	495.08	No LNAPL	11.49	0.00	483.59	
R-39	4/18/2014	495.08	No LNAPL	11.27	0.00	483.81	
R-39	5/15/2014	495.08	--	10.74	--	484.34	
R-39	5/16/2014	495.08	No LNAPL	10.86	0.00	484.22	
R-39	6/11/2014	495.09	No LNAPL	11.00	0.00	484.09	
R-39	6/19/2014	495.09	No LNAPL	10.64	0.00	484.45	
R-39	7/15/2014	495.08	No LNAPL	8.81	0.00	486.27	
R-39	8/26/2014	495.09	No LNAPL	9.54	0.00	485.55	
R-39	9/9/2014	495.09	No LNAPL	9.65	0.00	485.44	
R-39	9/24/2014	495.08	No LNAPL	10.03	0.00	485.05	
R-39	10/21/2014	495.08	No LNAPL	10.98	0.00	484.10	
R-39	11/19/2014	495.06	No LNAPL	10.63	0.00	484.43	
R-39	12/16/2014	495.07	No LNAPL	10.81	0.00	484.26	
R-39	12/29/2014	495.07	No LNAPL	10.88	0.00	484.19	
R-39	1/21/2015	495.07	No LNAPL	10.91	0.00	484.16	
R-39	2/25/2015	495.08	No LNAPL	11.08	0.00	484.00	
R-39	3/10/2015	495.07	No LNAPL	10.97	0.00	484.10	
R-39	3/18/2015	495.07	--	11.03	--	484.04	
R-39	3/26/2015	495.07	No LNAPL	10.98	0.00	484.09	
R-39	4/16/2015	495.07	--	10.80	--	484.27	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-39	5/21/2015	495.07	No LNAPL	10.67	0.00	484.40	
R-39	6/10/2015	495.07	No LNAPL	10.74	0.00	484.33	
R-39	8/12/2015	495.07	No LNAPL	9.65	0.00	485.46	
R-39	8/19/2015	495.07	No LNAPL	9.96	0.00	485.14	
R-39	10/6/2015	495.07	No LNAPL	10.19	0.00	484.89	
R-39	10/15/2015	495.07	No LNAPL	10.54	0.00	484.53	
R-39	11/19/2015	495.07	No LNAPL	10.85	0.00	484.22	
R-39	1/19/2016	495.07	--	11.27	--	483.76	
R-39	3/4/2016	495.07	No LNAPL	11.49	0.00	483.58	
R-39	5/26/2016	495.08	No LNAPL	10.96	0.00	484.14	
R-39	9/9/2016	495.07	No LNAPL	9.78	0.00	485.33	
R-39	10/13/2016	495.07	No LNAPL	10.81	0.00	484.26	
R-39	11/15/2016	495.06	No LNAPL	10.47	0.00	484.69	
R-39	2/8/2017	495.05	No LNAPL	10.85	0.00	484.27	
R-39	3/2/2017	495.05	No LNAPL	10.87	0.00	484.18	
R-39	6/13/2017	495.05	No LNAPL	10.23	0.00	484.87	
R-39	7/26/2017	495.05	Sheen	9.18	Sheen	485.87	
R-39	8/31/2017	495.05	Sheen	9.88	Sheen	485.17	
R-39	9/19/2017	495.05	Sheen	10.36	Sheen	484.69	
R-39	10/19/2017	495.05	Sheen	10.49	Sheen	484.56	
R-39	2/12/2018	495.05	No LNAPL	10.86	0.00	484.19	
R-39	4/10/2018	495.05	--	10.82	--	484.23	
R-40	1/15/2007	494.56	12.95	12.97	0.02	481.61	
R-40	4/23/2007	494.56	12.88	12.89	0.01	481.68	
R-40	8/17/2009	494.56	--	18.27	--	476.29	
R-40	4/26/2011	494.55	14.29	14.65	0.36	480.20	
R-40	5/18/2011	494.55	18.02	18.30	0.28	476.48	
R-40	6/21/2011	494.55	14.11	Frozen	0.14	—	Frozen at 14.25 ft BTOC
R-40	8/23/2011	494.55	18.94	18.97	0.03	475.60	
R-40	9/22/2011	494.55	16.36	17.01	0.65	478.07	
R-40	10/21/2011	494.55	15.05	20.05	5.00	478.61	
R-40	12/7/2011	494.53	16.51	16.53	0.02	478.02	
R-40	2/16/2012	494.53	17.62	17.69	0.07	476.90	
R-40	3/15/2012	494.53	18.41	18.46	0.05	476.11	
R-40	4/12/2012	494.53	18.48	18.51	0.03	476.04	
R-40	4/19/2012	494.53	17.69	17.80	0.11	476.82	
R-40	5/14/2012	494.53	Sheen	17.42	Sheen	477.11	
R-40	6/12/2012	494.53	17.00	17.04	0.04	477.52	
R-40	7/18/2012	494.53	18.52	18.63	0.11	475.99	
R-40	7/30/2012	494.53	17.39	17.42	0.03	477.13	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-40	8/21/2012	494.53	19.00	19.15	0.15	475.50	
R-40	9/19/2012	494.53	16.24	16.73	0.49	478.20	
R-40	10/15/2012	494.53	18.19	18.49	0.30	476.29	
R-40	11/1/2012	494.53	18.18	18.28	0.10	476.33	
R-40	11/29/2012	494.46	18.73	19.43	0.70	475.61	
R-40	12/28/2012	494.46	19.20	19.31	0.11	475.24	
R-40	1/24/2013	494.46	21.02	21.25	0.23	473.40	
R-40	2/26/2013	494.46	20.44	20.76	0.32	473.96	
R-40	3/28/2013	494.46	10.12	10.13	0.01	484.34	R-35R, R-39, and R-40 were offline on this date
R-40	4/24/2013	494.46	18.02	18.12	0.10	476.42	
R-40	5/21/2013	494.46	10.19	10.20	0.01	484.27	
R-40	6/24/2013	494.46	Sheen	9.62	Sheen	484.84	
R-40	7/23/2013	494.46	Sheen	9.05	Sheen	485.41	
R-40	8/1/2013	494.46	No LNAPL	9.00	0.00	485.46	
R-40	8/21/2013	494.46	Sheen	8.94	Sheen	485.52	
R-40	9/30/2013	494.47	10.16	10.17	0.01	484.31	
R-40	10/22/2013	494.48	10.78	10.84	0.06	483.69	
R-40	11/26/2013	494.48	Sheen	9.84	Sheen	484.64	
R-40	12/18/2013	494.48	10.09	10.10	0.01	484.39	
R-40	1/9/2014	494.48	10.37	10.38	0.01	484.11	
R-40	2/5/2014	494.49	10.54	10.55	0.01	483.95	
R-40	3/18/2014	494.46	10.74	10.75	0.01	483.72	
R-40	3/24/2014	494.46	10.79	10.82	0.03	483.66	
R-40	4/18/2014	494.47	10.58	10.59	0.01	483.89	
R-40	5/15/2014	494.48	10.14	10.15	0.01	484.34	
R-40	5/16/2014	494.48	Sheen	10.20	Sheen	484.28	
R-40	6/11/2014	494.48	Sheen	10.34	Sheen	484.14	
R-40	6/19/2014	494.48	Sheen	9.92	Sheen	484.56	
R-40	7/15/2014	494.50	8.13	8.32	0.19	486.34	
R-40	8/26/2014	494.49	8.80	9.12	0.32	485.63	
R-40	9/9/2014	494.49	9.03	9.42	0.39	485.39	
R-40	9/24/2014	494.48	9.31	9.75	0.44	485.09	
R-40	10/21/2014	494.48	10.22	10.74	0.52	484.17	
R-40	11/19/2014	494.50	9.90	10.04	0.14	484.58	
R-40	12/16/2014	494.47	10.10	10.25	0.15	484.34	
R-40	12/29/2014	494.47	12.26	12.38	0.12	482.19	
R-40	1/21/2015	494.46	20.91	21.06	0.15	473.52	Flow rate = 45.0 gpm
R-40	2/25/2015	494.47	15.53	16.33	0.80	478.80	Flow rate = ~30 gpm
R-40	3/10/2015	494.42	16.01	17.20	1.19	478.20	
R-40	3/18/2015	494.42	15.54	16.52	0.98	478.71	

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R-40	3/26/2015	494.42	15.48	17.31	1.83	478.61	
R-40	4/16/2015	494.42	19.72	20.10	0.38	474.63	
R-40	5/21/2015	494.42	14.01	14.44	0.43	480.33	
R-40	6/10/2015	494.42	14.70	15.29	0.59	479.61	
R-40	7/22/2015	494.42	11.61	11.62	0.01	482.83	
R-40	8/12/2015	495.49	11.10	11.16	0.06	484.42	
R-40	8/19/2015	495.49	11.59	11.64	0.05	483.96	
R-40	9/30/2015	494.48	11.65	11.70	0.05	482.86	
R-40	10/6/2015	494.48	11.46	11.47	0.01	483.06	The flow rate gauge (needle-style) was not working. The flow rate of 10 gpm was recorded on the 10-5-15 Night AM log entry in the well house.
R-40	10/15/2015	494.48	10.92	10.94	0.02	483.60	
R-40	11/19/2015	494.48	12.01	12.04	0.03	482.46	
R-40	11/25/2015	494.48	11.85	11.89	0.04	482.65	
R-40	12/16/2015	494.48	12.21	12.32	0.11	482.25	
R-40	1/19/2016	494.48	12.58	12.60	0.02	481.90	
R-40	1/19/2016	494.48	12.58	12.60	0.02	481.90	
R-40	2/25/2016	494.48	13.82	13.96	0.14	480.64	
R-40	3/4/2016	494.48	Sheen	11.69	Sheen	482.84	
R-40	4/14/2016	494.48	Sheen	10.16	Sheen	484.32	Pump was off
R-40	5/20/2016	494.48	14.34	14.65	0.31	480.08	
R-40	5/26/2016	494.48	14.16	14.50	0.34	480.28	
R-40	6/14/2016	494.48	14.02	14.45	0.43	480.38	
R-40	7/2/2016	494.48	13.85	14.25	0.40	480.56	
R-40	7/4/2016	494.48	13.69	14.12	0.43	480.71	DTP recorded as 14.12 on fieldsheet. Corrected based on recorded product thickness and recent Water level trend.
R-40	7/8/2016	494.48	12.80	12.98	0.18	481.65	
R-40	7/12/2016	494.48	12.76	13.00	0.24	481.68	
R-40	7/16/2016	494.48	12.90	13.13	0.23	481.54	
R-40	7/19/2016	494.48	12.50	12.60	0.10	481.96	
R-40	7/23/2016	494.48	12.03	12.25	0.22	482.41	
R-40	7/26/2016	494.48	12.17	12.48	0.31	482.25	
R-40	7/26/2016	494.48	12.17	12.47	0.30	482.26	
R-40	7/30/2016	494.48	12.32	12.71	0.39	482.09	
R-40	8/1/2016	494.48	12.05	12.36	0.31	482.37	
R-40	8/6/2016	494.48	11.43	11.73	0.30	483.00	
R-40	8/9/2016	494.48	12.10	12.41	0.31	482.32	
R-40	8/13/2016	494.48	12.15	12.45	0.30	482.28	
R-40	8/16/2016	494.48	12.55	13.00	0.45	481.85	Transcription error corrected: DTP/DTW entered vice-versa
R-40	8/18/2016	494.48	12.61	13.11	0.50	481.78	
R-40	8/20/2016	494.48	12.70	13.27	0.57	481.68	

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R-40	8/23/2016	494.48	12.83	12.93	0.10	481.63	
R-40	8/27/2016	494.48	12.85	12.95	0.10	481.61	
R-40	8/30/2016	494.48	12.92	13.08	0.16	481.53	
R-40	9/3/2016	494.48	13.23	13.51	0.28	481.20	
R-40	9/6/2016	494.48	13.20	13.46	0.26	481.23	
R-40	9/9/2016	494.48	13.26	13.58	0.32	481.21	
R-40	9/9/2016	494.48	13.26	13.58	0.32	481.21	
R-40	9/10/2016	494.48	13.30	13.61	0.31	481.12	
R-40	9/13/2016	494.48	13.30	13.65	0.35	481.12	Transcription error corrected: DTP/DTW entered vice-versa
R-40	9/17/2016	494.48	13.40	13.80	0.40	481.01	
R-40	9/24/2016	494.48	9.21	9.23	0.02	485.27	All recovery wells shutdown for sand filter media changeout
R-40	9/27/2016	494.48	13.92	14.29	0.37	480.49	
R-40	9/30/2016	494.48	13.37	13.66	0.29	481.06	
R-40	10/4/2016	494.48	14.00	14.36	0.36	480.42	
R-40	10/8/2016	494.48	13.95	14.40	0.45	480.45	
R-40	10/11/2016	494.48	14.15	14.25	0.10	480.31	
R-40	10/13/2016	494.48	14.18	14.25	0.07	480.29	
R-40	10/15/2016	494.48	14.25	14.40	0.15	480.20	
R-40	10/18/2016	494.48	14.46	14.55	0.09	480.00	
R-40	10/22/2016	494.48	14.60	14.72	0.12	479.86	
R-40	10/25/2016	494.48	14.79	14.92	0.13	479.67	
R-40	10/28/2016	494.48	14.68	14.79	0.11	479.78	
R-40	11/1/2016	494.48	14.06	14.15	0.09	480.40	
R-40	11/5/2016	494.48	13.82	13.94	0.12	480.64	
R-40	11/8/2016	494.48	—	—	—	—	Well pump was broken. DTW/DTP not recorded on fieldsheet
R-40	11/12/2016	494.48	13.90	14.05	0.15	480.55	
R-40	11/15/2016	494.48	13.89	14.00	0.11	480.57	
R-40	11/15/2016	494.48	13.92	14.02	0.10	480.58	
R-40	11/15/2016	494.48	13.92	14.02	0.10	480.58	
R-40	11/19/2016	494.48	13.83	13.95	0.12	480.63	
R-40	11/22/2016	494.48	14.01	14.15	0.14	480.45	
R-40	11/26/2016	494.48	14.01	14.16	0.15	480.44	
R-40	11/29/2016	494.48	14.10	14.27	0.17	480.35	
R-40	12/3/2016	494.48	14.26	14.45	0.19	480.19	
R-40	12/6/2016	494.48	14.30	14.36	0.06	480.17	
R-40	12/9/2016	494.48	14.70	14.88	0.18	479.75	
R-40	12/10/2016	494.48	14.40	14.57	0.17	480.05	
R-40	12/13/2016	494.48	14.22	14.35	0.13	480.24	
R-40	12/17/2016	494.48	14.25	14.45	0.20	480.19	
R-40	12/20/2016	494.48	14.20	14.33	0.13	480.26	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-40	12/24/2016	494.48	14.25	14.44	0.19	480.20	
R-40	12/27/2016	494.48	14.25	14.55	0.30	480.18	
R-40	12/31/2016	494.48	14.24	14.40	0.16	480.21	
R-40	1/7/2017	494.48	14.45	14.72	0.27	479.98	
R-40	1/10/2017	494.48	14.87	15.20	0.33	479.55	
R-40	1/15/2017	494.48	14.93	15.37	0.44	479.47	
R-40	1/17/2017	494.48	14.82	15.40	0.58	479.56	
R-40	1/21/2017	494.48	14.90	14.98	0.08	479.57	
R-40	1/24/2017	494.48	15.79	15.91	0.12	478.67	
R-40	1/24/2017	494.48	14.90	15.04	0.14	479.56	
R-40	1/28/2017	494.48	15.07	15.22	0.15	479.38	
R-40	1/31/2017	494.48	15.04	15.15	0.11	479.42	
R-40	2/4/2017	494.48	15.20	15.35	0.15	479.25	
R-40	2/7/2017	494.48	15.07	15.14	0.07	479.40	
R-40	2/8/2017	494.48	15.11	15.26	0.15	479.41	
R-40	2/8/2017	494.48	15.11	15.26	0.15	479.41	
R-40	2/11/2017	494.48	15.17	15.30	0.13	479.29	
R-40	2/14/2017	494.48	15.15	15.31	0.16	479.30	
R-40	2/18/2017	494.48	15.48	15.65	0.17	478.97	
R-40	2/21/2017	494.48	15.55	15.75	0.20	478.89	
R-40	2/25/2017	494.48	15.55	15.79	0.24	478.89	
R-40	2/28/2017	494.48	15.54	15.81	0.27	478.89	
R-40	3/1/2017	494.48	15.51	15.65	0.14	478.95	
R-40	3/4/2017	494.48	15.60	15.86	0.26	478.83	
R-40	3/7/2017	494.48	15.02	15.35	0.33	479.40	
R-40	3/11/2017	494.48	15.20	15.43	0.23	479.24	
R-40	3/14/2017	494.48	15.08	15.41	0.33	479.34	
R-40	3/18/2017	494.48	15.13	15.48	0.35	479.29	
R-40	3/21/2017	494.48	15.10	15.46	0.36	479.32	
R-40	3/24/2017	494.48	15.16	15.61	0.45	479.24	
R-40	3/28/2017	494.48	15.15	15.60	0.45	479.25	
R-40	4/1/2017	494.48	15.32	15.67	0.01	479.10	
R-40	4/4/2017	494.48	15.42	15.84	0.42	478.99	
R-40	4/8/2017	494.48	15.28	15.73	0.45	479.12	
R-40	4/11/2017	494.48	15.25	15.31	0.06	479.22	
R-40	4/15/2017	494.48	15.08	15.64	0.56	479.30	
R-40	4/18/2017	494.48	15.16	15.25	0.09	479.30	
R-40	4/18/2017	494.48	15.15	15.21	0.06	479.32	
R-40	4/22/2017	494.48	15.21	15.36	0.15	479.24	
R-40	4/25/2017	494.48	15.01	15.17	0.16	479.44	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-40	4/29/2017	494.48	14.80	15.02	0.22	479.64	
R-40	5/2/2017	494.48	14.63	14.88	0.25	479.81	
R-40	5/6/2017	494.48	14.74	15.06	0.32	479.68	
R-40	5/9/2017	494.48	15.03	15.41	0.38	479.38	
R-40	5/13/2017	494.48	14.80	15.21	0.41	479.61	
R-40	5/16/2017	494.48	14.50	15.10	0.60	479.87	
R-40	5/20/2017	494.48	14.70	14.78	0.08	479.77	
R-40	5/23/2017	494.48	14.88	14.97	0.09	479.58	
R-40	5/25/2017	494.48	14.91	15.01	0.10	479.55	
R-40	5/27/2017	494.48	15.00	15.10	0.10	479.46	
R-40	5/30/2017	494.48	15.11	15.28	0.17	479.34	
R-40	6/3/2017	494.48	15.10	15.30	0.20	479.34	
R-40	6/6/2017	494.48	15.16	15.37	0.21	479.28	
R-40	6/6/2017	494.48	15.12	15.35	0.23	479.32	
R-40	6/10/2017	494.48	14.80	15.04	0.24	479.64	
R-40	6/13/2017	494.48	14.15	14.35	0.20	480.35	
R-40	6/13/2017	494.48	14.15	14.35	0.20	480.29	
R-40	6/16/2017	494.48	14.10	14.37	0.27	480.33	
R-40	6/20/2017	494.48	14.07	14.38	0.31	480.35	
R-40	6/24/2017	494.48	14.08	14.20	0.12	480.38	
R-40	6/27/2017	494.48	14.09	14.16	0.07	480.38	
R-40	7/1/2017	494.48	14.10	14.25	0.15	480.35	
R-40	7/4/2017	494.48	13.97	14.10	0.13	480.49	
R-40	7/8/2017	494.48	13.76	13.92	0.16	480.69	
R-40	7/27/2017	494.48	No LNAPL	8.65	0.00	485.83	
R-40	8/15/2017	494.48	8.55	8.56	0.01	485.93	
R-40	8/28/2017	494.48	No LNAPL	9.15	0.00	485.33	
R-40	9/21/2017	494.47	Sheen	9.83	Sheen	484.64	
R-40	10/20/2017	494.47	Sheen	10.10	Sheen	484.37	
R-40	11/1/2017	494.47	Sheen	10.35	Sheen	484.12	
R-40	1/19/2018	494.47	Sheen	10.00	Sheen	484.47	
R-40	3/12/2018	494.47	No LNAPL	10.26	0.00	484.21	
R-40	4/4/2018	494.47	Sheen	10.29	Sheen	484.18	
R-40	6/8/2018	494.47	No LNAPL	9.41	0.00	485.06	
R-42	2/6/2012	493.30	No LNAPL	11.26	0.00	482.04	
R-42	2/15/2012	493.30	No LNAPL	11.11	0.00	482.19	
R-42	3/13/2012	493.30	No LNAPL	11.21	0.00	482.09	
R-42	4/10/2012	493.30	No LNAPL	11.10	0.00	482.20	
R-42	4/19/2012	493.30	--	10.51	--	482.79	
R-42	5/8/2012	493.30	No LNAPL	10.87	0.00	482.43	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-42	6/12/2012	493.30	No LNAPL	9.98	0.00	483.32	
R-42	7/17/2012	493.30	No LNAPL	9.65	0.00	483.65	
R-42	7/30/2012	493.30	No LNAPL	9.16	0.00	484.14	
R-42	8/21/2012	493.30	No LNAPL	10.03	0.00	483.27	
R-42	9/18/2012	493.30	No LNAPL	10.86	0.00	482.44	
R-42	10/16/2012	493.30	No LNAPL	10.87	0.00	482.43	
R-42	11/1/2012	493.30	No LNAPL	10.81	0.00	482.49	
R-42	11/29/2012	493.31	No LNAPL	10.44	0.00	482.87	
R-42	12/27/2012	493.31	No LNAPL	10.81	0.00	482.50	
R-42	1/23/2013	493.31	No LNAPL	10.87	0.00	482.44	
R-42	2/26/2013	493.31	No LNAPL	10.86	0.00	482.45	
R-42	3/28/2013	493.31	No LNAPL	11.16	0.00	482.15	R-35R, R-39, and R-40 were offline on this date
R-42	4/24/2013	493.31	No LNAPL	11.15	0.00	482.16	
R-42	5/21/2013	493.29	No LNAPL	10.38	0.00	482.91	
R-42	6/25/2013	493.29	No LNAPL	9.58	0.00	483.71	
R-42	8/1/2013	493.29	No LNAPL	9.17	0.00	484.12	
R-42	10/1/2013	493.29	--	10.27	--	483.02	
R-42	10/29/2013	493.29	No LNAPL	11.20	0.00	482.09	
R-42	11/19/2013	493.29	No LNAPL	10.36	0.00	482.93	
R-42	12/18/2013	493.29	No LNAPL	10.71	0.00	482.58	
R-42	3/18/2014	493.29	--	10.21	--	483.08	
R-42	6/11/2014	493.28	--	9.05	--	484.23	
R-42	8/26/2014	493.28	--	8.94	--	484.34	
R-42	9/9/2014	493.28	--	9.42	--	483.86	
R-42	9/24/2014	493.28	No LNAPL	9.59	0.00	483.69	
R-42	10/21/2014	493.28	No LNAPL	10.50	0.00	482.78	
R-42	11/19/2014	493.28	No LNAPL	10.11	0.00	483.17	
R-42	11/20/2014	493.28	No LNAPL	10.06	0.00	483.22	
R-42	12/16/2014	493.28	No LNAPL	10.27	0.00	483.01	
R-42	1/21/2015	493.26	No LNAPL	10.60	0.00	482.66	Flow rate not recorded
R-42	2/25/2015	493.26	No LNAPL	11.05	0.00	482.21	Flow rate = 120.1 gpm
R-42	3/10/2015	493.26	No LNAPL	10.63	0.00	482.63	Flow rate = 99.7 gpm
R-42	3/18/2015	493.26	--	10.76	--	482.50	
R-42	3/26/2015	493.26	No LNAPL	10.86	0.00	482.40	
R-42	4/16/2015	493.26	No LNAPL	10.58	0.00	482.68	Flow rate = 100.1 gpm
R-42	5/21/2015	493.26	No LNAPL	10.05	0.00	483.21	Flow rate = 85.0 gpm
R-42	6/10/2015	493.26	No LNAPL	10.12	0.00	483.14	Flow rate = 85.1 gpm
R-42	7/22/2015	493.28	No LNAPL	9.20	0.00	484.10	
R-42	8/12/2015	493.28	No LNAPL	9.05	0.00	484.27	
R-42	8/19/2015	493.28	No LNAPL	9.32	0.00	483.99	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-42	9/30/2015	493.28	No LNAPL	9.90	0.00	483.42	
R-42	10/6/2015	493.28	No LNAPL	9.67	0.00	483.62	
R-42	10/15/2015	493.28	No LNAPL	10.12	0.00	483.16	
R-42	11/19/2015	493.28	--	10.22	--	483.06	
R-42	11/25/2015	493.28	No LNAPL	9.95	0.00	483.36	
R-42	12/16/2015	493.28	No LNAPL	10.35	0.00	482.93	
R-42	1/19/2016	493.28	No LNAPL	10.75	0.00	482.53	
R-42	1/19/2016	493.28	No LNAPL	10.75	0.00	482.53	
R-42	2/25/2016	493.28	No LNAPL	10.90	0.00	482.38	
R-42	3/4/2016	493.28	No LNAPL	10.86	0.00	482.42	
R-42	4/14/2016	493.28	No LNAPL	10.35	0.00	482.93	
R-42	5/20/2016	493.28	No LNAPL	10.52	0.00	482.76	
R-42	5/26/2016	493.28	No LNAPL	10.36	0.00	482.94	
R-42	6/14/2016	493.28	No LNAPL	9.98	0.00	483.30	
R-42	7/2/2016	493.28	No LNAPL	9.47	0.00	483.81	
R-42	7/4/2016	493.28	No LNAPL	9.23	0.00	484.05	
R-42	7/8/2016	493.28	No LNAPL	8.99	0.00	484.29	
R-42	7/12/2016	493.28	No LNAPL	8.95	0.00	484.33	
R-42	7/16/2016	493.28	No LNAPL	8.86	0.00	484.42	
R-42	7/19/2016	493.28	No LNAPL	8.50	0.00	484.78	
R-42	7/23/2016	493.28	No LNAPL	8.00	0.00	485.28	
R-42	7/26/2016	493.28	No LNAPL	8.10	0.00	485.18	
R-42	7/26/2016	493.28	No LNAPL	8.09	0.00	485.19	
R-42	7/30/2016	493.28	No LNAPL	8.15	0.00	485.13	
R-42	8/1/2016	493.28	No LNAPL	7.99	0.00	485.29	
R-42	8/6/2016	493.28	No LNAPL	8.25	0.00	485.03	
R-42	8/9/2016	493.28	No LNAPL	8.33	0.00	484.95	
R-42	8/13/2016	493.28	No LNAPL	8.47	0.00	484.81	
R-42	8/16/2016	493.28	No LNAPL	8.71	0.00	484.57	
R-42	8/18/2016	493.28	No LNAPL	8.79	0.00	484.49	
R-42	8/20/2016	493.28	No LNAPL	8.90	0.00	484.38	
R-42	8/23/2016	493.28	No LNAPL	8.97	0.00	484.31	
R-42	8/27/2016	493.28	No LNAPL	8.98	0.00	484.30	
R-42	8/30/2016	493.28	No LNAPL	9.01	0.00	484.27	
R-42	9/3/2016	493.28	No LNAPL	8.65	0.00	484.63	
R-42	9/6/2016	493.28	No LNAPL	8.70	0.00	484.58	
R-42	9/9/2016	493.28	No LNAPL	8.84	0.00	484.48	
R-42	9/9/2016	493.28	No LNAPL	8.84	0.00	484.48	
R-42	9/10/2016	493.28	No LNAPL	8.89	0.00	484.39	
R-42	9/13/2016	493.28	No LNAPL	8.92	0.00	484.36	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-42	9/17/2016	493.28	No LNAPL	8.98	0.00	484.30	
R-42	9/24/2016	493.28	No LNAPL	8.11	0.00	485.17	All recovery wells shutdown for sand filter media changeout
R-42	9/27/2016	493.28	No LNAPL	9.36	0.00	483.92	
R-42	9/30/2016	493.28	--	9.42	--	483.86	
R-42	10/4/2016	493.28	No LNAPL	9.60	0.00	483.68	
R-42	10/8/2016	493.28	No LNAPL	9.70	0.00	483.58	
R-42	10/11/2016	493.28	No LNAPL	9.83	0.00	483.45	
R-42	10/13/2016	493.28	No LNAPL	9.89	0.00	483.39	
R-42	10/15/2016	493.28	No LNAPL	9.94	0.00	483.34	
R-42	10/18/2016	493.28	No LNAPL	10.02	0.00	483.26	
R-42	10/22/2016	493.28	No LNAPL	10.13	0.00	483.15	
R-42	10/25/2016	493.28	No LNAPL	10.19	0.00	483.09	
R-42	10/28/2016	493.28	No LNAPL	10.01	0.00	483.27	
R-42	11/1/2016	493.28	No LNAPL	9.48	0.00	483.80	
R-42	11/5/2016	493.28	No LNAPL	9.20	0.00	484.08	
R-42	11/8/2016	493.28	No LNAPL	9.35	0.00	483.93	
R-42	11/12/2016	493.28	No LNAPL	9.35	0.00	483.93	
R-42	11/15/2016	493.28	No LNAPL	9.44	0.00	483.94	
R-42	11/15/2016	493.28	No LNAPL	9.36	0.00	483.92	
R-42	11/15/2016	493.28	No LNAPL	9.44	0.00	483.94	
R-42	11/19/2016	493.28	No LNAPL	9.35	0.00	483.93	
R-42	11/22/2016	493.28	No LNAPL	9.43	0.00	483.85	
R-42	11/26/2016	493.28	No LNAPL	9.54	0.00	483.74	
R-42	11/29/2016	493.28	No LNAPL	9.60	0.00	483.68	
R-42	12/3/2016	493.28	No LNAPL	9.71	0.00	483.57	
R-42	12/6/2016	493.28	No LNAPL	9.67	0.00	483.61	
R-42	12/9/2016	493.28	No LNAPL	9.65	0.00	483.63	
R-42	12/10/2016	493.28	No LNAPL	9.65	0.00	483.63	Transcription error corrected: DTW entered as 17.65 on ops gauging sheet
R-42	12/13/2016	493.28	No LNAPL	9.66	0.00	483.62	
R-42	12/17/2016	493.28	No LNAPL	9.65	0.00	483.63	
R-42	12/20/2016	493.28	No LNAPL	9.59	0.00	483.69	
R-42	12/24/2016	493.28	No LNAPL	9.64	0.00	483.64	
R-42	12/27/2016	493.28	No LNAPL	9.69	0.00	483.59	
R-42	12/31/2016	493.28	No LNAPL	9.72	0.00	483.56	
R-42	1/7/2017	493.28	No LNAPL	9.67	0.00	483.61	
R-42	1/10/2017	493.28	No LNAPL	9.74	0.00	483.54	
R-42	1/15/2017	493.28	No LNAPL	9.75	0.00	483.53	
R-42	1/17/2017	493.28	No LNAPL	9.70	0.00	483.58	
R-42	1/21/2017	493.28	No LNAPL	9.75	0.00	483.53	
R-42	1/24/2017	493.28	No LNAPL	9.77	0.00	483.51	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-42	1/24/2017	493.28	No LNAPL	9.77	0.00	483.51	
R-42	1/28/2017	493.28	No LNAPL	9.78	0.00	483.50	
R-42	1/31/2017	493.28	No LNAPL	9.80	0.00	483.48	
R-42	2/4/2017	493.28	No LNAPL	9.82	0.00	483.46	
R-42	2/7/2017	493.28	No LNAPL	9.80	0.00	483.48	
R-42	2/8/2017	493.28	No LNAPL	9.85	0.00	483.50	
R-42	2/8/2017	493.28	No LNAPL	9.85	0.00	483.50	
R-42	2/11/2017	493.28	No LNAPL	9.80	0.00	483.48	
R-42	2/14/2017	493.28	No LNAPL	9.80	0.00	483.48	
R-42	2/18/2017	493.28	No LNAPL	9.88	0.00	483.40	
R-42	2/21/2017	493.28	No LNAPL	9.89	0.00	483.39	
R-42	2/25/2017	493.28	No LNAPL	9.89	0.00	483.39	
R-42	2/28/2017	493.28	No LNAPL	9.85	0.00	483.43	
R-42	3/1/2017	493.28	No LNAPL	9.90	0.00	483.38	
R-42	3/4/2017	493.28	No LNAPL	9.92	0.00	483.36	
R-42	3/7/2017	493.28	No LNAPL	9.91	0.00	483.37	
R-42	3/11/2017	493.28	No LNAPL	9.93	0.00	483.35	
R-42	3/14/2017	493.28	No LNAPL	9.91	0.00	483.37	
R-42	3/18/2017	493.28	No LNAPL	9.92	0.00	483.36	
R-42	3/21/2017	493.28	No LNAPL	9.98	0.00	483.30	
R-42	3/24/2017	493.28	No LNAPL	9.98	0.00	483.30	
R-42	3/28/2017	493.28	No LNAPL	9.97	0.00	483.31	
R-42	4/1/2017	493.28	No LNAPL	9.97	0.00	483.31	
R-42	4/4/2017	493.28	No LNAPL	9.92	0.00	483.36	
R-42	4/8/2017	493.28	No LNAPL	9.92	0.00	483.36	
R-42	4/11/2017	493.28	No LNAPL	9.88	0.00	483.40	
R-42	4/15/2017	493.28	No LNAPL	9.77	0.00	483.51	
R-42	4/18/2017	493.28	No LNAPL	9.76	0.00	483.52	
R-42	4/18/2017	493.28	No LNAPL	9.72	0.00	483.56	
R-42	4/22/2017	493.28	No LNAPL	9.76	0.00	483.52	
R-42	4/25/2017	493.28	No LNAPL	9.61	0.00	483.67	
R-42	4/29/2017	493.28	No LNAPL	9.84	0.00	483.44	
R-42	5/2/2017	493.28	No LNAPL	9.91	0.00	483.37	
R-42	5/6/2017	493.28	No LNAPL	9.54	0.00	483.74	
R-42	5/9/2017	493.28	No LNAPL	9.60	0.00	483.68	
R-42	5/13/2017	493.28	No LNAPL	9.48	0.00	483.80	
R-42	5/16/2017	493.28	No LNAPL	9.40	0.00	483.88	
R-42	5/20/2017	493.28	No LNAPL	9.43	0.00	483.85	
R-42	5/23/2017	493.28	No LNAPL	9.60	0.00	483.68	
R-42	5/25/2017	493.28	No LNAPL	9.64	0.00	483.64	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-42	5/27/2017	493.28	No LNAPL	9.72	0.00	483.56	
R-42	5/30/2017	493.28	No LNAPL	9.86	0.00	483.42	
R-42	6/3/2017	493.28	No LNAPL	9.98	0.00	483.30	
R-42	6/6/2017	493.28	No LNAPL	10.04	0.00	483.24	
R-42	6/6/2017	493.28	No LNAPL	10.00	0.00	483.28	
R-42	6/10/2017	493.28	No LNAPL	9.99	0.00	483.29	
R-42	6/13/2017	493.28	No LNAPL	9.27	0.00	484.06	
R-42	6/13/2017	493.28	No LNAPL	9.25	0.00	484.03	
R-42	6/16/2017	493.28	No LNAPL	9.11	0.00	484.17	
R-42	6/20/2017	493.28	No LNAPL	9.44	0.00	483.84	
R-42	6/24/2017	493.28	No LNAPL	9.36	0.00	483.92	
R-42	6/27/2017	493.28	No LNAPL	9.29	0.00	483.99	
R-42	7/1/2017	493.28	No LNAPL	9.30	0.00	483.98	
R-42	7/4/2017	493.28	No LNAPL	9.12	0.00	484.16	
R-42	7/8/2017	493.28	No LNAPL	8.89	0.00	484.39	
R-43	7/23/2013	495.45	No LNAPL	23.33	0.00	472.12	
R-43	8/1/2013	495.45	No LNAPL	25.86	0.00	469.59	
R-43	8/21/2013	495.45	No LNAPL	23.56	0.00	471.89	
R-43	9/24/2013	495.45	No LNAPL	25.42	0.00	470.03	
R-43	10/29/2013	495.45	No LNAPL	22.73	0.00	472.72	
R-43	11/19/2013	495.45	No LNAPL	19.52	0.00	475.93	
R-43	12/18/2013	495.45	No LNAPL	20.22	0.00	475.23	
R-43	8/26/2014	495.44	--	23.82	--	471.62	
R-43	9/24/2014	495.44	No LNAPL	25.49	0.00	469.95	
R-43	10/21/2014	495.44	No LNAPL	34.04	0.00	461.40	
R-43	11/19/2014	495.44	No LNAPL	34.10	0.00	461.34	
R-43	12/16/2014	495.44	No LNAPL	34.11	0.00	461.33	
R-43	1/21/2015	495.43	No LNAPL	32.70	0.00	462.73	
R-43	2/25/2015	495.43	No LNAPL	29.13	0.00	466.30	Flow rate = 42.2 gpm
R-43	3/10/2015	495.43	No LNAPL	29.06	0.00	466.37	Flow rate = 39.8 gpm
R-43	3/18/2015	495.43	No LNAPL	27.11	0.00	468.32	
R-43	3/26/2015	495.43	No LNAPL	28.61	0.00	466.82	
R-43	4/16/2015	495.43	No LNAPL	26.65	0.00	468.78	Flow rate = 31.8 gpm
R-43	5/21/2015	495.43	No LNAPL	23.96	0.00	471.47	Flow rate = 65.1 gpm
R-43	6/10/2015	495.43	No LNAPL	25.71	0.00	469.72	Flow rate = 70.3 gpm
R-43	7/22/2015	495.45	No LNAPL	23.53	0.00	471.94	
R-43	8/12/2015	495.45	No LNAPL	21.97	0.00	473.52	
R-43	8/19/2015	495.45	No LNAPL	23.93	0.00	471.55	
R-43	9/30/2015	495.45	No LNAPL	24.97	0.00	470.48	
R-43	10/6/2015	495.45	No LNAPL	26.83	0.00	468.63	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-43	10/15/2015	495.45	No LNAPL	26.27	0.00	469.18	
R-43	11/25/2015	495.45	No LNAPL	25.34	0.00	470.14	
R-43	12/16/2015	495.45	No LNAPL	26.85	0.00	468.60	
R-43	1/19/2016	495.45	No LNAPL	28.48	0.00	466.97	
R-43	1/19/2016	495.45	No LNAPL	28.48	0.00	466.97	
R-43	2/25/2016	495.45	No LNAPL	28.23	0.00	467.22	
R-43	3/4/2016	495.45	No LNAPL	29.44	0.00	466.01	
R-43	4/14/2016	495.45	No LNAPL	27.89	0.00	467.56	
R-43	5/20/2016	495.45	No LNAPL	28.78	0.00	466.67	
R-43	5/26/2016	495.45	No LNAPL	28.92	0.00	466.55	
R-43	6/14/2016	495.45	No LNAPL	29.00	0.00	466.45	
R-43	7/2/2016	495.45	No LNAPL	28.88	0.00	466.57	
R-43	7/4/2016	495.45	No LNAPL	28.43	0.00	467.02	
R-43	7/8/2016	495.45	No LNAPL	26.14	0.00	469.31	
R-43	7/12/2016	495.45	No LNAPL	27.23	0.00	468.22	
R-43	7/16/2016	495.45	No LNAPL	26.62	0.00	468.83	
R-43	7/19/2016	495.45	No LNAPL	26.53	0.00	468.92	
R-43	7/23/2016	495.45	No LNAPL	25.83	0.00	469.62	
R-43	7/26/2016	495.45	No LNAPL	24.52	0.00	470.93	
R-43	7/26/2016	495.45	No LNAPL	24.52	0.00	470.93	
R-43	7/30/2016	495.45	No LNAPL	25.12	0.00	470.33	
R-43	8/1/2016	495.45	No LNAPL	25.38	0.00	470.07	
R-43	8/6/2016	495.45	No LNAPL	24.23	0.00	471.22	
R-43	8/9/2016	495.45	No LNAPL	—	0.00	—	Well rehab in progress. DTP/DTW not recorded
R-43	8/14/2016	495.45	No LNAPL	22.55	0.00	472.90	
R-43	8/16/2016	495.45	No LNAPL	23.62	0.00	471.83	
R-43	8/18/2016	495.45	No LNAPL	23.88	0.00	471.57	
R-43	8/20/2016	495.45	No LNAPL	24.12	0.00	471.33	
R-43	8/23/2016	495.45	No LNAPL	24.41	0.00	471.04	
R-43	8/27/2016	495.44	No LNAPL	24.22	0.00	471.22	
R-43	8/30/2016	495.44	No LNAPL	24.53	0.00	470.91	
R-43	9/3/2016	495.44	No LNAPL	24.78	0.00	470.66	
R-43	9/6/2016	495.44	No LNAPL	24.60	0.00	470.84	
R-43	9/9/2016	495.44	No LNAPL	24.78	0.00	470.70	
R-43	9/9/2016	495.44	No LNAPL	24.78	0.00	470.70	
R-43	9/10/2016	495.44	No LNAPL	24.93	0.00	470.51	
R-43	9/13/2016	495.44	No LNAPL	24.99	0.00	470.45	
R-43	9/17/2016	495.44	No LNAPL	24.78	0.00	470.66	
R-43	9/24/2016	495.44	No LNAPL	10.35	0.00	485.09	All recovery wells shutdown for sand filter media changeout
R-43	9/27/2016	495.44	No LNAPL	25.64	0.00	469.80	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-43	9/30/2016	495.44	No LNAPL	26.06	0.00	469.38	
R-43	10/4/2016	495.44	No LNAPL	26.60	0.00	468.84	
R-43	10/8/2016	495.44	No LNAPL	26.73	0.00	468.71	
R-43	10/11/2016	495.44	No LNAPL	27.30	0.00	468.14	
R-43	10/13/2016	495.44	No LNAPL	27.33	0.00	468.11	
R-43	10/15/2016	495.44	No LNAPL	27.32	0.00	468.12	
R-43	10/18/2016	495.44	No LNAPL	27.44	0.00	468.00	
R-43	10/22/2016	495.44	No LNAPL	29.09	0.00	466.35	
R-43	10/25/2016	495.44	No LNAPL	28.70	0.00	466.74	
R-43	10/28/2016	495.44	No LNAPL	28.64	0.00	466.80	
R-43	11/1/2016	495.44	No LNAPL	27.95	0.00	467.49	
R-43	11/5/2016	495.44	No LNAPL	27.26	0.00	468.18	
R-43	11/8/2016	495.44	No LNAPL	27.60	0.00	467.84	
R-43	11/12/2016	495.44	No LNAPL	26.68	0.00	468.76	
R-43	11/15/2016	495.44	No LNAPL	26.68	0.00	468.86	
R-43	11/15/2016	495.44	No LNAPL	26.68	0.00	468.86	
R-43	11/15/2016	495.44	No LNAPL	26.64	0.00	468.80	
R-43	11/19/2016	495.44	No LNAPL	26.65	0.00	468.79	
R-43	11/22/2016	495.44	No LNAPL	26.88	0.00	468.56	
R-43	11/26/2016	495.44	No LNAPL	27.32	0.00	468.12	
R-43	11/29/2016	495.44	No LNAPL	27.71	0.00	467.73	
R-43	12/3/2016	495.44	No LNAPL	27.85	0.00	467.59	
R-43	12/6/2016	495.44	No LNAPL	27.46	0.00	467.98	
R-43	12/9/2016	495.44	No LNAPL	27.62	0.00	467.82	
R-43	12/10/2016	495.44	No LNAPL	27.30	0.00	468.14	
R-43	12/13/2016	495.44	No LNAPL	27.34	0.00	468.10	
R-43	12/17/2016	495.44	No LNAPL	27.70	0.00	467.74	
R-43	12/20/2016	495.44	No LNAPL	27.78	0.00	467.66	
R-43	12/24/2016	495.44	No LNAPL	28.09	0.00	467.35	
R-43	12/27/2016	495.44	No LNAPL	28.30	0.00	467.14	
R-43	12/31/2016	495.44	No LNAPL	28.15	0.00	467.29	
R-43	1/7/2017	495.44	No LNAPL	27.85	0.00	467.59	
R-43	1/10/2017	495.44	No LNAPL	27.87	0.00	467.57	
R-43	1/15/2017	495.44	No LNAPL	28.01	0.00	467.43	
R-43	1/17/2017	495.44	No LNAPL	28.27	0.00	467.17	
R-43	1/21/2017	495.44	No LNAPL	28.38	0.00	467.06	
R-43	1/24/2017	495.44	No LNAPL	28.97	0.00	466.47	
R-43	1/24/2017	495.44	No LNAPL	29.28	0.00	466.16	
R-43	1/28/2017	495.44	No LNAPL	29.85	0.00	465.59	
R-43	1/31/2017	495.44	No LNAPL	30.10	0.00	465.34	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-43	2/4/2017	495.44	No LNAPL	29.72	0.00	465.72	
R-43	2/7/2017	495.44	No LNAPL	29.47	0.00	465.97	
R-43	2/8/2017	495.44	No LNAPL	29.75	0.00	465.76	
R-43	2/8/2017	495.44	No LNAPL	29.75	0.00	465.76	
R-43	2/11/2017	495.44	No LNAPL	29.42	0.00	466.02	
R-43	2/14/2017	495.44	No LNAPL	29.35	0.00	466.09	
R-43	2/18/2017	495.44	No LNAPL	29.09	0.00	466.35	
R-43	2/21/2017	495.44	No LNAPL	29.02	0.00	466.42	
R-43	2/25/2017	495.44	No LNAPL	29.02	0.00	466.42	
R-43	2/28/2017	495.44	No LNAPL	28.95	0.00	466.49	
R-43	3/1/2017	495.44	No LNAPL	28.97	0.00	466.47	
R-43	3/4/2017	495.44	No LNAPL	29.01	0.00	466.43	
R-43	3/7/2017	495.44	No LNAPL	28.74	0.00	466.70	
R-43	3/11/2017	495.44	No LNAPL	28.72	0.00	466.72	
R-43	3/14/2017	495.44	No LNAPL	28.70	0.00	466.74	
R-43	3/18/2017	495.44	No LNAPL	28.73	0.00	466.71	
R-43	3/21/2017	495.44	No LNAPL	28.75	0.00	466.69	
R-43	3/28/2017	495.44	No LNAPL	28.71	0.00	466.73	
R-43	4/1/2017	495.44	No LNAPL	29.31	0.00	466.13	
R-43	4/4/2017	495.44	No LNAPL	29.35	0.00	466.09	
R-43	4/8/2017	495.44	No LNAPL	29.40	0.00	466.04	
R-43	4/11/2017	495.44	No LNAPL	29.82	0.00	465.62	
R-43	4/15/2017	495.44	No LNAPL	29.60	0.00	465.84	
R-43	4/18/2017	495.44	No LNAPL	29.10	0.00	466.34	
R-43	4/18/2017	495.44	No LNAPL	29.12	0.00	466.32	
R-43	4/22/2017	495.44	No LNAPL	29.23	0.00	466.21	
R-43	4/25/2017	495.44	No LNAPL	28.99	0.00	466.45	
R-43	4/29/2017	495.44	No LNAPL	28.60	0.00	466.84	
R-43	5/2/2017	495.44	No LNAPL	28.35	0.00	467.09	
R-43	5/6/2017	495.44	No LNAPL	28.63	0.00	466.81	
R-43	5/9/2017	495.44	No LNAPL	29.26	0.00	466.18	
R-43	5/13/2017	495.44	No LNAPL	28.87	0.00	466.57	
R-43	5/16/2017	495.44	No LNAPL	28.78	0.00	466.66	
R-43	5/20/2017	495.44	No LNAPL	28.83	0.00	466.61	
R-43	5/23/2017	495.44	No LNAPL	28.89	0.00	466.55	
R-43	5/25/2017	495.44	No LNAPL	28.91	0.00	466.53	Heavy biofoul/oxidation observed on probe
R-43	5/27/2017	495.44	No LNAPL	29.00	0.00	466.44	
R-43	5/30/2017	495.44	No LNAPL	29.10	0.00	466.34	
R-43	6/3/2017	495.44	No LNAPL	29.20	0.00	466.24	
R-43	6/6/2017	495.44	No LNAPL	29.12	0.00	466.32	

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R-43	6/6/2017	495.44	No LNAPL	29.13	0.00	466.31	
R-43	6/10/2017	495.44	No LNAPL	29.37	0.00	466.07	
R-43	6/13/2017	495.44	No LNAPL	28.70	0.00	466.79	
R-43	6/13/2017	495.44	No LNAPL	28.73	0.00	466.71	
R-43	6/16/2017	495.44	No LNAPL	28.53	0.00	466.91	
R-43	6/20/2017	495.44	No LNAPL	28.65	0.00	466.79	
R-43	6/24/2017	495.44	No LNAPL	29.02	0.00	466.42	
R-43	6/27/2017	495.44	No LNAPL	28.81	0.00	466.63	
R-43	7/1/2017	495.44	No LNAPL	28.67	0.00	466.77	
R-43	7/4/2017	495.44	No LNAPL	28.41	0.00	467.03	
R-43	7/8/2017	495.44	No LNAPL	23.91	0.00	471.53	
R-44	7/23/2013	496.25	15.14	15.34	0.20	481.07	
R-44	8/1/2013	496.25	16.69	16.84	0.15	479.53	
R-44	8/21/2013	496.25	16.14	16.30	0.16	480.08	
R-44	9/30/2013	496.25	16.12	16.26	0.14	480.10	
R-44	10/29/2013	496.25	18.41	18.46	0.05	477.83	
R-44	11/25/2013	496.25	Sheen	11.76	Sheen	484.49	
R-44	12/20/2013	496.25	No LNAPL	19.10	0.00	477.15	
R-44	1/15/2014	496.25	No LNAPL	17.72	0.00	478.53	
R-44	2/25/2014	496.25	Sheen	16.73	Sheen	479.52	
R-44	3/24/2014	496.25	Sheen	18.45	Sheen	477.80	
R-44	4/14/2014	496.24	Sheen	19.62	Sheen	476.62	
R-44	5/29/2014	496.24	No LNAPL	24.65	0.00	471.59	
R-44	6/20/2014	496.24	No LNAPL	17.74	0.00	478.50	
R-44	7/15/2014	496.24	17.26	17.40	0.14	478.95	
R-44	8/28/2014	496.24	18.83	18.90	0.07	477.40	
R-44	9/24/2014	496.24	Sheen	22.72	Sheen	473.52	
R-44	10/21/2014	496.24	Sheen	29.33	Sheen	466.91	
R-44	11/19/2014	496.24	No LNAPL	33.41	0.00	462.83	
R-44	12/16/2014	496.24	No LNAPL	34.02	0.00	462.22	
R-44	1/21/2015	496.25	No LNAPL	33.31	0.00	462.94	Flow rate = 61.9 gpm
R-44	2/25/2015	496.25	No LNAPL	33.66	0.00	462.59	Flow rate = 51.6 gpm
R-44	3/10/2015	496.25	No LNAPL	32.97	0.00	463.28	
R-44	3/18/2015	496.25	No LNAPL	32.89	0.00	463.36	
R-44	3/26/2015	496.25	No LNAPL	34.56	0.00	461.69	
R-44	4/16/2015	496.25	No LNAPL	17.63	0.00	478.62	
R-44	5/21/2015	496.25	No LNAPL	18.23	0.00	478.02	
R-44	6/10/2015	496.25	No LNAPL	19.78	0.00	476.47	
R-44	7/22/2015	496.25	19.29	19.30	0.01	476.98	
R-44	8/12/2015	496.22	19.03	19.07	0.04	477.22	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-44	8/19/2015	496.22	Sheen	19.69	Sheen	476.60	
R-44	9/30/2015	496.22	No LNAPL	18.67	0.00	477.59	
R-44	10/6/2015	496.22	20.23	20.25	0.02	476.04	Brown, product-saturated precipitate (sludge) affected how the interface probe registered product
R-44	10/15/2015	496.22	Sheen	20.34	Sheen	475.92	
R-44	11/25/2015	496.22	20.96	21.19	0.23	475.24	
R-44	12/16/2015	496.22	Sheen	21.86	Sheen	474.36	
R-44	1/19/2016	496.22	No LNAPL	23.40	0.00	472.82	
R-44	1/19/2016	496.22	No LNAPL	23.40	0.00	472.82	
R-44	2/25/2016	496.22	Sheen	24.93	Sheen	471.29	
R-44	3/4/2016	496.22	Sheen	25.58	Sheen	470.69	
R-44	4/14/2016	496.22	No LNAPL	26.64	0.00	469.58	
R-44	5/20/2016	496.22	Sheen	26.81	Sheen	469.41	
R-44	5/26/2016	496.22	Sheen	26.89	Sheen	469.35	
R-44	6/14/2016	496.22	No LNAPL	27.01	0.00	469.21	
R-44	7/2/2016	496.22	No LNAPL	26.91	0.00	469.31	
R-44	7/4/2016	496.22	No LNAPL	26.66	0.00	469.56	
R-44	7/8/2016	496.22	No LNAPL	27.24	0.00	468.98	
R-44	7/12/2016	496.22	No LNAPL	26.20	0.00	470.02	
R-44	7/16/2016	496.22	No LNAPL	26.22	0.00	470.00	
R-44	7/19/2016	496.22	No LNAPL	25.32	0.00	470.90	
R-44	7/23/2016	496.22	No LNAPL	21.10	0.00	475.12	
R-44	7/26/2016	496.22	No LNAPL	21.60	0.00	474.62	
R-44	7/26/2016	496.22	No LNAPL	21.50	0.00	474.72	
R-44	7/30/2016	496.22	No LNAPL	21.96	0.00	474.26	
R-44	8/1/2016	496.22	No LNAPL	—	0.00	—	Well rehab in progress. DTP/DTW not recorded
R-44	8/6/2016	496.21	No LNAPL	—	0.00	—	Well rehab in progress. DTP/DTW not recorded
R-44	8/9/2016	496.21	No LNAPL	18.10	0.00	478.11	
R-44	8/13/2016	496.21	No LNAPL	18.20	0.00	478.01	
R-44	8/16/2016	496.21	19.55	19.60	0.05	476.65	
R-44	8/18/2016	496.21	18.70	18.79	0.09	477.49	
R-44	8/20/2016	496.21	18.81	19.02	0.21	477.36	
R-44	8/23/2016	496.21	18.98	19.27	0.29	477.17	
R-44	8/27/2016	496.21	18.74	18.92	0.18	477.43	
R-44	8/30/2016	496.21	19.00	19.31	0.31	477.15	
R-44	9/3/2016	496.21	19.20	19.54	0.34	476.94	
R-44	9/6/2016	496.21	No LNAPL	19.25	0.00	476.96	
R-44	9/9/2016	496.21	19.35	19.39	0.04	476.89	
R-44	9/9/2016	496.21	19.35	19.39	0.04	476.89	
R-44	9/10/2016	496.21	19.50	19.60	0.10	476.69	

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Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-44	9/13/2016	496.21	No LNAPL	18.90	0.00	477.31	
R-44	9/17/2016	496.21	19.45	19.67	0.22	476.72	
R-44	9/24/2016	496.21	11.06	11.15	0.09	485.13	All recovery wells shutdown for sand filter media changeout
R-44	9/27/2016	496.21	19.70	20.01	0.31	476.45	
R-44	9/30/2016	496.21	19.66	19.98	0.32	476.49	
R-44	10/4/2016	496.21	20.22	20.30	0.08	475.97	
R-44	10/8/2016	496.21	20.50	20.55	0.05	475.70	
R-44	10/11/2016	496.21	No LNAPL	27.87	0.00	468.34	
R-44	10/14/2016	496.21	Sheen	20.95	Sheen	475.26	
R-44	10/15/2016	496.21	No LNAPL	20.50	0.00	475.71	
R-44	10/18/2016	496.21	20.65	20.66	0.01	475.56	
R-44	10/22/2016	496.21	21.07	21.10	0.03	475.13	
R-44	10/25/2016	496.21	21.04	21.05	0.01	475.17	
R-44	10/28/2016	496.21	No LNAPL	21.78	0.00	474.43	
R-44	11/1/2016	496.77	No LNAPL	21.12	0.00	475.65	
R-44	11/5/2016	496.77	No LNAPL	21.11	0.00	475.66	
R-44	11/8/2016	496.77	No LNAPL	21.40	0.00	475.37	
R-44	11/12/2016	496.77	No LNAPL	20.28	0.00	476.49	
R-44	11/15/2016	496.77	Sheen	20.97	Sheen	475.90	
R-44	11/15/2016	496.77	No LNAPL	20.30	0.00	476.47	
R-44	11/15/2016	496.77	Sheen	20.97	Sheen	475.90	
R-44	11/19/2016	496.77	No LNAPL	21.70	0.00	475.07	
R-44	11/22/2016	496.77	No LNAPL	20.75	0.00	476.02	
R-44	11/26/2016	496.77	20.80	20.82	0.02	475.97	
R-44	11/29/2016	496.77	No LNAPL	21.00	0.00	475.77	
R-44	12/3/2016	496.77	No LNAPL	20.95	0.00	475.82	
R-44	12/6/2016	496.77	No LNAPL	20.87	0.00	475.90	
R-44	12/9/2016	496.77	21.49	21.50	0.01	475.28	
R-44	12/10/2016	496.77	No LNAPL	20.40	0.00	476.37	
R-44	12/13/2016	496.77	No LNAPL	20.70	0.00	476.07	
R-44	12/17/2016	496.77	No LNAPL	21.03	0.00	475.74	
R-44	12/20/2016	496.77	21.08	21.10	0.02	475.69	
R-44	12/24/2016	496.77	21.05	21.07	0.02	475.72	
R-44	12/27/2016	496.77	No LNAPL	21.08	0.00	475.69	
R-44	12/31/2016	496.77	No LNAPL	21.28	0.00	475.49	
R-44	1/7/2017	496.77	No LNAPL	21.43	0.00	475.34	
R-44	1/10/2017	496.77	21.58	21.59	0.01	475.19	
R-44	1/15/2017	496.77	No LNAPL	21.70	0.00	475.07	
R-44	1/17/2017	496.77	21.69	21.71	0.02	475.08	
R-44	1/21/2017	496.77	No LNAPL	21.85	0.00	474.92	

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-44	1/24/2017	496.20	No LNAPL	21.80	0.00	474.40	
R-44	1/24/2017	496.20	No LNAPL	21.60	0.00	474.60	
R-44	1/28/2017	496.20	No LNAPL	21.91	0.00	474.29	
R-44	1/31/2017	496.20	No LNAPL	21.92	0.00	474.28	
R-44	2/4/2017	496.20	No LNAPL	21.97	0.00	474.23	
R-44	2/7/2017	496.20	No LNAPL	22.00	0.00	474.20	
R-44	2/8/2017	496.20	Sheen	22.13	Sheen	474.14	
R-44	2/8/2017	496.20	Sheen	22.13	Sheen	474.14	
R-44	2/11/2017	496.20	No LNAPL	22.20	0.00	474.00	
R-44	2/14/2017	496.20	No LNAPL	22.31	0.00	473.89	
R-44	2/15/2017	496.20	Sheen	22.36	Sheen	473.87	
R-44	2/18/2017	496.20	No LNAPL	22.05	0.00	474.15	
R-44	2/21/2017	496.20	No LNAPL	22.30	0.00	473.90	
R-44	2/25/2017	496.20	No LNAPL	22.42	0.00	473.78	
R-44	2/28/2017	496.20	No LNAPL	22.47	0.00	473.73	
R-44	3/1/2017	496.20	Sheen	22.55	Sheen	473.65	
R-44	3/4/2017	496.20	No LNAPL	22.65	0.00	473.55	
R-44	3/7/2017	496.20	No LNAPL	22.79	0.00	473.41	
R-44	3/11/2017	496.20	No LNAPL	22.90	0.00	473.30	
R-44	3/14/2017	496.20	No LNAPL	22.98	0.00	473.22	
R-44	3/18/2017	496.20	No LNAPL	23.08	0.00	473.12	
R-44	3/21/2017	496.20	No LNAPL	23.21	0.00	472.99	
R-44	3/28/2017	496.20	No LNAPL	23.45	0.00	472.75	
R-44	4/1/2017	496.20	No LNAPL	23.50	0.00	472.70	
R-44	4/4/2017	496.20	No LNAPL	23.37	0.00	472.83	
R-44	4/8/2017	496.20	No LNAPL	23.47	0.00	472.73	
R-44	4/11/2017	496.20	No LNAPL	23.61	0.00	472.59	
R-44	4/15/2017	496.20	No LNAPL	23.48	0.00	472.72	
R-44	4/18/2017	496.20	No LNAPL	23.44	0.00	472.76	Flow rate not recorded. Scaly sheen observed.
R-44	4/18/2017	496.20	No LNAPL	23.40	0.00	472.80	
R-44	4/22/2017	496.20	No LNAPL	23.66	0.00	472.54	
R-44	4/25/2017	496.20	No LNAPL	23.60	0.00	472.60	
R-44	4/29/2017	496.20	No LNAPL	23.64	0.00	472.56	
R-44	5/2/2017	496.20	No LNAPL	23.57	0.00	472.63	
R-44	5/6/2017	496.20	No LNAPL	23.98	0.00	472.22	
R-44	5/9/2017	496.20	No LNAPL	24.26	0.00	471.94	
R-44	5/13/2017	496.20	No LNAPL	24.28	0.00	471.92	
R-44	5/16/2017	496.20	No LNAPL	24.51	0.00	471.69	
R-44	5/20/2017	496.20	No LNAPL	24.70	0.00	471.50	
R-44	5/23/2017	496.20	No LNAPL	24.98	0.00	471.22	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-44	5/25/2017	496.20	Sheen	25.09	Sheen	471.11	Heavy biofoul/oxidation observed on probe
R-44	5/27/2017	496.20	No LNAPL	25.25	0.00	470.95	
R-44	5/30/2017	496.20	No LNAPL	25.50	0.00	470.70	
R-44	6/3/2017	496.20	No LNAPL	25.82	0.00	470.38	
R-44	6/6/2017	496.20	No LNAPL	25.95	0.00	470.25	
R-44	6/6/2017	496.20	No LNAPL	26.00	0.00	470.20	
R-44	6/10/2017	496.20	No LNAPL	25.99	0.00	470.21	
R-44	6/13/2017	496.20	No LNAPL	25.68	0.00	470.57	
R-44	6/13/2017	496.20	No LNAPL	25.70	0.00	470.50	
R-44	6/16/2017	496.20	No LNAPL	25.66	0.00	470.54	
R-44	6/20/2017	496.20	No LNAPL	25.93	0.00	470.27	
R-44	6/24/2017	496.20	No LNAPL	26.30	0.00	469.90	
R-44	6/27/2017	496.20	No LNAPL	26.35	0.00	469.85	
R-44	7/1/2017	496.20	No LNAPL	26.51	0.00	469.69	
R-44	7/4/2017	496.20	No LNAPL	26.50	0.00	469.70	
R-44	7/8/2017	496.20	No LNAPL	26.42	0.00	469.78	
R-45	7/23/2013	495.97	No LNAPL	22.55	0.00	473.42	
R-45	8/1/2013	495.97	No LNAPL	25.11	0.00	470.86	
R-45	8/21/2013	495.97	No LNAPL	24.13	0.00	471.84	
R-45	9/24/2013	495.97	No LNAPL	23.21	0.00	472.76	
R-45	10/29/2013	495.97	22.94	23.36	0.42	472.95	
R-45	11/19/2013	495.97	20.89	20.90	0.01	475.08	
R-45	12/20/2013	495.97	No LNAPL	18.35	0.00	477.62	
R-45	1/15/2014	495.97	No LNAPL	23.66	0.00	472.31	
R-45	2/25/2014	495.97	Sheen	27.06	Sheen	468.91	
R-45	3/24/2014	495.97	Sheen	29.13	Sheen	466.84	
R-45	4/14/2014	495.99	No LNAPL	32.03	0.00	463.96	
R-45	5/16/2014	495.99	No LNAPL	31.31	0.00	464.68	
R-45	6/20/2014	495.99	No LNAPL	24.72	0.00	471.27	
R-45	7/15/2014	495.99	No LNAPL	24.90	0.00	471.09	
R-45	8/26/2014	495.99	No LNAPL	29.87	0.00	466.12	
R-45	9/24/2014	495.99	No LNAPL	23.94	0.00	472.05	
R-45	10/21/2014	495.99	No LNAPL	27.91	0.00	468.08	
R-45	11/19/2014	495.99	No LNAPL	28.74	0.00	467.25	
R-45	12/16/2014	495.99	No LNAPL	29.43	0.00	466.56	
R-45	1/21/2015	495.96	No LNAPL	24.10	0.00	471.86	Flow rate = 16.3 gpm
R-45	2/25/2015	496.80	No LNAPL	31.37	0.00	465.43	Flow rate = 50.5 gpm
R-45	3/10/2015	496.80	No LNAPL	26.45	0.00	470.35	
R-45	3/18/2015	496.80	No LNAPL	25.79	0.00	471.01	
R-45	3/26/2015	496.80	No LNAPL	27.21	0.00	469.59	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-45	4/16/2015	496.80	No LNAPL	28.04	0.00	468.76	
R-45	5/21/2015	496.80	No LNAPL	31.24	0.00	465.56	
R-45	6/10/2015	496.80	No LNAPL	29.49	0.00	467.31	
R-45	7/22/2015	496.75	No LNAPL	27.23	0.00	469.54	
R-45	8/12/2015	496.75	No LNAPL	27.34	0.00	469.45	
R-45	8/19/2015	496.75	No LNAPL	29.46	0.00	467.32	
R-45	9/30/2015	496.75	No LNAPL	25.25	0.00	471.50	
R-45	10/6/2015	496.75	No LNAPL	27.74	0.00	469.02	
R-45	10/15/2015	496.75	No LNAPL	27.86	0.00	468.93	
R-45	11/25/2015	496.75	No LNAPL	27.65	0.00	469.13	
R-45	12/16/2015	496.75	No LNAPL	28.48	0.00	468.27	
R-45	1/19/2016	495.82	No LNAPL	29.65	0.00	466.17	
R-45	1/19/2016	495.82	No LNAPL	29.65	0.00	466.17	
R-45	2/25/2016	495.82	No LNAPL	28.12	0.00	467.70	
R-45	3/4/2016	495.82	No LNAPL	28.30	0.00	467.52	
R-45	4/14/2016	495.82	No LNAPL	11.46	0.00	484.36	Pump was off
R-45	5/20/2016	495.78	No LNAPL	27.55	0.00	468.23	
R-45	5/26/2016	495.78	No LNAPL	26.95	0.00	468.85	
R-45	6/14/2016	495.78	No LNAPL	26.15	0.00	469.63	
R-45	7/2/2016	495.78	No LNAPL	25.03	0.00	470.75	
R-45	7/4/2016	495.78	No LNAPL	24.73	0.00	471.05	
R-45	7/8/2016	495.78	No LNAPL	25.51	0.00	470.27	
R-45	7/12/2016	495.78	No LNAPL	25.41	0.00	470.37	
R-45	7/16/2016	495.78	No LNAPL	24.25	0.00	471.53	
R-45	7/19/2016	495.78	No LNAPL	—	0.00	—	Well rehab in progress. DTP/DTW not recorded
R-45	7/23/2016	495.78	No LNAPL	—	0.00	—	Well rehab in progress. DTP/DTW not recorded
R-45	7/26/2016	495.78	Sheen	8.93	Sheen	486.85	
R-45	7/26/2016	495.78	No LNAPL	—	0.00	—	Well rehab in progress. DTP/DTW not recorded
R-45	7/30/2016	495.78	No LNAPL	19.67	0.00	476.11	
R-45	8/1/2016	495.78	No LNAPL	20.52	0.00	475.26	
R-45	8/6/2016	495.78	No LNAPL	20.35	0.00	475.43	
R-45	8/9/2016	495.78	No LNAPL	21.20	0.00	474.58	
R-45	8/13/2016	495.78	No LNAPL	20.80	0.00	474.98	
R-45	8/16/2016	495.78	No LNAPL	21.11	0.00	474.67	
R-45	8/18/2016	495.78	No LNAPL	21.27	0.00	474.51	
R-45	8/20/2016	495.78	No LNAPL	21.37	0.00	474.41	
R-45	8/23/2016	495.78	No LNAPL	21.92	0.00	473.86	
R-45	8/27/2016	495.78	No LNAPL	21.39	0.00	474.39	
R-45	8/30/2016	495.78	No LNAPL	22.03	0.00	473.75	
R-45	9/3/2016	495.78	No LNAPL	22.46	0.00	473.32	

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R-45	9/6/2016	495.78	No LNAPL	22.47	0.00	473.31	
R-45	9/9/2016	495.78	No LNAPL	22.73	0.00	473.09	
R-45	9/9/2016	495.78	No LNAPL	22.73	0.00	473.09	
R-45	9/10/2016	495.78	No LNAPL	23.13	0.00	472.65	
R-45	9/13/2016	495.78	No LNAPL	23.10	0.00	472.68	
R-45	9/17/2016	495.78	No LNAPL	22.55	0.00	473.23	
R-45	9/24/2016	495.78	No LNAPL	10.20	0.00	485.58	All recovery wells shutdown for sand filter media changeout
R-45	9/27/2016	495.78	No LNAPL	24.03	0.00	471.75	
R-45	9/30/2016	495.78	No LNAPL	23.25	0.00	472.53	
R-45	10/4/2016	495.78	No LNAPL	23.67	0.00	472.11	
R-45	10/8/2016	495.78	No LNAPL	23.84	0.00	471.94	
R-45	10/11/2016	495.78	No LNAPL	25.15	0.00	470.63	
R-45	10/13/2016	495.78	No LNAPL	25.18	0.00	470.60	
R-45	10/15/2016	495.78	No LNAPL	24.33	0.00	471.45	
R-45	10/18/2016	495.78	No LNAPL	25.02	0.00	470.76	
R-45	10/22/2016	495.78	No LNAPL	25.22	0.00	470.56	
R-45	10/25/2016	495.78	No LNAPL	25.05	0.00	470.73	
R-45	10/28/2016	495.78	No LNAPL	25.20	0.00	470.58	
R-45	11/1/2016	495.78	No LNAPL	24.26	0.00	471.52	
R-45	11/5/2016	495.78	No LNAPL	23.96	0.00	471.82	
R-45	11/8/2016	495.78	No LNAPL	24.32	0.00	471.46	
R-45	11/12/2016	495.78	No LNAPL	22.39	0.00	473.39	
R-45	11/15/2016	495.78	No LNAPL	23.67	0.00	472.21	
R-45	11/15/2016	495.78	No LNAPL	23.67	0.00	472.21	
R-45	11/15/2016	495.78	No LNAPL	22.48	0.00	473.30	
R-45	11/19/2016	495.78	No LNAPL	23.68	0.00	472.10	
R-45	11/22/2016	495.78	No LNAPL	23.05	0.00	472.73	
R-45	11/26/2016	495.78	No LNAPL	24.69	0.00	471.09	
R-45	11/29/2016	495.78	No LNAPL	25.28	0.00	470.50	
R-45	12/3/2016	495.78	No LNAPL	25.31	0.00	470.47	
R-45	12/6/2016	495.78	No LNAPL	24.51	0.00	471.27	
R-45	12/9/2016	495.78	No LNAPL	24.23	0.00	471.55	
R-45	12/10/2016	495.78	No LNAPL	23.05	0.00	472.73	
R-45	12/13/2016	495.78	No LNAPL	23.04	0.00	472.74	
R-45	12/17/2016	495.78	No LNAPL	25.03	0.00	470.75	
R-45	12/20/2016	495.78	No LNAPL	26.14	0.00	469.64	
R-45	12/24/2016	495.78	No LNAPL	26.36	0.00	469.42	
R-45	12/27/2016	495.78	No LNAPL	26.15	0.00	469.63	
R-45	12/31/2016	495.78	No LNAPL	25.60	0.00	470.18	
R-45	1/7/2017	495.78	No LNAPL	25.12	0.00	470.66	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-45	1/10/2017	495.78	No LNAPL	25.33	0.00	470.45	
R-45	1/15/2017	495.78	No LNAPL	26.87	0.00	468.91	
R-45	1/17/2017	495.78	No LNAPL	27.27	0.00	468.51	
R-45	1/21/2017	495.78	No LNAPL	27.23	0.00	468.55	
R-45	1/24/2017	495.78	No LNAPL	27.46	0.00	468.32	
R-45	1/24/2017	495.78	No LNAPL	26.58	0.00	469.20	
R-45	1/28/2017	495.78	No LNAPL	26.71	0.00	469.07	
R-45	1/31/2017	495.78	No LNAPL	26.60	0.00	469.18	
R-45	2/4/2017	495.78	No LNAPL	26.75	0.00	469.03	
R-45	2/7/2017	495.78	No LNAPL	26.68	0.00	469.10	
R-45	2/8/2017	495.78	No LNAPL	26.76	0.00	469.09	
R-45	2/8/2017	495.78	No LNAPL	26.76	0.00	469.09	
R-45	2/11/2017	495.78	No LNAPL	27.96	0.00	467.82	
R-45	2/14/2017	495.78	No LNAPL	28.00	0.00	467.78	
R-45	2/18/2017	495.78	No LNAPL	27.24	0.00	468.54	
R-45	2/21/2017	495.78	No LNAPL	27.43	0.00	468.35	
R-45	2/25/2017	495.78	No LNAPL	27.65	0.00	468.13	
R-45	2/28/2017	495.78	No LNAPL	27.71	0.00	468.07	
R-45	3/1/2017	495.78	No LNAPL	27.74	0.00	468.04	
R-45	3/4/2017	495.78	No LNAPL	27.86	0.00	467.92	
R-45	3/7/2017	495.78	No LNAPL	27.90	0.00	467.88	
R-45	3/11/2017	495.78	No LNAPL	27.52	0.00	468.26	
R-45	3/14/2017	495.78	No LNAPL	27.73	0.00	468.05	
R-45	3/18/2017	495.78	No LNAPL	27.43	0.00	468.35	
R-45	3/21/2017	495.78	No LNAPL	27.60	0.00	468.18	
R-45	3/24/2017	495.78	No LNAPL	29.27	0.00	466.51	
R-45	3/28/2017	495.78	No LNAPL	29.99	0.00	465.79	
R-45	4/1/2017	495.78	No LNAPL	26.82	0.00	468.96	
R-45	4/4/2017	495.78	No LNAPL	26.95	0.00	468.83	
R-45	4/8/2017	495.78	No LNAPL	26.13	0.00	469.65	
R-45	4/11/2017	495.78	No LNAPL	27.33	0.00	468.45	
R-45	4/15/2017	495.78	No LNAPL	27.18	0.00	468.60	
R-45	4/18/2017	495.78	Sheen	27.97	Sheen	467.81	
R-45	4/18/2017	495.78	No LNAPL	26.82	0.00	468.96	
R-45	4/22/2017	495.78	No LNAPL	22.00	0.00	473.78	
R-45	4/25/2017	495.78	No LNAPL	22.88	0.00	472.90	
R-45	4/29/2017	495.78	No LNAPL	23.47	0.00	472.31	
R-45	5/2/2017	495.78	No LNAPL	23.39	0.00	472.39	
R-45	5/6/2017	495.78	No LNAPL	24.10	0.00	471.68	
R-45	5/9/2017	495.78	No LNAPL	20.77	0.00	475.01	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-45	5/13/2017	495.78	No LNAPL	22.27	0.00	473.51	
R-45	5/16/2017	495.78	No LNAPL	22.20	0.00	473.58	
R-45	5/20/2017	495.78	No LNAPL	22.32	0.00	473.46	
R-45	5/23/2017	495.78	No LNAPL	22.99	0.00	472.79	
R-45	5/25/2017	495.78	No LNAPL	23.10	0.00	472.68	
R-45	5/27/2017	495.78	No LNAPL	23.28	0.00	472.50	
R-45	5/30/2017	495.78	No LNAPL	23.38	0.00	472.40	
R-45	6/3/2017	495.78	No LNAPL	24.65	0.00	471.13	
R-45	6/6/2017	495.78	No LNAPL	24.97	0.00	470.81	
R-45	6/6/2017	495.78	No LNAPL	24.91	0.00	470.87	Transcription error corrected: pumping rate was recorded as 43 gpm
R-45	6/10/2017	495.78	No LNAPL	24.72	0.00	471.06	
R-45	6/13/2017	495.78	No LNAPL	24.70	0.00	471.13	
R-45	6/13/2017	495.78	No LNAPL	24.68	0.00	471.10	
R-45	6/16/2017	495.78	No LNAPL	24.57	0.00	471.21	
R-45	6/20/2017	495.78	No LNAPL	24.80	0.00	470.98	
R-45	6/24/2017	495.78	No LNAPL	21.65	0.00	474.13	
R-45	6/27/2017	495.78	No LNAPL	22.03	0.00	473.75	
R-45	7/1/2017	495.78	No LNAPL	22.02	0.00	473.76	
R-45	7/4/2017	495.78	No LNAPL	21.80	0.00	473.98	
R-45	7/8/2017	495.78	No LNAPL	21.01	0.00	474.77	
R-46	7/23/2013	496.10	No LNAPL	24.11	0.00	471.99	
R-46	8/1/2013	496.10	No LNAPL	23.63	0.00	472.47	
R-46	8/21/2013	496.10	No LNAPL	22.47	0.00	473.63	
R-46	9/25/2013	496.10	No LNAPL	22.12	0.00	473.98	
R-46	10/29/2013	496.10	No LNAPL	26.96	0.00	469.14	
R-46	11/19/2013	496.10	No LNAPL	23.63	0.00	472.47	
R-46	12/20/2013	496.10	No LNAPL	26.51	0.00	469.59	
R-46	7/15/2014	496.12	No LNAPL	22.72	0.00	473.40	
R-46	9/24/2014	496.12	No LNAPL	21.59	0.00	474.53	
R-46	10/21/2014	496.12	No LNAPL	25.90	0.00	470.22	
R-46	11/19/2014	496.12	No LNAPL	26.48	0.00	469.64	
R-46	12/16/2014	496.12	No LNAPL	25.86	0.00	470.26	
R-46	1/21/2015	496.08	No LNAPL	23.14	0.00	472.94	Flow rate = 22.0 gpm
R-46	2/25/2015	496.08	No LNAPL	28.32	0.00	467.76	Flow rate = 28.7 gpm
R-46	3/10/2015	496.08	No LNAPL	25.99	0.00	470.09	Flow rate = 25.5 gpm
R-46	3/18/2015	496.08	No LNAPL	23.10	0.00	472.98	
R-46	3/26/2015	496.08	No LNAPL	25.06	0.00	471.02	
R-46	4/16/2015	496.08	No LNAPL	23.06	0.00	473.02	Flow rate = 20.1 gpm
R-46	5/21/2015	496.08	No LNAPL	22.37	0.00	473.71	Flow rate = 31.7 gpm
R-46	6/10/2015	496.08	No LNAPL	24.20	0.00	471.88	Flow rate = 35.2 gpm

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-46	7/22/2015	496.08	No LNAPL	22.69	0.00	473.41	
R-46	8/12/2015	496.08	No LNAPL	20.47	0.00	475.65	
R-46	8/19/2015	496.08	No LNAPL	23.44	0.00	472.67	
R-46	9/30/2015	496.08	No LNAPL	23.21	0.00	472.87	
R-46	10/6/2015	496.08	No LNAPL	22.00	0.00	474.09	
R-46	10/15/2015	496.08	No LNAPL	20.31	0.00	475.81	
R-46	11/25/2015	496.08	No LNAPL	22.18	0.00	473.93	
R-46	12/16/2015	496.08	No LNAPL	24.65	0.00	471.43	
R-46	1/19/2016	496.08	No LNAPL	23.43	0.00	472.65	
R-46	1/19/2016	496.08	No LNAPL	23.34	0.00	472.74	
R-46	2/25/2016	496.08	No LNAPL	25.72	0.00	470.36	
R-46	3/4/2016	496.08	No LNAPL	26.35	0.00	469.73	
R-46	4/14/2016	496.08	No LNAPL	29.02	0.00	467.06	
R-46	5/20/2016	496.08	No LNAPL	23.20	0.00	472.88	
R-46	5/26/2016	496.08	No LNAPL	24.65	0.00	471.45	
R-46	6/14/2016	496.08	No LNAPL	23.68	0.00	472.40	
R-46	7/2/2016	496.08	No LNAPL	23.00	0.00	473.08	
R-46	7/4/2016	496.08	No LNAPL	23.97	0.00	472.11	
R-46	7/8/2016	496.08	No LNAPL	22.46	0.00	473.62	
R-46	7/12/2016	496.08	No LNAPL	21.45	0.00	474.63	
R-46	7/16/2016	496.08	No LNAPL	22.77	0.00	473.31	
R-46	7/19/2016	496.08	No LNAPL	21.98	0.00	474.10	
R-46	7/23/2016	496.08	No LNAPL	21.30	0.00	474.78	
R-46	7/26/2016	496.08	No LNAPL	—	0.00	—	Well rehab in progress. DTP/DTW not recorded
R-46	7/26/2016	496.08	No LNAPL	9.37	0.00	486.71	
R-46	7/30/2016	496.08	No LNAPL	—	0.00	—	Well rehab in progress. DTP/DTW not recorded
R-46	8/1/2016	496.08	No LNAPL	20.63	0.00	475.45	
R-46	8/6/2016	496.08	No LNAPL	20.74	0.00	475.34	
R-46	8/9/2016	496.08	No LNAPL	21.41	0.00	474.67	
R-46	8/13/2016	496.08	No LNAPL	20.57	0.00	475.51	
R-46	8/16/2016	496.08	No LNAPL	21.15	0.00	474.93	
R-46	8/18/2016	496.08	No LNAPL	20.74	0.00	475.34	
R-46	8/20/2016	496.08	No LNAPL	20.18	0.00	475.90	
R-46	8/23/2016	496.08	No LNAPL	21.97	0.00	474.11	
R-46	8/27/2016	496.05	No LNAPL	21.60	0.00	474.45	
R-46	8/30/2016	496.05	No LNAPL	21.64	0.00	474.41	
R-46	9/3/2016	496.05	No LNAPL	22.20	0.00	473.85	
R-46	9/6/2016	496.05	No LNAPL	22.20	0.00	473.85	
R-46	9/9/2016	496.05	No LNAPL	21.96	0.00	474.13	
R-46	9/9/2016	496.05	No LNAPL	21.96	0.00	474.13	

Appendix A-1
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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-46	9/10/2016	496.05	No LNAPL	22.10	0.00	473.95	
R-46	9/13/2016	496.05	No LNAPL	22.03	0.00	474.02	
R-46	9/17/2016	496.05	No LNAPL	21.86	0.00	474.19	
R-46	9/24/2016	496.05	No LNAPL	10.73	0.00	485.32	All recovery wells shutdown for sand filter media changeout
R-46	9/27/2016	496.05	No LNAPL	22.76	0.00	473.29	
R-46	9/30/2016	496.05	No LNAPL	22.67	0.00	473.38	
R-46	10/4/2016	496.05	No LNAPL	22.85	0.00	473.20	
R-46	10/8/2016	496.05	No LNAPL	23.16	0.00	472.89	
R-46	10/11/2016	496.05	No LNAPL	23.72	0.00	472.33	
R-46	10/13/2016	496.05	No LNAPL	23.05	0.00	473.00	
R-46	10/15/2016	496.05	No LNAPL	22.53	0.00	473.52	
R-46	10/18/2016	496.05	No LNAPL	23.55	0.00	472.50	
R-46	10/22/2016	496.05	No LNAPL	22.98	0.00	473.07	
R-46	10/25/2016	496.05	No LNAPL	23.56	0.00	472.49	
R-46	10/28/2016	496.05	No LNAPL	24.78	0.00	471.27	
R-46	11/1/2016	496.05	No LNAPL	24.11	0.00	471.94	
R-46	11/5/2016	496.05	No LNAPL	23.04	0.00	473.01	
R-46	11/8/2016	496.05	No LNAPL	22.82	0.00	473.23	
R-46	11/12/2016	496.05	No LNAPL	22.71	0.00	473.34	
R-46	11/15/2016	496.05	No LNAPL	23.80	0.00	472.25	
R-46	11/15/2016	496.05	No LNAPL	23.83	0.00	472.32	
R-46	11/15/2016	496.05	No LNAPL	23.83	0.00	472.32	
R-46	11/19/2016	496.05	No LNAPL	23.14	0.00	472.91	
R-46	11/22/2016	496.05	No LNAPL	23.78	0.00	472.27	
R-46	11/26/2016	496.05	No LNAPL	23.95	0.00	472.10	
R-46	11/29/2016	496.05	No LNAPL	24.24	0.00	471.81	
R-46	12/3/2016	496.05	No LNAPL	23.97	0.00	472.08	
R-46	12/6/2016	496.05	No LNAPL	23.58	0.00	472.47	
R-46	12/9/2016	496.05	No LNAPL	24.05	0.00	472.00	
R-46	12/10/2016	496.05	No LNAPL	22.69	0.00	473.36	
R-46	12/13/2016	496.05	No LNAPL	24.08	0.00	471.97	
R-46	12/17/2016	496.05	No LNAPL	23.90	0.00	472.15	
R-46	12/20/2016	496.05	No LNAPL	24.28	0.00	471.77	
R-46	12/24/2016	496.05	No LNAPL	24.10	0.00	471.95	
R-46	12/27/2016	496.05	No LNAPL	23.96	0.00	472.09	
R-46	12/31/2016	496.05	No LNAPL	24.49	0.00	471.56	
R-46	1/7/2017	496.05	No LNAPL	22.65	0.00	473.40	
R-46	1/10/2017	496.05	No LNAPL	22.94	0.00	473.11	
R-46	1/15/2017	496.05	No LNAPL	24.38	0.00	471.67	
R-46	1/17/2017	496.05	No LNAPL	24.87	0.00	471.18	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-46	1/21/2017	496.05	No LNAPL	23.74	0.00	472.31	
R-46	1/24/2017	496.05	No LNAPL	24.62	0.00	471.43	
R-46	1/24/2017	496.05	No LNAPL	24.73	0.00	471.32	
R-46	1/28/2017	496.05	No LNAPL	25.82	0.00	470.23	
R-46	1/31/2017	496.05	No LNAPL	26.35	0.00	469.70	
R-46	2/4/2017	496.05	No LNAPL	24.32	0.00	471.73	
R-46	2/7/2017	496.05	No LNAPL	24.68	0.00	471.37	
R-46	2/8/2017	496.05	No LNAPL	24.64	0.00	471.48	
R-46	2/8/2017	496.05	No LNAPL	24.64	0.00	471.48	
R-46	2/11/2017	496.05	No LNAPL	24.27	0.00	471.78	
R-46	2/14/2017	496.05	No LNAPL	24.45	0.00	471.60	
R-46	2/18/2017	496.05	No LNAPL	25.50	0.00	470.55	
R-46	2/21/2017	496.05	No LNAPL	25.28	0.00	470.77	
R-46	2/25/2017	496.05	No LNAPL	25.62	0.00	470.43	
R-46	2/28/2017	496.05	No LNAPL	25.17	0.00	470.88	
R-46	3/2/2017	496.05	No LNAPL	23.01	0.00	473.04	
R-46	3/4/2017	496.05	No LNAPL	24.50	0.00	471.55	
R-46	3/7/2017	496.05	No LNAPL	25.51	0.00	470.54	
R-46	3/11/2017	496.05	No LNAPL	25.42	0.00	470.63	
R-46	3/14/2017	496.05	No LNAPL	25.18	0.00	470.87	
R-46	3/18/2017	496.05	No LNAPL	24.88	0.00	471.17	
R-46	3/21/2017	496.05	No LNAPL	24.67	0.00	471.38	
R-46	3/24/2017	496.05	No LNAPL	25.04	0.00	471.01	
R-46	3/28/2017	496.05	No LNAPL	25.59	0.00	470.46	
R-46	4/1/2017	496.05	No LNAPL	25.72	0.00	470.33	
R-46	4/4/2017	496.05	No LNAPL	25.02	0.00	471.03	
R-46	4/8/2017	496.05	No LNAPL	24.58	0.00	471.47	
R-46	4/11/2017	496.05	No LNAPL	24.07	0.00	471.98	
R-46	4/15/2017	496.05	No LNAPL	24.53	0.00	471.52	
R-46	4/18/2017	496.05	No LNAPL	24.98	0.00	471.07	
R-46	4/18/2017	496.05	No LNAPL	24.12	0.00	471.93	
R-46	4/22/2017	496.05	No LNAPL	25.05	0.00	471.00	
R-46	4/25/2017	496.05	No LNAPL	23.56	0.00	472.49	
R-46	4/29/2017	496.05	No LNAPL	23.15	0.00	472.90	
R-46	5/2/2017	496.05	No LNAPL	22.72	0.00	473.33	
R-46	5/6/2017	496.05	No LNAPL	24.68	0.00	471.37	Flow rate incorrectly recorded at 60.9 gpm on fieldsheet. Flow rate of approximately 30 gpm verified on Pi system.
R-46	5/9/2017	496.05	No LNAPL	22.50	0.00	473.55	
R-46	5/13/2017	496.05	No LNAPL	23.27	0.00	472.78	
R-46	5/16/2017	496.05	No LNAPL	22.33	0.00	473.72	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-46	5/20/2017	496.05	No LNAPL	22.15	0.00	473.90	
R-46	5/23/2017	496.05	No LNAPL	24.96	0.00	471.09	
R-46	5/25/2017	496.05	No LNAPL	25.04	0.00	471.01	Light biofoul/oxidation observed on probe
R-46	5/27/2017	496.05	No LNAPL	24.95	0.00	471.10	
R-46	5/30/2017	496.05	No LNAPL	25.25	0.00	470.80	
R-46	6/3/2017	496.05	No LNAPL	25.58	0.00	470.47	
R-46	6/6/2017	496.05	No LNAPL	25.11	0.00	470.94	
R-46	6/6/2017	496.05	No LNAPL	25.08	0.00	470.97	
R-46	6/10/2017	496.05	No LNAPL	26.56	0.00	469.49	
R-46	6/13/2017	496.05	No LNAPL	25.41	0.00	470.69	
R-46	6/13/2017	496.05	No LNAPL	25.65	0.00	470.40	
R-46	6/16/2017	496.05	No LNAPL	24.87	0.00	471.18	
R-46	6/20/2017	496.05	No LNAPL	26.58	0.00	469.47	
R-46	6/24/2017	496.05	No LNAPL	23.10	0.00	472.95	
R-46	6/27/2017	496.05	No LNAPL	23.19	0.00	472.86	
R-46	7/1/2017	496.05	No LNAPL	23.05	0.00	473.00	
R-46	7/4/2017	496.05	No LNAPL	23.05	0.00	473.00	
R-46	7/8/2017	496.05	No LNAPL	23.79	0.00	472.26	
R-47	8/26/2014	494.82	--	24.50	--	470.32	
R-47	9/24/2014	494.82	No LNAPL	25.77	0.00	469.05	
R-47	10/21/2014	494.82	No LNAPL	26.91	0.00	467.91	
R-47	11/19/2014	494.82	No LNAPL	25.90	0.00	468.92	
R-47	12/16/2014	494.82	No LNAPL	25.75	0.00	469.07	
R-47	1/21/2015	494.81	No LNAPL	26.15	0.00	468.66	
R-47	2/25/2015	494.81	No LNAPL	-	0.00	—	DTW recorded at ~25.4. Field sheet notes, "heavy organic interference ~4.5' of probe tape" causing imprecision in measurement.
R-47	3/18/2015	494.81	No LNAPL	26.60	0.00	468.21	
R-47	3/26/2015	494.81	No LNAPL	27.54	0.00	467.27	
R-47	4/16/2015	494.81	No LNAPL	23.89	0.00	470.92	
R-47	8/19/2015	494.81	No LNAPL	30.76	0.00	464.08	
R-47	10/6/2015	494.81	--	29.26	--	465.56	
R-47	1/19/2016	494.81	No LNAPL	26.77	0.00	468.04	
R-47	5/26/2016	494.81	No LNAPL	23.77	0.00	471.06	
R-47	7/2/2016	494.81	No LNAPL	31.72	0.00	463.09	
R-47	7/4/2016	494.81	No LNAPL	31.65	0.00	463.16	
R-47	7/8/2016	494.81	No LNAPL	31.78	0.00	463.03	
R-47	7/12/2016	494.81	No LNAPL	32.10	0.00	462.71	
R-47	7/16/2016	494.81	No LNAPL	32.49	0.00	462.32	
R-47	7/19/2016	494.81	No LNAPL	32.21	0.00	462.60	
R-47	7/23/2016	494.81	No LNAPL	32.00	0.00	462.81	

Appendix A-1
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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation# (feet MSL)	Notes
R-47	7/26/2016	494.81	No LNAPL	32.49	0.00	462.32	
R-47	7/30/2016	494.81	No LNAPL	33.11	0.00	461.70	
R-47	8/1/2016	494.81	No LNAPL	33.15	0.00	461.66	
R-47	8/6/2016	494.81	No LNAPL	34.04	0.00	460.77	
R-47	8/9/2016	494.81	No LNAPL	34.64	0.00	460.17	
R-47	8/13/2016	494.81	No LNAPL	35.48	0.00	459.33	
R-47	8/16/2016	494.81	No LNAPL	36.30	0.00	458.51	
R-47	8/20/2016	494.81	No LNAPL	32.60	0.00	462.21	
R-47	8/23/2016	494.81	No LNAPL	33.45	0.00	461.36	
R-47	8/27/2016	494.81	No LNAPL	33.08	0.00	461.73	
R-47	8/30/2016	494.81	No LNAPL	33.85	0.00	460.96	
R-47	9/9/2016	494.81	No LNAPL	9.55	0.00	485.30	
R-47	11/15/2016	494.81	No LNAPL	10.15	0.00	484.76	
R-47	2/8/2017	494.81	No LNAPL	10.55	0.00	484.33	
R-47	6/13/2017	494.81	No LNAPL	9.87	0.00	484.99	
R-48	9/24/2014	494.42	No LNAPL	16.91	0.00	477.51	
R-48	10/21/2014	494.42	No LNAPL	17.90	0.00	476.52	
R-48	11/19/2014	494.42	No LNAPL	17.40	0.00	477.02	
R-48	12/16/2014	494.42	No LNAPL	17.49	0.00	476.93	
R-48	1/21/2015	494.42	No LNAPL	17.80	0.00	476.62	
R-48	2/25/2015	494.42	No LNAPL	18.08	0.00	476.34	
R-48	3/18/2015	494.42	No LNAPL	18.13	0.00	476.29	
R-48	3/26/2015	494.42	No LNAPL	17.99	0.00	476.43	
R-48	4/16/2015	494.42	No LNAPL	17.93	0.00	476.49	
R-48	8/19/2015	494.42	No LNAPL	20.71	0.00	473.74	
R-48	10/6/2015	494.42	--	20.65	--	473.78	
R-48	1/19/2016	494.42	No LNAPL	26.92	0.00	467.50	
R-48	5/26/2016	494.42	No LNAPL	27.85	0.00	466.59	
R-48	7/2/2016	494.42	No LNAPL	26.14	0.00	468.28	
R-48	7/4/2016	494.42	No LNAPL	25.85	0.00	468.57	
R-48	7/8/2016	494.42	No LNAPL	25.60	0.00	468.82	
R-48	7/12/2016	494.42	No LNAPL	25.50	0.00	468.92	
R-48	7/16/2016	494.42	No LNAPL	25.40	0.00	469.02	
R-48	7/19/2016	494.42	No LNAPL	24.98	0.00	469.44	
R-48	7/23/2016	494.42	No LNAPL	24.36	0.00	470.06	
R-48	7/26/2016	494.42	No LNAPL	24.49	0.00	469.93	
R-48	7/30/2016	494.42	No LNAPL	24.50	0.00	469.92	
R-48	8/1/2016	494.42	No LNAPL	24.21	0.00	470.21	
R-48	8/6/2016	494.42	No LNAPL	24.49	0.00	469.93	
R-48	8/9/2016	494.42	No LNAPL	24.55	0.00	469.87	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
R-48	8/13/2016	494.42	No LNAPL	24.62	0.00	469.80	
R-48	8/16/2016	494.42	No LNAPL	24.74	0.00	469.68	
R-48	8/20/2016	494.42	No LNAPL	22.85	0.00	471.57	
R-48	8/23/2016	494.42	No LNAPL	22.93	0.00	471.49	
R-48	8/27/2016	494.42	No LNAPL	22.97	0.00	471.45	
R-48	8/30/2016	494.42	No LNAPL	22.99	0.00	471.43	
R-48	9/9/2016	494.42	No LNAPL	9.19	0.00	485.27	
R-48	11/15/2016	494.42	No LNAPL	9.78	0.00	484.74	
R-48	2/8/2017	494.42	No LNAPL	10.20	0.00	484.29	
R-48	6/13/2017	494.42	No LNAPL	9.52	0.00	484.95	
S-9	4/18/2006	—	--	11.04	--	—	
S-9	7/19/2006	—	--	9.46	--	—	
S-9	10/19/2006	—	--	11.09	--	—	
S-9	1/16/2007	—	No LNAPL	11.01	0.00	—	
S-9	4/23/2007	—	No LNAPL	10.95	0.00	—	
S-9	7/17/2007	—	No LNAPL	9.77	0.00	—	
S-9	10/17/2007	—	No LNAPL	11.05	0.00	—	
S-9	1/4/2008	—	No LNAPL	10.43	0.00	—	
S-9	4/1/2008	—	No LNAPL	11.05	0.00	—	
S-9	7/2/2008	—	No LNAPL	9.87	0.00	—	
S-9	10/1/2008	—	No LNAPL	10.43	0.00	—	
S-9	4/10/2009	—	No LNAPL	10.63	0.00	—	
S-9	7/8/2009	—	No LNAPL	9.87	0.00	—	
S-9	10/5/2009	—	No LNAPL	10.93	0.00	—	
S-9	1/22/2010	—	No LNAPL	11.07	0.00	—	
S-9	4/7/2010	—	No LNAPL	10.98	0.00	—	
S-9	10/13/2010	—	No LNAPL	11.22	0.00	—	
S-9	3/18/2011	—	No LNAPL	10.97	0.00	—	
S-9	4/25/2011	—	No LNAPL	10.48	0.00	—	
S-9	5/6/2011	—	No LNAPL	10.33	0.00	—	
S-9	5/16/2011	—	No LNAPL	11.08	0.00	—	
S-9	7/15/2011	—	No LNAPL	9.76	0.00	—	
S-9	10/21/2011	—	No LNAPL	11.73	0.00	—	
S-9	1/10/2012	495.11	No LNAPL	11.60	0.00	483.51	
S-9	2/6/2012	495.11	No LNAPL	11.66	0.00	483.45	
S-9	3/13/2012	495.11	No LNAPL	11.57	0.00	483.54	
S-9	4/10/2012	495.11	No LNAPL	11.51	0.00	483.60	
S-9	5/8/2012	495.11	No LNAPL	11.29	0.00	483.82	
S-9	6/13/2012	495.11	No LNAPL	10.38	0.00	484.73	
S-9	7/17/2012	495.11	No LNAPL	10.06	0.00	485.05	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-9	8/21/2012	495.11	No LNAPL	10.47	0.00	484.64	
S-9	9/18/2012	495.11	No LNAPL	11.09	0.00	484.02	
S-9	10/16/2012	495.11	No LNAPL	11.10	0.00	484.01	
S-9	11/29/2012	495.12	No LNAPL	10.65	0.00	484.47	
S-9	12/27/2012	495.12	No LNAPL	10.98	0.00	484.14	
S-9	1/23/2013	495.12	No LNAPL	10.90	0.00	484.22	
S-9	2/26/2013	495.12	No LNAPL	11.06	0.00	484.06	
S-9	3/29/2013	495.12	No LNAPL	11.22	0.00	483.90	R-35R, R-39, and R-40 were offline on this date
S-9	4/24/2013	495.12	No LNAPL	11.18	0.00	483.94	
S-9	5/21/2013	495.12	No LNAPL	10.18	0.00	484.94	
S-9	6/25/2013	495.12	No LNAPL	10.10	0.00	485.02	
S-9	10/29/2013	495.12	No LNAPL	11.73	0.00	483.39	
S-9	11/19/2013	495.12	No LNAPL	11.23	0.00	483.89	
S-9	12/20/2013	495.12	No LNAPL	11.02	0.00	484.10	
S-9	3/10/2015	495.14	No LNAPL	11.23	0.00	483.91	
S-9	10/15/2015	495.15	No LNAPL	10.86	0.00	484.29	
S-9	8/10/2016	495.16	--	9.09	--	486.07	
S-9	8/2/2017	495.16	--	9.81	--	485.35	
S-9	2/12/2018	495.16	--	11.36	--	483.80	
S-9	8/3/2018	495.16	--	9.75	--	485.41	
S-21	4/19/2006	—	13.22	13.74	0.52	—	
S-21	10/19/2006	—	13.31	13.82	0.51	—	
S-21	1/15/2007	—	13.20	13.65	0.45	—	
S-21	7/18/2007	—	11.78	12.32	0.54	—	
S-21	10/18/2007	—	13.65	13.89	0.24	—	
S-21	4/1/2008	—	13.35	13.78	0.43	—	
S-21	7/2/2008	—	12.51	12.53	0.02	—	
S-21	10/1/2008	—	13.02	13.19	0.17	—	
S-21	4/8/2009	—	13.24	13.74	0.50	—	
S-21	7/7/2009	—	12.38	12.62	0.24	—	
S-21	8/20/2009	—	12.29	12.54	0.25	—	
S-21	10/5/2009	—	--	13.57	--	—	
S-21	1/22/2010	—	13.65	14.00	0.35	—	
S-21	4/7/2010	—	13.58	13.99	0.41	—	
S-21	7/22/2010	—	12.25	12.55	0.30	—	
S-21	10/13/2010	—	13.85	14.10	0.25	—	
S-21	3/17/2011	—	13.61	14.00	0.39	—	
S-21	4/6/2011	—	13.59	14.00	0.41	—	
S-21	5/5/2011	—	12.87	13.13	0.26	—	
S-21	5/17/2011	—	13.90	14.10	0.20	—	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-21	5/18/2011	—	13.80	14.12	0.32	—	
S-21	6/21/2011	—	13.14	13.42	0.28	—	
S-21	7/15/2011	—	No LNAPL	12.71	0.00	—	
S-21	8/23/2011	—	12.62	13.26	0.64	—	
S-21	9/22/2011	—	13.81	14.05	0.24	—	
S-21	10/21/2011	—	12.90	14.37	1.47	—	
S-21	12/7/2011	497.16	--	13.58	--	483.58	
S-21	2/16/2012	497.16	12.77	14.28	1.51	484.07	
S-21	3/15/2012	497.16	12.76	14.39	1.63	484.05	
S-21	4/12/2012	497.16	12.69	13.96	1.27	484.20	
S-21	5/7/2012	497.16	12.58	13.15	0.57	484.46	
S-21	6/12/2012	497.16	11.83	11.86	0.03	485.32	
S-21	7/18/2012	497.16	11.36	11.99	0.63	485.67	
S-21	8/21/2012	497.16	11.71	12.47	0.76	485.29	
S-21	9/19/2012	497.16	12.46	12.81	0.35	484.63	
S-21	10/15/2012	497.16	12.43	12.69	0.26	484.67	
S-21	11/29/2012	497.19	12.02	12.34	0.32	485.10	
S-21	12/28/2012	497.19	12.37	12.59	0.22	484.77	
S-21	2/26/2013	497.19	12.46	12.79	0.33	484.66	
S-21	3/28/2013	497.19	12.50	12.83	0.33	484.62	R-35R, R-39, and R-40 were offline on this date
S-21	4/24/2013	497.19	12.55	12.88	0.33	484.57	
S-21	5/31/2013	497.19	Sheen	11.30	Sheen	485.89	
S-21	6/24/2013	497.19	11.43	11.59	0.16	485.73	
S-21	7/23/2013	497.19	11.20	11.21	0.01	485.99	
S-21	8/21/2013	497.19	11.06	11.11	0.05	486.12	
S-21	9/25/2013	497.19	12.04	12.48	0.44	485.06	
S-21	10/29/2013	497.19	12.91	14.20	1.29	484.01	
S-21	11/19/2013	497.19	12.47	12.70	0.23	484.67	
S-21	12/20/2013	497.19	12.34	12.62	0.28	484.79	
S-21	1/14/2014	497.19	12.61	12.95	0.34	484.51	
S-21	2/25/2014	497.19	12.83	13.44	0.61	484.23	
S-21	3/24/2014	497.19	12.87	13.73	0.86	484.14	
S-21	4/14/2014	497.19	12.87	13.81	0.94	484.12	
S-21	5/16/2014	497.19	12.36	12.56	0.20	484.79	
S-21	6/20/2014	497.19	Sheen	11.90	Sheen	485.29	
S-21	7/19/2014	497.19	Sheen	10.43	Sheen	486.76	
S-21	8/28/2014	497.19	11.02	11.13	0.11	486.15	
S-21	9/29/2014	497.19	11.77	12.22	0.45	485.32	
S-21	10/16/2014	497.19	12.38	12.53	0.15	484.78	
S-21	3/10/2015	497.19	12.53	12.65	0.12	484.63	

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S-21	5/18/2015	497.19	12.18	12.21	0.03	485.00	
S-21	8/12/2015	497.19	Sheen	11.13	Sheen	486.10	
S-21	10/15/2015	497.19	12.11	12.46	0.35	485.05	
S-21	3/4/2016	497.19	12.83	13.41	0.58	484.29	
S-21	6/14/2016	497.19	No LNAPL	12.06	0.00	485.13	
S-21	8/18/2016	497.19	Sheen	10.74	Sheen	486.45	
S-21	8/18/2016	497.25	Sheen	10.76	Sheen	486.49	
S-21	10/13/2016	497.25	12.26	12.50	0.24	484.94	
S-21	3/1/2017	497.25	12.35	12.51	0.16	484.87	
S-21	6/6/2017	497.25	12.42	12.52	0.10	484.81	
S-22	4/21/2006	—	12.61	13.74	1.13	—	
S-22	7/19/2006	—	No LNAPL	11.25	0.00	—	
S-22	10/19/2006	—	12.63	14.46	1.83	—	
S-22	1/16/2007	—	12.65	13.91	1.26	—	
S-22	4/23/2007	—	12.59	13.72	1.13	—	
S-22	7/18/2007	—	No LNAPL	11.38	0.00	—	
S-22	10/17/2007	—	12.95	14.75	1.80	—	
S-22	1/4/2008	—	12.38	13.49	1.11	—	
S-22	4/1/2008	—	12.88	14.08	1.20	—	
S-22	7/2/2008	—	12.08	12.19	0.11	—	
S-22	10/1/2008	—	12.57	12.84	0.27	—	
S-22	4/10/2009	—	12.68	13.76	1.08	—	
S-22	7/8/2009	—	11.92	12.28	0.36	—	
S-22	8/20/2009	—	11.84	12.04	0.20	—	
S-22	10/5/2009	—	12.76	12.77	0.01	—	
S-22	1/22/2010	—	12.97	14.55	1.58	—	
S-22	4/7/2010	—	13.01	14.11	1.10	—	
S-22	7/21/2010	—	11.86	11.91	0.05	—	
S-22	10/13/2010	—	13.15	15.05	1.90	—	
S-22	3/18/2011	—	13.08	14.18	1.10	—	
S-22	4/26/2011	—	12.65	12.97	0.32	—	
S-22	5/5/2011	—	12.47	12.58	0.11	—	
S-22	5/17/2011	—	13.16	14.57	1.41	—	
S-22	5/18/2011	—	13.17	14.59	1.42	—	
S-22	6/21/2011	—	12.63	13.22	0.59	—	
S-22	7/15/2011	—	No LNAPL	11.97	0.00	—	
S-22	8/23/2011	—	12.20	12.70	0.50	—	
S-22	9/22/2011	—	13.04	14.96	1.92	—	
S-22	10/21/2011	—	11.94	13.88	1.94	—	
S-22	12/7/2011	496.70	--	-	--	—	Unable to open

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S-22	2/17/2012	496.70	11.86	13.44	1.58	484.56	
S-22	3/15/2012	496.70	11.88	13.55	1.67	484.52	
S-22	4/12/2012	496.70	11.78	13.19	1.41	484.67	
S-22	5/7/2012	496.70	11.57	12.78	1.21	484.91	
S-22	5/11/2012	496.70	11.82	12.29	0.47	484.80	Initial levels of first May 2012 baildown test
S-22	6/12/2012	496.70	10.88	11.03	0.15	485.79	
S-22	7/18/2012	496.70	10.54	10.56	0.02	486.16	
S-22	8/21/2012	496.70	10.72	11.93	1.21	485.76	
S-22	9/18/2012	496.70	11.27	13.25	1.98	485.08	
S-22	10/15/2012	496.70	11.26	13.07	1.81	485.12	
S-22	10/26/2012	496.70	11.81	13.30	1.49	484.62	Initial levels of October 2012 baildown test
S-22	11/29/2012	496.70	11.08	11.63	0.55	485.52	
S-22	12/28/2012	496.70	11.33	12.41	1.08	485.18	
S-22	2/26/2013	496.70	11.45	12.39	0.94	485.08	
S-22	3/28/2013	496.70	11.60	12.46	0.86	484.95	R-35R, R-39, and R-40 were offline on this date
S-22	4/24/2013	496.70	11.55	12.61	1.06	484.96	
S-22	5/31/2013	496.70	Sheen	10.43	Sheen	486.27	
S-22	6/24/2013	496.70	Sheen	10.53	Sheen	486.17	
S-22	7/23/2013	496.70	No LNAPL	10.28	0.00	486.42	
S-22	8/21/2013	496.70	Sheen	10.14	Sheen	486.56	
S-22	9/30/2013	496.70	11.18	12.79	1.61	485.23	
S-22	10/29/2013	496.70	11.95	13.73	1.78	484.43	
S-22	11/19/2013	496.70	11.42	12.53	1.11	485.08	
S-22	12/20/2013	496.70	11.31	12.37	1.06	485.20	
S-22	1/14/2014	496.70	11.51	13.00	1.49	484.92	
S-22	2/24/2014	496.70	11.82	13.29	1.47	484.62	
S-22	3/24/2014	496.70	11.92	13.28	1.36	484.54	
S-22	4/14/2014	496.77	11.87	13.63	1.76	484.58	
S-22	5/16/2014	496.77	11.34	12.23	0.89	485.27	
S-22	6/20/2014	496.77	10.97	11.13	0.16	485.77	
S-22	7/19/2014	496.77	9.51	9.53	0.02	487.26	
S-22	8/28/2014	496.77	10.12	10.13	0.01	486.65	
S-22	9/29/2014	496.77	10.79	11.81	1.02	485.80	
S-22	10/16/2014	496.77	11.27	12.62	1.35	485.26	
S-22	3/10/2015	496.77	11.58	11.99	0.41	485.12	
S-22	5/18/2015	496.77	11.26	11.42	0.16	485.48	
S-22	8/12/2015	496.78	Sheen	10.23	Sheen	486.59	
S-22	10/15/2015	496.78	11.10	12.27	1.17	485.51	
S-22	3/4/2016	496.78	11.87	13.02	1.15	484.75	
S-22	6/14/2016	496.78	11.14	11.27	0.13	485.62	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-22	7/2/2016	496.78	No LNAPL	10.67	0.00	486.11	
S-22	7/9/2016	496.78	No LNAPL	10.14	0.00	486.64	
S-22	8/18/2016	496.78	9.83	9.85	0.02	486.95	
S-22	10/13/2016	496.85	11.14	11.35	0.21	485.67	
S-22	3/1/2017	496.85	11.33	12.09	0.76	485.38	
S-22	3/11/2017	496.85	11.40	12.30	0.90	485.29	
S-22	3/18/2017	496.85	11.33	12.20	0.87	485.36	
S-22	3/24/2017	496.85	11.40	12.26	0.86	485.30	
S-22	4/1/2017	496.85	11.35	12.30	0.95	485.33	
S-22	4/8/2017	496.85	11.42	12.05	0.63	485.32	
S-22	4/15/2017	496.85	11.21	11.62	0.41	485.57	
S-22	4/22/2017	496.85	11.26	11.70	0.44	485.51	
S-22	4/29/2017	496.85	--	10.88	--	485.97	
S-22	5/6/2017	496.85	No LNAPL	Frozen	0.00	—	Ice or obstruction at 12.28 feet
S-22	5/13/2017	496.85	10.95	10.97	0.02	485.90	
S-22	5/20/2017	496.85	No LNAPL	10.92	0.00	485.93	
S-22	5/27/2017	496.85	11.15	11.20	0.05	485.69	
S-22	6/6/2017	496.85	11.37	12.11	0.74	485.35	
S-22	7/1/2017	496.85	No LNAPL	10.71	0.00	486.14	
S-22	7/8/2017	496.85	No LNAPL	10.35	0.00	486.50	
S-32	7/19/2006	—	--	9.31	--	—	
S-32	10/19/2006	—	--	10.74	--	—	
S-32	1/15/2007	—	No LNAPL	10.59	0.00	—	
S-32	4/23/2007	—	No LNAPL	6.64	0.00	—	
S-32	7/18/2007	—	No LNAPL	9.42	0.00	—	
S-32	10/17/2007	—	No LNAPL	11.10	0.00	—	
S-32	1/4/2008	—	No LNAPL	10.44	0.00	—	
S-32	4/1/2008	—	No LNAPL	7.16	0.00	—	
S-32	7/2/2008	—	No LNAPL	9.92	0.00	—	
S-32	10/1/2008	—	No LNAPL	10.43	0.00	—	
S-32	4/10/2009	—	No LNAPL	Frozen	0.00	—	Frozen
S-32	7/8/2009	—	No LNAPL	9.90	0.00	—	
S-32	8/20/2009	—	No LNAPL	9.75	0.00	—	
S-32	10/5/2009	—	No LNAPL	10.98	0.00	—	
S-32	1/22/2010	—	No LNAPL	10.97	0.00	—	
S-32	4/7/2010	—	No LNAPL	7.77	0.00	—	
S-32	7/22/2010	—	No LNAPL	9.73	0.00	—	
S-32	10/13/2010	—	No LNAPL	11.17	0.00	—	
S-32	4/26/2011	—	No LNAPL	7.77	0.00	—	
S-32	5/5/2011	—	No LNAPL	10.20	0.00	—	

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S-32	5/17/2011	—	No LNAPL	11.21	0.00	—	
S-32	5/18/2011	—	No LNAPL	11.24	0.00	—	
S-32	6/21/2011	—	No LNAPL	10.55	0.00	—	
S-32	7/15/2011	—	No LNAPL	9.89	0.00	—	
S-32	8/23/2011	—	No LNAPL	10.17	0.00	—	
S-32	9/22/2011	—	No LNAPL	11.19	0.00	—	
S-32	10/21/2011	—	Sheen	11.90	Sheen	—	
S-32	2/17/2012	495.69	Sheen	11.78	Sheen	483.91	
S-32	3/15/2012	495.69	Sheen	11.79	Sheen	483.90	
S-32	4/12/2012	495.69	No LNAPL	Frozen	0.00	—	Frozen at 11.82 ft BTOC
S-32	4/19/2012	495.69	No LNAPL	10.94	0.00	484.75	
S-32	5/14/2012	495.69	Sheen	11.55	Sheen	484.14	
S-32	6/12/2012	495.69	Sheen	10.56	Sheen	485.13	
S-32	7/18/2012	495.69	No LNAPL	10.31	0.00	485.38	
S-32	7/30/2012	495.69	No LNAPL	9.90	0.00	485.79	
S-32	8/21/2012	495.69	No LNAPL	10.60	0.00	485.09	
S-32	9/18/2012	495.69	No LNAPL	11.22	0.00	484.47	
S-32	10/15/2012	495.69	No LNAPL	11.32	0.00	484.37	
S-32	11/1/2012	495.69	No LNAPL	11.44	0.00	484.25	
S-32	11/29/2012	495.82	No LNAPL	10.97	0.00	484.85	
S-32	12/28/2012	495.82	No LNAPL	11.26	0.00	484.56	
S-32	1/24/2013	495.82	No LNAPL	11.21	0.00	484.61	
S-32	2/26/2013	495.82	No LNAPL	11.34	0.00	484.48	
S-32	3/28/2013	495.82	No LNAPL	Frozen	0.00	—	Frozen at 11.36 ft BTOC. R-35R, R-39, and R-40 were offline on this date
S-32	4/24/2013	495.82	No LNAPL	Frozen	0.00	—	Frozen at 11.35 ft BTOC
S-32	5/23/2013	495.82	No LNAPL	11.19	0.00	484.63	
S-32	6/24/2013	495.82	No LNAPL	10.31	0.00	485.51	
S-32	7/23/2013	495.81	No LNAPL	10.07	0.00	485.74	
S-32	8/1/2013	495.81	--	11.91	--	483.90	
S-32	8/21/2013	495.81	No LNAPL	9.95	0.00	485.86	
S-32	9/30/2013	495.81	No LNAPL	11.10	0.00	484.71	
S-32	10/22/2013	495.84	No LNAPL	11.75	0.00	484.09	
S-32	11/26/2013	495.84	No LNAPL	11.11	0.00	484.73	
S-32	12/18/2013	495.81	No LNAPL	11.11	0.00	484.70	
S-32	1/9/2014	495.80	No LNAPL	11.42	0.00	484.38	
S-32	2/5/2014	495.82	No LNAPL	11.08	0.00	484.74	
S-32	3/18/2014	495.81	No LNAPL	11.79	0.00	484.02	
S-32	3/24/2014	495.81	No LNAPL	11.83	0.00	483.98	
S-32	4/14/2014	495.82	No LNAPL	11.81	0.00	484.01	

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S-32	4/18/2014	495.82	No LNAPL	7.29	0.00	488.53	Surface water infiltration was possibly affecting the water table elevation at S-32 on this date.
S-32	5/15/2014	495.82	--	11.17	--	484.65	
S-32	5/16/2014	495.82	No LNAPL	11.30	0.00	484.52	
S-32	6/11/2014	495.83	No LNAPL	11.38	0.00	484.45	
S-32	6/19/2014	495.83	No LNAPL	11.04	0.00	484.79	
S-32	7/15/2014	495.83	No LNAPL	9.21	0.00	486.62	
S-32	8/26/2014	495.82	No LNAPL	9.84	0.00	485.98	
S-32	9/9/2014	495.82	No LNAPL	10.04	0.00	485.78	
S-32	9/24/2014	495.82	No LNAPL	10.41	0.00	485.41	
S-32	10/21/2014	495.84	No LNAPL	11.32	0.00	484.52	
S-32	11/19/2014	495.80	No LNAPL	10.98	0.00	484.82	
S-32	12/16/2014	495.81	No LNAPL	11.15	0.00	484.66	
S-32	12/29/2014	495.81	No LNAPL	11.27	0.00	484.54	
S-32	1/21/2015	495.79	No LNAPL	11.31	0.00	484.48	
S-32	2/25/2015	495.81	No LNAPL	11.43	0.00	484.38	
S-32	3/10/2015	495.80	No LNAPL	11.36	0.00	484.44	
S-32	3/18/2015	495.80	No LNAPL	11.46	0.00	484.34	
S-32	3/26/2015	495.80	No LNAPL	11.39	0.00	484.41	
S-32	4/16/2015	495.81	--	9.59	--	486.22	Surface water infiltration was possibly affecting the water table elevation at S-32 on this date.
S-32	5/21/2015	495.82	No LNAPL	11.00	0.00	484.82	
S-32	6/10/2015	495.81	No LNAPL	11.05	0.00	484.76	
S-32	8/12/2015	495.83	--	9.97	--	485.86	
S-32	8/19/2015	495.83	No LNAPL	10.26	0.00	485.60	
S-32	10/6/2015	495.81	No LNAPL	10.52	0.00	485.30	
S-32	10/15/2015	495.81	No LNAPL	10.94	0.00	484.87	
S-32	11/19/2015	495.81	--	11.13	--	484.68	
S-32	1/19/2016	495.79	--	11.55	--	484.20	
S-32	3/4/2016	495.79	No LNAPL	11.77	0.00	484.02	
S-32	5/26/2016	495.81	No LNAPL	11.27	0.00	484.56	
S-32	9/9/2016	495.82	No LNAPL	10.09	0.00	485.77	
S-32	10/13/2016	495.82	No LNAPL	11.13	0.00	484.69	
S-32	11/15/2016	495.80	No LNAPL	10.78	0.00	485.12	
S-32	2/8/2017	495.77	No LNAPL	11.16	0.00	484.68	
S-32	3/1/2017	495.77	No LNAPL	11.12	0.00	484.65	
S-32	6/13/2017	495.79	No LNAPL	10.54	0.00	485.30	
S-39	4/21/2006	—	--	10.78	--	—	
S-39	7/19/2006	—	--	9.30	--	—	
S-39	10/19/2006	—	12.69	13.21	0.52	—	

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S-39	1/15/2007	—	12.62	13.23	0.61	—	
S-39	4/23/2007	—	No LNAPL	10.82	0.00	—	
S-39	7/18/2007	—	No LNAPL	9.64	0.00	—	
S-39	10/17/2007	—	No LNAPL	11.38	0.00	—	
S-39	1/4/2008	—	No LNAPL	10.66	0.00	—	
S-39	7/2/2008	—	11.16	11.98	0.82	—	
S-39	10/1/2008	—	12.36	12.78	0.42	—	
S-39	4/10/2009	—	No LNAPL	Frozen	0.00	—	Frozen
S-39	7/8/2009	—	11.78	12.66	0.88	—	
S-39	8/20/2009	—	11.68	12.86	1.18	—	
S-39	10/5/2009	—	No LNAPL	11.37	0.00	—	
S-39	1/22/2010	—	No LNAPL	11.57	0.00	—	
S-39	4/7/2010	—	12.85	13.70	0.85	—	
S-39	7/21/2010	—	11.72	12.67	0.95	—	
S-39	10/13/2010	—	12.54	13.80	1.26	—	
S-39	3/18/2011	—	12.85	13.33	0.48	—	
S-39	4/5/2011	—	12.84	13.58	0.74	—	
S-39	5/10/2011	—	12.77	13.34	0.57	—	
S-39	5/13/2011	—	12.88	13.57	0.69	—	
S-39	5/18/2011	—	12.94	14.19	1.25	—	
S-39	6/21/2011	—	12.31	13.08	0.77	—	
S-39	10/21/2011	—	12.90	12.91	0.01	—	
S-39	12/7/2011	497.11	14.71	15.06	0.35	482.33	
S-39	2/16/2012	497.11	14.89	15.26	0.37	482.15	
S-39	3/15/2012	497.11	14.93	15.29	0.36	482.11	
S-39	4/12/2012	497.11	13.70	13.87	0.17	483.38	
S-39	4/19/2012	497.11	14.34	14.41	0.07	482.76	
S-39	5/14/2012	497.11	14.61	14.80	0.19	482.46	
S-39	6/12/2012	497.11	13.75	14.02	0.27	483.31	
S-39	7/18/2012	497.11	13.63	13.80	0.17	483.45	
S-39	7/30/2012	497.11	13.19	13.58	0.39	483.85	
S-39	8/21/2012	497.11	13.82	14.18	0.36	483.22	
S-39	9/19/2012	497.11	13.98	14.50	0.52	483.03	
S-39	10/15/2012	497.11	10.98	11.61	0.63	486.01	
S-39	10/26/2012	497.11	11.38	12.02	0.64	485.61	Initial levels of October 2012 baildown test
S-39	11/1/2012	497.11	11.10	11.18	0.08	485.99	
S-39	11/29/2012	494.07	10.76	10.80	0.04	483.30	
S-39	12/28/2012	494.07	11.00	11.13	0.13	483.05	
S-39	1/24/2013	494.07	11.02	11.24	0.22	483.01	
S-39	2/26/2013	494.07	11.09	11.14	0.05	482.97	

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S-39	3/28/2013	494.07	9.76	9.81	0.05	484.30	R-35R, R-39, and R-40 were offline on this date
S-39	4/24/2013	494.07	10.97	11.07	0.10	483.08	
S-39	5/31/2013	494.07	8.52	8.53	0.01	485.55	
S-39	6/24/2013	494.07	8.94	9.54	0.60	485.02	
S-39	7/23/2013	494.07	8.62	9.47	0.85	485.29	
S-39	8/2/2013	494.07	8.51	9.46	0.95	485.38	
S-39	8/21/2013	494.07	8.58	8.95	0.37	485.42	
S-39	9/24/2013	494.07	9.27	11.03	1.76	484.47	
S-39	10/1/2013	494.07	9.57	11.43	1.86	484.15	
S-39	10/29/2013	494.07	10.48	11.24	0.76	483.45	
S-39	11/19/2013	494.07	9.96	10.01	0.05	484.10	
S-39	12/20/2013	494.07	9.81	9.93	0.12	484.24	
S-39	1/14/2014	494.07	10.10	10.46	0.36	483.90	
S-39	2/25/2014	494.07	10.35	11.03	0.68	483.59	
S-39	3/18/2014	494.07	10.48	10.50	0.02	483.59	
S-39	4/14/2014	494.13	10.48	10.87	0.39	483.58	
S-39	5/16/2014	494.13	9.89	10.13	0.24	484.19	
S-39	6/11/2014	494.13	9.97	10.60	0.63	484.04	
S-39	7/19/2014	494.13	7.59	9.24	1.65	486.23	
S-39	8/28/2014	494.13	8.42	9.43	1.01	485.52	
S-39	9/9/2014	494.13	8.61	9.91	1.30	485.28	
S-39	10/16/2014	494.13	9.75	10.19	0.44	484.30	
S-39	11/20/2014	494.13	9.57	9.96	0.39	484.49	
S-39	12/29/2014	494.13	10.36	10.90	0.54	483.67	
S-39	1/21/2015	494.19	11.26	11.93	0.67	482.80	
S-39	2/25/2015	494.19	11.15	11.16	0.01	483.04	
S-39	3/10/2015	494.15	11.09	11.25	0.16	483.03	
S-39	3/18/2015	494.15	11.09	11.26	0.17	483.03	
S-39	3/26/2015	494.15	11.03	11.25	0.22	483.08	
S-39	4/16/2015	494.16	11.18	11.47	0.29	482.93	
S-39	5/18/2015	494.19	10.80	10.88	0.08	483.37	
S-39	5/21/2015	494.19	10.58	10.59	0.01	483.61	
S-39	6/10/2015	493.98	10.44	10.52	0.08	483.52	
S-39	8/12/2015	493.98	8.97	9.09	0.12	485.03	
S-39	8/19/2015	494.31	9.29	9.43	0.14	485.06	
S-39	10/6/2015	493.97	9.41	10.04	0.63	484.48	
S-39	10/15/2015	493.97	9.57	10.33	0.76	484.30	
S-39	11/19/2015	493.97	9.90	10.16	0.26	484.02	
S-39	1/19/2016	494.00	10.58	10.72	0.14	483.39	
S-39	3/4/2016	494.00	10.30	10.32	0.02	483.75	

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S-39	5/26/2016	494.00	10.50	10.53	0.03	483.51	
S-39	6/14/2016	494.00	10.16	10.29	0.13	483.82	
S-39	8/18/2016	494.00	8.70	10.00	1.30	485.06	
S-39	8/18/2016	494.02	8.73	10.05	1.32	485.04	
S-39	9/9/2016	494.03	9.17	10.48	1.31	484.66	
S-39	9/10/2016	494.03	9.23	10.54	1.31	484.55	
S-39	9/17/2016	494.03	9.70	10.50	0.80	484.18	
S-39	9/24/2016	494.03	8.66	9.13	0.47	485.28	
S-39	9/30/2016	494.03	9.91	9.96	0.05	484.11	
S-39	10/8/2016	494.03	10.20	10.23	0.03	483.82	
S-39	10/13/2016	494.03	10.32	10.46	0.14	483.68	
S-39	10/15/2016	494.03	10.70	10.85	0.15	483.30	
S-39	10/22/2016	494.03	10.60	10.80	0.20	483.39	
S-39	10/26/2016	494.02	10.70	10.98	0.28	483.27	
S-39	10/28/2016	494.03	10.58	10.68	0.10	483.43	
S-39	11/5/2016	494.02	9.90	10.10	0.20	484.08	
S-39	11/15/2016	494.02	10.04	10.19	0.15	483.99	
S-39	2/8/2017	494.03	10.40	11.13	0.73	483.56	
S-39	3/1/2017	494.03	10.45	11.28	0.83	483.42	
S-39	3/11/2017	494.03	10.50	11.20	0.70	483.40	
S-39	3/18/2017	494.03	10.55	10.68	0.13	483.46	
S-39	3/24/2017	494.03	10.61	10.82	0.21	483.38	
S-39	4/1/2017	494.03	10.57	10.75	0.18	483.43	
S-39	4/8/2017	494.03	10.50	10.80	0.30	483.47	
S-39	4/15/2017	494.03	10.33	10.34	0.01	483.70	
S-39	6/6/2017	494.08	10.42	10.81	0.39	483.59	
S-39	6/13/2017	494.08	9.75	10.14	0.39	484.32	
S-41R	8/16/2016	496.83	--	9.23	--	487.60	
S-43	4/21/2006	—	--	11.88	--	—	
S-43	7/19/2006	—	--	10.42	--	—	
S-43	10/19/2006	—	--	12.01	--	—	
S-43	1/16/2007	—	No LNAPL	12.01	0.00	—	
S-43	4/23/2007	—	No LNAPL	11.97	0.00	—	
S-43	7/18/2007	—	No LNAPL	10.68	0.00	—	
S-43	10/17/2007	—	No LNAPL	12.45	0.00	—	
S-43	1/4/2008	—	No LNAPL	11.86	0.00	—	
S-43	4/1/2008	—	No LNAPL	12.42	0.00	—	
S-43	7/2/2008	—	No LNAPL	11.37	0.00	—	
S-43	10/1/2008	—	No LNAPL	11.97	0.00	—	
S-43	4/10/2009	—	No LNAPL	15.44	0.00	—	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-43	7/8/2009	—	No LNAPL	11.38	0.00	—	
S-43	8/20/2009	—	No LNAPL	11.28	0.00	—	
S-43	10/5/2009	—	12.60	12.61	0.01	—	
S-43	1/22/2010	—	No LNAPL	12.78	0.00	—	
S-43	4/7/2010	—	No LNAPL	12.68	0.00	—	
S-43	7/21/2010	—	No LNAPL	11.45	0.00	—	
S-43	10/13/2010	—	No LNAPL	12.75	0.00	—	
S-43	3/18/2011	—	No LNAPL	12.60	0.00	—	
S-43	4/26/2011	—	No LNAPL	12.50	0.00	—	
S-43	5/5/2011	—	No LNAPL	11.81	0.00	—	
S-43	5/17/2011	—	No LNAPL	12.84	0.00	—	
S-43	5/18/2011	—	No LNAPL	12.88	0.00	—	
S-43	6/21/2011	—	No LNAPL	12.26	0.00	—	
S-43	7/15/2011	—	No LNAPL	11.55	0.00	—	
S-43	8/23/2011	—	No LNAPL	11.88	0.00	—	
S-43	9/22/2011	—	No LNAPL	12.89	0.00	—	
S-43	10/21/2011	—	Sheen	12.29	Sheen	—	
S-43	12/7/2011	496.13	No LNAPL	11.43	0.00	484.70	
S-43	2/16/2012	496.13	Sheen	12.22	Sheen	483.91	
S-43	3/15/2012	496.13	Sheen	12.25	Sheen	483.88	
S-43	4/12/2012	496.13	Sheen	12.11	Sheen	484.02	
S-43	4/19/2012	496.13	Sheen	11.60	Sheen	484.53	
S-43	5/7/2012	496.13	Sheen	11.91	Sheen	484.22	
S-43	6/12/2012	496.13	Sheen	11.05	Sheen	485.08	
S-43	7/18/2012	496.13	No LNAPL	10.72	0.00	485.41	
S-43	7/30/2012	496.13	No LNAPL	10.34	0.00	485.79	
S-43	8/21/2012	496.13	Sheen	11.06	Sheen	485.07	
S-43	9/19/2012	496.13	No LNAPL	11.69	0.00	484.44	
S-43	10/15/2012	496.13	Sheen	11.64	Sheen	484.49	
S-43	11/1/2012	496.13	Sheen	11.70	Sheen	484.43	
S-43	11/29/2012	496.21	No LNAPL	11.29	0.00	484.92	
S-43	12/28/2012	496.21	Sheen	11.62	Sheen	484.59	
S-43	1/24/2013	496.21	Sheen	11.60	Sheen	484.61	
S-43	2/26/2013	496.21	Sheen	11.72	Sheen	484.49	
S-43	3/29/2013	496.20	Sheen	11.88	Sheen	484.32	R-35R, R-39, and R-40 were offline on this date
S-43	4/24/2013	496.20	11.83	11.84	0.01	484.37	
S-43	5/20/2013	496.27	Sheen	11.51	Sheen	484.76	
S-43	6/24/2013	496.28	No LNAPL	10.69	0.00	485.59	
S-43	7/23/2013	496.28	Sheen	10.46	Sheen	485.82	
S-43	8/1/2013	496.28	No LNAPL	10.35	0.00	485.93	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-43	8/21/2013	496.28	Sheen	10.34	Sheen	485.94	
S-43	9/30/2013	496.29	Sheen	11.57	Sheen	484.72	
S-43	10/22/2013	496.31	Sheen	12.17	Sheen	484.14	
S-43	11/19/2013	496.31	Sheen	11.69	Sheen	484.62	
S-43	12/18/2013	496.28	Sheen	11.57	Sheen	484.71	
S-43	1/9/2014	496.28	Sheen	11.79	Sheen	484.49	
S-43	2/5/2014	496.30	No LNAPL	11.93	0.00	484.37	
S-43	3/14/2014	496.32	Sheen	12.18	Sheen	484.14	
S-43	3/18/2014	496.32	No LNAPL	12.20	0.00	484.12	
S-43	3/24/2014	496.32	Sheen	12.23	Sheen	484.09	
S-43	4/14/2014	496.33	Sheen	12.01	Sheen	484.32	
S-43	4/18/2014	496.33	Sheen	12.01	Sheen	484.32	
S-43	5/15/2014	496.33	Sheen	11.57	Sheen	484.76	
S-43	5/16/2014	496.33	Sheen	11.60	Sheen	484.73	
S-43	6/11/2014	496.34	No LNAPL	11.77	0.00	484.57	
S-43	6/19/2014	496.34	Sheen	11.41	Sheen	484.93	
S-43	7/15/2014	496.34	No LNAPL	9.60	0.00	486.74	
S-43	7/15/2014	496.34	No LNAPL	9.59	0.00	486.75	
S-43	8/26/2014	496.33	No LNAPL	10.24	0.00	486.09	
S-43	9/9/2014	496.33	Sheen	10.49	Sheen	485.84	
S-43	9/24/2014	496.34	No LNAPL	10.84	0.00	485.50	
S-43	10/21/2014	496.33	No LNAPL	11.76	0.00	484.57	
S-43	11/19/2014	496.34	No LNAPL	11.38	0.00	484.96	
S-43	12/16/2014	496.36	No LNAPL	11.58	0.00	484.78	
S-43	12/29/2014	496.36	Sheen	11.71	Sheen	484.65	
S-43	1/21/2015	496.38	No LNAPL	11.79	0.00	484.59	
S-43	2/25/2015	496.41	Sheen	11.92	Sheen	484.49	
S-43	3/10/2015	496.42	Sheen	11.85	Sheen	484.57	
S-43	3/18/2015	496.42	Sheen	11.96	Sheen	484.46	
S-43	3/26/2015	496.42	Sheen	11.88	Sheen	484.54	
S-43	4/16/2015	496.43	Sheen	11.79	Sheen	484.64	
S-43	5/21/2015	496.44	No LNAPL	11.50	0.00	484.94	
S-43	6/10/2015	496.44	No LNAPL	11.53	0.00	484.91	
S-43	8/12/2015	496.44	Sheen	10.49	Sheen	485.99	
S-43	8/19/2015	496.44	No LNAPL	10.73	0.00	485.74	
S-43	10/6/2015	496.45	Sheen	11.04	Sheen	485.42	
S-43	10/15/2015	496.45	Sheen	11.46	Sheen	484.99	
S-43	11/19/2015	496.45	No LNAPL	11.69	0.00	484.76	
S-43	1/19/2016	496.43	No LNAPL	12.18	0.00	484.25	
S-43	5/26/2016	496.50	Sheen	11.87	Sheen	484.65	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-43	8/18/2016	496.22	Sheen	9.87	Sheen	486.35	
S-43	9/9/2016	496.20	No LNAPL	10.35	0.00	485.90	
S-43	10/25/2016	496.22	Sheen	11.75	Sheen	484.47	
S-43	11/15/2016	496.22	No LNAPL	11.05	0.00	485.27	
S-43	2/8/2017	496.27	No LNAPL	11.54	0.00	484.80	
S-43	3/2/2017	496.27	No LNAPL	11.54	0.00	484.73	
S-43	6/13/2017	496.33	No LNAPL	10.92	0.00	485.46	
S-44	4/21/2006	—	10.05	10.95	0.90	—	
S-44	7/19/2006	—	--	8.79	--	—	
S-44	10/19/2006	—	10.05	11.37	1.32	—	
S-44	1/15/2007	—	10.19	10.91	0.72	—	
S-44	4/23/2007	—	10.20	10.76	0.56	—	
S-44	7/18/2007	—	No LNAPL	9.05	0.00	—	
S-44	10/17/2007	—	10.78	11.21	0.43	—	
S-44	1/4/2008	—	10.15	10.48	0.33	—	
S-44	4/1/2008	—	10.58	11.61	1.03	—	
S-44	7/2/2008	—	No LNAPL	9.76	0.00	—	
S-44	10/1/2008	—	10.34	10.45	0.11	—	
S-44	4/10/2009	—	10.68	10.85	0.17	—	
S-44	7/8/2009	—	No LNAPL	9.87	0.00	—	
S-44	8/20/2009	—	No LNAPL	9.76	0.00	—	
S-44	10/5/2009	—	No LNAPL	11.04	0.00	—	
S-44	1/22/2010	—	10.87	12.18	1.31	—	
S-44	4/7/2010	—	10.82	11.88	1.06	—	
S-44	7/21/2010	—	No LNAPL	9.84	0.00	—	
S-44	10/13/2010	—	10.80	12.50	1.70	—	
S-44	3/18/2011	—	10.78	11.98	1.20	—	
S-44	4/6/2011	—	10.83	11.84	1.01	—	
S-44	5/5/2011	—	No LNAPL	10.30	0.00	—	
S-44	5/17/2011	—	No LNAPL	11.24	0.00	—	
S-44	5/18/2011	—	Sheen	11.28	Sheen	—	
S-44	6/21/2011	—	10.59	10.83	0.24	—	
S-44	7/15/2011	—	No LNAPL	9.92	0.00	—	
S-44	8/23/2011	—	10.24	10.54	0.30	—	
S-44	9/22/2011	—	10.93	12.71	1.78	—	
S-44	10/21/2011	—	11.59	13.65	2.06	—	
S-44	12/7/2011	495.69	11.35	12.70	1.35	484.04	
S-44	2/16/2012	495.69	11.53	13.35	1.82	483.76	
S-44	3/15/2012	495.69	11.58	13.38	1.80	483.71	
S-44	4/12/2012	495.69	11.49	13.00	1.51	483.86	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-44	4/19/2012	495.69	11.19	11.56	0.37	484.42	
S-44	5/14/2012	495.69	11.65	11.93	0.28	483.98	
S-44	6/12/2012	495.69	Sheen	10.05	Sheen	485.64	
S-44	7/18/2012	495.69	Sheen	9.74	Sheen	485.95	
S-44	7/30/2012	495.69	Sheen	9.36	Sheen	486.33	
S-44	8/21/2012	495.69	Sheen	10.11	Sheen	485.58	
S-44	9/19/2012	495.69	Sheen	10.76	Sheen	484.93	
S-44	10/15/2012	495.69	10.66	10.79	0.13	485.00	
S-44	11/1/2012	495.69	10.60	11.35	0.75	484.92	
S-44	11/29/2012	495.02	10.25	10.61	0.36	484.69	
S-44	12/28/2012	495.02	10.45	11.27	0.82	484.39	
S-44	1/24/2013	495.02	10.37	10.39	0.02	484.65	
S-44	2/26/2013	495.02	10.46	11.59	1.13	484.31	
S-44	3/28/2013	495.02	10.38	11.34	0.96	484.43	R-35R, R-39, and R-40 were offline on this date
S-44	4/24/2013	495.02	10.51	11.82	1.31	484.22	
S-44	5/21/2013	495.02	10.38	10.88	0.50	484.53	
S-44	6/24/2013	495.05	Sheen	9.63	Sheen	485.42	
S-44	7/23/2013	495.04	Sheen	9.40	Sheen	485.64	
S-44	8/1/2013	495.04	No LNAPL	9.31	0.00	485.73	
S-44	8/21/2013	495.04	Sheen	9.30	Sheen	485.74	
S-44	9/30/2013	495.03	10.48	10.52	0.04	484.54	
S-44	10/22/2013	495.04	10.83	12.14	1.31	483.92	
S-44	11/26/2013	495.04	10.27	10.41	0.14	484.74	
S-44	12/18/2013	495.05	10.48	10.65	0.17	484.53	
S-44	1/9/2014	495.04	10.63	11.10	0.47	484.31	
S-44	2/5/2014	495.05	10.70	11.62	0.92	484.15	
S-44	3/18/2014	495.02	11.16	11.22	0.06	483.85	
S-44	3/24/2014	495.02	11.07	11.39	0.32	483.88	
S-44	4/14/2014	495.04	10.69	11.74	1.05	484.12	
S-44	4/18/2014	495.04	10.69	11.74	1.05	484.12	
S-44	5/15/2014	495.05	10.43	10.63	0.20	484.58	
S-44	5/16/2014	495.05	10.46	10.69	0.23	484.54	
S-44	6/11/2014	495.05	10.53	11.27	0.74	484.36	
S-44	6/19/2014	495.05	10.21	10.75	0.54	484.72	
S-44	7/15/2014	495.07	Sheen	8.52	Sheen	486.55	
S-44	8/26/2014	495.06	Sheen	9.17	Sheen	485.89	
S-44	9/9/2014	495.06	Sheen	9.42	Sheen	485.64	
S-44	9/24/2014	495.04	Sheen	9.75	Sheen	485.29	
S-44	10/21/2014	495.04	Sheen	10.68	Sheen	484.36	
S-44	11/19/2014	495.06	10.24	10.45	0.21	484.77	

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S-44	12/16/2014	495.03	10.38	10.92	0.54	484.53	
S-44	12/29/2014	495.03	10.45	11.16	0.71	484.42	
S-44	1/21/2015	495.03	10.50	11.43	0.93	484.32	
S-44	2/25/2015	495.03	10.68	11.18	0.50	484.24	
S-44	3/10/2015	494.99	10.66	10.91	0.25	484.27	
S-44	3/18/2015	494.99	10.77	10.85	0.08	484.20	
S-44	3/26/2015	494.99	10.67	11.01	0.34	484.24	
S-44	4/16/2015	495.03	10.54	10.94	0.40	484.40	
S-44	5/21/2015	495.03	10.35	10.37	0.02	484.68	
S-44	6/10/2015	495.06	10.37	10.47	0.10	484.67	
S-44	8/12/2015	495.05	Sheen	9.31	Sheen	485.78	
S-44	8/19/2015	495.05	Sheen	9.61	Sheen	485.51	
S-44	10/6/2015	495.03	Sheen	9.90	Sheen	485.17	
S-44	10/15/2015	495.03	Sheen	10.29	Sheen	484.78	
S-44	11/19/2015	495.03	10.32	11.03	0.71	484.55	
S-44	1/19/2016	495.03	10.66	12.12	1.46	484.05	
S-44	3/4/2016	495.03	10.88	11.73	0.85	484.01	
S-44	5/26/2016	495.05	10.49	10.91	0.42	484.49	
S-44	6/14/2016	495.05	No LNAPL	10.24	0.00	484.81	
S-44	8/18/2016	495.05	No LNAPL	8.94	0.00	486.11	
S-44	8/18/2016	495.02	Sheen	8.96	Sheen	486.06	
S-44	9/9/2016	495.05	Sheen	9.43	Sheen	485.67	
S-44	10/13/2016	495.05	Sheen	10.46	Sheen	484.59	
S-44	11/15/2016	495.02	Sheen	10.09	Sheen	484.97	
S-44	2/8/2017	495.00	10.46	10.62	0.16	484.57	
S-44	2/15/2017	495.00	10.47	10.67	0.20	484.52	
S-44	3/1/2017	495.00	10.49	10.73	0.24	484.46	
S-44	6/6/2017	495.05	10.52	10.65	0.13	484.50	
S-44	6/13/2017	495.05	Sheen	9.86	Sheen	485.25	
S-50	4/21/2006	—	11.39	—	—	—	Only depth to LNAPL was recorded
S-50	7/19/2006	—	No LNAPL	10.07	0.00	—	
S-50	10/19/2006	—	11.52	12.81	1.29	—	
S-50	1/15/2007	—	11.46	12.34	0.88	—	
S-50	7/17/2007	—	--	10.15	--	—	
S-50	10/17/2007	—	11.69	13.58	1.89	—	
S-50	1/4/2008	—	11.19	11.76	0.57	—	
S-50	4/1/2008	—	11.45	13.31	1.86	—	
S-50	7/2/2008	—	No LNAPL	10.79	0.00	—	
S-50	9/2/2008	—	10.52	10.60	0.08	—	
S-50	10/1/2008	—	11.39	11.52	0.13	—	

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S-50	4/8/2009	—	11.46	12.64	1.18	—	
S-50	7/7/2009	—	10.67	10.98	0.31	—	
S-50	8/21/2009	—	10.62	10.83	0.21	—	
S-50	10/5/2009	—	11.69	12.86	1.17	—	
S-50	1/22/2010	—	11.75	11.76	0.01	—	
S-50	4/7/2010	—	11.59	13.48	1.89	—	
S-50	7/21/2010	—	10.55	10.56	0.01	—	
S-50	10/13/2010	—	11.80	14.00	2.20	—	
S-50	3/18/2011	—	11.67	13.36	1.69	—	
S-50	4/18/2011	—	11.62	12.91	1.29	—	
S-50	5/4/2011	—	No LNAPL	11.04	0.00	—	
S-50	5/17/2011	—	11.82	13.48	1.66	—	
S-50	5/24/2011	—	11.42	13.30	1.88	—	
S-50	6/21/2011	—	11.31	11.87	0.56	—	
S-50	7/14/2011	—	No LNAPL	10.60	0.00	—	
S-50	8/23/2011	—	Sheen	10.95	Sheen	—	
S-50	9/22/2011	—	11.87	13.50	1.63	—	
S-50	10/21/2011	—	12.42	14.75	2.33	—	
S-50	12/2/2011	496.67	12.30	13.74	1.44	484.14	
S-50	2/17/2012	496.67	11.67	13.44	1.77	484.72	
S-50	3/15/2012	496.67	12.36	14.42	2.06	483.98	
S-50	4/12/2012	496.67	12.27	13.98	1.71	484.13	
S-50	4/19/2012	496.67	11.96	12.11	0.15	484.69	
S-50	5/7/2012	496.67	12.12	13.30	1.18	484.36	
S-50	6/12/2012	496.67	Sheen	11.46	Sheen	485.21	
S-50	7/18/2012	496.67	11.09	11.11	0.02	485.58	
S-50	7/30/2012	496.67	Sheen	10.70	Sheen	485.97	
S-50	8/21/2012	496.67	11.46	11.56	0.10	485.19	
S-50	9/19/2012	496.67	11.94	13.36	1.42	484.51	
S-50	10/15/2012	496.67	11.87	13.36	1.49	484.56	
S-50	10/19/2012	496.67	11.98	13.70	1.72	484.42	Initial levels of first October 2012 baildown test
S-50	10/22/2012	496.67	12.11	13.84	1.73	484.29	Initial levels of second October 2012 baildown test
S-50	11/1/2012	496.67	12.04	12.75	0.71	484.52	
S-50	11/29/2012	496.68	11.66	11.79	0.13	485.00	
S-50	12/28/2012	496.68	11.89	12.67	0.78	484.67	
S-50	1/24/2013	496.68	11.90	12.43	0.53	484.70	
S-50	2/26/2013	496.68	12.04	12.89	0.85	484.51	
S-50	3/28/2013	496.68	12.07	13.98	1.91	484.31	R-35R, R-39, and R-40 were offline on this date
S-50	4/24/2013	496.68	12.11	13.61	1.50	484.33	
S-50	5/21/2013	496.70	11.99	12.02	0.03	484.71	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-50	6/24/2013	496.69	11.08	11.11	0.03	485.61	
S-50	7/23/2013	496.70	Sheen	10.77	Sheen	485.93	
S-50	8/1/2013	496.70	Sheen	10.73	Sheen	485.97	
S-50	8/21/2013	496.70	Sheen	10.70	Sheen	486.00	
S-50	9/30/2013	496.70	12.00	12.17	0.17	484.67	
S-50	10/22/2013	496.71	12.50	13.89	1.39	483.99	
S-50	11/26/2013	496.71	11.90	11.91	0.01	484.81	
S-50	12/18/2013	496.69	11.94	12.68	0.74	484.63	
S-50	1/9/2014	496.69	12.09	13.13	1.04	484.44	
S-50	2/5/2014	496.66	12.38	13.30	0.92	484.13	
S-50	3/18/2014	496.68	12.42	13.68	1.26	484.06	
S-50	3/24/2014	496.68	12.41	13.93	1.52	484.03	
S-50	4/14/2014	497.00	12.27	13.61	1.34	484.52	
S-50	4/18/2014	497.00	12.27	13.61	1.34	484.52	
S-50	5/15/2014	496.71	12.01	12.17	0.16	484.67	Skimmer pump removed to take measurement
S-50	5/16/2014	496.71	12.05	12.20	0.15	484.64	
S-50	6/11/2014	496.70	12.27	12.30	0.03	484.43	Product skimmer-pump present
S-50	6/19/2014	496.70	11.86	11.99	0.13	484.82	No skimmer pump present
S-50	7/15/2014	496.70	10.05	10.06	0.01	486.65	
S-50	8/26/2014	496.72	10.72	10.73	0.01	486.00	
S-50	9/9/2014	496.72	11.02	11.03	0.01	485.70	
S-50	9/24/2014	496.70	11.34	11.36	0.02	485.36	
S-50	10/21/2014	496.70	12.24	12.25	0.01	484.46	
S-50	11/19/2014	496.69	11.82	11.83	0.01	484.87	
S-50	12/16/2014	496.71	12.03	12.18	0.15	484.66	
S-50	12/29/2014	496.71	12.11	12.49	0.38	484.54	
S-50	1/21/2015	496.69	12.14	12.74	0.60	484.46	
S-50	2/25/2015	496.70	12.14	13.25	1.11	484.38	
S-50	3/10/2015	496.64	12.15	12.54	0.39	484.43	
S-50	3/18/2015	496.64	12.26	12.63	0.37	484.32	
S-50	3/26/2015	496.64	12.15	12.96	0.81	484.36	
S-50	4/16/2015	496.65	12.09	12.42	0.33	484.51	
S-50	5/21/2015	496.69	11.87	11.89	0.02	484.82	
S-50	6/10/2015	496.72	11.91	11.97	0.06	484.80	
S-50	8/12/2015	496.70	Sheen	10.82	Sheen	485.92	
S-50	8/19/2015	496.70	11.11	11.12	0.01	485.66	
S-50	10/6/2015	496.70	11.48	11.49	0.01	485.26	
S-50	10/15/2015	496.70	11.90	11.91	0.01	484.84	
S-50	11/19/2015	496.70	11.96	12.21	0.25	484.70	
S-50	1/19/2016	496.71	12.27	13.80	1.53	484.20	

Appendix A-1
Historical Groundwater Elevation and LNAPL Thickness Data

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-50	3/4/2016	496.71	12.37	13.85	1.48	484.16	
S-50	5/26/2016	496.70	12.07	12.22	0.15	484.63	
S-50	6/14/2016	496.70	No LNAPL	11.72	0.00	484.98	
S-50	8/18/2016	496.70	Sheen	10.43	Sheen	486.27	
S-50	8/18/2016	496.68	10.46	10.47	0.01	486.22	
S-50	9/9/2016	496.71	Sheen	10.95	Sheen	485.81	
S-50	10/13/2016	496.71	12.00	12.01	0.01	484.71	
S-50	11/15/2016	496.68	No LNAPL	11.57	0.00	485.15	
S-50	2/8/2017	496.67	11.98	12.05	0.07	484.75	
S-50	2/15/2017	496.67	12.00	12.11	0.11	484.68	
S-50	3/1/2017	496.67	12.02	12.18	0.16	484.62	
S-50	6/6/2017	496.71	12.06	12.17	0.11	484.63	
S-50	6/13/2017	496.71	11.33	11.42	0.09	485.43	
S-51	4/21/2006	—	10.77	10.85	0.08	—	
S-51	7/19/2006	—	--	9.38	--	—	
S-51	10/19/2006	—	10.81	11.80	0.99	—	
S-51	1/16/2007	—	10.76	11.30	0.54	—	
S-51	7/18/2007	—	9.37	9.44	0.07	—	
S-51	10/17/2007	—	11.04	12.59	1.55	—	
S-51	1/4/2008	—	10.47	11.11	0.64	—	
S-51	4/1/2008	—	10.88	12.07	1.19	—	
S-51	7/2/2008	—	No LNAPL	10.04	0.00	—	
S-51	10/1/2008	—	10.54	11.02	0.48	—	
S-51	4/10/2009	—	No LNAPL	16.75	0.00	—	
S-51	7/8/2009	—	9.96	10.00	0.04	—	
S-51	8/21/2009	—	9.91	10.28	0.37	—	
S-51	10/5/2009	—	10.88	12.47	1.59	—	
S-51	1/22/2010	—	11.07	12.40	1.33	—	
S-51	4/7/2010	—	10.91	12.29	1.38	—	
S-51	7/21/2010	—	9.85	9.86	0.01	—	
S-51	10/13/2010	—	11.16	12.71	1.55	—	
S-51	3/17/2011	—	11.02	12.53	1.51	—	
S-51	4/5/2011	—	10.98	11.99	1.01	—	
S-51	5/4/2011	—	10.42	10.44	0.02	—	
S-51	5/17/2011	—	11.09	12.92	1.83	—	
S-51	5/18/2011	—	11.11	12.98	1.87	—	
S-51	6/21/2011	—	10.64	11.03	0.39	—	
S-51	7/14/2011	—	Sheen	9.93	Sheen	—	
S-51	8/23/2011	—	10.23	10.27	0.04	—	
S-51	9/22/2011	—	11.12	12.70	1.58	—	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-51	10/21/2011	—	11.75	13.91	2.16	—	
S-51	12/7/2011	495.90	11.85	13.48	1.63	483.76	
S-51	2/17/2012	495.90	12.35	14.29	1.94	483.21	
S-51	3/15/2012	495.90	11.67	13.67	2.00	483.88	
S-51	4/12/2012	495.90	11.57	13.37	1.80	484.02	
S-51	5/7/2012	495.90	11.39	12.86	1.47	484.25	
S-51	6/12/2012	495.90	Sheen	10.78	Sheen	485.12	
S-51	7/18/2012	495.90	Sheen	10.42	Sheen	485.48	
S-51	8/21/2012	495.90	10.76	11.00	0.24	485.10	
S-51	9/19/2012	495.90	11.36	12.14	0.78	484.40	
S-51	10/15/2012	495.90	11.27	12.25	0.98	484.46	
S-51	10/18/2012	495.90	11.33	12.60	1.27	484.35	Initial levels of first October 2012 baildown test
S-51	10/19/2012	495.90	11.35	12.64	1.29	484.32	Initial levels of second October 2012 baildown test
S-51	11/29/2012	495.90	10.95	11.12	0.17	484.92	
S-51	12/28/2012	495.90	11.28	11.68	0.40	484.55	
S-51	2/26/2013	495.90	11.32	12.03	0.71	484.46	
S-51	3/28/2013	495.90	11.29	12.84	1.55	484.34	R-35R, R-39, and R-40 were offline on this date
S-51	4/24/2013	495.90	11.29	12.89	1.60	484.33	
S-51	5/21/2013	495.93	11.23	11.90	0.67	484.58	
S-51	6/24/2013	495.92	10.41	10.53	0.12	485.49	
S-51	7/23/2013	495.92	10.14	10.28	0.14	485.76	
S-51	8/1/2013	495.92	10.17	10.18	0.01	485.75	
S-51	8/21/2013	495.92	10.03	10.05	0.02	485.89	
S-51	9/30/2013	495.92	11.19	12.17	0.98	484.56	
S-51	10/22/2013	495.92	11.63	13.56	1.93	483.95	
S-51	11/26/2013	495.92	11.12	11.26	0.14	484.78	
S-51	12/18/2013	495.92	11.21	11.76	0.55	484.61	
S-51	1/9/2014	495.92	11.35	12.68	1.33	484.34	
S-51	2/5/2014	495.92	11.46	12.97	1.51	484.20	
S-51	3/18/2014	495.91	11.68	13.30	1.62	483.95	
S-51	3/24/2014	495.91	11.71	13.38	1.67	483.91	
S-51	4/14/2014	495.92	11.58	13.50	1.92	484.00	
S-51	4/18/2014	495.92	11.58	13.50	1.92	484.00	
S-51	5/15/2014	495.93	11.27	11.81	0.54	484.57	
S-51	5/16/2014	495.93	11.29	11.90	0.61	484.53	
S-51	6/19/2014	495.93	11.18	11.28	0.10	484.73	
S-51	6/20/2014	495.93	Sheen	10.81	Sheen	485.12	
S-51	7/15/2014	495.94	Sheen	9.40	Sheen	486.54	
S-51	8/26/2014	495.95	10.05	10.07	0.02	485.90	
S-51	9/24/2014	495.93	10.69	10.71	0.02	485.24	

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North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-51	10/21/2014	495.93	11.55	11.70	0.15	484.35	
S-51	11/19/2014	495.92	11.15	11.23	0.08	484.76	
S-51	12/16/2014	495.95	11.32	11.76	0.44	484.55	
S-51	12/29/2014	495.95	11.41	12.13	0.72	484.41	
S-51	1/21/2015	495.93	11.42	12.34	0.92	484.35	
S-51	2/25/2015	495.94	11.51	12.61	1.10	484.24	
S-51	3/10/2015	495.88	11.43	12.26	0.83	484.30	
S-51	3/18/2015	495.88	11.46	11.69	0.23	484.38	
S-51	3/26/2015	495.88	11.45	12.58	1.13	484.23	
S-51	4/16/2015	495.90	11.40	12.05	0.65	484.39	
S-51	5/21/2015	495.92	11.22	11.26	0.04	484.69	
S-51	6/10/2015	495.95	11.25	11.31	0.06	484.69	
S-51	8/12/2015	495.93	Sheen	10.18	Sheen	485.79	
S-51	8/19/2015	495.93	Sheen	10.47	Sheen	485.53	
S-51	10/6/2015	495.93	10.81	10.87	0.06	485.15	
S-51	10/15/2015	495.93	11.22	11.35	0.13	484.73	
S-51	1/19/2016	495.94	11.61	13.16	1.55	484.06	
S-51	3/4/2016	495.94	11.73	13.18	1.45	484.01	
S-51	5/26/2016	495.94	11.40	11.69	0.29	484.51	
S-51	6/14/2016	495.94	No LNAPL	11.07	0.00	484.87	
S-51	7/2/2016	495.94	No LNAPL	10.59	0.00	485.35	
S-51	7/8/2016	495.94	No LNAPL	10.06	0.00	485.88	
S-51	8/18/2016	495.94	9.80	9.81	0.01	486.14	
S-51	8/18/2016	495.92	9.82	9.83	0.01	486.10	
S-51	9/9/2016	495.95	10.30	10.31	0.01	485.70	
S-51	10/13/2016	495.95	11.35	11.41	0.06	484.59	
S-51	10/26/2016	495.92	11.73	11.78	0.05	484.18	
S-51	11/15/2016	495.92	No LNAPL	10.93	0.00	485.03	
S-51	2/8/2017	495.92	11.36	11.37	0.01	484.63	
S-51	2/15/2017	495.92	11.38	11.39	0.01	484.57	
S-51	3/1/2017	495.92	11.39	11.48	0.09	484.51	
S-51	6/6/2017	495.95	11.41	11.56	0.15	484.51	
S-51	6/13/2017	495.95	Sheen	10.69	Sheen	485.32	
S-51	7/13/2017	495.95	9.95	9.96	0.01	485.99	
S-51	10/18/2017	495.95	Sheen	11.28	Sheen	484.67	
S-51	1/19/2018	495.95	11.26	11.53	0.27	484.64	
S-51	4/3/2018	495.95	11.45	12.51	1.06	484.31	
S-51	7/17/2018	495.95	9.96	9.97	0.01	485.99	
S-54	10/19/2006	497.53	--	13.55	--	483.98	
S-54	4/1/2008	497.53	--	13.79	--	483.74	

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Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation± (feet MSL)	Notes
S-54	9/2/2008	497.53	--	12.70	--	484.83	
S-54	4/10/2009	497.53	--	Frozen	--	—	Frozen
S-54	9/3/2009	497.53	--	12.98	--	484.55	
S-54	4/25/2011	497.53	--	13.54	--	483.99	
S-54	10/21/2011	497.53	--	13.87	--	483.66	
S-54	2/15/2012	496.98	--	13.82	--	483.16	
S-54	4/19/2012	496.98	--	13.26	--	483.72	
S-54	7/30/2012	496.98	No LNAPL	12.14	0.00	484.84	
S-54	11/1/2012	496.98	No LNAPL	13.40	0.00	483.58	
S-54	1/24/2013	497.01	No LNAPL	13.23	0.00	483.78	
S-54	4/24/2013	497.01	--	13.46	--	483.55	
S-54	8/1/2013	497.01	--	12.02	--	484.99	
S-54	10/1/2013	497.01	--	13.19	--	483.82	
South Gravel Pit	4/19/2012	—	—	-9.30	—	—	Depth of water observed on 12 feet staff gauge
South Gravel Pit	7/31/2012	481.51	—	-11.07	—	492.58	Depth of water observed on 12 feet staff gauge
South Gravel Pit	11/2/2012	481.51	—	-9.55	—	491.06	Depth of water observed on 12 feet staff gauge
South Gravel Pit	1/24/2013	481.51	—	-8.56	—	490.07	Depth of water observed on 12 feet staff gauge
South Gravel Pit	4/24/2013	481.51	—	-9.79	—	491.30	Depth of water observed on 12 feet staff gauge
South Gravel Pit	8/1/2013	481.51	—	-11.70	—	493.21	Depth of water observed on 12 feet staff gauge
South Gravel Pit	10/1/2013	481.51	—	-9.80	—	491.31	Depth of water observed on 12 feet staff gauge
South Gravel Pit	3/18/2014	481.48	—	-9.10	—	490.58	Depth of water observed on 12 feet staff gauge
South Gravel Pit	4/25/2014	481.58	—	-4.34	—	485.92	Depth of water observed on 12 feet staff gauge
South Gravel Pit	5/20/2014	481.58	—	-6.95	—	488.53	Depth of water observed on 12 feet staff gauge
South Gravel Pit	6/4/2014	481.58	—	-6.90	—	488.48	Depth of water observed on 12 feet staff gauge
South Gravel Pit	6/11/2014	481.58	—	-6.75	—	488.33	Depth of water observed on 12 feet staff gauge
South Gravel Pit	9/9/2014	481.58	—	-8.50	—	490.08	Depth of water observed on 12 feet staff gauge
South Gravel Pit	11/20/2014	481.58	—	-8.67	—	490.25	Depth of water observed on 12 feet staff gauge
South Gravel Pit	3/19/2015	481.58	—	-7.97	—	489.55	Depth of water observed on 12 feet staff gauge
South Gravel Pit	6/10/2015	481.58	—	-8.13	—	489.71	Depth of water observed on 12 feet staff gauge
South Gravel Pit	8/13/2015	481.58	—	-8.41	—	489.99	Depth of water observed on 12 feet staff gauge
South Gravel Pit	11/19/2015	481.61	—	-8.20	—	489.81	Depth of water observed on 12 feet staff gauge

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Date	Top of Riser Elevation (feet MSL)	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	Water Table Elevation‡ (feet MSL)	Notes
South Gravel Pit	3/22/2016	481.61	—	-8.66	—	490.27	Depth of water observed on 12 feet staff gauge
South Gravel Pit	9/13/2016	481.61	—	-9.04	—	490.65	Depth of water observed on 12 feet staff gauge
South Gravel Pit	3/14/2017	481.62	—	-10.28	—	491.90	Depth of water observed on 12 feet staff gauge

General Notes:

MW-148-80/100/A-15/B-30/C-55/D-150 are offsite wells, but are reported along with the Onsite data

Acronyms and Abbreviations

‡ = At locations where the LNAPL specific gravity has not been determined, the LNAPL specific gravity of 0.8 is used to calculate the corrected groundwater elevation.

-- = A water sounder was used to measure the depth to water

— = Not measured or incalculable

BOW = bottom of well

BOC = below top of casing (measuring point)

CMT = continuous multichannel tubing

DTP = depth to product

DTW = depth to water

gpm = gallons per minute

ft = feet

LNAPL = light non-aqueous phase liquid

NPT = North Pole Terminal

MSL = mean sea level

No LNAPL = an interface probe was used to measure depth to water; LNAPL was not observed

SAP = sampling and analysis plan

sheen = LNAPL thickness was less than 0.01 feet and was not detected with an air/product/water interface probe; product was detected visually on rinse water

SWI = Shannon and Wilson, Inc.

Appendix A-2
Historical BTEX Analytical Results

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-101A-25	Onsite	10-55	04/07/1987	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	05/06/1987	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	08/26/1987	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	10/06/1987	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	12/17/1987	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	01/25/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	02/23/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/22/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	04/11/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	05/18/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	06/14/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	07/26/1988	ND	ND	--	ND
MW-101A-25	Onsite	10-55	08/25/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/29/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	11/28/1988	6.00	ND	ND	ND
MW-101A-25	Onsite	10-55	12/21/1988	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	02/09/1989	ND	0.200	ND	ND
MW-101A-25	Onsite	10-55	03/07/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	04/17/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	05/30/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	06/22/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	07/19/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	08/08/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/28/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	10/19/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	11/14/1989	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	02/21/1990	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	05/22/1990	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	08/27/1990	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	11/26/1990	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/28/1991	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	06/24/1991	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/17/1991	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/18/1992	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	06/16/1992	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/21/1992	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	12/09/1992	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/02/1993	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	06/22/1993	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/09/1993	ND	ND	ND	0.600
MW-101A-25	Onsite	10-55	03/24/1994	1.00	ND	ND	ND
MW-101A-25	Onsite	10-55	06/28/1994	0.600	ND	ND	ND
MW-101A-25	Onsite	10-55	09/19/1994	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/27/1995	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/14/1995	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/21/1996	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/26/1996	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/18/1997	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/25/1997	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/24/1998	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/22/1998	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/22/1999	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-101A-25	Onsite	10-55	09/14/1999	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/15/2000	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/19/2000	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	03/13/2001	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	05/10/2001	<0.500	<2.00	<2.00	3.89
MW-101A-25	Onsite	10-55	04/03/2002	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	04/29/2003	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	09/08/2004	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	05/18/2005	ND	ND	ND	ND
MW-101A-25	Onsite	10-55	04/17/2007	<1.00	<1.00	<1.00	<3.00
MW-101A-25	Onsite	10-55	04/03/2008	<1.00	<1.00	<1.00	<2.00
MW-101A-25	Onsite	10-55	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-101A-25	Onsite	10-55	04/05/2010	<0.500	<2.00	<2.00	<4.00*
MW-101A-25	Onsite	10-55	04/12/2011	<0.400	<1.00	<1.00	<3.00*
MW-101A-25	Onsite	10-55	10/16/2011	<0.240	<0.620	<0.620	<1.86*
MW-101A-25	Onsite	10-55	05/03/2012	<0.240	<0.620	<0.620	<1.86*
MW-101A-25	Onsite	10-55	04/17/2013	<0.240	<0.620	<0.620	<1.86*
MW-101A-25	Onsite	10-55	07/22/2014	<0.200	<0.500	<0.500	<1.50
MW-101A-25	Onsite	10-55	07/31/2015	<0.200	<0.500	<0.500	<1.50
MW-101A-25	Onsite	10-55	07/19/2016	<0.200	<0.500	<0.500	<1.50
MW-101A-25	Onsite	10-55	08/07/2017	<0.200	<0.500	<0.500	<1.50
MW-101A-25	Onsite	10-55	11/15/2017	<0.200	<0.500	<0.500	<1.50
MW-101A-25	Onsite	10-55	2/15/2018	<0.200	<0.500	<0.500	<1.50
MW-101A-25	Onsite	10-55	4/10/2018	<0.200	<0.500	<0.500	<1.50
MW-101A-25	Onsite	10-55	8/2/2018	<0.200	<0.500	<0.500	<1.50
MW-101-60	Onsite	10-55	04/07/1987	ND	ND	ND	ND
MW-101-60	Onsite	10-55	05/06/1987	ND	ND	ND	ND
MW-101-60	Onsite	10-55	08/26/1987	ND	ND	ND	ND
MW-101-60	Onsite	10-55	10/06/1987	ND	ND	ND	ND
MW-101-60	Onsite	10-55	12/17/1987	2.20	ND	ND	ND
MW-101-60	Onsite	10-55	01/25/1988	0.760	ND	ND	ND
MW-101-60	Onsite	10-55	02/23/1988	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/22/1988	ND	ND	ND	ND
MW-101-60	Onsite	10-55	04/11/1988	ND	ND	ND	ND
MW-101-60	Onsite	10-55	05/18/1988	ND	ND	ND	ND
MW-101-60	Onsite	10-55	06/14/1988	ND	ND	ND	ND
MW-101-60	Onsite	10-55	07/26/1988	ND	ND	--	ND
MW-101-60	Onsite	10-55	08/25/1988	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/29/1988	ND	ND	ND	ND
MW-101-60	Onsite	10-55	12/21/1988	ND	ND	ND	ND
MW-101-60	Onsite	10-55	02/09/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/07/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	04/17/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	05/30/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	06/22/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	07/19/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	08/08/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/28/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	10/19/1989	ND	ND	ND	ND
MW-101-60	Onsite	10-55	11/14/1989	0.880	0.800	ND	ND
MW-101-60	Onsite	10-55	02/21/1990	4.10	3.10	ND	1.10

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-101-60	Onsite	10-55	03/28/1990	ND	ND	ND	ND
MW-101-60	Onsite	10-55	05/22/1990	9.70	8.30	0.570	1.40
MW-101-60	Onsite	10-55	06/26/1990	ND	ND	ND	ND
MW-101-60	Onsite	10-55	08/27/1990	ND	ND	ND	ND
MW-101-60	Onsite	10-55	11/26/1990	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/28/1991	ND	ND	ND	ND
MW-101-60	Onsite	10-55	06/24/1991	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/17/1991	ND	ND	ND	ND
MW-101-60	Onsite	10-55	12/11/1991	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/18/1992	ND	ND	ND	ND
MW-101-60	Onsite	10-55	06/16/1992	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/21/1992	ND	ND	ND	ND
MW-101-60	Onsite	10-55	12/09/1992	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/02/1993	ND	ND	ND	ND
MW-101-60	Onsite	10-55	06/22/1993	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/09/1993	0.400	ND	ND	ND
MW-101-60	Onsite	10-55	12/20/1993	4.00	2.00	ND	0.900
MW-101-60	Onsite	10-55	03/24/1994	0.800	ND	ND	ND
MW-101-60	Onsite	10-55	06/28/1994	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/19/1994	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/27/1995	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/14/1995	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/21/1996	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/26/1996	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/18/1997	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/25/1997	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/24/1998	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/22/1998	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/22/1999	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/14/1999	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/15/2000	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/19/2000	ND	ND	ND	ND
MW-101-60	Onsite	10-55	03/13/2001	ND	ND	ND	ND
MW-101-60	Onsite	10-55	05/10/2001	<0.500	<2.00	<2.00	<4.00
MW-101-60	Onsite	10-55	04/03/2002	ND	ND	ND	ND
MW-101-60	Onsite	10-55	04/29/2003	ND	ND	ND	ND
MW-101-60	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-101-60	Onsite	10-55	09/08/2004	ND	ND	ND	ND
MW-101-60	Onsite	10-55	05/18/2005	ND	ND	ND	ND
MW-101-60	Onsite	10-55	04/17/2007	<1.00	<1.00	<1.00	<3.00
MW-101-60	Onsite	10-55	04/03/2008	<1.00	<1.00	<1.00	<2.00
MW-101-60	Onsite	10-55	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-101-60	Onsite	10-55	04/05/2010	<0.500	<2.00	<2.00	<4.00*
MW-102-70	Onsite	55-90	04/07/1987	ND	ND	ND	ND
MW-102-70	Onsite	55-90	05/06/1987	ND	ND	ND	ND
MW-102-70	Onsite	55-90	08/26/1987	ND	ND	ND	ND
MW-102-70	Onsite	55-90	10/06/1987	ND	ND	ND	ND
MW-102-70	Onsite	55-90	01/26/1988	ND	ND	ND	ND
MW-102-70	Onsite	55-90	04/11/1988	ND	ND	ND	ND
MW-102-70	Onsite	55-90	05/18/1988	0.550	ND	ND	ND
MW-102-70	Onsite	55-90	06/14/1988	0.590	ND	ND	ND
MW-102-70	Onsite	55-90	07/26/1988	ND	ND	--	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-102-70	Onsite	55-90	08/25/1988	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/28/1988	17.0	ND	ND	ND
MW-102-70	Onsite	55-90	11/29/1988	6.00	ND	1.00	ND
MW-102-70	Onsite	55-90	02/09/1989	1.10	ND	ND	ND
MW-102-70	Onsite	55-90	04/17/1989	ND	ND	ND	ND
MW-102-70	Onsite	55-90	05/30/1989	ND	ND	ND	ND
MW-102-70	Onsite	55-90	06/22/1989	ND	ND	ND	ND
MW-102-70	Onsite	55-90	08/08/1989	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/28/1989	ND	ND	ND	ND
MW-102-70	Onsite	55-90	10/18/1989	ND	ND	ND	ND
MW-102-70	Onsite	55-90	11/16/1989	0.880	0.800	ND	ND
MW-102-70	Onsite	55-90	02/19/1990	9.00	6.80	0.710	3.30
MW-102-70	Onsite	55-90	03/19/1990	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/28/1990	ND	ND	ND	ND
MW-102-70	Onsite	55-90	04/19/1990	ND	ND	ND	ND
MW-102-70	Onsite	55-90	05/23/1990	ND	0.560	ND	ND
MW-102-70	Onsite	55-90	08/27/1990	ND	ND	ND	ND
MW-102-70	Onsite	55-90	11/26/1990	0.650	0.660	ND	ND
MW-102-70	Onsite	55-90	12/18/1990	ND	0.660	ND	0.570
MW-102-70	Onsite	55-90	01/22/1991	0.700	0.970	0.570	0.910
MW-102-70	Onsite	55-90	03/27/1991	ND	ND	0.590	ND
MW-102-70	Onsite	55-90	06/24/1991	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/17/1991	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/16/1992	ND	ND	ND	ND
MW-102-70	Onsite	55-90	06/16/1992	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/23/1992	ND	ND	ND	ND
MW-102-70	Onsite	55-90	12/09/1992	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/01/1993	ND	ND	ND	ND
MW-102-70	Onsite	55-90	06/22/1993	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/08/1993	ND	ND	ND	ND
MW-102-70	Onsite	55-90	12/21/1993	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/25/1994	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/20/1994	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/28/1995	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/13/1995	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/27/1996	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/24/1996	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/20/1997	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/22/1997	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/25/1998	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/24/1998	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/24/1999	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/15/1999	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/15/2000	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/19/2000	ND	ND	ND	ND
MW-102-70	Onsite	55-90	03/14/2001	ND	ND	ND	ND
MW-102-70	Onsite	55-90	10/10/2001	ND	ND	ND	1.30
MW-102-70	Onsite	55-90	04/09/2002	ND	ND	ND	ND
MW-102-70	Onsite	55-90	04/29/2003	ND	ND	ND	ND
MW-102-70	Onsite	55-90	04/23/2004	ND	ND	ND	ND
MW-102-70	Onsite	55-90	09/08/2004	ND	ND	ND	ND
MW-102-70	Onsite	55-90	04/22/2005	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-102-70	Onsite	55-90	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-102-70	Onsite	55-90	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-102-70	Onsite	55-90	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-102-70	Onsite	55-90	04/02/2010	<0.500	<2.00	<2.00	<4.00*
MW-104-65	Onsite	10-55	04/07/1987	0.600	0.200	ND	ND
MW-104-65	Onsite	10-55	05/06/1987	0.810	ND	ND	ND
MW-104-65	Onsite	10-55	08/26/1987	ND	ND	ND	ND
MW-104-65	Onsite	10-55	10/06/1987	ND	ND	ND	ND
MW-104-65	Onsite	10-55	04/29/1988	ND	ND	ND	ND
MW-104-65	Onsite	10-55	05/18/1988	ND	ND	ND	ND
MW-104-65	Onsite	10-55	06/14/1988	ND	ND	ND	ND
MW-104-65	Onsite	10-55	07/26/1988	ND	ND	--	ND
MW-104-65	Onsite	10-55	08/25/1988	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/28/1988	ND	ND	ND	ND
MW-104-65	Onsite	10-55	06/22/1989	ND	ND	ND	ND
MW-104-65	Onsite	10-55	08/08/1989	ND	ND	ND	ND
MW-104-65	Onsite	10-55	10/18/1989	6.40	1.30	ND	1.10
MW-104-65	Onsite	10-55	11/16/1989	7.70	ND	ND	ND
MW-104-65	Onsite	10-55	01/09/1990	10.0	4.30	0.750	3.30
MW-104-65	Onsite	10-55	02/19/1990	4.60	0.600	ND	ND
MW-104-65	Onsite	10-55	03/15/1990	9.00	ND	ND	ND
MW-104-65	Onsite	10-55	03/28/1990	15.0	ND	ND	ND
MW-104-65	Onsite	10-55	04/20/1990	20.0	ND	ND	ND
MW-104-65	Onsite	10-55	05/22/1990	19.0	ND	ND	ND
MW-104-65	Onsite	10-55	08/27/1990	15.0	ND	ND	ND
MW-104-65	Onsite	10-55	03/28/1991	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/16/1991	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/16/1992	ND	ND	ND	ND
MW-104-65	Onsite	10-55	06/16/1992	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/23/1992	ND	ND	ND	ND
MW-104-65	Onsite	10-55	12/09/1992	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/01/1993	ND	ND	ND	ND
MW-104-65	Onsite	10-55	06/22/1993	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/08/1993	ND	ND	ND	ND
MW-104-65	Onsite	10-55	12/21/1993	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/25/1994	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/20/1994	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/28/1995	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/13/1995	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/27/1996	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/24/1996	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/19/1997	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/22/1997	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/25/1998	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/24/1998	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/24/1999	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/15/1999	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/15/2000	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/20/2000	ND	ND	ND	ND
MW-104-65	Onsite	10-55	03/14/2001	ND	ND	ND	ND
MW-104-65	Onsite	10-55	04/09/2002	ND	ND	ND	ND
MW-104-65	Onsite	10-55	05/07/2003	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-104-65	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-104-65	Onsite	10-55	09/08/2004	ND	ND	ND	ND
MW-104-65	Onsite	10-55	04/22/2005	ND	ND	ND	ND
MW-104-65	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-104-65	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-104-65	Onsite	10-55	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-104-65	Onsite	10-55	04/02/2010	<0.500	<2.00	<2.00	<4.00*
MW-105A-25	Onsite	10-55	04/07/1987	0.930	ND	ND	ND
MW-105A-25	Onsite	10-55	05/06/1987	1.10	ND	ND	ND
MW-105A-25	Onsite	10-55	08/26/1987	1.80	ND	ND	ND
MW-105A-25	Onsite	10-55	10/06/1987	1.00	ND	ND	ND
MW-105A-25	Onsite	10-55	12/17/1987	14.0	ND	ND	ND
MW-105A-25	Onsite	10-55	01/25/1988	12.0	ND	ND	ND
MW-105A-25	Onsite	10-55	02/23/1988	11.0	ND	ND	ND
MW-105A-25	Onsite	10-55	03/22/1988	8.70	ND	ND	ND
MW-105A-25	Onsite	10-55	04/11/1988	15.0	ND	ND	ND
MW-105A-25	Onsite	10-55	05/18/1988	6.20	ND	ND	ND
MW-105A-25	Onsite	10-55	06/14/1988	4.60	ND	ND	ND
MW-105A-25	Onsite	10-55	07/26/1988	ND	ND	--	ND
MW-105A-25	Onsite	10-55	08/25/1988	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/29/1988	0.600	ND	ND	ND
MW-105A-25	Onsite	10-55	11/28/1988	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	12/21/1988	10.0	7.00	ND	2.00
MW-105A-25	Onsite	10-55	02/09/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	03/07/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	04/17/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	05/30/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	06/22/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	07/19/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	08/08/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/28/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	10/19/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	11/14/1989	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	02/21/1990	12.0	8.90	0.790	4.10
MW-105A-25	Onsite	10-55	05/24/1990	ND	0.880	ND	ND
MW-105A-25	Onsite	10-55	08/27/1990	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	04/01/1991	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/17/1991	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	03/18/1992	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/23/1992	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	03/03/1993	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/08/1993	0.600	ND	ND	0.600
MW-105A-25	Onsite	10-55	03/28/1994	11.0	ND	ND	ND
MW-105A-25	Onsite	10-55	09/19/1994	66.0	ND	ND	ND
MW-105A-25	Onsite	10-55	03/27/1995	200	ND	ND	ND
MW-105A-25	Onsite	10-55	09/19/1995	270	ND	ND	ND
MW-105A-25	Onsite	10-55	03/25/1996	78.4	ND	ND	ND
MW-105A-25	Onsite	10-55	09/26/1996	92.7	ND	ND	ND
MW-105A-25	Onsite	10-55	03/19/1997	12.0	ND	ND	ND
MW-105A-25	Onsite	10-55	09/24/1997	4.00	ND	ND	ND
MW-105A-25	Onsite	10-55	03/23/1998	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/24/1998	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-105A-25	Onsite	10-55	03/23/1999	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/14/1999	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	03/14/2000	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/20/2000	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	03/14/2001	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	05/10/2001	<0.500	2.37	2.21	9.04
MW-105A-25	Onsite	10-55	06/13/2001	<0.500	<2.00	<2.00	<4.00
MW-105A-25	Onsite	10-55	10/10/2001	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	04/10/2002	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	10/08/2002	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	04/29/2003	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	10/05/2003	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	09/08/2004	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	04/22/2005	ND	ND	ND	ND
MW-105A-25	Onsite	10-55	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-105A-25	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-105A-25	Onsite	10-55	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-105A-25	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-105A-25	Onsite	10-55	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-105A-25	Onsite	10-55	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-105A-25	Onsite	10-55	10/02/2009	<0.500	<2.00	<2.00	<4.00*
MW-105A-25	Onsite	10-55	04/06/2010	<0.500	<2.00	<2.00	<4.00*
MW-105A-25	Onsite	10-55	10/07/2010	<0.400	<1.00	<1.00	<3.00*
MW-105A-25	Onsite	10-55	04/18/2011	<0.400	<1.00	<1.00	<3.00*
MW-105A-25	Onsite	10-55	05/04/2012	<0.240	<0.620	<0.620	<1.86*
MW-105A-25	Onsite	10-55	05/22/2013	<0.410B*	0.390J	<0.620	1.26J*
MW-105A-25	Onsite	10-55	08/20/2014	<0.200	<0.500	<0.500	<1.50
MW-105A-25	Onsite	10-55	08/04/2015	0.420	<0.500	<0.500	<1.50
MW-105A-25	Onsite	10-55	10/02/2015	<0.200	<0.500	<0.500	<1.50
MW-105A-25	Onsite	10-55	07/26/2016	<0.200	<0.500	<0.500	<1.50
MW-105-65	Onsite	10-55	04/07/1987	ND	ND	ND	ND
MW-105-65	Onsite	10-55	05/06/1987	ND	ND	ND	ND
MW-105-65	Onsite	10-55	08/26/1987	ND	ND	ND	ND
MW-105-65	Onsite	10-55	10/06/1987	ND	ND	ND	ND
MW-105-65	Onsite	10-55	12/17/1987	ND	ND	ND	ND
MW-105-65	Onsite	10-55	01/25/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	02/23/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/22/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	04/11/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	05/18/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	06/14/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	07/26/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	08/25/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/29/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	11/28/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	12/21/1988	ND	ND	ND	ND
MW-105-65	Onsite	10-55	02/09/1989	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/07/1989	ND	ND	ND	ND
MW-105-65	Onsite	10-55	04/17/1989	ND	ND	ND	ND
MW-105-65	Onsite	10-55	05/30/1989	ND	ND	ND	ND
MW-105-65	Onsite	10-55	06/22/1989	ND	ND	ND	ND

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MW-105-65	Onsite	10-55	07/19/1989	ND	ND	ND	ND
MW-105-65	Onsite	10-55	08/08/1989	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/28/1989	ND	ND	ND	ND
MW-105-65	Onsite	10-55	10/19/1989	ND	ND	ND	ND
MW-105-65	Onsite	10-55	11/14/1989	4.10	4.00	ND	1.30
MW-105-65	Onsite	10-55	02/21/1990	41.0	41.0	4.20	18.0
MW-105-65	Onsite	10-55	05/24/1990	7.90	12.0	1.20	5.80
MW-105-65	Onsite	10-55	08/27/1990	ND	ND	ND	ND
MW-105-65	Onsite	10-55	04/01/1991	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/17/1991	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/18/1992	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/23/1992	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/03/1993	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/08/1993	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/28/1994	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/19/1994	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/29/1995	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/19/1995	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/25/1996	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/26/1996	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/19/1997	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/25/1997	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/23/1998	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/24/1998	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/23/1999	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/14/1999	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/14/2000	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/20/2000	ND	ND	ND	ND
MW-105-65	Onsite	10-55	03/14/2001	ND	ND	ND	ND
MW-105-65	Onsite	10-55	05/10/2001	1.64	9.46	6.46	44.3
MW-105-65	Onsite	10-55	06/13/2001	<0.500	<2.00	<2.00	<4.00
MW-105-65	Onsite	10-55	10/10/2001	ND	ND	ND	ND
MW-105-65	Onsite	10-55	04/10/2002	ND	ND	ND	ND
MW-105-65	Onsite	10-55	10/08/2002	ND	ND	ND	ND
MW-105-65	Onsite	10-55	04/29/2003	ND	ND	ND	ND
MW-105-65	Onsite	10-55	10/05/2003	ND	ND	ND	ND
MW-105-65	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-105-65	Onsite	10-55	09/08/2004	ND	ND	ND	ND
MW-105-65	Onsite	10-55	04/22/2005	ND	ND	ND	ND
MW-105-65	Onsite	10-55	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-105-65	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-105-65	Onsite	10-55	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-105-65	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-105-65	Onsite	10-55	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-105-65	Onsite	10-55	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-105-65	Onsite	10-55	10/02/2009	<0.500	<2.00	<2.00	<4.00*
MW-105-65	Onsite	10-55	04/06/2010	<0.500	<2.00	<2.00	<4.00*
MW-105-65	Onsite	10-55	10/07/2010	<0.400	<1.00	<1.00	<3.00*
MW-106-25	Onsite	10-55	10/06/1987	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/17/1987	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/26/1988	ND	0.640	ND	ND
MW-106-25	Onsite	10-55	02/23/1988	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-106-25	Onsite	10-55	03/22/1988	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/11/1988	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/18/1988	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/14/1988	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/26/1988	ND	ND	--	ND
MW-106-25	Onsite	10-55	08/24/1988	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/28/1988	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/28/1988	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/22/1988	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/08/1989	ND	1.70	0.300	1.40
MW-106-25	Onsite	10-55	03/07/1989	0.600	1.30	0.300	1.50
MW-106-25	Onsite	10-55	05/30/1989	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/22/1989	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/19/1989	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/08/1989	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/28/1989	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/19/1989	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/14/1989	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/21/1990	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/24/1990	ND	0.710	ND	ND
MW-106-25	Onsite	10-55	07/31/1990	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/27/1990	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/19/1990	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/24/1990	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/27/1990	4.30	ND	ND	0.730
MW-106-25	Onsite	10-55	12/18/1990	6.10	ND	ND	1.60
MW-106-25	Onsite	10-55	01/22/1991	3.10	ND	ND	1.50
MW-106-25	Onsite	10-55	02/20/1991	1.90	ND	ND	ND
MW-106-25	Onsite	10-55	03/28/1991	1.20	ND	ND	ND
MW-106-25	Onsite	10-55	04/30/1991	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/31/1991	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/24/1991	0.700	ND	ND	ND
MW-106-25	Onsite	10-55	07/31/1991	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/30/1991	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/17/1991	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/22/1991	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/18/1991	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/11/1991	3.30	2.90	ND	1.70
MW-106-25	Onsite	10-55	01/31/1992	2.60	1.60	ND	ND
MW-106-25	Onsite	10-55	02/25/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/18/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/14/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/05/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/16/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/16/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/31/1992	ND	2.00	ND	3.00
MW-106-25	Onsite	10-55	09/21/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/26/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/09/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/09/1992	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/27/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/12/1993	ND	ND	ND	ND

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MW-106-25	Onsite	10-55	03/02/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/20/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/24/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/22/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/27/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/20/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/09/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/15/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/08/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/20/1993	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/17/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/04/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/24/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/28/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/25/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/28/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/29/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/24/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/19/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/06/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/04/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/13/1994	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/04/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/06/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/27/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/20/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/20/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/24/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/28/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/24/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/16/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/14/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/24/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/28/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/07/1995	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/29/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/21/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/29/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/28/1996	2.00	2.00	ND	2.00
MW-106-25	Onsite	10-55	06/19/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/23/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/27/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/17/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/28/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/19/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/12/1996	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/30/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/21/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/18/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/29/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/29/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/24/1997	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-106-25	Onsite	10-55	07/22/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/19/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/16/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/22/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/25/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/12/1997	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/12/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/12/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/17/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/27/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/27/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/26/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/29/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/24/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/22/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/15/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/03/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/01/1998	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/13/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/16/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/22/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/28/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/26/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/29/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/21/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/18/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/14/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/13/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/15/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/21/1999	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/19/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/22/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/13/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/04/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	05/09/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	06/15/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	07/20/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	08/28/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/18/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/11/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	11/07/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	12/12/2000	ND	ND	ND	ND
MW-106-25	Onsite	10-55	01/15/2001	ND	ND	ND	ND
MW-106-25	Onsite	10-55	02/14/2001	ND	ND	ND	ND
MW-106-25	Onsite	10-55	03/13/2001	0.800	ND	ND	ND
MW-106-25	Onsite	10-55	04/10/2001	0.900	ND	ND	ND
MW-106-25	Onsite	10-55	05/10/2001	0.698	<2.00	<2.00	<4.00
MW-106-25	Onsite	10-55	06/13/2001	0.630	ND	ND	ND
MW-106-25	Onsite	10-55	10/09/2001	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/05/2002	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/07/2002	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/29/2003	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-106-25	Onsite	10-55	10/05/2003	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-106-25	Onsite	10-55	09/08/2004	ND	ND	ND	ND
MW-106-25	Onsite	10-55	04/21/2005	ND	ND	ND	ND
MW-106-25	Onsite	10-55	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-106-25	Onsite	10-55	11/15/2006	<0.226	<0.202	<0.241	<0.223*
MW-106-25	Onsite	10-55	04/17/2007	<1.00	<1.00	<1.00	<3.00
MW-106-25	Onsite	10-55	09/19/2007	<1.00	<1.00	<1.00	<3.00*
MW-106-25	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-106-25	Onsite	10-55	09/04/2008	<1.00	--	--	--
MW-106-25	Onsite	10-55	04/08/2009	<0.150	<0.620	<0.620	<1.24*
MW-106-25	Onsite	10-55	09/02/2009	<0.500	<2.00	<2.00	<4.00*
MW-106-25	Onsite	10-55	04/02/2010	<0.400	<1.00	<1.00	<3.00*
MW-106-25	Onsite	10-55	09/03/2010	<0.400	<1.00	<1.00	<3.00*
MW-106-25	Onsite	10-55	02/24/2011	<0.400	<1.00	<1.00	<3.00*
MW-106-25	Onsite	10-55	04/15/2011	<0.400	<1.00	<1.00	<3.00*
MW-106-25	Onsite	10-55	10/11/2011	<0.240	<0.620	<0.620	<1.86*
MW-106-25	Onsite	10-55	04/27/2012	<0.240	<0.620	<0.620	<1.86*
MW-106-25	Onsite	10-55	05/04/2012	<0.240	1.30	<0.620	<1.86*
MW-106-25	Onsite	10-55	11/15/2012	<0.240	<0.620	<0.620	<1.86*
MW-106-25	Onsite	10-55	05/13/2013	<0.240	<0.620	<0.620	<1.86*
MW-106-25	Onsite	10-55	05/13/2013	<0.240	<0.620	<0.620	<1.86*
MW-106-25	Onsite	10-55	03/10/2014	<0.200	<0.500	<0.500	<1.50
MW-106-25	Onsite	10-55	08/15/2014	<0.200	<0.500	<0.500	<1.50
MW-106-25	Onsite	10-55	07/31/2015	<0.200	<0.500	<0.500	<1.50
MW-106-25	Onsite	10-55	02/16/2016	<0.200	<0.500	<0.500	<1.50
MW-106-25	Onsite	10-55	07/27/2016	<0.200	<0.500	<0.500	<1.50
MW-106-25	Onsite	10-55	03/01/2017	<0.200	<0.500	<0.500	<1.50
MW-109-15	Onsite	Water Table	08/24/1988	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/28/1988	140	1.00	3.10	19.0
MW-109-15	Onsite	Water Table	11/30/1988	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	12/22/1988	11.0	ND	ND	ND
MW-109-15	Onsite	Water Table	11/15/1989	17.0	ND	8.80	1.20
MW-109-15	Onsite	Water Table	02/20/1990	11.0	ND	6.40	ND
MW-109-15	Onsite	Water Table	05/24/1990	9.90	0.640	6.50	1.30
MW-109-15	Onsite	Water Table	08/29/1990	0.660	ND	ND	ND
MW-109-15	Onsite	Water Table	03/26/1991	1.00	ND	ND	ND
MW-109-15	Onsite	Water Table	09/16/1991	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/17/1992	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/22/1992	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/02/1993	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/09/1993	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/24/1994	2.00	0.900	1.00	1.00
MW-109-15	Onsite	Water Table	09/19/1994	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/21/1995	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/14/1995	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/21/1996	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/18/1996	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/18/1997	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/16/1997	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/20/1998	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/22/1998	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-109-15	Onsite	Water Table	03/23/1999	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/14/1999	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/14/2000	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/18/2000	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	03/13/2001	17.0	ND	ND	ND
MW-109-15	Onsite	Water Table	10/09/2001	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	04/03/2002	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	10/07/2002	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	04/29/2003	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	10/05/2003	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	04/23/2004	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	09/08/2004	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	04/20/2005	ND	ND	ND	ND
MW-109-15	Onsite	Water Table	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-109-15	Onsite	Water Table	04/17/2007	<1.00	<1.00	<1.00	<3.00
MW-109-15	Onsite	Water Table	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-109-15	Onsite	Water Table	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-109-15	Onsite	Water Table	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-109-15	Onsite	Water Table	04/08/2009	<0.150	<0.620	<0.620	<1.24*
MW-109-15	Onsite	Water Table	10/01/2009	<0.500	<2.00	<2.00	<4.00*
MW-109-15	Onsite	Water Table	04/02/2010	<0.500	<2.00	<2.00	<4.00*
MW-109-15	Onsite	Water Table	10/06/2010	<0.400	<1.00	<1.00	<3.00*
MW-109-15	Onsite	Water Table	02/10/2011	<0.400	<1.00	<1.00	<3.00*
MW-109-15	Onsite	Water Table	06/01/2011	0.430	<0.310	<0.310	<0.930*
MW-109-15	Onsite	Water Table	10/17/2011	<0.240	<0.620	<0.620	<1.86*
MW-109-15	Onsite	Water Table	05/04/2012	<0.240	<0.620	<0.620	<1.86*
MW-109-15	Onsite	Water Table	11/14/2012	<0.240	<0.620	<0.620	<1.86*
MW-109-15	Onsite	Water Table	06/06/2013	<0.240	<0.620	<0.620	<1.86*
MW-109-15	Onsite	Water Table	11/01/2013	<0.240	<0.620	<0.620	<1.88
MW-109-15	Onsite	Water Table	03/10/2014	<0.200	<0.500	<0.500	<1.50
MW-109-15	Onsite	Water Table	08/19/2014	<0.200	<0.500	<0.500	<1.50
MW-109-15	Onsite	Water Table	07/31/2015	<0.200	<0.500	<0.500	<1.50
MW-109-15	Onsite	Water Table	07/20/2016	<0.200	<0.500	<0.500	<1.50
MW-110-20	Onsite	Water Table	08/24/1988	760	ND	26.0	6.60
MW-110-20	Onsite	Water Table	09/29/1988	420	3.30	21.0	ND
MW-110-20	Onsite	Water Table	11/30/1988	180	ND	4.00	ND
MW-110-20	Onsite	Water Table	12/22/1988	ND	ND	ND	ND
MW-110-20	Onsite	Water Table	11/15/1989	260	ND	ND	ND
MW-110-20	Onsite	Water Table	02/20/1990	200	ND	ND	ND
MW-110-20	Onsite	Water Table	05/24/1990	240	ND	ND	ND
MW-110-20	Onsite	Water Table	08/29/1990	220	ND	ND	ND
MW-110-20	Onsite	Water Table	03/26/1991	180	ND	ND	6.20
MW-110-20	Onsite	Water Table	09/16/1991	400	18.0	ND	ND
MW-110-20	Onsite	Water Table	03/17/1992	100	ND	ND	ND
MW-110-20	Onsite	Water Table	09/22/1992	190	55.0	25.0	190
MW-110-20	Onsite	Water Table	03/02/1993	51.0	ND	ND	1.00
MW-110-20	Onsite	Water Table	09/10/1993	120	0.500	1.00	16.0
MW-110-20	Onsite	Water Table	03/25/1994	72.0	ND	ND	5.00
MW-110-20	Onsite	Water Table	09/19/1994	78.0	0.800	1.00	36.0
MW-110-20	Onsite	Water Table	03/20/1995	39.0	ND	ND	ND
MW-110-20	Onsite	Water Table	09/14/1995	230	3.00	31.0	280
MW-110-20	Onsite	Water Table	09/18/1996	120	1.00	46.0	480

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-110-20	Onsite	Water Table	03/18/1997	44.0	ND	ND	ND
MW-110-20	Onsite	Water Table	09/16/1997	ND	8.00	39.0	ND
MW-110-20	Onsite	Water Table	09/28/1998	490	94.0	32.0	460
MW-110-20	Onsite	Water Table	09/14/1999	5500	690	51.0	1000
MW-110-20	Onsite	Water Table	03/13/2000	950	6.00	8.00	93.0
MW-110-20	Onsite	Water Table	09/18/2000	3400	1400	38.0	580
MW-110-20	Onsite	Water Table	06/13/2001	3080	372	51.0	380
MW-110-20	Onsite	Water Table	07/11/2001	3000	1300	73.0	560
MW-110-20	Onsite	Water Table	10/09/2001	2000	1100	83.0	650
MW-110-20	Onsite	Water Table	08/14/2002	1000	410	43.0	380
MW-110-20	Onsite	Water Table	10/07/2002	830	55.0	39.0	360
MW-110-20	Onsite	Water Table	01/07/2003	330	ND	11.0	59.0
MW-110-20	Onsite	Water Table	07/10/2003	890	53.0	18.0	100
MW-110-20	Onsite	Water Table	10/05/2003	360	ND	9.40	100
MW-110-20	Onsite	Water Table	01/13/2004	160	ND	ND	23.0
MW-110-20	Onsite	Water Table	04/23/2004	211	11.0	5.00	22.0
MW-110-20	Onsite	Water Table	07/22/2004	236	ND	4.40	23.0
MW-110-20	Onsite	Water Table	09/09/2004	288	2.20	10.0	97.0
MW-110-20	Onsite	Water Table	01/29/2005	98.0	ND	ND	ND
MW-110-20	Onsite	Water Table	04/20/2005	134	ND	ND	ND
MW-110-20	Onsite	Water Table	07/26/2005	168	ND	4.90	18.0
MW-110-20	Onsite	Water Table	07/18/2006	220	23.2	19.9	27.2*
MW-110-20	Onsite	Water Table	10/17/2006	170	21.7	14.0	19.3*
MW-110-20	Onsite	Water Table	01/17/2007	101	10.6	7.91	60.3*
MW-110-20	Onsite	Water Table	07/17/2007	140	27.3	15.3	125
MW-110-20	Onsite	Water Table	10/16/2007	403	11.6	16.1	199
MW-110-20	Onsite	Water Table	01/04/2008	165	2.57	8.82	90.2
MW-110-20	Onsite	Water Table	07/01/2008	450	6.80	35.0	331
MW-110-20	Onsite	Water Table	10/02/2008	240	<2.00	8.70	140
MW-110-20	Onsite	Water Table	01/12/2009	116	<2.00	5.42	66.7*
MW-110-20	Onsite	Water Table	07/07/2009	288	<2.00	25.7	159*
MW-110-20	Onsite	Water Table	10/01/2009	120	3.15	4.07	39.6*
MW-110-20	Onsite	Water Table	01/19/2010	24.8	<2.00	<2.00	<4.00*
MW-110-20	Onsite	Water Table	07/23/2010	134	<0.620	6.57	64.0*
MW-110-20	Onsite	Water Table	10/06/2010	183	1.31	4.08	95.4*
MW-110-20	Onsite	Water Table	02/10/2011	44.3	<1.00	2.05	32.4*
MW-110-20	Onsite	Water Table	08/23/2011	128	0.750	4.45	108
MW-110-20	Onsite	Water Table	10/18/2011	111	0.390J	2.47	53.7
MW-110-20	Onsite	Water Table	02/21/2012	28.0	<0.620	0.790J	10.9
MW-110-20	Onsite	Water Table	06/15/2012	209	<0.620	6.67	51.8*
MW-110-20	Onsite	Water Table	10/18/2012	125	<0.620	0.630J	<73.5*
MW-110-20	Onsite	Water Table	10/15/2013	97.6	<0.620	1.17	73.7
MW-110-20	Onsite	Water Table	03/12/2014	5.18	<0.500	<0.500	<1.50
MW-110-20	Onsite	Water Table	09/03/2014	66.3	<0.500	0.690J	45.6
MW-110-20	Onsite	Water Table	02/20/2015	7.57	<0.500	<0.500	<1.50
MW-110-20	Onsite	Water Table	07/31/2015	39.8	<0.500	<0.500	35.8
MW-110-20	Onsite	Water Table	08/09/2016	55.2	<0.500	0.550J	108
MW-110-65	Onsite	10-55	09/04/2013	<0.240	<0.620	<0.620	<1.88
MW-111-15	Onsite	Water Table	09/27/1988	470	1.40	4.80	1.60
MW-111-15	Onsite	Water Table	11/30/1988	530	0.400	0.300	0.700
MW-111-15	Onsite	Water Table	12/22/1988	70.0	ND	ND	ND
MW-111-15	Onsite	Water Table	11/15/1989	130	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-111-15	Onsite	Water Table	02/20/1990	82.0	ND	ND	ND
MW-111-15	Onsite	Water Table	05/23/1990	100	ND	ND	ND
MW-111-15	Onsite	Water Table	08/29/1990	49.0	ND	ND	ND
MW-111-15	Onsite	Water Table	04/01/1991	24.0	ND	ND	ND
MW-111-15	Onsite	Water Table	09/16/1991	4.00	ND	ND	ND
MW-111-15	Onsite	Water Table	03/17/1992	9.00	ND	ND	ND
MW-111-15	Onsite	Water Table	09/21/1992	11.0	ND	ND	ND
MW-111-15	Onsite	Water Table	09/10/1993	11.0	ND	ND	ND
MW-111-15	Onsite	Water Table	03/25/1994	20.0	ND	ND	ND
MW-111-15	Onsite	Water Table	09/19/1994	28.0	ND	ND	ND
MW-111-15	Onsite	Water Table	03/20/1995	39.0	ND	ND	ND
MW-111-15	Onsite	Water Table	09/14/1995	12.0	ND	ND	ND
MW-111-15	Onsite	Water Table	03/25/1996	13.8	ND	ND	ND
MW-111-15	Onsite	Water Table	09/18/1996	17.6	ND	ND	ND
MW-111-15	Onsite	Water Table	03/18/1997	26.0	ND	ND	ND
MW-111-15	Onsite	Water Table	09/22/1997	11.0	ND	ND	ND
MW-111-15	Onsite	Water Table	03/17/1998	7.00	ND	ND	ND
MW-111-15	Onsite	Water Table	09/22/1998	5.00	ND	ND	ND
MW-111-15	Onsite	Water Table	03/22/1999	18.0	ND	ND	ND
MW-111-15	Onsite	Water Table	09/14/1999	7.00	ND	ND	ND
MW-111-15	Onsite	Water Table	03/13/2000	3.00	ND	ND	ND
MW-111-15	Onsite	Water Table	09/18/2000	4.40	ND	ND	ND
MW-111-15	Onsite	Water Table	03/13/2001	5.00	ND	ND	ND
MW-111-15	Onsite	Water Table	10/09/2001	3.40	ND	ND	ND
MW-111-15	Onsite	Water Table	04/03/2002	3.40	ND	ND	ND
MW-111-15	Onsite	Water Table	10/07/2002	5.80	ND	ND	ND
MW-111-15	Onsite	Water Table	04/29/2003	3.70	ND	ND	ND
MW-111-15	Onsite	Water Table	10/05/2003	4.00	ND	ND	ND
MW-111-15	Onsite	Water Table	04/23/2004	16.0	ND	ND	ND
MW-111-15	Onsite	Water Table	09/09/2004	4.30	ND	ND	ND
MW-111-15	Onsite	Water Table	04/21/2005	11.0	ND	ND	ND
MW-111-15	Onsite	Water Table	10/17/2006	7.34	<0.127	<0.125	<0.118*
MW-111-15	Onsite	Water Table	04/18/2007	2.28	<1.00	<1.00	<3.00
MW-111-15	Onsite	Water Table	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-111-15	Onsite	Water Table	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-111-15	Onsite	Water Table	10/02/2008	3.10	<1.00	<1.00	<2.00
MW-111-15	Onsite	Water Table	04/08/2009	<0.150	<0.620	<0.620	<1.24*
MW-111-15	Onsite	Water Table	10/01/2009	0.591	<2.00	<2.00	<4.00*
MW-111-15	Onsite	Water Table	04/02/2010	0.650	<2.00	<2.00	<4.00*
MW-111-15	Onsite	Water Table	10/12/2010	2.96	<0.310	<0.310	<0.930*
MW-111-15	Onsite	Water Table	02/24/2011	1.06	<1.00	<1.00	<3.00*
MW-111-15	Onsite	Water Table	04/14/2011	1.30	<1.00	<1.00	<3.00*
MW-111-15	Onsite	Water Table	10/11/2011	1.05	<0.620	<0.620	<1.86*
MW-113-15	Onsite	Water Table	09/27/1988	170	ND	3.00	ND
MW-113-15	Onsite	Water Table	11/30/1988	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	12/22/1988	82.0	ND	3.00	ND
MW-113-15	Onsite	Water Table	11/15/1989	230	ND	ND	ND
MW-113-15	Onsite	Water Table	02/21/1990	170	ND	ND	ND
MW-113-15	Onsite	Water Table	05/24/1990	140	ND	ND	ND
MW-113-15	Onsite	Water Table	08/28/1990	79.0	ND	ND	ND
MW-113-15	Onsite	Water Table	04/01/1991	110	ND	ND	ND
MW-113-15	Onsite	Water Table	09/17/1991	160	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-113-15	Onsite	Water Table	03/17/1992	200	ND	ND	ND
MW-113-15	Onsite	Water Table	09/21/1992	160	ND	ND	ND
MW-113-15	Onsite	Water Table	03/02/1993	240	ND	ND	ND
MW-113-15	Onsite	Water Table	09/08/1993	350	7.00	0.500	1.00
MW-113-15	Onsite	Water Table	03/28/1994	280	4.00	1.30	3.60
MW-113-15	Onsite	Water Table	09/19/1994	180	ND	ND	0.800
MW-113-15	Onsite	Water Table	03/20/1995	280	ND	ND	ND
MW-113-15	Onsite	Water Table	09/14/1995	230	ND	ND	ND
MW-113-15	Onsite	Water Table	03/25/1996	139	ND	ND	ND
MW-113-15	Onsite	Water Table	09/18/1996	18.7	ND	ND	ND
MW-113-15	Onsite	Water Table	03/18/1997	24.0	ND	ND	ND
MW-113-15	Onsite	Water Table	09/16/1997	4.00	ND	ND	ND
MW-113-15	Onsite	Water Table	03/17/1998	3.00	ND	ND	ND
MW-113-15	Onsite	Water Table	09/22/1998	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	03/22/1999	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	09/14/1999	19.0	ND	ND	ND
MW-113-15	Onsite	Water Table	03/13/2000	93.0	ND	ND	5.00
MW-113-15	Onsite	Water Table	09/18/2000	1.70	ND	ND	ND
MW-113-15	Onsite	Water Table	03/13/2001	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	10/09/2001	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	04/03/2002	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	10/07/2002	0.810	ND	ND	ND
MW-113-15	Onsite	Water Table	04/29/2003	3.30	ND	ND	ND
MW-113-15	Onsite	Water Table	10/05/2003	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	04/23/2004	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	09/09/2004	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	04/22/2005	ND	ND	ND	ND
MW-113-15	Onsite	Water Table	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-113-15	Onsite	Water Table	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-113-15	Onsite	Water Table	10/17/2007	<1.00	<1.00	<1.00	<3.00
MW-113-15	Onsite	Water Table	04/02/2008	1.90	<1.00	<1.00	<2.00
MW-113-15	Onsite	Water Table	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-113-15	Onsite	Water Table	04/09/2009	8.56	<0.620	<0.620	<1.24*
MW-113-15	Onsite	Water Table	10/01/2009	<0.500	<2.00	<2.00	<4.00*
MW-113-15	Onsite	Water Table	04/02/2010	<0.500	<2.00	<2.00	<4.00*
MW-113-15	Onsite	Water Table	10/06/2010	<0.400	<1.00	<1.00	<3.00*
MW-113-15	Onsite	Water Table	02/08/2011	<0.400	<1.00	<1.00	<3.00*
MW-113-15	Onsite	Water Table	04/14/2011	<0.400	<1.00	<1.00	<3.00*
MW-113-15	Onsite	Water Table	08/17/2011	<0.226	<0.266	<0.175	<0.364
MW-113-15	Onsite	Water Table	10/14/2011	<0.240	<0.620	<0.620	<1.88
MW-113-15	Onsite	Water Table	02/14/2012	1.70	<0.620	3.40	7.40
MW-113-15	Onsite	Water Table	05/17/2012	0.440	<0.620	1.72	2.16J
MW-113-15	Onsite	Water Table	11/14/2012	0.150J	<0.620	3.70	<1.86*
MW-113-15	Onsite	Water Table	05/20/2013	<0.240	<0.620	<0.620	<1.86*
MW-113-15	Onsite	Water Table	10/22/2013	<0.240	<0.620	<0.620	<1.88
MW-113-15	Onsite	Water Table	02/28/2014	<0.200	<0.500	<0.500	<1.50
MW-113-15	Onsite	Water Table	07/31/2014	<0.200	<0.500	<0.500	<1.50
MW-113-15	Onsite	Water Table	04/23/2015	0.240J	<0.500	<0.500	<1.50
MW-113-15	Onsite	Water Table	07/28/2015	<0.200	<0.500	<0.500	<1.50
MW-113-15	Onsite	Water Table	02/04/2016	<0.200	<0.500	<0.500	<1.50
MW-113-15	Onsite	Water Table	08/08/2016	<0.200	<0.500	<0.500	<1.50
MW-115-15	Onsite	Water Table	09/27/1988	19000	2300	830	5000

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MW-115-15	Onsite	Water Table	11/30/1988	1200	190	350	910
MW-115-15	Onsite	Water Table	12/22/1988	1000	64.0	350	330
MW-115-15	Onsite	Water Table	11/16/1989	8300	600	840	3700
MW-115-15	Onsite	Water Table	02/20/1990	9800	ND	830	3800
MW-115-15	Onsite	Water Table	05/24/1990	22000	11000	2200	11000
MW-115-15	Onsite	Water Table	08/29/1990	12000	1300	1200	5300
MW-115-15	Onsite	Water Table	03/26/1991	14000	ND	1400	6700
MW-115-15	Onsite	Water Table	09/17/1991	7700	ND	190	690
MW-115-15	Onsite	Water Table	03/17/1992	5700	7.00	490	2700
MW-115-15	Onsite	Water Table	09/22/1992	10000	6.60	1200	5900
MW-115-15	Onsite	Water Table	03/03/1993	3500	2.00	460	2300
MW-115-15	Onsite	Water Table	09/10/1993	5000	4.00	610	2900
MW-115-15	Onsite	Water Table	03/28/1994	3500	ND	350	1700
MW-115-15	Onsite	Water Table	09/21/1994	3600	ND	330	1700
MW-115-15	Onsite	Water Table	03/21/1995	2600	5.10	200	800
MW-115-15	Onsite	Water Table	09/19/1995	9900	ND	900	5600
MW-115-15	Onsite	Water Table	03/26/1996	1900	2.30	300	800
MW-115-15	Onsite	Water Table	09/25/1996	4500	ND	300	2000
MW-115-15	Onsite	Water Table	03/19/1997	2060	ND	200	860
MW-115-15	Onsite	Water Table	09/26/1997	3200	ND	310	1600
MW-115-15	Onsite	Water Table	03/24/1998	1500	1.00	169	1200
MW-115-15	Onsite	Water Table	09/24/1998	5600	ND	230	3000
MW-115-15	Onsite	Water Table	03/24/1999	3400	ND	173	1900
MW-115-15	Onsite	Water Table	09/14/1999	4800	ND	440	3800
MW-115-15	Onsite	Water Table	03/14/2000	1900	ND	130	2200
MW-115-15	Onsite	Water Table	09/20/2000	3900	ND	240	3300
MW-115-15	Onsite	Water Table	03/13/2001	2100	ND	55.0	1900
MW-115-15	Onsite	Water Table	05/10/2001	966	<1.00	44.0	917
MW-115-15	Onsite	Water Table	04/09/2002	1500	ND	24.0	1200
MW-115-15	Onsite	Water Table	10/08/2002	13000	190	370	5800
MW-115-15	Onsite	Water Table	04/29/2003	1900	ND	ND	670
MW-115-15	Onsite	Water Table	04/23/2004	4030	ND	46.0	2610
MW-115-15	Onsite	Water Table	09/10/2004	4200	ND	54.0	1900
MW-115-15	Onsite	Water Table	04/22/2005	2240	ND	21.0	1050
MW-115-15	Onsite	Water Table	04/17/2007	2360	<10.0	<10.0	132
MW-115-15	Onsite	Water Table	04/04/2008	2700	<20.0	23.0	770
MW-115-15	Onsite	Water Table	04/10/2009	1770	<0.620	39.7	353*
MW-115-15	Onsite	Water Table	04/03/2010	1420	<20.0	<20.0	<40.0*
MW-115-15	Onsite	Water Table	05/31/2012	1530	<6.20	10.6	<360*
MW-115-15	Onsite	Water Table	04/11/2013	705	<0.620	2.87	97.6*
MW-115-15	Onsite	Water Table	11/17/2013	1600	0.490J	18.0	856
MW-116-15	Onsite	Water Table	09/27/1988	17000	11000	1000	5100
MW-116-15	Onsite	Water Table	11/30/1988	19000	11000	1300	6200
MW-116-15	Onsite	Water Table	12/22/1988	1800	ND	570	480
MW-116-15	Onsite	Water Table	11/15/1989	7700	9800	1400	6200
MW-116-15	Onsite	Water Table	02/20/1990	10000	11000	1400	6700
MW-116-15	Onsite	Water Table	05/24/1990	9700	9700	2000	7100
MW-116-15	Onsite	Water Table	08/28/1990	9600	3300	740	3600
MW-116-15	Onsite	Water Table	03/27/1991	16000	3200	1200	5700
MW-116-15	Onsite	Water Table	09/17/1991	24000	ND	270	540
MW-116-15	Onsite	Water Table	03/17/1992	24000	ND	370	3000
MW-116-15	Onsite	Water Table	09/23/1992	17000	250	1300	6400

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-116-15	Onsite	Water Table	03/03/1993	16000	13.0	1200	5700
MW-116-15	Onsite	Water Table	09/10/1993	19000	12.0	1100	4500
MW-116-15	Onsite	Water Table	03/28/1994	20000	74.0	1200	5200
MW-116-15	Onsite	Water Table	09/21/1994	14000	46.0	990	4700
MW-116-15	Onsite	Water Table	03/21/1995	14000	ND	1100	5000
MW-116-15	Onsite	Water Table	09/19/1995	16000	17.0	1000	4000
MW-116-15	Onsite	Water Table	09/25/1996	17000	ND	830	4200
MW-116-15	Onsite	Water Table	03/19/1997	14400	ND	1000	4700
MW-116-15	Onsite	Water Table	09/26/1997	17000	ND	1100	5400
MW-116-15	Onsite	Water Table	03/24/1998	17000	20.0	950	5400
MW-116-15	Onsite	Water Table	09/24/1998	16000	13.0	960	4700
MW-116-15	Onsite	Water Table	03/24/1999	16000	ND	1000	5300
MW-116-15	Onsite	Water Table	09/14/1999	15000	290	1300	6000
MW-116-15	Onsite	Water Table	03/15/2000	15000	ND	1100	5500
MW-116-15	Onsite	Water Table	09/20/2000	12000	ND	720	5200
MW-116-15	Onsite	Water Table	03/13/2001	12000	5.00	580	4900
MW-116-15	Onsite	Water Table	05/10/2001	3960	3.14	753	2910
MW-116-15	Onsite	Water Table	04/09/2002	11000	ND	190	5600
MW-116-15	Onsite	Water Table	04/29/2003	7200	ND	120	4900
MW-116-15	Onsite	Water Table	04/23/2004	8730	5.00	198	6140
MW-116-15	Onsite	Water Table	09/10/2004	10500	5.40	108	6760
MW-116-15	Onsite	Water Table	04/22/2005	10700	ND	127	5720
MW-116-15	Onsite	Water Table	04/17/2007	856	2.41	15.8	614
MW-116-15	Onsite	Water Table	04/04/2008	8800	<10.0	260	6400
MW-116-15	Onsite	Water Table	04/10/2009	7150	<62.0	246	4640*
MW-116-15	Onsite	Water Table	04/03/2010	7000	<20.0	242	4270*
MW-116-15	Onsite	Water Table	04/13/2011	6000	<1.00	161	5090*
MW-116-15	Onsite	Water Table	10/20/2011	7470	1.42	260	4330*
MW-116-15	Onsite	Water Table	05/21/2012	5580	1.17	282	4770*
MW-116-15	Onsite	Water Table	06/12/2013	5720	<1.43B*	271	4850*
MW-116-15	Onsite	Water Table	11/17/2013	7390	1.37	346	4930
MW-116-15	Onsite	Water Table	06/04/2014	9430	3.50J	409	4250
MW-116-15	Onsite	Water Table	09/04/2014	6480	10.2	401	4720
MW-116-15	Onsite	Water Table	08/10/2015	6860	<25.0	377	5170
MW-116-15	Onsite	Water Table	02/29/2016	7740	<1.74B*	409	5270
MW-116-15	Onsite	Water Table	08/16/2016	8970	18.1	609	5110
MW-116-15	Onsite	Water Table	08/31/2017	9310	<50.0	558	4480
MW-116-15	Onsite	Water Table	11/15/2017	9060	<5.00	576	4340
MW-116-15	Onsite	Water Table	2/14/2018	7700	<50.0	656	4350
MW-116-15	Onsite	Water Table	4/10/2018	5880	<50.0	547	4090
MW-116-15	Onsite	Water Table	8/8/2018	9470	<5.00	708	3570
MW-118-45	Onsite	10-55	03/15/1990	1100	ND	ND	ND
MW-118-45	Onsite	10-55	03/27/1990	130	ND	ND	ND
MW-118-45	Onsite	10-55	04/19/1990	1500	ND	ND	ND
MW-118-45	Onsite	10-55	05/23/1990	1300	ND	ND	ND
MW-118-45	Onsite	10-55	08/28/1990	1500	ND	ND	ND
MW-118-45	Onsite	10-55	03/28/1991	22.0	ND	ND	ND
MW-118-45	Onsite	10-55	05/31/1991	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/16/1991	ND	ND	ND	ND
MW-118-45	Onsite	10-55	03/16/1992	ND	ND	ND	ND
MW-118-45	Onsite	10-55	06/16/1992	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/23/1992	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-118-45	Onsite	10-55	03/01/1993	2.00	ND	ND	2.00
MW-118-45	Onsite	10-55	06/22/1993	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/08/1993	ND	ND	ND	ND
MW-118-45	Onsite	10-55	03/25/1994	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/20/1994	ND	ND	ND	ND
MW-118-45	Onsite	10-55	03/27/1995	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/19/1995	ND	ND	ND	ND
MW-118-45	Onsite	10-55	03/20/1996	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/25/1996	7.50	ND	ND	ND
MW-118-45	Onsite	10-55	12/17/1996	41.0	ND	ND	ND
MW-118-45	Onsite	10-55	02/26/1997	22.0	ND	ND	ND
MW-118-45	Onsite	10-55	03/19/1997	9.00	ND	ND	ND
MW-118-45	Onsite	10-55	05/29/1997	ND	ND	ND	ND
MW-118-45	Onsite	10-55	06/24/1997	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/25/1997	ND	ND	ND	ND
MW-118-45	Onsite	10-55	03/23/1998	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/23/1998	ND	ND	ND	ND
MW-118-45	Onsite	10-55	03/23/1999	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/15/1999	ND	ND	ND	ND
MW-118-45	Onsite	10-55	03/14/2000	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/20/2000	ND	ND	ND	ND
MW-118-45	Onsite	10-55	03/14/2001	ND	ND	ND	ND
MW-118-45	Onsite	10-55	04/04/2002	ND	ND	ND	ND
MW-118-45	Onsite	10-55	04/29/2003	ND	ND	ND	ND
MW-118-45	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-118-45	Onsite	10-55	09/09/2004	ND	ND	ND	ND
MW-118-45	Onsite	10-55	04/22/2005	ND	ND	ND	ND
MW-118-45	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-118-45	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-118-45	Onsite	10-55	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-118-45	Onsite	10-55	04/02/2010	<0.500	<2.00	<2.00	<4.00*
MW-124-25	Onsite	10-55	06/06/1990	4000	ND	ND	ND
MW-124-25	Onsite	10-55	06/26/1990	2500	ND	ND	140
MW-124-25	Onsite	10-55	08/28/1990	3700	ND	270	ND
MW-124-25	Onsite	10-55	03/27/1991	270	ND	18.0	ND
MW-124-25	Onsite	10-55	09/17/1991	ND	ND	ND	ND
MW-124-25	Onsite	10-55	03/17/1992	ND	ND	ND	ND
MW-124-25	Onsite	10-55	09/23/1992	ND	ND	ND	ND
MW-124-25	Onsite	10-55	03/02/1993	ND	ND	ND	ND
MW-124-25	Onsite	10-55	09/09/1993	0.300	0.500	0.400	1.00
MW-124-25	Onsite	10-55	03/25/1994	ND	ND	ND	ND
MW-124-25	Onsite	10-55	09/19/1994	ND	ND	ND	ND
MW-124-25	Onsite	10-55	03/21/1995	ND	ND	ND	ND
MW-124-25	Onsite	10-55	09/19/1995	ND	ND	ND	ND
MW-124-25	Onsite	10-55	09/18/1996	240	ND	13.0	11.0
MW-124-25	Onsite	10-55	09/26/1997	470	2.00	10.0	17.0
MW-124-25	Onsite	10-55	03/24/1998	17.0	ND	ND	ND
MW-124-25	Onsite	10-55	09/22/1998	2.00	ND	ND	ND
MW-124-25	Onsite	10-55	09/14/1999	6.00	ND	1.00	2.00
MW-124-25	Onsite	10-55	03/14/2000	ND	ND	ND	ND
MW-124-25	Onsite	10-55	09/19/2000	69.7	2.00	2.00	3.00
MW-124-25	Onsite	10-55	03/14/2001	77.0	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-124-25	Onsite	10-55	07/11/2001	13.0	ND	ND	ND
MW-124-25	Onsite	10-55	10/09/2001	1100	100	41.0	92.0
MW-124-25	Onsite	10-55	11/14/2001	170	ND	4.50	2.80
MW-124-25	Onsite	10-55	12/11/2001	12.0	ND	ND	ND
MW-124-25	Onsite	10-55	01/08/2002	1.10	ND	ND	ND
MW-124-25	Onsite	10-55	02/04/2002	5.20	ND	ND	ND
MW-124-25	Onsite	10-55	03/06/2002	17.0	ND	ND	ND
MW-124-25	Onsite	10-55	04/08/2002	3.90	ND	ND	ND
MW-124-25	Onsite	10-55	05/07/2002	16.0	ND	ND	ND
MW-124-25	Onsite	10-55	07/15/2002	240	5.90	28.0	32.0
MW-124-25	Onsite	10-55	08/14/2002	220	ND	30.0	17.0
MW-124-25	Onsite	10-55	09/11/2002	460	ND	41.0	34.0
MW-124-25	Onsite	10-55	10/08/2002	220	1.10	18.0	10.5
MW-124-25	Onsite	10-55	01/07/2003	2.10	ND	ND	ND
MW-124-25	Onsite	10-55	02/05/2003	3.10	ND	ND	ND
MW-124-25	Onsite	10-55	03/05/2003	11.0	ND	ND	ND
MW-124-25	Onsite	10-55	04/29/2003	13.0	ND	ND	ND
MW-124-25	Onsite	10-55	05/07/2003	14.0	ND	ND	ND
MW-124-25	Onsite	10-55	06/04/2003	6.30	3.10	ND	3.70
MW-124-25	Onsite	10-55	07/10/2003	5.60	ND	ND	ND
MW-124-25	Onsite	10-55	08/20/2003	100	8.50	3.90	7.80
MW-124-25	Onsite	10-55	09/11/2003	130	32.0	6.70	21.0
MW-124-25	Onsite	10-55	10/05/2003	150	ND	11.0	31.0
MW-124-25	Onsite	10-55	11/11/2003	14.0	ND	ND	ND
MW-124-25	Onsite	10-55	01/13/2004	1.00	ND	ND	ND
MW-124-25	Onsite	10-55	02/17/2004	1.80	ND	ND	ND
MW-124-25	Onsite	10-55	04/23/2004	3.00	ND	ND	3.00
MW-124-25	Onsite	10-55	05/11/2004	5.00	ND	ND	ND
MW-124-25	Onsite	10-55	06/07/2004	2.00	ND	ND	ND
MW-124-25	Onsite	10-55	07/22/2004	50.0	ND	2.20	4.60
MW-124-25	Onsite	10-55	08/05/2004	103	ND	6.10	16.0
MW-124-25	Onsite	10-55	09/09/2004	120	ND	7.30	30.0
MW-124-25	Onsite	10-55	10/25/2004	13.0	ND	ND	ND
MW-124-25	Onsite	10-55	11/16/2004	3.90	ND	ND	ND
MW-124-25	Onsite	10-55	12/08/2004	0.800	ND	ND	ND
MW-124-25	Onsite	10-55	01/29/2005	ND	ND	ND	ND
MW-124-25	Onsite	10-55	02/27/2005	ND	ND	ND	ND
MW-124-25	Onsite	10-55	03/28/2005	ND	ND	ND	ND
MW-124-25	Onsite	10-55	04/20/2005	ND	ND	ND	ND
MW-124-25	Onsite	10-55	05/17/2005	5.00	ND	ND	ND
MW-124-25	Onsite	10-55	06/16/2005	4.00	ND	ND	ND
MW-124-25	Onsite	10-55	07/26/2005	13.0	ND	ND	ND
MW-124-25	Onsite	10-55	08/23/2005	55.0	ND	4.60	24.0
MW-124-25	Onsite	10-55	09/21/2005	43.0	ND	ND	11.0
MW-124-25	Onsite	10-55	06/20/2006	ND	ND	ND	ND
MW-124-25	Onsite	10-55	07/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-124-25	Onsite	10-55	08/22/2006	38.0	<0.127	2.18	2.11*
MW-124-25	Onsite	10-55	09/18/2006	74.0	<0.127	2.76	3.27*
MW-124-25	Onsite	10-55	10/17/2006	86.9	<0.127	2.85	3.12*
MW-124-25	Onsite	10-55	11/15/2006	83.6	<0.202	1.70	<0.223*
MW-124-25	Onsite	10-55	12/08/2006	51.5	<0.202	<0.241	<0.223*
MW-124-25	Onsite	10-55	01/17/2007	1.81	<1.00	<1.00	<3.00

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-124-25	Onsite	10-55	02/13/2007	3.34	<1.00	<1.00	<3.00
MW-124-25	Onsite	10-55	07/18/2007	<1.00	<1.00	<1.00	<3.00
MW-124-25	Onsite	10-55	08/21/2007	16.9	<1.00	<1.00	3.81
MW-124-25	Onsite	10-55	09/20/2007	66.9	10.2	9.52	30.0*
MW-124-25	Onsite	10-55	10/16/2007	23.5	<1.00	<1.00	<3.60*
MW-124-25	Onsite	10-55	11/12/2007	10.1	<1.00	<1.00	4.41
MW-124-25	Onsite	10-55	12/06/2007	5.91	<1.00	<1.00	<3.00
MW-124-25	Onsite	10-55	01/04/2008	4.23	<1.00	<1.00	<3.00
MW-124-25	Onsite	10-55	02/12/2008	<1.00	<1.00	<1.00	<3.00
MW-124-25	Onsite	10-55	06/10/2008	1.16	<1.00	<1.00	<3.00
MW-124-25	Onsite	10-55	07/01/2008	4.10	<1.00	<1.00	<2.00
MW-124-25	Onsite	10-55	08/07/2008	38.6	1.16	7.93	67.6
MW-124-25	Onsite	10-55	09/01/2008	73.0	--	--	--
MW-124-25	Onsite	10-55	10/02/2008	92.0	14.0	36.0	110
MW-124-25	Onsite	10-55	11/06/2008	46.7	<0.500	11.1	12.6
MW-124-25	Onsite	10-55	12/04/2008	29.9	<0.500	1.26	13.7
MW-124-25	Onsite	10-55	01/14/2009	1.80	<2.00	<2.00	<4.00*
MW-124-25	Onsite	10-55	02/10/2009	5.08	<2.00	<2.00	<5.67*
MW-124-25	Onsite	10-55	07/07/2009	22.7	18.7	6.45	28.1*
MW-124-25	Onsite	10-55	08/03/2009	13.0	<0.620	<0.620	<1.24*
MW-124-25	Onsite	10-55	09/02/2009	5.23	<2.00	<2.00	<4.00*
MW-124-25	Onsite	10-55	10/02/2009	<0.500	<2.00	<2.00	<4.00*
MW-124-25	Onsite	10-55	11/03/2009	<0.500	<2.00	<2.00	<4.00*
MW-124-25	Onsite	10-55	12/01/2009	15.8	<2.00	<2.00	52.6*
MW-124-25	Onsite	10-55	01/20/2010	<0.500	<2.00	<2.00	<4.00*
MW-124-25	Onsite	10-55	02/17/2010	<0.400	<1.00	<1.00	<3.00*
MW-124-25	Onsite	10-55	03/04/2010	<0.500	<2.00	<2.00	<4.00*
MW-124-25	Onsite	10-55	06/14/2010	<0.400	<1.00	<1.00	<3.00*
MW-124-25	Onsite	10-55	07/23/2010	<0.150	<0.620	<0.620	<1.24*
MW-124-25	Onsite	10-55	08/13/2010	<0.120	<0.310	<0.310	<0.930*
MW-124-25	Onsite	10-55	09/03/2010	<0.400	<1.00	<1.00	<3.00*
MW-124-25	Onsite	10-55	10/07/2010	<0.400	<1.00	<1.00	<3.00*
MW-124-25	Onsite	10-55	11/04/2010	<0.120	<0.310	<0.310	<0.930*
MW-124-25	Onsite	10-55	02/24/2011	<0.400	<1.00	<1.00	<3.00*
MW-124-25	Onsite	10-55	06/01/2011	1.20	<0.310	<0.310	<0.930*
MW-124-25	Onsite	10-55	10/16/2011	<0.240	<0.620	<0.620	<1.86*
MW-124-25	Onsite	10-55	05/05/2012	<0.240	<0.620	<0.620	<1.86*
MW-124-25	Onsite	10-55	11/14/2012	<0.240	<0.620	<0.620	<1.86*
MW-124-25	Onsite	10-55	11/01/2013	<0.240	0.460J	0.320J	2.20J
MW-124-25	Onsite	10-55	03/26/2014	<0.200	<0.500	<0.500	<1.50
MW-124-25	Onsite	10-55	09/03/2014	4.11	1.87	2.58	15.2
MW-124-25	Onsite	10-55	08/07/2015	<0.200	<0.500	<0.500	4.21
MW-124-25	Onsite	10-55	08/15/2016	1.21	<0.500	2.19	20.2
MW-125-25	Onsite	10-55	06/06/1990	21000	10000	1300	2000
MW-125-25	Onsite	10-55	06/26/1990	24000	13000	1800	2800
MW-125-25	Onsite	10-55	08/28/1990	23000	12000	1600	3100
MW-125-25	Onsite	10-55	03/27/1991	12600	8970	1100	2440
MW-125-25	Onsite	10-55	09/17/1991	16000	19000	250	340
MW-125-25	Onsite	10-55	03/17/1992	240	270	10.0	11.0
MW-125-25	Onsite	10-55	09/23/1992	17000	17000	1600	6400
MW-125-25	Onsite	10-55	03/02/1993	4.00	ND	ND	ND
MW-125-25	Onsite	10-55	09/09/1993	34.0	ND	1.00	ND

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MW-125-25	Onsite	10-55	03/25/1994	150	ND	2.00	ND
MW-125-25	Onsite	10-55	09/19/1994	370	0.500	6.60	ND
MW-125-25	Onsite	10-55	03/21/1995	240	ND	ND	ND
MW-125-25	Onsite	10-55	09/19/1995	430	11.0	2.20	3.70
MW-125-25	Onsite	10-55	03/26/1996	940	1.00	5.00	2.00
MW-125-25	Onsite	10-55	09/18/1996	3800	4.00	500	1100
MW-125-25	Onsite	10-55	03/18/1997	690	14.0	23.0	23.0
MW-125-25	Onsite	10-55	09/26/1997	184	ND	2.00	ND
MW-125-25	Onsite	10-55	03/20/1998	2600	2100	570	1800
MW-125-25	Onsite	10-55	09/22/1998	5900	8800	1040	3500
MW-125-25	Onsite	10-55	03/23/1999	4100	4800	780	2800
MW-125-25	Onsite	10-55	09/14/1999	6100	9900	1100	3900
MW-125-25	Onsite	10-55	03/14/2000	4000	3700	910	3100
MW-125-25	Onsite	10-55	09/18/2000	4800	6500	1000	3700
MW-125-25	Onsite	10-55	03/14/2001	26.0	2.00	2.00	6.00
MW-125-25	Onsite	10-55	05/10/2001	90.0	<1.00	1.68	1.77
MW-125-25	Onsite	10-55	10/09/2001	49.0	ND	1.20	1.80
MW-125-25	Onsite	10-55	04/04/2002	9.00	ND	ND	ND
MW-125-25	Onsite	10-55	10/08/2002	790	790	160	460
MW-125-25	Onsite	10-55	04/29/2003	750	ND	220	730
MW-125-25	Onsite	10-55	10/05/2003	1300	ND	310	1000
MW-125-25	Onsite	10-55	04/23/2004	1400	ND	310	1320
MW-125-25	Onsite	10-55	09/09/2004	1960	ND	304	1980
MW-125-25	Onsite	10-55	04/20/2005	744	ND	ND	931
MW-125-25	Onsite	10-55	07/18/2006	355	<0.508	6.50	106*
MW-125-25	Onsite	10-55	10/17/2006	151	<0.127	24.4	44.3*
MW-125-25	Onsite	10-55	01/17/2007	133	<4.00	<4.00	143
MW-125-25	Onsite	10-55	04/17/2007	264	<1.00	42.0	301E
MW-125-25	Onsite	10-55	07/18/2007	169	<1.00	31.7	338
MW-125-25	Onsite	10-55	10/16/2007	743	<20.0	116	1030
MW-125-25	Onsite	10-55	01/04/2008	775	7.84	109	1380
MW-125-25	Onsite	10-55	04/03/2008	620	<20.0	37.0	1180
MW-125-25	Onsite	10-55	07/01/2008	380	29.0	16.0	650
MW-125-25	Onsite	10-55	10/02/2008	890	<10.0	29.0	1200
MW-125-25	Onsite	10-55	01/14/2009	861	<100	<100	1760*
MW-125-25	Onsite	10-55	04/08/2009	630	8.48	68.7	1340*
MW-125-25	Onsite	10-55	07/07/2009	757	<2.00	82.3	1490*
MW-125-25	Onsite	10-55	10/02/2009	938	<200	350	2580*
MW-125-25	Onsite	10-55	01/21/2010	745	17.0	102	1920*
MW-125-25	Onsite	10-55	04/05/2010	575	<20.0	25.3	1370*
MW-125-25	Onsite	10-55	07/23/2010	380	<6.20	<6.20	531*
MW-125-25	Onsite	10-55	10/07/2010	771	<1.00	9.93	1150*
MW-125-25	Onsite	10-55	04/05/2011	519	<1.00	42.4	1090*
MW-125-25	Onsite	10-55	08/17/2011	559	14.0	52.4	1110
MW-125-25	Onsite	10-55	10/18/2011	406	<0.620	9.08	752
MW-125-25	Onsite	10-55	02/17/2012	83.8	<0.620	0.400J	95.9
MW-125-25	Onsite	10-55	05/22/2012	11.6	<0.620	<0.620	2.65J
MW-125-25	Onsite	10-55	11/14/2012	130	<0.620	0.910J	<1.86*
MW-125-25	Onsite	10-55	04/16/2013	53.7	<0.620	<0.620	<1.86*
MW-125-25	Onsite	10-55	11/01/2013	2.79	<0.620	<0.620	<1.88
MW-125-25	Onsite	10-55	03/04/2014	0.530	<0.500	<0.500	<1.50
MW-125-25	Onsite	10-55	08/12/2014	4.32	<0.500	<0.500	<1.50

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MW-125-25	Onsite	10-55	02/20/2015	0.540	<0.500	<0.500	<1.50
MW-125-25	Onsite	10-55	08/04/2015	<0.200	<0.500	<0.500	<1.50
MW-125-25	Onsite	10-55	02/25/2016	<0.200	<0.500	<0.500	<1.50
MW-125-25	Onsite	10-55	08/18/2016	<0.200	<0.500	<0.500	<1.50
MW-125-25	Onsite	10-55	02/24/2017	<0.200	<0.500	<0.500	<1.50
MW-125-25	Onsite	10-55	08/15/2017	2.10	<0.500	<0.500	1.29J
MW-125-25	Onsite	10-55	11/16/2017	366JH*	<1.27B*	133	731
MW-125-25	Onsite	10-55	2/14/2018	447	1.83	318	1630
MW-125-25	Onsite	10-55	4/5/2018	406	<5.00	265	1710
MW-125-25	Onsite	10-55	8/7/2018	450	<1.21B*	157	1770
MW-126-25	Onsite	10-55	08/30/1991	1200	ND	ND	ND
MW-126-25	Onsite	10-55	09/17/1991	180	ND	ND	ND
MW-126-25	Onsite	10-55	12/11/1991	ND	ND	ND	ND
MW-126-25	Onsite	10-55	03/17/1992	ND	ND	ND	ND
MW-126-25	Onsite	10-55	05/05/1992	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/16/1992	140	ND	ND	ND
MW-126-25	Onsite	10-55	09/23/1992	76.0	ND	ND	ND
MW-126-25	Onsite	10-55	03/03/1993	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/22/1993	4.00	ND	ND	ND
MW-126-25	Onsite	10-55	09/09/1993	0.500	ND	ND	ND
MW-126-25	Onsite	10-55	12/21/1993	ND	ND	ND	ND
MW-126-25	Onsite	10-55	03/25/1994	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/28/1994	0.900	ND	ND	ND
MW-126-25	Onsite	10-55	09/20/1994	ND	ND	ND	ND
MW-126-25	Onsite	10-55	12/13/1994	ND	ND	ND	ND
MW-126-25	Onsite	10-55	03/21/1995	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/28/1995	ND	ND	ND	ND
MW-126-25	Onsite	10-55	09/19/1995	ND	ND	ND	ND
MW-126-25	Onsite	10-55	12/07/1995	10.5	ND	ND	ND
MW-126-25	Onsite	10-55	01/29/1996	ND	ND	ND	ND
MW-126-25	Onsite	10-55	03/26/1996	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/19/1996	ND	ND	ND	ND
MW-126-25	Onsite	10-55	09/18/1996	ND	ND	ND	ND
MW-126-25	Onsite	10-55	12/12/1996	ND	ND	ND	ND
MW-126-25	Onsite	10-55	03/18/1997	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/24/1997	ND	ND	ND	ND
MW-126-25	Onsite	10-55	09/25/1997	ND	ND	ND	ND
MW-126-25	Onsite	10-55	12/12/1997	ND	ND	ND	ND
MW-126-25	Onsite	10-55	03/24/1998	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/26/1998	ND	ND	ND	ND
MW-126-25	Onsite	10-55	09/22/1998	ND	ND	ND	ND
MW-126-25	Onsite	10-55	12/01/1998	ND	ND	ND	ND
MW-126-25	Onsite	10-55	03/23/1999	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/29/1999	ND	ND	ND	ND
MW-126-25	Onsite	10-55	09/14/1999	ND	ND	ND	ND
MW-126-25	Onsite	10-55	12/28/1999	ND	ND	ND	ND
MW-126-25	Onsite	10-55	03/15/2000	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/15/2000	ND	ND	ND	ND
MW-126-25	Onsite	10-55	09/19/2000	ND	ND	ND	ND
MW-126-25	Onsite	10-55	12/12/2000	3.00	ND	ND	ND
MW-126-25	Onsite	10-55	03/14/2001	ND	ND	ND	ND
MW-126-25	Onsite	10-55	06/13/2001	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-126-25	Onsite	10-55	07/11/2001	ND	ND	ND	ND
MW-126-25	Onsite	10-55	10/09/2001	ND	ND	ND	ND
MW-126-25	Onsite	10-55	01/09/2002	ND	ND	ND	ND
MW-126-25	Onsite	10-55	04/04/2002	ND	ND	ND	ND
MW-126-25	Onsite	10-55	08/14/2002	ND	ND	ND	ND
MW-126-25	Onsite	10-55	10/08/2002	ND	ND	ND	ND
MW-126-25	Onsite	10-55	01/07/2003	ND	ND	ND	ND
MW-126-25	Onsite	10-55	04/29/2003	1.00	ND	ND	ND
MW-126-25	Onsite	10-55	07/10/2003	ND	ND	ND	ND
MW-126-25	Onsite	10-55	10/05/2003	ND	ND	ND	ND
MW-126-25	Onsite	10-55	01/13/2004	ND	ND	ND	ND
MW-126-25	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-126-25	Onsite	10-55	07/22/2004	ND	ND	ND	ND
MW-126-25	Onsite	10-55	09/09/2004	ND	ND	ND	ND
MW-126-25	Onsite	10-55	01/29/2005	ND	ND	ND	ND
MW-126-25	Onsite	10-55	04/21/2005	ND	ND	ND	ND
MW-126-25	Onsite	10-55	07/26/2005	ND	ND	ND	ND
MW-126-25	Onsite	10-55	07/18/2006	5.63	<0.127	<0.125	<0.118*
MW-126-25	Onsite	10-55	10/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-126-25	Onsite	10-55	01/17/2007	<1.00	<1.00	<1.00	<3.00
MW-126-25	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-126-25	Onsite	10-55	07/17/2007	1.52	<1.00	<1.00	<3.00
MW-126-25	Onsite	10-55	10/18/2007	<1.00	<1.00	<1.00	<3.00
MW-126-25	Onsite	10-55	01/04/2008	<1.00	<1.00	<1.00	<3.00
MW-126-25	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-126-25	Onsite	10-55	07/01/2008	<1.00	<1.00	<1.00	<2.00
MW-126-25	Onsite	10-55	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-126-25	Onsite	10-55	01/14/2009	<0.500	<2.00	<2.00	<4.00*
MW-126-25	Onsite	10-55	04/10/2009	<0.150	<0.620	<0.620	<1.24*
MW-126-25	Onsite	10-55	07/07/2009	<0.500	<2.00	<2.00	<4.00*
MW-126-25	Onsite	10-55	10/02/2009	<0.500	<2.00	<2.00	<4.00*
MW-126-25	Onsite	10-55	01/21/2010	<0.500	<2.00	<2.00	<4.00*
MW-126-25	Onsite	10-55	04/06/2010	<0.500	<2.00	<2.00	<4.00*
MW-126-25	Onsite	10-55	07/23/2010	1.00	<0.620	<0.620	<1.24*
MW-126-25	Onsite	10-55	10/07/2010	<0.400	<1.00	<1.00	<3.00*
MW-126-25	Onsite	10-55	02/10/2011	<0.400	<1.00	<1.00	<3.00*
MW-126-25	Onsite	10-55	04/08/2011	<0.400	<1.00	<1.00	<3.00*
MW-126-25	Onsite	10-55	10/19/2011	<0.240	<0.620	<0.620	<1.86*
MW-126-25	Onsite	10-55	05/03/2012	<0.240	<0.620	<0.620	<1.86*
MW-126-25	Onsite	10-55	07/26/2012	<0.240	<0.620	<0.620	<1.86*
MW-126-25	Onsite	10-55	11/15/2012	<0.240	<0.620	<0.620	<1.86*
MW-126-25	Onsite	10-55	01/31/2013	<0.240	<0.620	<0.620	<1.86*
MW-126-25	Onsite	10-55	04/13/2013	<0.240	<0.620	<0.620	<1.86*
MW-126-25	Onsite	10-55	07/20/2013	<0.240	<0.620	<0.620	<1.88
MW-126-25	Onsite	10-55	11/16/2013	<0.200	<0.500	<0.500	<1.50
MW-126-25	Onsite	10-55	03/10/2014	<0.200	<0.500	<0.500	<1.50
MW-126-25	Onsite	10-55	04/24/2014	<0.200	<0.500	<0.500	<1.50
MW-126-25	Onsite	10-55	08/13/2014	<0.200	<0.500	<0.500	<1.50
MW-126-25	Onsite	10-55	11/06/2014	<0.200	<0.500	<0.500	<1.50
MW-126-25	Onsite	10-55	08/10/2015	<0.200	<0.500	<0.500	<1.50
MW-126-25	Onsite	10-55	08/10/2016	<0.200	<0.500	<0.500	<1.50
MW-127-25	Onsite	10-55	08/30/1991	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-127-25	Onsite	10-55	09/17/1991	ND	ND	ND	ND
MW-127-25	Onsite	10-55	12/11/1991	ND	ND	ND	ND
MW-127-25	Onsite	10-55	03/17/1992	1.20	ND	ND	1.30
MW-127-25	Onsite	10-55	05/05/1992	ND	ND	ND	ND
MW-127-25	Onsite	10-55	06/16/1992	ND	ND	ND	ND
MW-127-25	Onsite	10-55	09/22/1992	1.60	ND	ND	1.60
MW-127-25	Onsite	10-55	03/03/1993	ND	ND	ND	ND
MW-127-25	Onsite	10-55	06/22/1993	ND	ND	ND	ND
MW-127-25	Onsite	10-55	09/09/1993	ND	ND	ND	ND
MW-127-25	Onsite	10-55	12/21/1993	ND	ND	ND	ND
MW-127-25	Onsite	10-55	03/25/1994	11.0	4.00	0.500	2.00
MW-127-25	Onsite	10-55	06/28/1994	ND	ND	ND	ND
MW-127-25	Onsite	10-55	09/20/1994	1.00	0.700	ND	ND
MW-127-25	Onsite	10-55	12/13/1994	1.00	1.50	ND	1.00
MW-127-25	Onsite	10-55	03/21/1995	0.700	ND	ND	ND
MW-127-25	Onsite	10-55	06/28/1995	ND	ND	ND	ND
MW-127-25	Onsite	10-55	09/19/1995	ND	ND	ND	ND
MW-127-25	Onsite	10-55	01/29/1996	ND	ND	ND	ND
MW-127-25	Onsite	10-55	03/26/1996	ND	ND	ND	ND
MW-127-25	Onsite	10-55	06/19/1996	ND	ND	ND	ND
MW-127-25	Onsite	10-55	09/18/1996	0.600	ND	ND	ND
MW-127-25	Onsite	10-55	12/12/1996	2.80	ND	ND	ND
MW-127-25	Onsite	10-55	03/18/1997	ND	ND	ND	ND
MW-127-25	Onsite	10-55	06/24/1997	ND	ND	ND	ND
MW-127-25	Onsite	10-55	09/25/1997	1.00	ND	ND	ND
MW-127-25	Onsite	10-55	12/12/1997	22.0	ND	ND	ND
MW-127-25	Onsite	10-55	01/12/1998	17.0	ND	ND	ND
MW-127-25	Onsite	10-55	02/12/1998	17.0	ND	ND	1.00
MW-127-25	Onsite	10-55	03/20/1998	18.0	ND	ND	3.00
MW-127-25	Onsite	10-55	04/27/1998	20.0	ND	ND	3.00
MW-127-25	Onsite	10-55	05/27/1998	35.0	ND	ND	2.00
MW-127-25	Onsite	10-55	06/26/1998	29.0	ND	1.00	3.00
MW-127-25	Onsite	10-55	08/24/1998	60.0	6.00	3.00	9.00
MW-127-25	Onsite	10-55	09/22/1998	52.0	3.00	3.00	8.00
MW-127-25	Onsite	10-55	10/15/1998	89.0	ND	5.00	15.0
MW-127-25	Onsite	10-55	11/03/1998	135	ND	7.00	16.0
MW-127-25	Onsite	10-55	12/01/1998	76.0	ND	4.00	6.00
MW-127-25	Onsite	10-55	01/13/1999	86.0	ND	3.00	3.00
MW-127-25	Onsite	10-55	02/16/1999	90.0	ND	3.00	2.00
MW-127-25	Onsite	10-55	03/23/1999	103	ND	2.00	2.00
MW-127-25	Onsite	10-55	04/28/1999	127	ND	2.00	ND
MW-127-25	Onsite	10-55	05/26/1999	142	ND	1.00	ND
MW-127-25	Onsite	10-55	06/29/1999	150	ND	ND	ND
MW-127-25	Onsite	10-55	07/21/1999	210	ND	1.00	ND
MW-127-25	Onsite	10-55	08/18/1999	210	ND	ND	ND
MW-127-25	Onsite	10-55	09/14/1999	199	ND	ND	ND
MW-127-25	Onsite	10-55	10/13/1999	180	ND	ND	ND
MW-127-25	Onsite	10-55	11/15/1999	217	ND	ND	ND
MW-127-25	Onsite	10-55	12/28/1999	261	ND	ND	ND
MW-127-25	Onsite	10-55	01/19/2000	267	ND	ND	ND
MW-127-25	Onsite	10-55	02/22/2000	260	ND	ND	ND
MW-127-25	Onsite	10-55	03/14/2000	260	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-127-25	Onsite	10-55	04/04/2000	270	ND	ND	ND
MW-127-25	Onsite	10-55	05/09/2000	350	ND	ND	ND
MW-127-25	Onsite	10-55	06/15/2000	190	ND	ND	ND
MW-127-25	Onsite	10-55	07/20/2000	280	ND	ND	ND
MW-127-25	Onsite	10-55	08/28/2000	360	ND	ND	ND
MW-127-25	Onsite	10-55	09/19/2000	350	ND	ND	ND
MW-127-25	Onsite	10-55	10/11/2000	180	ND	ND	ND
MW-127-25	Onsite	10-55	11/07/2000	290	ND	ND	ND
MW-127-25	Onsite	10-55	12/12/2000	370	ND	ND	ND
MW-127-25	Onsite	10-55	01/15/2001	420	ND	ND	ND
MW-127-25	Onsite	10-55	02/14/2001	460	ND	ND	ND
MW-127-25	Onsite	10-55	03/14/2001	430	ND	ND	ND
MW-127-25	Onsite	10-55	04/10/2001	370	ND	ND	ND
MW-127-25	Onsite	10-55	05/10/2001	170	<1.00	<1.00	<2.00
MW-127-25	Onsite	10-55	06/13/2001	420	ND	ND	ND
MW-127-25	Onsite	10-55	07/10/2001	450	ND	ND	ND
MW-127-25	Onsite	10-55	08/21/2001	430	ND	ND	ND
MW-127-25	Onsite	10-55	09/12/2001	500	ND	ND	ND
MW-127-25	Onsite	10-55	10/09/2001	450	ND	ND	ND
MW-127-25	Onsite	10-55	11/14/2001	320	ND	ND	ND
MW-127-25	Onsite	10-55	12/11/2001	290	ND	ND	ND
MW-127-25	Onsite	10-55	01/09/2002	250	ND	ND	ND
MW-127-25	Onsite	10-55	02/04/2002	200	ND	ND	ND
MW-127-25	Onsite	10-55	03/06/2002	160	ND	ND	ND
MW-127-25	Onsite	10-55	04/04/2002	130	ND	ND	ND
MW-127-25	Onsite	10-55	05/07/2002	120	ND	ND	ND
MW-127-25	Onsite	10-55	07/15/2002	130	ND	ND	ND
MW-127-25	Onsite	10-55	08/14/2002	110	ND	ND	ND
MW-127-25	Onsite	10-55	09/11/2002	100	ND	ND	ND
MW-127-25	Onsite	10-55	10/08/2002	48.0	ND	ND	ND
MW-127-25	Onsite	10-55	11/19/2002	43.0	ND	ND	ND
MW-127-25	Onsite	10-55	12/03/2002	57.0	ND	ND	ND
MW-127-25	Onsite	10-55	01/07/2003	34.0	ND	ND	ND
MW-127-25	Onsite	10-55	02/05/2003	29.0	ND	ND	ND
MW-127-25	Onsite	10-55	03/05/2003	27.0	ND	ND	ND
MW-127-25	Onsite	10-55	04/29/2003	5.30	ND	ND	ND
MW-127-25	Onsite	10-55	05/07/2003	36.0	ND	ND	ND
MW-127-25	Onsite	10-55	06/04/2003	23.0	1.00	ND	ND
MW-127-25	Onsite	10-55	07/10/2003	3.00	ND	ND	ND
MW-127-25	Onsite	10-55	08/20/2003	1.30	ND	ND	ND
MW-127-25	Onsite	10-55	09/11/2003	ND	ND	ND	ND
MW-127-25	Onsite	10-55	10/05/2003	ND	ND	ND	ND
MW-127-25	Onsite	10-55	11/11/2003	ND	ND	ND	ND
MW-127-25	Onsite	10-55	01/13/2004	ND	ND	ND	ND
MW-127-25	Onsite	10-55	02/17/2004	ND	ND	ND	ND
MW-127-25	Onsite	10-55	04/23/2004	16.0	ND	ND	2.00
MW-127-25	Onsite	10-55	05/11/2004	19.0	ND	ND	ND
MW-127-25	Onsite	10-55	06/07/2004	ND	ND	ND	ND
MW-127-25	Onsite	10-55	07/22/2004	ND	ND	ND	ND
MW-127-25	Onsite	10-55	08/05/2004	ND	ND	ND	ND
MW-127-25	Onsite	10-55	09/09/2004	ND	ND	ND	ND
MW-127-25	Onsite	10-55	10/25/2004	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-127-25	Onsite	10-55	11/16/2004	ND	ND	ND	ND
MW-127-25	Onsite	10-55	12/08/2004	ND	ND	ND	ND
MW-127-25	Onsite	10-55	01/29/2005	ND	ND	ND	ND
MW-127-25	Onsite	10-55	02/27/2005	ND	ND	ND	ND
MW-127-25	Onsite	10-55	03/28/2005	ND	ND	ND	ND
MW-127-25	Onsite	10-55	04/21/2005	ND	ND	ND	ND
MW-127-25	Onsite	10-55	05/17/2005	29.0	ND	ND	3.00
MW-127-25	Onsite	10-55	06/16/2005	ND	ND	ND	ND
MW-127-25	Onsite	10-55	07/26/2005	ND	ND	ND	ND
MW-127-25	Onsite	10-55	08/23/2005	ND	ND	ND	ND
MW-127-25	Onsite	10-55	09/21/2005	ND	ND	ND	ND
MW-127-25	Onsite	10-55	07/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-127-25	Onsite	10-55	10/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-127-25	Onsite	10-55	01/17/2007	<1.00	<1.00	<1.00	<3.00
MW-127-25	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-127-25	Onsite	10-55	07/17/2007	<1.00	<1.00	<1.00	<3.00
MW-127-25	Onsite	10-55	10/18/2007	<1.00	<1.00	<1.00	<3.00
MW-127-25	Onsite	10-55	01/04/2008	<1.00	<1.00	<1.00	<3.00
MW-127-25	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-127-25	Onsite	10-55	07/01/2008	<1.00	<1.00	<1.00	<2.00
MW-127-25	Onsite	10-55	10/02/2008	0.630J	<1.00	<1.00	<2.00
MW-127-25	Onsite	10-55	12/04/2008	<0.500	<0.500	<0.500	<1.00
MW-127-25	Onsite	10-55	01/14/2009	<0.500	<2.00	<2.00	<4.00*
MW-127-25	Onsite	10-55	04/10/2009	<0.150	<0.620	<0.620	<1.24*
MW-127-25	Onsite	10-55	07/07/2009	<0.500	<2.00	<2.00	<4.00*
MW-127-25	Onsite	10-55	10/02/2009	<0.500	<2.00	<2.00	<4.00*
MW-127-25	Onsite	10-55	01/21/2010	<0.500	<2.00	<2.00	<4.00*
MW-127-25	Onsite	10-55	04/06/2010	<0.500	<2.00	<2.00	<4.00*
MW-127-25	Onsite	10-55	07/23/2010	<0.150	<0.620	<0.620	<1.24*
MW-127-25	Onsite	10-55	10/07/2010	<0.400	<1.00	<1.00	<3.00*
MW-127-25	Onsite	10-55	04/13/2011	<0.120	<0.310	<0.310	<0.930*
MW-127-25	Onsite	10-55	08/18/2011	<0.226	<0.266	<0.175	<0.364
MW-127-25	Onsite	10-55	10/20/2011	<0.240	<0.620	<0.620	<1.88
MW-127-25	Onsite	10-55	10/20/2011	<0.240	<0.620	<0.620	<1.86*
MW-127-25	Onsite	10-55	02/21/2012	0.430	<0.620	<0.620	<1.88
MW-127-25	Onsite	10-55	05/18/2012	2.09	<0.620	<0.620	2.31J
MW-127-25	Onsite	10-55	11/12/2012	<0.240	<0.620	<0.620	<1.86*
MW-127-25	Onsite	10-55	04/16/2013	<0.240	<0.620	<0.620	<1.86*
MW-127-25	Onsite	10-55	10/19/2013	54.6	<0.620	<0.620	5.07
MW-127-25	Onsite	10-55	03/07/2014	<0.200	<0.500	<0.500	<1.50
MW-127-25	Onsite	10-55	08/14/2014	2.72	<0.500	<0.500	<1.50
MW-127-25	Onsite	10-55	02/21/2015	<0.200	<0.500	<0.500	<1.50
MW-127-25	Onsite	10-55	08/07/2015	<0.200	<0.500	<0.500	<1.50
MW-127-25	Onsite	10-55	08/15/2016	<0.200	<0.500	<0.500	<1.50
MW-129-40	Onsite	10-55	10/21/1996	10.4	ND	ND	ND
MW-129-40	Onsite	10-55	12/17/1996	38.5	ND	ND	ND
MW-129-40	Onsite	10-55	02/26/1997	21.0	ND	ND	ND
MW-129-40	Onsite	10-55	03/18/1997	10.5	ND	ND	ND
MW-129-40	Onsite	10-55	04/29/1997	6.00	ND	ND	ND
MW-129-40	Onsite	10-55	05/29/1997	2.00	ND	ND	ND
MW-129-40	Onsite	10-55	06/24/1997	5.00	ND	ND	ND
MW-129-40	Onsite	10-55	07/22/1997	3.00	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-129-40	Onsite	10-55	09/25/1997	ND	ND	ND	ND
MW-129-40	Onsite	10-55	12/12/1997	ND	ND	ND	ND
MW-129-40	Onsite	10-55	03/23/1998	ND	ND	ND	ND
MW-129-40	Onsite	10-55	06/26/1998	ND	ND	ND	ND
MW-129-40	Onsite	10-55	09/28/1998	ND	ND	ND	ND
MW-129-40	Onsite	10-55	12/01/1998	ND	ND	ND	ND
MW-129-40	Onsite	10-55	03/23/1999	ND	ND	ND	ND
MW-129-40	Onsite	10-55	06/29/1999	ND	ND	ND	ND
MW-129-40	Onsite	10-55	09/14/1999	ND	ND	ND	ND
MW-129-40	Onsite	10-55	12/28/1999	ND	ND	ND	ND
MW-129-40	Onsite	10-55	03/14/2000	ND	ND	ND	ND
MW-129-40	Onsite	10-55	06/15/2000	ND	ND	ND	ND
MW-129-40	Onsite	10-55	09/19/2000	ND	ND	ND	ND
MW-129-40	Onsite	10-55	12/12/2000	ND	ND	ND	ND
MW-129-40	Onsite	10-55	03/14/2001	ND	ND	ND	ND
MW-129-40	Onsite	10-55	06/13/2001	ND	ND	ND	ND
MW-129-40	Onsite	10-55	07/11/2001	ND	ND	ND	ND
MW-129-40	Onsite	10-55	10/09/2001	4.70	ND	ND	ND
MW-129-40	Onsite	10-55	12/11/2001	ND	ND	ND	ND
MW-129-40	Onsite	10-55	01/09/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	02/04/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	03/06/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	04/04/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	07/15/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	08/14/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	09/11/2002	2400	1900	490	2050
MW-129-40	Onsite	10-55	10/08/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	11/19/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	12/03/2002	ND	ND	ND	ND
MW-129-40	Onsite	10-55	01/07/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	02/05/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	03/05/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	04/29/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	05/07/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	06/04/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	07/10/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	08/02/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	09/11/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	10/05/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	11/11/2003	ND	ND	ND	ND
MW-129-40	Onsite	10-55	01/13/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	02/17/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	05/11/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	06/07/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	07/22/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	08/05/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	09/09/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	10/25/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	11/16/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	12/08/2004	ND	ND	ND	ND
MW-129-40	Onsite	10-55	01/29/2005	ND	ND	ND	ND

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-129-40	Onsite	10-55	02/27/2005	ND	ND	ND	ND
MW-129-40	Onsite	10-55	03/28/2005	ND	ND	ND	ND
MW-129-40	Onsite	10-55	04/21/2005	ND	ND	ND	ND
MW-129-40	Onsite	10-55	05/17/2005	ND	ND	ND	ND
MW-129-40	Onsite	10-55	06/16/2005	ND	ND	ND	ND
MW-129-40	Onsite	10-55	07/26/2005	ND	ND	ND	ND
MW-129-40	Onsite	10-55	08/23/2005	ND	ND	ND	ND
MW-129-40	Onsite	10-55	07/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-129-40	Onsite	10-55	10/19/2006	<0.114	<0.127	<0.125	<0.118*
MW-129-40	Onsite	10-55	01/17/2007	<1.00	<1.00	<1.00	<3.00
MW-129-40	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-129-40	Onsite	10-55	07/17/2007	<1.00	<1.00	<1.00	<3.00
MW-129-40	Onsite	10-55	09/20/2007	<1.00	<1.00	<1.00	<3.00*
MW-129-40	Onsite	10-55	01/04/2008	<1.00	<1.00	<1.00	<3.00
MW-129-40	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-129-40	Onsite	10-55	07/01/2008	<1.00	<1.00	<1.00	<2.00
MW-129-40	Onsite	10-55	09/04/2008	<1.00	--	--	--
MW-129-40	Onsite	10-55	01/14/2009	<0.500	<2.00	<2.00	<4.00*
MW-129-40	Onsite	10-55	04/10/2009	<0.150	<0.620	<0.620	<1.24*
MW-129-40	Onsite	10-55	07/07/2009	<0.500	<2.00	<2.00	<4.00*
MW-129-40	Onsite	10-55	09/02/2009	<0.500	<2.00	<2.00	<4.00*
MW-129-40	Onsite	10-55	01/21/2010	<0.500	<2.00	<2.00	<4.00*
MW-129-40	Onsite	10-55	04/06/2010	<0.500	<2.00	<2.00	<4.00*
MW-129-40	Onsite	10-55	07/22/2010	<0.500	<2.00	<2.00	<4.00*
MW-129-40	Onsite	10-55	09/03/2010	<0.400	<1.00	<1.00	<3.00*
MW-129-40	Onsite	10-55	05/20/2013	<0.240	<0.620	<0.620	<1.86*
MW-129-40	Onsite	10-55	10/19/2013	<0.240	<0.620	<0.620	<1.88
MW-129-40	Onsite	10-55	03/02/2014	<0.200	<0.500	<0.500	<1.50
MW-129-40	Onsite	10-55	08/13/2014	<0.200	<0.500	<0.500	<1.50
MW-129-40	Onsite	10-55	02/24/2015	<0.200	<0.500	<0.500	<1.50
MW-129-40	Onsite	10-55	08/07/2015	<0.200	<0.500	<0.500	<1.50
MW-129-40	Onsite	10-55	08/10/2016	<0.200	<0.500	<0.500	<1.50
MW-130-25	Onsite	10-55	04/29/1997	650	800	310	1400
MW-130-25	Onsite	10-55	09/26/1997	1600	3000	900	4100
MW-130-25	Onsite	10-55	03/24/1998	550	810	260	1200
MW-130-25	Onsite	10-55	09/28/1998	1600	3200	740	3500
MW-130-25	Onsite	10-55	03/23/1999	270	320	77.0	340
MW-130-25	Onsite	10-55	09/14/1999	1200	2800	650	3100
MW-130-25	Onsite	10-55	03/14/2000	780	1200	310	1500
MW-130-25	Onsite	10-55	09/20/2000	950	1800	540	2600
MW-130-25	Onsite	10-55	03/14/2001	30.0	21.0	9.00	42.0
MW-130-25	Onsite	10-55	05/10/2001	55.5	15.3	5.78	25.2
MW-130-25	Onsite	10-55	07/11/2001	98.0	10.0	8.80	28.0
MW-130-25	Onsite	10-55	10/09/2001	110	22.0	15.0	41.0
MW-130-25	Onsite	10-55	01/09/2002	66.0	18.0	18.0	39.0
MW-130-25	Onsite	10-55	04/03/2002	90.0	26.0	19.0	40.0
MW-130-25	Onsite	10-55	08/14/2002	630	1500	310	1650
MW-130-25	Onsite	10-55	10/08/2002	690	2900	450	2480
MW-130-25	Onsite	10-55	01/07/2003	57.0	49.0	23.0	100
MW-130-25	Onsite	10-55	04/29/2003	74.0	60.0	21.0	80.0
MW-130-25	Onsite	10-55	07/10/2003	370	460	92.0	510
MW-130-25	Onsite	10-55	10/05/2003	770	1500	320	1700

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-130-25	Onsite	10-55	01/13/2004	380	720	240	1300
MW-130-25	Onsite	10-55	04/23/2004	198	40.0	47.0	148
MW-130-25	Onsite	10-55	07/22/2004	113	6.20	36.0	97.0
MW-130-25	Onsite	10-55	09/10/2004	372	201	61.0	296
MW-130-25	Onsite	10-55	01/29/2005	161	12.0	51.0	186
MW-130-25	Onsite	10-55	04/20/2005	105	14.0	30.0	96.0
MW-130-25	Onsite	10-55	07/26/2005	1090	2970	551	2860
MW-130-25	Onsite	10-55	07/18/2006	89.3	95.1	37.8	50.4*
MW-130-25	Onsite	10-55	10/18/2006	496	1620	326	578*
MW-130-25	Onsite	10-55	01/17/2007	24.6	8.47	11.7	35.7*
MW-130-25	Onsite	10-55	04/17/2007	10.4	3.63	4.79	17.4
MW-130-25	Onsite	10-55	07/17/2007	106	389	92.9	327
MW-130-25	Onsite	10-55	10/16/2007	274	954	135	821
MW-130-25	Onsite	10-55	01/04/2008	2.96	1.40	1.19	3.56
MW-130-25	Onsite	10-55	04/03/2008	<1.00	1.00	<1.00	<2.00
MW-130-25	Onsite	10-55	07/01/2008	13.0	44.0	11.0	62.0
MW-130-25	Onsite	10-55	10/02/2008	140	910	230	1400
MW-130-25	Onsite	10-55	01/14/2009	2.98	<2.00	<2.00	<6.01*
MW-130-25	Onsite	10-55	04/08/2009	2.43	<0.620	<0.620	<1.24*
MW-130-25	Onsite	10-55	07/07/2009	1.59	<2.00	<2.00	6.86*
MW-130-25	Onsite	10-55	10/02/2009	12.9	6.87	7.07	28.0*
MW-130-25	Onsite	10-55	01/20/2010	18.2	2.48	10.2	38.4*
MW-130-25	Onsite	10-55	04/05/2010	11.6	<2.00	4.81	14.1*
MW-130-25	Onsite	10-55	07/26/2010	2.01	<2.00	<2.00	<4.00*
MW-130-25	Onsite	10-55	10/12/2010	2.05	<0.310	<0.310	<0.930*
MW-130-25	Onsite	10-55	11/11/2013	60.0	145	55.4	414
MW-130-25	Onsite	10-55	03/05/2014	119	247	88.8	666
MW-130-25	Onsite	10-55	09/03/2014	165	579	221	1760
MW-130-25	Onsite	10-55	02/20/2015	201	213	89.6	630
MW-130-25	Onsite	10-55	08/07/2015	386	248	123	947
MW-130-25	Onsite	10-55	03/07/2016	366	44.7	56.3	374
MW-130-25	Onsite	10-55	08/18/2016	335	546	291	2220
MW-130-25	Onsite	10-55	02/24/2017	205	30.3	31.8	266
MW-130-25	Onsite	10-55	08/03/2017	217	178	137	1130
MW-130-25	Onsite	10-55	10/20/2017	185	310	182	1450
MW-130-25	Onsite	10-55	11/15/2017	<124B*	129	102	853
MW-130-25	Onsite	10-55	2/14/2018	97.5	140	100	730
MW-130-25	Onsite	10-55	4/10/2018	92.2	84.3	60.5	443
MW-130-25	Onsite	10-55	8/8/2018	123	107	107	805
MW-131-25	Onsite	10-55	07/29/1998	ND	ND	ND	ND
MW-131-25	Onsite	10-55	09/23/1998	ND	ND	ND	ND
MW-131-25	Onsite	10-55	03/24/1999	ND	ND	ND	ND
MW-131-25	Onsite	10-55	08/18/1999	ND	ND	ND	ND
MW-131-25	Onsite	10-55	09/15/1999	ND	ND	ND	ND
MW-131-25	Onsite	10-55	10/13/1999	ND	ND	ND	ND
MW-131-25	Onsite	10-55	03/13/2000	ND	ND	ND	ND
MW-131-25	Onsite	10-55	09/18/2000	ND	ND	ND	ND
MW-131-25	Onsite	10-55	12/12/2000	ND	ND	ND	ND
MW-131-25	Onsite	10-55	03/13/2001	ND	ND	ND	ND
MW-131-25	Onsite	10-55	06/13/2001	ND	ND	ND	ND
MW-131-25	Onsite	10-55	07/10/2001	ND	ND	ND	ND
MW-131-25	Onsite	10-55	10/10/2001	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-131-25	Onsite	10-55	01/09/2002	ND	ND	ND	ND
MW-131-25	Onsite	10-55	04/08/2002	ND	ND	ND	ND
MW-131-25	Onsite	10-55	08/14/2002	ND	ND	ND	ND
MW-131-25	Onsite	10-55	10/07/2002	ND	ND	ND	ND
MW-131-25	Onsite	10-55	01/07/2003	ND	ND	ND	ND
MW-131-25	Onsite	10-55	04/29/2003	ND	ND	ND	ND
MW-131-25	Onsite	10-55	07/10/2003	ND	ND	ND	ND
MW-131-25	Onsite	10-55	10/05/2003	ND	ND	ND	ND
MW-131-25	Onsite	10-55	01/13/2004	ND	ND	ND	ND
MW-131-25	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-131-25	Onsite	10-55	07/22/2004	ND	ND	ND	ND
MW-131-25	Onsite	10-55	09/09/2004	ND	ND	ND	ND
MW-131-25	Onsite	10-55	01/29/2005	ND	ND	ND	ND
MW-131-25	Onsite	10-55	04/21/2005	ND	ND	ND	ND
MW-131-25	Onsite	10-55	07/26/2005	ND	ND	ND	ND
MW-131-25	Onsite	10-55	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-131-25	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-131-25	Onsite	10-55	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-131-25	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-131-25	Onsite	10-55	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-131-25	Onsite	10-55	04/08/2009	<0.150	<0.620	<0.620	<1.24*
MW-131-25	Onsite	10-55	10/01/2009	<0.500	<2.00	<2.00	<4.00*
MW-131-25	Onsite	10-55	04/02/2010	<0.500	<2.00	<2.00	<4.00*
MW-131-25	Onsite	10-55	10/06/2010	<0.400	<1.00	<1.00	<3.00*
MW-131-25	Onsite	10-55	04/08/2011	<0.120	<0.310	<0.310	<0.930*
MW-131-25	Onsite	10-55	05/05/2012	<0.240	<0.620	<0.620	<1.86*
MW-131-25	Onsite	10-55	06/06/2013	<0.240	<0.620	<0.620	<1.86*
MW-131-25	Onsite	10-55	07/25/2014	<0.200	<0.500	<0.500	<1.50
MW-131-25	Onsite	10-55	07/27/2015	<0.200	<0.500	<0.500	--
MW-131-25	Onsite	10-55	07/28/2016	<0.200	<0.500	<0.500	<1.50
MW-131-25	Onsite	10-55	07/14/2017	<1.01B*	<0.500	<0.500	<1.50
MW-131-25	Onsite	10-55	7/19/2018	<0.200	<0.500	<0.500	<1.50
MW-132-20	Onsite	Water Table	09/15/1999	4.00	10.0	20.0	19.0
MW-132-20	Onsite	Water Table	03/15/2000	8.00	19.0	37.0	65.0
MW-132-20	Onsite	Water Table	09/20/2000	3.80	2.00	31.0	41.0
MW-132-20	Onsite	Water Table	03/14/2001	0.700	ND	4.00	3.00
MW-132-20	Onsite	Water Table	07/11/2001	0.670	ND	4.40	6.70
MW-132-20	Onsite	Water Table	10/10/2001	ND	ND	1.30	ND
MW-132-20	Onsite	Water Table	01/09/2002	0.840	ND	5.20	5.00
MW-132-20	Onsite	Water Table	04/08/2002	ND	ND	ND	ND
MW-132-20	Onsite	Water Table	08/14/2002	1.10	ND	7.00	9.30
MW-132-20	Onsite	Water Table	10/08/2002	ND	ND	ND	ND
MW-132-20	Onsite	Water Table	01/07/2003	ND	ND	ND	ND
MW-132-20	Onsite	Water Table	04/29/2003	ND	ND	ND	3.00
MW-132-20	Onsite	Water Table	07/10/2003	ND	1.10	ND	3.40
MW-132-20	Onsite	Water Table	10/05/2003	ND	ND	ND	ND
MW-132-20	Onsite	Water Table	01/13/2004	1.10	19.0	7.90	34.0
MW-132-20	Onsite	Water Table	04/23/2004	1.00	ND	ND	8.00
MW-132-20	Onsite	Water Table	07/22/2004	ND	ND	ND	6.80
MW-132-20	Onsite	Water Table	09/10/2004	ND	ND	ND	ND
MW-132-20	Onsite	Water Table	01/29/2005	ND	ND	ND	ND
MW-132-20	Onsite	Water Table	04/20/2005	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-132-20	Onsite	Water Table	07/26/2005	ND	ND	ND	ND
MW-132-20	Onsite	Water Table	10/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-132-20	Onsite	Water Table	04/17/2007	<1.00	<1.00	<1.00	<3.00
MW-132-20	Onsite	Water Table	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-132-20	Onsite	Water Table	04/03/2008	<1.00	<1.00	<1.00	2.60
MW-132-20	Onsite	Water Table	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-132-20	Onsite	Water Table	04/08/2009	<0.150	<0.620	<0.620	<1.24*
MW-132-20	Onsite	Water Table	04/06/2010	1.87	<2.00	2.99	36.2*
MW-132-20	Onsite	Water Table	10/13/2010	56.0	<100	165	2450*
MW-132-20	Onsite	Water Table	11/19/2010	0.690	<0.310	1.73	31.8*
MW-132-20	Onsite	Water Table	02/18/2011	0.990	<1.00	2.99	40.6*
MW-132-20	Onsite	Water Table	04/11/2011	1.07	<1.00	1.69	27.7*
MW-132-20	Onsite	Water Table	10/18/2011	<0.240	<0.620	<0.620	<1.93J*
MW-132-20	Onsite	Water Table	05/05/2012	0.300J	<0.620	0.860J	7.17*
MW-132-20	Onsite	Water Table	04/13/2013	0.320J	<0.620	1.06	12.8*
MW-132-20	Onsite	Water Table	11/07/2013	<0.240	<0.620	1.02J*	16.4J*
MW-132-20	Onsite	Water Table	03/25/2014	0.512	<0.500	1.26	17.8
MW-132-20	Onsite	Water Table	08/11/2014	0.320J	<0.500	3.69	19.5
MW-132-20	Onsite	Water Table	08/06/2015	0.460	<0.500	2.78	32.9
MW-132-20	Onsite	Water Table	08/15/2016	0.150J	<0.500	0.330J	6.65
MW-133-20	Onsite	Water Table	09/15/1999	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	03/15/2000	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	09/19/2000	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	03/14/2001	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	05/10/2001	<0.500	<2.00	<2.00	<4.00
MW-133-20	Onsite	Water Table	10/10/2001	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	10/08/2002	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	04/29/2003	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	10/05/2003	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	04/23/2004	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	09/10/2004	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	04/20/2005	ND	ND	ND	ND
MW-133-20	Onsite	Water Table	04/17/2007	<1.00	<1.00	<1.00	<3.00
MW-133-20	Onsite	Water Table	04/03/2008	<1.00	<1.00	<1.00	<2.00
MW-133-20	Onsite	Water Table	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-133-20	Onsite	Water Table	04/06/2010	<0.500	<2.00	<2.00	<4.00*
MW-133-20	Onsite	Water Table	02/18/2011	<0.400	<1.00	<1.00	<3.00*
MW-133-20	Onsite	Water Table	04/12/2011	<0.400	<1.00	<1.00	<3.00*
MW-133-20	Onsite	Water Table	08/17/2011	<0.226	<0.266	<0.175	<0.364
MW-133-20	Onsite	Water Table	10/18/2011	<0.240	<0.620	<0.620	<1.88
MW-133-20	Onsite	Water Table	02/17/2012	<0.240	<0.620	<0.620	<1.88
MW-133-20	Onsite	Water Table	05/19/2012	<0.240	<0.620	<0.620	<1.88
MW-133-20	Onsite	Water Table	11/15/2012	<0.240	<0.620	<0.620	<1.54J*
MW-133-20	Onsite	Water Table	04/26/2013	<0.240	<0.620	<0.620	<1.86*
MW-133-20	Onsite	Water Table	11/07/2013	<0.240	<0.620	<0.620	<1.88
MW-133-20	Onsite	Water Table	03/25/2014	<0.200	<0.500	<0.500	<1.50
MW-133-20	Onsite	Water Table	08/11/2014	<0.200	<0.500	<0.500	<1.50
MW-133-20	Onsite	Water Table	08/06/2015	<0.200	<0.500	<0.500	<1.50
MW-133-20	Onsite	Water Table	08/15/2016	<0.200	<0.500	<0.500	<1.50
MW-134-20	Onsite	Water Table	09/15/1999	ND	ND	ND	ND
MW-134-20	Onsite	Water Table	10/13/2000	0.700	ND	ND	ND
MW-134-20	Onsite	Water Table	10/10/2001	ND	ND	ND	ND

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-134-20	Onsite	Water Table	10/08/2002	ND	ND	ND	ND
MW-134-20	Onsite	Water Table	10/05/2003	ND	ND	ND	ND
MW-134-20	Onsite	Water Table	09/10/2004	ND	ND	ND	ND
MW-134-20	Onsite	Water Table	10/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-134-20	Onsite	Water Table	09/20/2007	<1.00	<1.00	<1.00	<3.00*
MW-134-20	Onsite	Water Table	09/04/2008	<1.00	--	--	--
MW-134-20	Onsite	Water Table	09/03/2009	<0.500	<2.00	<2.00	<4.00*
MW-134-20	Onsite	Water Table	09/15/2010	<0.400	<1.00	<1.00	<3.00*
MW-134-20	Onsite	Water Table	08/16/2011	<0.240	<0.620	<0.620	<1.86*
MW-134-20	Onsite	Water Table	08/09/2012	<0.240	<0.620	<0.620	<1.86*
MW-134-20	Onsite	Water Table	07/23/2013	<0.240	<0.620	<0.620	<1.88
MW-134-20	Onsite	Water Table	11/16/2013	<0.200	<0.500	<0.500	<3.00B*
MW-134-20	Onsite	Water Table	03/26/2014	<0.200	<0.500	<0.500	<1.50
MW-134-20	Onsite	Water Table	09/03/2014	<0.200	<0.500	<0.500	<1.50
MW-134-20	Onsite	Water Table	10/30/2014	2.84	<0.500	<0.500	1.89J
MW-134-20	Onsite	Water Table	08/07/2015	0.180J	<0.500	<0.500	<1.50
MW-134-20	Onsite	Water Table	08/17/2016	0.120J	<0.500	<0.500	<1.50
MW-135-20	Onsite	Water Table	07/19/2001	5470	3980	332	1410
MW-135-20	Onsite	Water Table	10/09/2001	14000	7600	500	2120
MW-135-20	Onsite	Water Table	11/14/2001	3000	1500	190	800
MW-135-20	Onsite	Water Table	12/11/2001	4800	2400	320	1280
MW-135-20	Onsite	Water Table	01/08/2002	5800	2600	330	1270
MW-135-20	Onsite	Water Table	02/04/2002	11000	5700	580	2300
MW-135-20	Onsite	Water Table	03/06/2002	6000	3200	390	1430
MW-135-20	Onsite	Water Table	07/15/2002	8400	4200	580	2370
MW-135-20	Onsite	Water Table	08/14/2002	8700	5100	640	2670
MW-135-20	Onsite	Water Table	10/08/2002	16000	11000	890	4200
MW-135-20	Onsite	Water Table	01/07/2003	3900	2900	290	1200
MW-135-20	Onsite	Water Table	02/05/2003	4300	3000	330	1300
MW-135-20	Onsite	Water Table	03/05/2003	4400	3300	380	1500
MW-135-20	Onsite	Water Table	06/04/2003	3600	2300	270	ND
MW-135-20	Onsite	Water Table	07/10/2003	1700	910	160	660
MW-135-20	Onsite	Water Table	08/20/2003	4700	3200	440	2000
MW-135-20	Onsite	Water Table	09/11/2003	1400	3200	570	2300
MW-135-20	Onsite	Water Table	10/05/2003	3500	2300	290	1500
MW-135-20	Onsite	Water Table	11/11/2003	8000	5600	580	2700
MW-135-20	Onsite	Water Table	01/13/2004	2100	800	170	580
MW-135-20	Onsite	Water Table	02/17/2004	2300	520	180	580
MW-135-20	Onsite	Water Table	06/07/2004	1920	242	179	577
MW-135-20	Onsite	Water Table	07/22/2004	1690	240	219	645
MW-135-20	Onsite	Water Table	08/05/2004	3260	802	396	1450
MW-135-20	Onsite	Water Table	09/09/2004	10600	6640	1170	5230
MW-135-20	Onsite	Water Table	10/25/2004	2950	1480	376	1420
MW-135-20	Onsite	Water Table	11/16/2004	1460	222	311	1020
MW-135-20	Onsite	Water Table	12/08/2004	2210	973	355	1260
MW-135-20	Onsite	Water Table	01/29/2005	1560	404	439	1220
MW-135-20	Onsite	Water Table	02/27/2005	881	231	229	859
MW-135-20	Onsite	Water Table	03/28/2005	629	99.0	133	489
MW-135-20	Onsite	Water Table	04/20/2005	1390	245	232	913
MW-135-20	Onsite	Water Table	05/17/2005	1270	248	166	629
MW-135-20	Onsite	Water Table	06/16/2005	983	109	123	461
MW-135-20	Onsite	Water Table	07/26/2005	4980	3470	628	2780

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-135-20	Onsite	Water Table	08/23/2005	1720	784	302	1360
MW-135-20	Onsite	Water Table	09/21/2005	1910	1250	310	1370
MW-135-20	Onsite	Water Table	07/18/2006	2000	77.4	282	276*
MW-135-20	Onsite	Water Table	08/22/2006	18900	9860	1580	2030*
MW-135-20	Onsite	Water Table	09/18/2006	32200	25800	1990	2720*
MW-135-20	Onsite	Water Table	10/17/2006	18000	12300	1780	2690*
MW-135-20	Onsite	Water Table	11/15/2006	<0.226	<0.202	<0.241	<0.223*
MW-135-20	Onsite	Water Table	12/08/2006	23900	21100	2110	3240*
MW-135-20	Onsite	Water Table	01/17/2007	7660	3410	1020	5060
MW-135-20	Onsite	Water Table	07/18/2007	5940	6380	1250	5810
MW-135-20	Onsite	Water Table	08/21/2007	14800	8640	1370	6280
MW-135-20	Onsite	Water Table	09/20/2007	35700	15400	2730	13800*
MW-135-20	Onsite	Water Table	10/16/2007	19700	16400	1300	6450
MW-135-20	Onsite	Water Table	11/12/2007	3340	1290	646	3520
MW-135-20	Onsite	Water Table	12/06/2007	12000	13500	1140	5920
MW-135-20	Onsite	Water Table	01/04/2008	8810	13000	1080	5170
MW-135-20	Onsite	Water Table	02/12/2008	8730	13100	1040	5920
MW-135-20	Onsite	Water Table	07/14/2008	15000	23000	2300	10900
MW-135-20	Onsite	Water Table	08/07/2008	27400	39200	2230	10900
MW-135-20	Onsite	Water Table	09/01/2008	<500	--	--	--
MW-135-20	Onsite	Water Table	10/02/2008	23000	33000	2300	11000
MW-135-20	Onsite	Water Table	11/06/2008	13400	29700	2930	13600
MW-135-20	Onsite	Water Table	12/04/2008	15500	29500	3050	13400
MW-135-20	Onsite	Water Table	01/14/2009	11600	19100	1950	9720*
MW-135-20	Onsite	Water Table	07/07/2009	15100	30100	2750	14100*
MW-135-20	Onsite	Water Table	08/03/2009	10500	21500	2140	10800*
MW-135-20	Onsite	Water Table	09/02/2009	18500	23700	2120	10600*
MW-135-20	Onsite	Water Table	10/02/2009	10500	19800	1800	8870*
MW-135-20	Onsite	Water Table	11/03/2009	8730	17200	1340	7220*
MW-135-20	Onsite	Water Table	12/01/2009	16100	26900	2060	10400*
MW-135-20	Onsite	Water Table	01/21/2010	4310	17500	1400	6790*
MW-135-20	Onsite	Water Table	02/17/2010	4910	14500	1410	7210*
MW-135-20	Onsite	Water Table	06/14/2010	3430	2600	845	4470*
MW-135-20	Onsite	Water Table	07/23/2010	1790	789	449	2340*
MW-135-20	Onsite	Water Table	08/11/2010	3510	2620	636	3250*
MW-135-20	Onsite	Water Table	09/03/2010	1960	1660	242	1910*
MW-135-20	Onsite	Water Table	10/07/2010	3400	2130	537	3090*
MW-135-20	Onsite	Water Table	11/04/2010	3580	2150	618	3380*
MW-135-20	Onsite	Water Table	02/18/2011	1070	664	220	1420*
MW-135-20	Onsite	Water Table	10/14/2011	2430	6080	586	3100
MW-135-20	Onsite	Water Table	11/07/2013	704	9370	376	1950
MW-135-20	Onsite	Water Table	02/20/2015	1180	6000	1100	5590
MW-135-20	Onsite	Water Table	08/05/2015	922	7470	1950	13800
MW-135-20	Onsite	Water Table	02/24/2017	1570	1020	1520	8280
MW-135-20	Onsite	Water Table	07/24/2017	695	5710	1810	15100
MW-135-20	Onsite	Water Table	11/16/2017	957	9080	1890	16000
MW-135-20	Onsite	Water Table	2/13/2018	917	6870	1660	14100
MW-135-20	Onsite	Water Table	4/4/2018	2650	14000	2580	17100
MW-135-20	Onsite	Water Table	8/8/2018	236	2700	794	16100
MW-136-20	Onsite	Water Table	07/11/2001	5600	1300	240	760
MW-136-20	Onsite	Water Table	10/09/2001	11000	3500	680	2370
MW-136-20	Onsite	Water Table	11/14/2001	8200	2700	490	1830

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-136-20	Onsite	Water Table	12/11/2001	7300	1200	390	1370
MW-136-20	Onsite	Water Table	01/08/2002	6900	1200	360	1340
MW-136-20	Onsite	Water Table	02/04/2002	6500	1700	360	1380
MW-136-20	Onsite	Water Table	07/15/2002	9500	5500	620	2760
MW-136-20	Onsite	Water Table	08/14/2002	9500	5000	640	2730
MW-136-20	Onsite	Water Table	10/08/2002	17000	12000	1100	5200
MW-136-20	Onsite	Water Table	01/07/2003	5000	2500	470	2000
MW-136-20	Onsite	Water Table	02/05/2003	5300	2400	500	2200
MW-136-20	Onsite	Water Table	03/05/2003	4400	2000	400	1800
MW-136-20	Onsite	Water Table	04/29/2003	2600	860	210	960
MW-136-20	Onsite	Water Table	05/07/2003	3300	1500	310	1400
MW-136-20	Onsite	Water Table	06/04/2003	5500	2300	350	1500
MW-136-20	Onsite	Water Table	07/10/2003	4100	1400	260	1100
MW-136-20	Onsite	Water Table	08/20/2003	8800	5600	630	2800
MW-136-20	Onsite	Water Table	09/11/2003	10000	7900	800	3700
MW-136-20	Onsite	Water Table	10/05/2003	9300	6500	750	3500
MW-136-20	Onsite	Water Table	11/11/2003	9400	5900	830	4300
MW-136-20	Onsite	Water Table	01/13/2004	6100	2000	400	2200
MW-136-20	Onsite	Water Table	02/17/2004	6200	1900	400	2200
MW-136-20	Onsite	Water Table	06/07/2004	2860	589	311	1450
MW-136-20	Onsite	Water Table	07/22/2004	4220	1110	436	2020
MW-136-20	Onsite	Water Table	08/05/2004	5130	1780	387	1840
MW-136-20	Onsite	Water Table	09/09/2004	8300	4320	734	3920
MW-136-20	Onsite	Water Table	10/25/2004	9140	3960	486	2730
MW-136-20	Onsite	Water Table	11/16/2004	5780	1680	336	2140
MW-136-20	Onsite	Water Table	12/08/2004	5850	2310	367	2320
MW-136-20	Onsite	Water Table	01/29/2005	3800	1080	233	1330
MW-136-20	Onsite	Water Table	02/27/2005	3240	1000	217	1340
MW-136-20	Onsite	Water Table	03/28/2005	3330	888	198	1260
MW-136-20	Onsite	Water Table	04/20/2005	2730	806	226	1420
MW-136-20	Onsite	Water Table	05/17/2005	3330	820	412	2340
MW-136-20	Onsite	Water Table	06/16/2005	3060	731	308	1870
MW-136-20	Onsite	Water Table	07/26/2005	5860	2840	476	2600
MW-136-20	Onsite	Water Table	08/23/2005	4460	2320	432	2800
MW-136-20	Onsite	Water Table	09/21/2005	5170	2480	401	2820
MW-136-20	Onsite	Water Table	06/20/2006	6200	2220	510	761*
MW-136-20	Onsite	Water Table	07/18/2006	126	31.3	9.19	14.0*
MW-136-20	Onsite	Water Table	08/22/2006	6930	1950	520	812*
MW-136-20	Onsite	Water Table	09/18/2006	10200	3520	1050	1420*
MW-136-20	Onsite	Water Table	10/17/2006	8770	1850	843	1380*
MW-136-20	Onsite	Water Table	11/15/2006	--	1680	720	1170*
MW-136-20	Onsite	Water Table	12/08/2006	8320	1540	577	1310*
MW-136-20	Onsite	Water Table	01/17/2007	5250	1560	459	3170
MW-136-20	Onsite	Water Table	06/20/2007	9720	6600	1240	5970*
MW-136-20	Onsite	Water Table	07/18/2007	5010	2470	792	479
MW-136-20	Onsite	Water Table	08/21/2007	11300	6710	1220	5950
MW-136-20	Onsite	Water Table	09/20/2007	12900	6860	1140	7150*
MW-136-20	Onsite	Water Table	10/16/2007	6720	3400	538	3810
MW-136-20	Onsite	Water Table	11/12/2007	5020	1130	708	3200
MW-136-20	Onsite	Water Table	12/06/2007	5410	2250	368	3190
MW-136-20	Onsite	Water Table	01/04/2008	3920	1650	358	2600
MW-136-20	Onsite	Water Table	02/12/2008	5370	1920	446	2940

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-136-20	Onsite	Water Table	06/10/2008	67.3	97.9	2070	10300
MW-136-20	Onsite	Water Table	07/14/2008	9900	9500	1400	7000
MW-136-20	Onsite	Water Table	08/07/2008	17300	25300	2370	11400
MW-136-20	Onsite	Water Table	09/01/2008	20000	--	--	--
MW-136-20	Onsite	Water Table	10/02/2008	14000	17000	1700	8400
MW-136-20	Onsite	Water Table	11/06/2008	10900	9010	1580	7550
MW-136-20	Onsite	Water Table	12/04/2008	11000	9690	1640	7300
MW-136-20	Onsite	Water Table	01/14/2009	7570	7910	1150	5730*
MW-136-20	Onsite	Water Table	06/05/2009	12200	25400	2440	12100*
MW-136-20	Onsite	Water Table	07/07/2009	11300	18000	2020	10400*
MW-136-20	Onsite	Water Table	08/03/2009	8640	<0.620	<0.620	<1.24*
MW-136-20	Onsite	Water Table	09/02/2009	10600	15100	1750	9200*
MW-136-20	Onsite	Water Table	10/02/2009	6540	5690	886	5800*
MW-136-20	Onsite	Water Table	11/03/2009	2930	2270	<1000	4400*
MW-136-20	Onsite	Water Table	12/01/2009	6000	7150	1390	7700*
MW-136-20	Onsite	Water Table	01/20/2010	3240	13700	1180	5870*
MW-136-20	Onsite	Water Table	02/17/2010	4520	4320	747	4910*
MW-136-20	Onsite	Water Table	03/04/2010	3630	3110	685	4150*
MW-136-20	Onsite	Water Table	04/05/2010	3960	4230	739	4940*
MW-136-20	Onsite	Water Table	05/03/2010	3730	4280	790	4860*
MW-136-20	Onsite	Water Table	06/14/2010	2660	2410	549	3190*
MW-136-20	Onsite	Water Table	07/23/2010	1960	1700	379	2350*
MW-136-20	Onsite	Water Table	08/11/2010	2500	2320	462	2800*
MW-136-20	Onsite	Water Table	09/03/2010	3790	2530	498	3350*
MW-136-20	Onsite	Water Table	10/07/2010	2750	2050	402	2520*
MW-136-20	Onsite	Water Table	05/07/2012	875	1720	722	1580*
MW-136-20	Onsite	Water Table	11/01/2013	1770	1820	312	1750
MW-136-20	Onsite	Water Table	03/17/2014	470	1.65J	71.5	339
MW-136-20	Onsite	Water Table	02/20/2015	1080	894	495	2590
MW-136-20	Onsite	Water Table	02/24/2017	417	311	328	1970
MW-137-20	Onsite	Water Table	11/14/2001	1400	24.0	150	267
MW-137-20	Onsite	Water Table	12/11/2001	990	36.0	67.0	55.5
MW-137-20	Onsite	Water Table	01/09/2002	330	7.70	7.40	8.70
MW-137-20	Onsite	Water Table	02/05/2002	740	3.10	5.60	5.30
MW-137-20	Onsite	Water Table	03/06/2002	690	2.50	4.80	4.50
MW-137-20	Onsite	Water Table	04/08/2002	470	ND	1.70	1.00
MW-137-20	Onsite	Water Table	05/07/2002	1900	1200	200	770
MW-137-20	Onsite	Water Table	07/15/2002	1100	350	310	1040
MW-137-20	Onsite	Water Table	08/14/2002	1200	ND	260	615
MW-137-20	Onsite	Water Table	10/08/2002	1300	540	360	1260
MW-137-20	Onsite	Water Table	01/08/2003	170	3.10	20.0	25.0
MW-137-20	Onsite	Water Table	02/05/2003	140	2.40	6.10	13.0
MW-137-20	Onsite	Water Table	03/05/2003	220	2.20	5.10	12.0
MW-137-20	Onsite	Water Table	04/29/2003	500	100	41.0	120
MW-137-20	Onsite	Water Table	05/07/2003	470	110	42.0	110
MW-137-20	Onsite	Water Table	06/04/2003	360	ND	40.0	67.0
MW-137-20	Onsite	Water Table	07/10/2003	370	20.0	14.0	ND
MW-137-20	Onsite	Water Table	08/20/2003	960	2000	360	1500
MW-137-20	Onsite	Water Table	09/11/2003	8400	5700	740	3300
MW-137-20	Onsite	Water Table	10/05/2003	1000	1800	460	1800
MW-137-20	Onsite	Water Table	11/11/2003	370	91.0	310	950
MW-137-20	Onsite	Water Table	01/13/2004	140	2.70	8.80	36.0

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-137-20	Onsite	Water Table	02/17/2004	220	ND	ND	41.0
MW-137-20	Onsite	Water Table	04/23/2004	595	497	127	506
MW-137-20	Onsite	Water Table	05/11/2004	375	8.00	52.0	193
MW-137-20	Onsite	Water Table	06/07/2004	319	51.0	67.0	190
MW-137-20	Onsite	Water Table	07/22/2004	294	ND	2.80	20.0
MW-137-20	Onsite	Water Table	08/05/2004	390	ND	19.0	50.0
MW-137-20	Onsite	Water Table	09/09/2004	514	ND	65.0	187
MW-137-20	Onsite	Water Table	10/25/2004	452	12.0	114	463
MW-137-20	Onsite	Water Table	11/16/2004	520	ND	ND	130
MW-137-20	Onsite	Water Table	12/08/2004	244	ND	ND	ND
MW-137-20	Onsite	Water Table	01/29/2005	108	ND	ND	6.30
MW-137-20	Onsite	Water Table	02/27/2005	91.0	ND	ND	6.60
MW-137-20	Onsite	Water Table	03/28/2005	84.0	ND	ND	ND
MW-137-20	Onsite	Water Table	04/21/2005	398	646	182	763
MW-137-20	Onsite	Water Table	05/17/2005	155	216	155	457
MW-137-20	Onsite	Water Table	06/16/2005	118	ND	69.0	250
MW-137-20	Onsite	Water Table	07/26/2005	256	ND	245	1160
MW-137-20	Onsite	Water Table	08/23/2005	325	2.10	79.0	394
MW-137-20	Onsite	Water Table	09/21/2005	311	ND	97.0	487
MW-137-20	Onsite	Water Table	05/16/2006	138	<0.0890	37.7	143
MW-137-20	Onsite	Water Table	06/21/2006	145	ND	37.2	14.0*
MW-137-20	Onsite	Water Table	07/18/2006	107	<0.127	11.1	3.91*
MW-137-20	Onsite	Water Table	08/22/2006	2040	746	354	560*
MW-137-20	Onsite	Water Table	09/18/2006	3170	1450	614	903*
MW-137-20	Onsite	Water Table	10/18/2006	3300	1120	600	860*
MW-137-20	Onsite	Water Table	11/16/2006	5150	155	497	674*
MW-137-20	Onsite	Water Table	12/08/2006	6280	53.9	333	579*
MW-137-20	Onsite	Water Table	01/17/2007	540	<8.00	34.5	164
MW-137-20	Onsite	Water Table	02/13/2007	294	1.14	3.97	25.7*
MW-137-20	Onsite	Water Table	03/19/2007	150	<5.00	<5.00	<15.0
MW-137-20	Onsite	Water Table	04/18/2007	321	833	302	1340
MW-137-20	Onsite	Water Table	05/22/2007	89.7	<1.00	15.9	30.3
MW-137-20	Onsite	Water Table	06/20/2007	238	5.07	93.0	267*
MW-137-20	Onsite	Water Table	07/18/2007	99.8	<1.00	13.5	101
MW-137-20	Onsite	Water Table	08/21/2007	309	<10.0	127	564
MW-137-20	Onsite	Water Table	09/20/2007	396	21.0	246	1040*
MW-137-20	Onsite	Water Table	10/18/2007	113E	1.32	132E	259E*
MW-137-20	Onsite	Water Table	11/12/2007	120	61.6	20.3	159
MW-137-20	Onsite	Water Table	12/06/2007	91.8	<1.00	1.30	38.2
MW-137-20	Onsite	Water Table	01/04/2008	164	<1.00	<1.00	37.4
MW-137-20	Onsite	Water Table	02/12/2008	155	<5.00	<5.00	<15.0
MW-137-20	Onsite	Water Table	03/05/2008	148	<1.00	<1.00	17.0
MW-137-20	Onsite	Water Table	04/02/2008	170	<1.00	<1.00	16.0
MW-137-20	Onsite	Water Table	05/07/2008	208	<1.00	13.2	92.8
MW-137-20	Onsite	Water Table	06/10/2008	260	131	121	586
MW-137-20	Onsite	Water Table	07/01/2008	400	80.0	200	1030
MW-137-20	Onsite	Water Table	08/07/2008	1780	202	275	1530
MW-137-20	Onsite	Water Table	09/01/2008	1500	--	--	--
MW-137-20	Onsite	Water Table	10/02/2008	1600	1500	550	2200
MW-137-20	Onsite	Water Table	11/06/2008	740	12.2	299	1170
MW-137-20	Onsite	Water Table	12/04/2008	809	8.39	135	685
MW-137-20	Onsite	Water Table	01/14/2009	363	3.13	10.2	201*

Appendix A-2
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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-137-20	Onsite	Water Table	02/10/2009	355	2.30	4.14	115*
MW-137-20	Onsite	Water Table	03/03/2009	286	<2.00	2.93	69.5*
MW-137-20	Onsite	Water Table	04/10/2009	216	<0.620	<0.620	34.9*
MW-137-20	Onsite	Water Table	05/06/2009	407	21.5	44.5	329*
MW-137-20	Onsite	Water Table	06/05/2009	231	<10.0	35.1	212*
MW-137-20	Onsite	Water Table	07/07/2009	190	<4.00	40.7	220*
MW-137-20	Onsite	Water Table	08/03/2009	178	169	33.5	234*
MW-137-20	Onsite	Water Table	09/02/2009	79.9	2.36	30.7	134*
MW-137-20	Onsite	Water Table	10/02/2009	8.35	<2.00	22.2	49.0*
MW-137-20	Onsite	Water Table	11/03/2009	229	<20.0	<20.0	259*
MW-137-20	Onsite	Water Table	12/01/2009	2260	26.9	106	1570*
MW-137-20	Onsite	Water Table	01/21/2010	60.4	<2.00	<2.00	<4.00*
MW-137-20	Onsite	Water Table	02/17/2010	17.3	<1.00	<1.00	<3.00*
MW-137-20	Onsite	Water Table	03/04/2010	11.0	<2.00	<2.00	<4.00*
MW-137-20	Onsite	Water Table	04/06/2010	6.21	<2.00	<2.00	<4.00*
MW-137-20	Onsite	Water Table	05/14/2010	7.21	<2.00	<2.00	<4.00*
MW-137-20	Onsite	Water Table	07/19/2010	5.25	<1.00	<1.00	<3.00*
MW-137-20	Onsite	Water Table	07/23/2010	9.09	<0.620	3.79	13.2*
MW-137-20	Onsite	Water Table	08/11/2010	7.74	<0.310	3.20	6.09*
MW-137-20	Onsite	Water Table	09/03/2010	13.6	7.90	31.5	101*
MW-137-20	Onsite	Water Table	10/07/2010	7.89	<1.00	17.3	40.7*
MW-137-20	Onsite	Water Table	11/04/2010	4.74	<0.310	7.22	<0.930*
MW-137-20	Onsite	Water Table	04/07/2011	3.34	<1.00	<1.00	<3.00*
MW-137-20	Onsite	Water Table	10/14/2011	2.50	<0.620	11.6	14.9J*
MW-137-20	Onsite	Water Table	05/07/2012	4.89	2.75	1.71	11.2*
MW-137-20	Onsite	Water Table	07/26/2012	2.02	<0.620	7.45	20.6*
MW-137-20	Onsite	Water Table	01/31/2013	0.740J*	<0.620	<0.620	<1.86*
MW-137-20	Onsite	Water Table	04/22/2013	0.380J	<0.620	<0.620	<1.86*
MW-137-20	Onsite	Water Table	07/20/2013	2.31	<0.620	2.83	10.2
MW-137-20	Onsite	Water Table	11/16/2013	<0.200	<0.500	3.73	19.4
MW-137-20	Onsite	Water Table	03/10/2014	1.56	<0.500	<0.500	<1.50
MW-137-20	Onsite	Water Table	04/24/2014	199	519	178	721
MW-137-20	Onsite	Water Table	06/05/2014	26.9	6.39	30.0	140
MW-137-20	Onsite	Water Table	08/13/2014	14.6	<0.500	17.5	93.0
MW-137-20	Onsite	Water Table	11/06/2014	2.42	<0.500	1.11	64.5
MW-137-20	Onsite	Water Table	02/24/2015	2.14	<0.500	0.680J	<1.50
MW-137-20	Onsite	Water Table	08/10/2015	3.28	<0.500	7.34	24.7
MW-137-20	Onsite	Water Table	08/15/2016	9.74	<0.500	6.33	36.5
MW-137-20	Onsite	Water Table	08/02/2017	150	93.4	128	627
MW-137-20	Onsite	Water Table	7/19/2018	732	1910	1100	7140
MW-138-20	Onsite	Water Table	09/11/2002	53000	49000	2300	19500
MW-138-20	Onsite	Water Table	04/29/2003	43000	36000	2600	23000
MW-138-20	Onsite	Water Table	07/10/2003	36000	1800	33000	14000
MW-138-20	Onsite	Water Table	09/10/2004	39200	33700	1960	15600
MW-138-20	Onsite	Water Table	01/29/2005	36600	29900	2670	19800
MW-138-20	Onsite	Water Table	04/17/2007	38900	43900	2100	18100
MW-138-20	Onsite	Water Table	04/04/2008	27000	18000	1700	14500
MW-138-20	Onsite	Water Table	04/08/2009	29200	29100	1420	18500*
MW-138-20	Onsite	Water Table	04/03/2010	28500	17700	1180	13800*
MW-138-20	Onsite	Water Table	02/23/2012	19000	10400	1260	13000
MW-138-20	Onsite	Water Table	05/31/2012	27300	23100	1450	16100
MW-138-20	Onsite	Water Table	04/02/2013	12700	11500	894	17000*

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska**

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-138-20	Onsite	Water Table	04/11/2016	3440	10600	634	15100
MW-139-25	Onsite	10-55	07/19/2001	110	<2.00	97.7	834
MW-139-25	Onsite	10-55	10/09/2001	220	2.20	39.0	1200
MW-139-25	Onsite	10-55	01/09/2002	140	ND	37.0	1070
MW-139-25	Onsite	10-55	04/08/2002	110	ND	35.0	740
MW-139-25	Onsite	10-55	08/14/2002	190	ND	51.0	1130
MW-139-25	Onsite	10-55	10/07/2002	250	ND	45.0	1460
MW-139-25	Onsite	10-55	01/08/2003	92.0	ND	31.0	440
MW-139-25	Onsite	10-55	04/29/2003	110	ND	55.0	540
MW-139-25	Onsite	10-55	07/10/2003	79.0	4.00	50.0	610
MW-139-25	Onsite	10-55	10/05/2003	140	ND	39.0	880
MW-139-25	Onsite	10-55	01/13/2004	78.0	ND	27.0	710
MW-139-25	Onsite	10-55	04/23/2004	80.0	ND	41.0	637
MW-139-25	Onsite	10-55	07/22/2004	96.0	ND	66.0	825
MW-139-25	Onsite	10-55	09/09/2004	180	ND	87.0	1480
MW-139-25	Onsite	10-55	01/29/2005	87.0	ND	ND	223
MW-139-25	Onsite	10-55	04/21/2005	84.0	ND	61.0	766
MW-139-25	Onsite	10-55	07/26/2005	122	ND	109	1210
MW-139-25	Onsite	10-55	07/18/2006	51.8	<0.127	52.0	103*
MW-139-25	Onsite	10-55	10/17/2006	90.9	<0.127	63.4	249*
MW-139-25	Onsite	10-55	01/17/2007	69.0	<1.00	63.0	955
MW-139-25	Onsite	10-55	04/18/2007	72.7	<1.00	64.0	343E
MW-139-25	Onsite	10-55	07/17/2007	60.4	<1.00	58.2	241
MW-139-25	Onsite	10-55	10/16/2007	80.5	<5.00	62.4	1010
MW-139-25	Onsite	10-55	01/04/2008	82.9	<1.00	78.5	830
MW-139-25	Onsite	10-55	04/02/2008	91.0	<5.00	100	1040
MW-139-25	Onsite	10-55	07/01/2008	42.0	<1.00	65.0	553
MW-139-25	Onsite	10-55	10/02/2008	78.0	<5.00	61.0	700
MW-139-25	Onsite	10-55	04/09/2009	141	<0.620	101	904*
MW-139-25	Onsite	10-55	07/07/2009	82.6	<2.00	52.5	488*
MW-139-25	Onsite	10-55	10/01/2009	106	<2.00	66.1	832*
MW-139-25	Onsite	10-55	01/19/2010	99.3	8.25	79.6	610*
MW-139-25	Onsite	10-55	04/02/2010	46.7	3.37	42.4	377*
MW-139-25	Onsite	10-55	07/07/2010	34.4	<1.00	36.1	<21.0*
MW-139-25	Onsite	10-55	10/06/2010	67.8	<1.00	55.7	<41.0*
MW-139-25	Onsite	10-55	02/09/2011	49.2	<0.310	40.6	<6.51*
MW-139-25	Onsite	10-55	04/11/2011	43.7	<1.00	45.7	<11.0*
MW-139-25	Onsite	10-55	08/17/2011	145	<10.6	192	1940
MW-139-25	Onsite	10-55	10/12/2011	47.5	<0.620	41.8	555
MW-139-25	Onsite	10-55	02/14/2012	40.8	<0.620	33.2	478
MW-139-25	Onsite	10-55	05/21/2012	21.7	<0.620	29.5	257
MW-139-25	Onsite	10-55	11/14/2012	36.4	<0.620	36.9	<410*
MW-139-25	Onsite	10-55	05/13/2013	4.17	<0.620	6.96	74.9*
MW-139-25	Onsite	10-55	10/16/2013	36.8	0.410J	23.5	413
MW-139-25	Onsite	10-55	02/28/2014	24.7	<0.500	30.7	184
MW-139-25	Onsite	10-55	07/30/2014	16.0	<0.500	23.5	128
MW-139-25	Onsite	10-55	02/26/2015	6.67	<0.500	3.58	33.4
MW-139-25	Onsite	10-55	07/31/2015	9.91	<0.500	12.1	15.3
MW-139-25	Onsite	10-55	10/02/2015	9.37	<0.500	1.27	17.6
MW-139-25	Onsite	10-55	02/04/2016	4.16J*	<0.500	0.400J	8.07J*
MW-139-25	Onsite	10-55	07/21/2016	1.53	<0.500	0.770J	<1.50
MW-139-25	Onsite	10-55	02/28/2017	4.70	<0.500	2.67	13.9

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-139-25	Onsite	10-55	07/14/2017	<5.43B*	<0.500	6.66	12.7
MW-139-25	Onsite	10-55	10/20/2017	11.3	<1.00	44.2	304
MW-139-25	Onsite	10-55	1/19/2018	12.7	0.310	48.9	396
MW-139-25	Onsite	10-55	4/4/2018	13.4	1.67	38.0	290
MW-139-25	Onsite	10-55	8/8/2018	14.9	<1.00B*	27.0	207
MW-140-25	Onsite	10-55	07/19/2001	<0.500	<2.00	<2.00	<4.00
MW-140-25	Onsite	10-55	10/10/2001	ND	ND	ND	2.10
MW-140-25	Onsite	10-55	01/09/2002	ND	ND	ND	ND
MW-140-25	Onsite	10-55	04/09/2002	ND	ND	ND	ND
MW-140-25	Onsite	10-55	08/14/2002	12.0	ND	ND	ND
MW-140-25	Onsite	10-55	10/07/2002	ND	ND	ND	ND
MW-140-25	Onsite	10-55	01/08/2003	ND	ND	ND	ND
MW-140-25	Onsite	10-55	04/29/2003	ND	ND	ND	ND
MW-140-25	Onsite	10-55	07/10/2003	ND	ND	ND	ND
MW-140-25	Onsite	10-55	10/05/2003	ND	ND	ND	ND
MW-140-25	Onsite	10-55	01/13/2004	ND	ND	ND	ND
MW-140-25	Onsite	10-55	04/23/2004	ND	ND	ND	ND
MW-140-25	Onsite	10-55	07/22/2004	0.700	ND	ND	ND
MW-140-25	Onsite	10-55	09/09/2004	ND	ND	ND	ND
MW-140-25	Onsite	10-55	01/29/2005	ND	ND	ND	ND
MW-140-25	Onsite	10-55	04/22/2005	ND	ND	ND	ND
MW-140-25	Onsite	10-55	07/26/2005	ND	ND	ND	ND
MW-140-25	Onsite	10-55	07/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-140-25	Onsite	10-55	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-140-25	Onsite	10-55	01/17/2007	<1.00	<1.00	<1.00	<3.00
MW-140-25	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-140-25	Onsite	10-55	07/17/2007	<1.00	<1.00	<1.00	<3.00
MW-140-25	Onsite	10-55	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-140-25	Onsite	10-55	01/04/2008	<1.00	<1.00	<1.00	<3.00
MW-140-25	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-140-25	Onsite	10-55	07/01/2008	<1.00	<1.00	<1.00	<2.00
MW-140-25	Onsite	10-55	10/02/2008	0.300J	<1.00	<1.00	<2.00
MW-140-25	Onsite	10-55	01/12/2009	<0.500	<2.00	<2.00	<4.00*
MW-140-25	Onsite	10-55	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-140-25	Onsite	10-55	07/07/2009	<0.500	<2.00	<2.00	<4.00*
MW-140-25	Onsite	10-55	10/01/2009	<0.500	<2.00	<2.00	<4.00*
MW-140-25	Onsite	10-55	01/20/2010	<0.500	<2.00	<2.00	<4.00*
MW-140-25	Onsite	10-55	04/05/2010	<0.500	<2.00	<2.00	<4.00*
MW-140-25	Onsite	10-55	07/07/2010	<0.400	<1.00	<1.00	<3.00*
MW-140-25	Onsite	10-55	10/06/2010	<0.400	<1.00	<1.00	<3.00*
MW-140-25	Onsite	10-55	02/24/2011	<0.400	<1.00	<1.00	<3.00*
MW-140-25	Onsite	10-55	04/07/2011	<0.400	<1.00	<1.00	<3.00*
MW-140-25	Onsite	10-55	10/16/2011	<0.240	<0.620	<0.620	<1.86*
MW-140-25	Onsite	10-55	05/03/2012	<0.240	<0.620	<0.620	<1.86*
MW-140-25	Onsite	10-55	04/27/2013	<0.240	<0.620	<0.620	<1.86*
MW-140-25	Onsite	10-55	10/31/2013	<0.240	<0.620	<0.620	1.08J
MW-140-25	Onsite	10-55	03/21/2014	<0.200	<0.500	<0.500	<1.50
MW-140-25	Onsite	10-55	07/30/2014	<0.200	<0.500	<0.500	<1.50
MW-140-25	Onsite	10-55	07/30/2015	<0.200	<0.500	<0.500	<1.50
MW-140-25	Onsite	10-55	07/21/2016	<0.200	<0.500	<0.500	<1.50
MW-140-25	Onsite	10-55	07/24/2017	<0.200	<0.500	<0.500	<1.50
MW-140-25	Onsite	10-55	1/19/2018	<0.200	<0.500	<0.500	<1.50

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-140-25	Onsite	10-55	8/8/2018	<0.200	<0.500	<0.500	<1.50
MW-141-20	Onsite	Water Table	04/05/2002	ND	ND	ND	ND
MW-141-20	Onsite	Water Table	10/07/2002	ND	ND	ND	ND
MW-141-20	Onsite	Water Table	05/07/2003	ND	ND	ND	ND
MW-141-20	Onsite	Water Table	10/05/2003	ND	ND	ND	ND
MW-141-20	Onsite	Water Table	04/23/2004	ND	ND	ND	ND
MW-141-20	Onsite	Water Table	04/21/2005	ND	ND	ND	ND
MW-141-20	Onsite	Water Table	11/17/2006	<0.226	<0.202	<0.241	<0.223*
MW-141-20	Onsite	Water Table	04/17/2007	<1.00	<1.00	<1.00	<3.00
MW-141-20	Onsite	Water Table	09/19/2007	<1.00	<1.00	<1.00	<3.00*
MW-141-20	Onsite	Water Table	04/03/2008	<1.00	<1.00	<1.00	<2.00
MW-141-20	Onsite	Water Table	09/01/2008	<1.00	--	--	--
MW-141-20	Onsite	Water Table	04/08/2009	<0.150	<0.620	<0.620	<1.24*
MW-141-20	Onsite	Water Table	09/03/2009	<0.500	<2.00	<2.00	<4.00*
MW-141-20	Onsite	Water Table	04/02/2010	<0.400	<1.00	<1.00	<3.00*
MW-141-20	Onsite	Water Table	09/03/2010	<0.400	<1.00	<1.00	<3.00*
MW-141-20	Onsite	Water Table	02/09/2011	<0.400	<1.00	<1.00	<3.00*
MW-141-20	Onsite	Water Table	04/15/2011	<0.400	<1.00	<1.00	<3.00*
MW-141-20	Onsite	Water Table	08/17/2011	<0.226	<0.266	<0.175	<0.364
MW-141-20	Onsite	Water Table	10/14/2011	<0.240	<0.620	<0.620	<1.88
MW-141-20	Onsite	Water Table	02/14/2012	<0.240	<0.620	<0.620	<1.88
MW-141-20	Onsite	Water Table	04/27/2012	<0.240	<0.620	<0.620	<1.88
MW-141-20	Onsite	Water Table	05/17/2012	<0.240	<0.620	<0.620	<1.88
MW-141-20	Onsite	Water Table	11/15/2012	<0.240	<0.620	<0.620	<1.86*
MW-141-20	Onsite	Water Table	05/08/2013	<0.240	<0.620	<0.620	<1.86*
MW-141-20	Onsite	Water Table	05/08/2013	<0.240	<0.620	<0.620	<1.86*
MW-141-20	Onsite	Water Table	03/07/2014	<0.200	<0.500	<0.500	<1.50
MW-141-20	Onsite	Water Table	07/31/2014	<0.200	<0.500	<0.500	<1.50
MW-141-20	Onsite	Water Table	08/03/2015	<0.200	<0.500	<0.500	<1.50
MW-141-20	Onsite	Water Table	02/23/2016	<0.200	<0.500	<0.500	<1.50
MW-141-20	Onsite	Water Table	08/04/2016	<0.200	<0.500	<0.500	<1.50
MW-141-20	Onsite	Water Table	03/01/2017	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	08/13/2001	<1.00	1.20	<1.00	<3.00
MW-142-20	Onsite	Water Table	05/07/2002	110	2.30	ND	ND
MW-142-20	Onsite	Water Table	08/14/2002	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	10/07/2002	9.80	ND	ND	2.40
MW-142-20	Onsite	Water Table	01/08/2003	8.70	ND	ND	ND
MW-142-20	Onsite	Water Table	04/29/2003	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	07/10/2003	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	10/05/2003	5.00	ND	ND	ND
MW-142-20	Onsite	Water Table	01/13/2004	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	04/23/2004	1.00	ND	ND	ND
MW-142-20	Onsite	Water Table	07/22/2004	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	09/09/2004	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	01/29/2005	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	04/21/2005	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	07/26/2005	ND	ND	ND	ND
MW-142-20	Onsite	Water Table	07/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-142-20	Onsite	Water Table	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-142-20	Onsite	Water Table	01/17/2007	<1.00	<1.00	<1.00	<3.00
MW-142-20	Onsite	Water Table	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-142-20	Onsite	Water Table	07/17/2007	<1.00	<1.00	<1.00	<3.00

Appendix A-2
Historical BTEX Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-142-20	Onsite	Water Table	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-142-20	Onsite	Water Table	01/04/2008	<1.00	<1.00	<1.00	<3.00
MW-142-20	Onsite	Water Table	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-142-20	Onsite	Water Table	07/01/2008	<1.00	<1.00	<1.00	<2.00
MW-142-20	Onsite	Water Table	10/02/2008	1.10	<1.00	<1.00	<2.00
MW-142-20	Onsite	Water Table	01/12/2009	0.614	<2.00	<2.00	<4.00*
MW-142-20	Onsite	Water Table	04/08/2009	0.705	<0.620	<0.620	<1.24*
MW-142-20	Onsite	Water Table	07/07/2009	<0.500	<2.00	<2.00	<4.00*
MW-142-20	Onsite	Water Table	10/01/2009	0.512	<2.00	<2.00	<4.00*
MW-142-20	Onsite	Water Table	01/19/2010	0.633	<2.00	<2.00	<4.00*
MW-142-20	Onsite	Water Table	04/02/2010	<0.500	<2.00	<2.00	<4.00*
MW-142-20	Onsite	Water Table	07/07/2010	<0.400	<1.00	<1.00	<3.00*
MW-142-20	Onsite	Water Table	10/06/2010	<0.400	<1.00	<1.00	<3.00*
MW-142-20	Onsite	Water Table	04/08/2011	<0.120	<0.310	<0.310	<0.930*
MW-142-20	Onsite	Water Table	10/18/2011	0.170J	<0.620	<0.620	<1.86*
MW-142-20	Onsite	Water Table	05/03/2012	<0.240	<0.620	<0.620	<1.86*
MW-142-20	Onsite	Water Table	11/12/2012	<0.240	<0.620	<0.620	<1.86*
MW-142-20	Onsite	Water Table	06/12/2013	<0.240	<0.620	<0.620	<1.86*
MW-142-20	Onsite	Water Table	10/15/2013	<0.240	<0.620	<0.620	<1.88
MW-142-20	Onsite	Water Table	02/28/2014	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	09/03/2014	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	02/26/2015	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	07/31/2015	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	08/09/2016	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	08/09/2017	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	11/16/2017	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	2/13/2018	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	4/26/2018	<0.200	<0.500	<0.500	<1.50
MW-142-20	Onsite	Water Table	8/3/2018	<0.200	<0.500	<0.500	<1.50
MW-143-20	Onsite	Water Table	05/16/2006	<0.136	<0.0890	<0.0990	<0.360
MW-143-20	Onsite	Water Table	06/21/2006	ND	ND	ND	ND
MW-143-20	Onsite	Water Table	07/19/2006	<0.114	<0.127	<0.125	<0.118*
MW-143-20	Onsite	Water Table	08/22/2006	<0.114	<0.127	<0.125	<0.118*
MW-143-20	Onsite	Water Table	09/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-143-20	Onsite	Water Table	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-143-20	Onsite	Water Table	11/16/2006	<0.226	<0.202	<0.241	<0.223*
MW-143-20	Onsite	Water Table	12/08/2006	<0.226	<0.202	<0.241	<0.223*
MW-143-20	Onsite	Water Table	01/17/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	02/13/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	03/19/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	04/17/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	05/22/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	06/20/2007	<1.00	<1.00	<1.00	<3.00*
MW-143-20	Onsite	Water Table	07/18/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	08/21/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	09/20/2007	<1.00	<1.00	<1.00	<3.00*
MW-143-20	Onsite	Water Table	10/17/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	11/12/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	12/06/2007	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	01/04/2008	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	03/05/2008	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	04/03/2008	<1.00	<1.00	<1.00	<2.00

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Historical BTEX Analytical Results

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-143-20	Onsite	Water Table	05/07/2008	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	06/10/2008	<1.00	<1.00	<1.00	<3.00
MW-143-20	Onsite	Water Table	07/01/2008	<1.00	<1.00	<1.00	<2.00
MW-143-20	Onsite	Water Table	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-143-20	Onsite	Water Table	01/13/2009	0.931	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	02/09/2009	1.56	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	03/03/2009	1.83	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	04/09/2009	2.21	<0.620	<0.620	<1.24*
MW-143-20	Onsite	Water Table	05/06/2009	2.08	<0.620	<0.620	<1.24*
MW-143-20	Onsite	Water Table	06/08/2009	1.58	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	07/06/2009	1.89	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	08/03/2009	<0.150	<0.620	<0.620	<1.24*
MW-143-20	Onsite	Water Table	09/02/2009	1.40	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	10/01/2009	<0.500	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	11/03/2009	<0.500	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	12/01/2009	<0.500	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	01/21/2010	<0.500	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	03/04/2010	<0.500	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	04/05/2010	<0.500	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	05/03/2010	<0.500	<2.00	<2.00	<4.00*
MW-143-20	Onsite	Water Table	06/14/2010	<0.400	<1.00	<1.00	<3.00*
MW-143-20	Onsite	Water Table	07/23/2010	<0.150	<0.620	<0.620	<1.24*
MW-143-20	Onsite	Water Table	08/10/2010	<0.150	<0.620	<0.620	<1.24*
MW-143-20	Onsite	Water Table	09/03/2010	<0.400	<1.00	<1.00	<3.00*
MW-143-20	Onsite	Water Table	10/05/2010	<0.400	<1.00	<1.00	<3.00*
MW-143-20	Onsite	Water Table	11/04/2010	<0.120	<0.310	<0.310	<0.930*
MW-143-20	Onsite	Water Table	04/08/2011	<0.120	<0.310	<0.310	<0.930*
MW-143-20	Onsite	Water Table	10/20/2011	<0.240	<0.620	<0.620	<1.86*
MW-143-20	Onsite	Water Table	05/03/2012	<0.240	<0.620	<0.620	<1.86*
MW-143-20	Onsite	Water Table	11/15/2012	<0.240	<0.620	<0.620	<1.86*
MW-143-20	Onsite	Water Table	04/18/2013	<0.240	<0.620	<0.620	<1.86*
MW-143-20	Onsite	Water Table	10/15/2013	<0.240	<0.620	<0.620	<1.88
MW-143-20	Onsite	Water Table	02/27/2014	<0.200	<0.500	<0.500	<1.50
MW-143-20	Onsite	Water Table	07/22/2014	<0.200	<0.500	<0.500	<1.50
MW-143-20	Onsite	Water Table	07/24/2015	<0.200	<0.500	<0.500	--
MW-143-20	Onsite	Water Table	07/18/2016	<0.200	<0.500	<0.500	<1.50
MW-143-20	Onsite	Water Table	08/01/2017	<0.200	0.380J	<0.500	<1.50
MW-143-20	Onsite	Water Table	8/3/2018	4.30	<0.500	<0.500	<1.50
MW-144A-25	Onsite	10-55	05/16/2006	<0.136	<0.0890	<0.0990	<0.360
MW-144A-25	Onsite	10-55	06/20/2006	ND	ND	ND	ND
MW-144A-25	Onsite	10-55	07/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-144A-25	Onsite	10-55	08/22/2006	<0.114	<0.127	<0.125	<0.118*
MW-144A-25	Onsite	10-55	09/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-144A-25	Onsite	10-55	10/17/2006	<0.114	<0.127	<0.125	<0.118*
MW-144A-25	Onsite	10-55	11/15/2006	4.55	2.06	<0.241	2.19*
MW-144A-25	Onsite	10-55	12/08/2006	<0.226	<0.202	<0.241	<0.223*
MW-144A-25	Onsite	10-55	01/17/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	02/13/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	03/19/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	05/22/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	06/20/2007	<1.00	<1.00	<1.00	<3.00*

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Historical BTEX Analytical Results

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-144A-25	Onsite	10-55	07/17/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	08/21/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	09/20/2007	<1.00	<1.00	<1.00	<3.00*
MW-144A-25	Onsite	10-55	10/16/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	11/12/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	12/06/2007	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	01/04/2008	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	03/05/2008	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-144A-25	Onsite	10-55	05/07/2008	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	06/10/2008	<1.00	<1.00	<1.00	<3.00
MW-144A-25	Onsite	10-55	07/01/2008	<1.00	<1.00	<1.00	<2.00
MW-144A-25	Onsite	10-55	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-144A-25	Onsite	10-55	04/09/2009	<0.150	<0.620	<0.620	<1.24*
MW-144A-25	Onsite	10-55	07/07/2009	<0.500	<2.00	<2.00	<4.00*
MW-144A-25	Onsite	10-55	10/02/2009	1.56	5.55	<2.00	<4.00*
MW-144A-25	Onsite	10-55	01/19/2010	<0.500	<2.00	<2.00	<4.00*
MW-144A-25	Onsite	10-55	04/02/2010	<0.500	<2.00	<2.00	<4.00*
MW-144A-25	Onsite	10-55	07/23/2010	<0.150	<0.620	<0.620	<1.24*
MW-144A-25	Onsite	10-55	10/05/2010	<0.400	<1.00	<1.00	<3.00*
MW-144A-25	Onsite	10-55	02/08/2011	<0.400	<1.00	<1.00	<3.00*
MW-144A-25	Onsite	10-55	04/26/2011	<0.400	<1.00	<1.00	<3.00*
MW-144A-25	Onsite	10-55	10/14/2011	<0.240	<0.620	<0.620	<1.86*
MW-144A-25	Onsite	10-55	05/02/2012	<0.240	<0.620	<0.620	<1.86*
MW-144A-25	Onsite	10-55	11/14/2012	<0.240	<0.620	<0.620	<1.86*
MW-144A-25	Onsite	10-55	04/27/2013	<0.240	<0.620	<0.620	<1.86*
MW-144A-25	Onsite	10-55	10/30/2013	<0.240	<0.620	<0.620	<1.88
MW-144A-25	Onsite	10-55	03/21/2014	<0.200	<0.500	<0.500	<1.50
MW-144A-25	Onsite	10-55	07/30/2014	<0.200	<0.500	<0.500	<1.50
MW-144A-25	Onsite	10-55	07/24/2015	<0.200	<0.500	<0.500	<1.50
MW-144A-25	Onsite	10-55	07/21/2016	<0.200	<0.500	<0.500	<1.50
MW-144A-25	Onsite	10-55	07/14/2017	<0.600B*	<0.500	<0.500	1.11J
MW-145-20	Onsite	Water Table	05/16/2006	<0.136	<0.0890	<0.0990	<0.360
MW-145-20	Onsite	Water Table	06/21/2006	ND	ND	ND	ND
MW-145-20	Onsite	Water Table	07/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-145-20	Onsite	Water Table	08/22/2006	<0.114	<0.127	<0.125	<0.118*
MW-145-20	Onsite	Water Table	09/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-145-20	Onsite	Water Table	10/18/2006	<0.114	<0.127	<0.125	<0.118*
MW-145-20	Onsite	Water Table	11/16/2006	<0.226	<0.202	<0.241	<0.223*
MW-145-20	Onsite	Water Table	12/08/2006	<0.226	<0.202	<0.241	<0.223*
MW-145-20	Onsite	Water Table	01/17/2007	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	02/13/2007	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	03/19/2007	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	04/18/2007	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	05/22/2007	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	06/20/2007	<1.00	<1.00	<1.00	<3.00*
MW-145-20	Onsite	Water Table	07/17/2007	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	08/21/2007	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	09/20/2007	<1.00	<1.00	<1.00	<3.00*
MW-145-20	Onsite	Water Table	10/18/2007	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	11/12/2007	<1.00	1.01	<1.00	<3.00
MW-145-20	Onsite	Water Table	12/06/2007	1.00	1.81	<1.00	<3.00

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-145-20	Onsite	Water Table	03/05/2008	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	04/02/2008	<1.00	<1.00	<1.00	<2.00
MW-145-20	Onsite	Water Table	05/07/2008	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	06/10/2008	<1.00	<1.00	<1.00	<3.00
MW-145-20	Onsite	Water Table	07/01/2008	<1.00	<1.00	<1.00	<2.00
MW-145-20	Onsite	Water Table	10/02/2008	<1.00	<1.00	<1.00	<2.00
MW-145-20	Onsite	Water Table	01/14/2009	<0.500	<2.00	<2.00	<4.00*
MW-145-20	Onsite	Water Table	04/10/2009	<0.150	<0.620	<0.620	<1.24*
MW-145-20	Onsite	Water Table	07/07/2009	<0.500	<2.00	<2.00	<4.00*
MW-145-20	Onsite	Water Table	10/02/2009	<0.500	<2.00	<2.00	<4.00*
MW-145-20	Onsite	Water Table	01/21/2010	<0.500	<2.00	<2.00	<4.00*
MW-145-20	Onsite	Water Table	04/06/2010	<0.500	<2.00	<2.00	<4.00*
MW-145-20	Onsite	Water Table	07/22/2010	<0.500	<2.00	<2.00	<4.00*
MW-145-20	Onsite	Water Table	10/07/2010	<0.400	<1.00	<1.00	<3.00*
MW-145-20	Onsite	Water Table	02/10/2011	<0.400	<1.00	<1.00	<3.00*
MW-145-20	Onsite	Water Table	04/07/2011	<0.400	<1.00	<1.00	<3.00*
MW-145-20	Onsite	Water Table	10/19/2011	0.170J	<0.620	<0.620	<1.86*
MW-145-20	Onsite	Water Table	05/03/2012	<0.240	<0.620	<0.620	<1.86*
MW-145-20	Onsite	Water Table	07/26/2012	<0.240	<0.620	<0.620	<1.86*
MW-145-20	Onsite	Water Table	11/15/2012	<0.240	<0.620	<0.620	<1.86*
MW-145-20	Onsite	Water Table	01/31/2013	<0.240	<0.620	<0.620	<1.86*
MW-145-20	Onsite	Water Table	04/27/2013	<0.240	<0.620	<0.620	<1.86*
MW-145-20	Onsite	Water Table	07/20/2013	<0.240	<0.620	<0.620	<1.88
MW-145-20	Onsite	Water Table	10/19/2013	<0.240	<0.620	<0.620	<1.88
MW-145-20	Onsite	Water Table	03/02/2014	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	06/17/2014	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	08/13/2014	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	11/06/2014	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	02/24/2015	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	08/10/2015	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	08/10/2016	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	08/10/2017	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	11/16/2017	<0.860B*	7.21	<1.45B*	<11.1B*
MW-145-20	Onsite	Water Table	2/15/2018	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	4/5/2018	<0.200	<0.500	<0.500	<1.50
MW-145-20	Onsite	Water Table	8/3/2018	<0.200	<0.500	<0.500	<1.50
MW-146A-15	Onsite	Water Table	10/05/2008	<0.500	<2.00	<2.00	<4.00*
MW-147A-15	Onsite	Water Table	10/05/2008	<0.500	<2.00	<2.00	<4.00*
MW-148A-15	Offsite	Water Table	10/04/2008	<0.500	<2.00	<2.00	<4.00*
MW-148A-15	Offsite	Water Table	04/21/2009	<0.150	<0.620	<0.620	<1.24*
MW-148A-15	Offsite	Water Table	04/08/2011	<0.120	<0.310	<0.310	<0.930*
MW-148A-15	Offsite	Water Table	08/18/2011	<0.226	<0.266	<0.175	<0.364
MW-148A-15	Offsite	Water Table	10/07/2011	<0.240	<0.620	<0.620	<1.88
MW-148A-15	Offsite	Water Table	02/12/2012	<0.240	<0.620	<0.620	<1.88
MW-148A-15	Offsite	Water Table	05/03/2012	<0.240	<0.620	<0.620	<1.86*
MW-148A-15	Offsite	Water Table	10/22/2012	<0.240	<0.620	<0.620	<1.86*
MW-148A-15	Offsite	Water Table	05/06/2013	<0.240	<0.620	<0.620	<1.86*
MW-148A-15	Offsite	Water Table	10/11/2013	<0.240	<0.620	<0.620	<1.88
MW-148A-15	Offsite	Water Table	04/09/2014	<0.200	<0.500	<0.500	<1.50
MW-148A-15	Offsite	Water Table	08/04/2014	<0.200	<0.500	<0.500	<1.50
MW-148A-15	Offsite	Water Table	07/17/2015	<0.200	<0.500	<0.500	<1.50
MW-148B-30	Offsite	10-55	04/21/2009	<0.150	<0.620	<0.620	<1.24*

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-148B-30	Offsite	10-55	04/08/2011	<0.120	<0.310	<0.310	<0.930*
MW-148B-30	Offsite	10-55	10/07/2011	<0.240	<0.620	<0.620	<1.86*
MW-148B-30	Offsite	10-55	05/01/2012	<0.240	<0.620	<0.620	<1.86*
MW-148B-30	Offsite	10-55	11/11/2012	<0.240	<0.620	<0.620	<1.86*
MW-148B-30	Offsite	10-55	04/15/2013	<0.240	<0.620	<0.620	<1.86*
MW-148B-30	Offsite	10-55	10/11/2013	<0.240	<0.620	<0.620	<1.88
MW-149A-15	Onsite	Water Table	10/04/2008	<0.500	<2.00	<2.00	<4.00*
MW-149A-15	Onsite	Water Table	04/21/2009	<0.150	<0.620	<0.620	<1.24*
MW-149A-15	Onsite	Water Table	04/18/2011	<0.400	<1.00	<1.00	<3.00*
MW-149A-15	Onsite	Water Table	08/18/2011	<0.226	<0.266	<0.175	<0.364
MW-149A-15	Onsite	Water Table	10/13/2011	<0.240	<0.620	<0.620	<1.88
MW-149A-15	Onsite	Water Table	02/12/2012	<0.240	<0.620	<0.620	<1.88
MW-149A-15	Onsite	Water Table	05/17/2012	<0.240	<0.620	<0.620	<1.88
MW-149A-15	Onsite	Water Table	11/10/2012	<0.240	<0.620	<0.620	<1.56J*
MW-149A-15	Onsite	Water Table	04/10/2013	<0.240	<0.620	<0.620	<1.86*
MW-149A-15	Onsite	Water Table	10/09/2013	<0.240	<0.620	<0.620	<1.88
MW-149A-15	Onsite	Water Table	03/24/2014	<0.200	<0.500	<0.500	<1.50
MW-149A-15	Onsite	Water Table	07/26/2014	<0.200	<0.500	<0.500	<1.50
MW-149A-15	Onsite	Water Table	07/17/2015	<0.200	<0.500	<0.500	<1.50
MW-149A-15	Onsite	Water Table	07/10/2017	<0.200	<0.500	<0.500	<1.50
MW-149B-20	Onsite	Water Table	04/21/2009	<0.150	<0.620	<0.620	<1.24*
MW-149B-20	Onsite	Water Table	04/18/2011	<0.400	<1.00	<1.00	<3.00*
MW-149B-20	Onsite	Water Table	10/13/2011	<0.240	<0.620	<0.620	<1.86*
MW-149B-20	Onsite	Water Table	05/17/2012	<0.240	<0.620	<0.620	<1.88
MW-149B-20	Onsite	Water Table	11/10/2012	<0.240	<0.620	<0.620	<1.86*
MW-149B-20	Onsite	Water Table	04/10/2013	<0.240	<0.620	<0.620	<1.86*
MW-149B-20	Onsite	Water Table	10/09/2013	<0.240	<0.620	<0.620	<1.88
MW-153A-15	Offsite	Water Table	04/13/2011	<0.120	<0.310	<0.310	<0.930*
MW-153A-15	Offsite	Water Table	08/18/2011	<0.226	<0.266	<0.175	<0.364
MW-153A-15	Offsite	Water Table	10/12/2011	<0.240	<0.620	<0.620	<1.88
MW-153A-15	Offsite	Water Table	02/13/2012	<0.240	<0.620	<0.620	<1.88
MW-153A-15	Offsite	Water Table	05/10/2012	<0.240	<0.620	<0.620	<1.88
MW-153A-15	Offsite	Water Table	11/14/2012	<0.240	<0.620	<0.620	<1.86*
MW-153A-15	Offsite	Water Table	04/09/2013	<0.240	<0.620	<0.620	<1.86*
MW-153A-15	Offsite	Water Table	10/11/2013	<0.240	<0.620	<0.620	<1.88
MW-153A-15	Offsite	Water Table	04/10/2014	<0.200	<0.500	<0.500	<1.50
MW-153A-15	Offsite	Water Table	10/10/2014	<0.200	<0.500	<0.500	<1.50
MW-153B-55	Offsite	10-55	04/13/2011	<0.120	<0.310	<0.310	<0.930*
MW-153B-55	Offsite	10-55	10/12/2011	<0.240	<0.620	<0.620	<1.86*
MW-153B-55	Offsite	10-55	11/14/2012	<0.240	<0.620	<0.620	<1.86*
MW-153B-55	Offsite	10-55	05/09/2013	<0.240	<0.620	<0.620	<1.86*
MW-153B-55	Offsite	10-55	10/11/2013	<0.240	<0.620	<0.620	<1.88
MW-154A-75	Onsite	55-90	11/15/2012	<0.240	<0.620	<0.620	<1.86*
MW-154A-75	Onsite	55-90	02/01/2013	<0.240	<0.620	<0.620	<1.86*
MW-154A-75	Onsite	55-90	05/20/2013	0.290J	0.360J	0.320J	<1.86*
MW-154A-75	Onsite	55-90	11/17/2013	<0.240	0.390J	<0.620	<1.88
MW-154B-95	Onsite	55-90	11/15/2012	<0.240	<0.620	<0.620	<1.86*
MW-154B-95	Onsite	55-90	02/01/2013	0.150J	<1.00B*	<0.620	<1.86*
MW-154B-95	Onsite	55-90	05/17/2013	<0.240	<0.620	<0.620	<1.86*
MW-154B-95	Onsite	55-90	10/17/2013	<0.240	0.310J	<0.620	<1.88
MW-154B-95	Onsite	55-90	8/7/2018	11.0	<0.500	3.65	<1.50
MW-173A-15	Onsite	Water Table	04/09/2010	<0.400	<1.00	<1.00	<3.00*

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-173B-150	Onsite	90-160	04/09/2010	<0.400	<1.00	<1.00	<3.00*
MW-174-15	Onsite	Water Table	04/04/2013	0.490	0.740J	<0.620	1.25J*
MW-174-15	Onsite	Water Table	10/23/2013	<0.240	<0.620	<0.620	<1.88
MW-174B-90	Onsite	55-90	02/14/2012	<0.240	<0.620	<0.620	<1.88
MW-175-90	Onsite	55-90	11/14/2012	<0.240	<0.620	<0.620	<1.86*
MW-175-90	Onsite	55-90	02/05/2013	<0.240	<0.620	<0.620	<1.86*
MW-175-90	Onsite	55-90	11/04/2013	<0.240	<0.620	<0.620	<1.88
MW-176A-15	Onsite	Water Table	05/22/2012	295	362	130	803
MW-176A-15	Onsite	Water Table	12/12/2012	116	63.8	92.5	694*
MW-176A-15	Onsite	Water Table	04/02/2013	180	187	131	896*
MW-176A-15	Onsite	Water Table	11/11/2013	76.8	78.6	150	1140
MW-176A-15	Onsite	Water Table	07/13/2017	139	7.61	28.7	164
MW-176B-50	Onsite	10-55	12/12/2012	<0.240	<0.620	<0.620	<1.86*
MW-176B-50	Onsite	10-55	01/12/2013	<0.240	<0.620	<0.620	<1.86*
MW-176C-90	Onsite	55-90	12/12/2012	<0.240	0.330J	<0.620	<1.86*
MW-176C-90	Onsite	55-90	01/14/2013	<0.240	<0.620	<0.620	<1.86*
MW-178B-50	Onsite	10-55	12/13/2012	<0.240	<0.620	<0.620	<1.86*
MW-178C-90	Onsite	55-90	12/13/2012	<0.240	<0.620	<0.620	<1.86*
MW-179A-15	Onsite	Water Table	10/11/2011	0.220J	<0.620	<0.620	<1.81J*
MW-179A-15	Onsite	Water Table	11/12/2013	<0.200	0.320J	<0.500	1.04J
MW-179A-15	Onsite	Water Table	08/14/2014	2.55	<0.500	<0.500	<1.50
MW-179A-15	Onsite	Water Table	08/06/2015	<0.200	<0.500	<0.500	<1.50
MW-179A-15	Onsite	Water Table	08/12/2016	<0.200	<0.500	<0.500	<1.50
MW-179B-50	Onsite	10-55	08/09/2013	<0.240	<0.620	<0.620	<1.88
MW-179C-90	Onsite	55-90	08/09/2013	<0.240	<0.620	<0.620	<1.88
MW-180A-15	Onsite	Water Table	11/04/2011	4.51	<0.620	18.9	30.7*
MW-180A-15	Onsite	Water Table	11/12/2012	0.210J	2.06	24.1	77.4*
MW-180A-15	Onsite	Water Table	11/11/2013	0.930	1.96	34.4J*	57.6J*
MW-180A-15	Onsite	Water Table	03/25/2014	0.148J	<0.500	9.02	14.6
MW-180A-15	Onsite	Water Table	08/13/2014	0.680	<0.500	44.7	114
MW-180A-15	Onsite	Water Table	08/07/2015	0.450	<0.500	1.72	4.09
MW-180A-15	Onsite	Water Table	08/12/2016	0.380J	<0.500	5.27	8.28
MW-180A-15	Onsite	Water Table	08/16/2017	1.55	<0.500	3.07	7.65
MW-180A-15	Onsite	Water Table	11/15/2017	1.51	<0.500	11.1	23.3
MW-180A-15	Onsite	Water Table	2/14/2018	3.24	<0.500	2.76	5.55JH*
MW-180A-15	Onsite	Water Table	4/11/2018	<0.400B*	<0.500	1.81JH*	<4.03B*
MW-180A-15	Onsite	Water Table	8/8/2018	0.180J	<0.500	2.00J*	3.86J*
MW-180B-50	Onsite	10-55	11/12/2012	<0.240	<0.620	<0.620	<1.86*
MW-180C-90	Onsite	55-90	11/12/2012	<0.240	<0.620	<0.620	<1.86*
MW-186A-15	Onsite	Water Table	05/24/2013	58.3	1.04	75.2	269*
MW-186A-15	Onsite	Water Table	11/05/2013	2.19	<0.620	17.4	117
MW-186A-15	Onsite	Water Table	08/05/2015	<0.200	<0.500	0.620J	8.90
MW-186B-60	Onsite	10-55	11/15/2012	<0.240	<0.620	<0.620	<1.86*
MW-186B-60	Onsite	10-55	01/12/2013	<0.240	<0.620	<0.620	<1.86*
MW-186B-60	Onsite	10-55	05/22/2013	<0.400B*	0.320J	0.310J	<1.86*
MW-186B-60	Onsite	10-55	11/05/2013	<0.240	<0.620	<0.620	<1.88
MW-186E-75	Onsite	55-90	05/22/2013	<0.400B*	0.340J	0.340J	<1.86*
MW-186E-75	Onsite	55-90	11/05/2013	0.720	0.440J	0.530J	2.05J
MW-186C-100	Onsite	55-90	11/12/2012	<0.240	<0.620	<0.620	<1.86*
MW-186C-100	Onsite	55-90	02/28/2013	<0.240	<0.620	<0.620	<1.86*
MW-192A-15	Onsite	Water Table	05/05/2012	<0.240	<0.620	<0.620	<1.86*
MW-192A-15	Onsite	Water Table	04/27/2013	<0.240	<0.620	<0.620	<1.86*

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-192A-15	Onsite	Water Table	08/20/2014	<0.200	<0.500	<0.500	<1.50
MW-192A-15	Onsite	Water Table	08/04/2015	<0.200	<0.500	<0.500	<1.50
MW-192A-15	Onsite	Water Table	10/02/2015	<0.200	<0.500	<0.500	<1.50
MW-192A-15	Onsite	Water Table	07/26/2016	<0.200	<0.500	<0.500	<1.50
MW-192A-15	Onsite	Water Table	08/16/2017	<0.200	<0.500	<0.500	<1.50
MW-192A-15	Onsite	Water Table	11/15/2017	<0.200J*	<0.500J*	<0.500J*	<1.50J*
MW-192A-15	Onsite	Water Table	2/15/2018	<0.200	<0.500	<0.500	<1.50
MW-192A-15	Onsite	Water Table	4/10/2018	<0.200	<0.500	<0.500	<1.50
MW-192A-15	Onsite	Water Table	8/7/2018	<0.200	<0.500	<0.500	<1.50
MW-196-15	Onsite	Water Table	05/04/2012	<0.240	<0.620	<0.620	<1.86*
MW-196-15	Onsite	Water Table	06/06/2013	<0.240	<0.620	<0.620	<1.86*
MW-196-15	Onsite	Water Table	08/20/2014	<0.200	<0.500	<0.500	<1.50
MW-196-15	Onsite	Water Table	08/04/2015	<0.200	<0.500	<0.500	<1.50
MW-196-15	Onsite	Water Table	08/09/2016	<0.200	<0.500	<0.500	<1.50
MW-199-150	Onsite	90-160	10/30/2013	<0.240	<0.620	<0.620	<1.88
MW-301-CMT-10	Onsite	Water Table	07/30/2015	<0.200	<0.500	<0.500	<1.50
MW-301-CMT-10	Onsite	Water Table	07/15/2016	<0.200	<0.500	<0.500	<1.50
MW-301-CMT-20	Onsite	Water Table	07/30/2015	<0.200	<0.500	<0.500	<1.50
MW-301-CMT-20	Onsite	Water Table	07/15/2016	<0.200	<0.500	<0.500	<1.50
MW-302-CMT-10	Onsite	Water Table	07/21/2015	<0.200	<0.500	<0.500	<1.50
MW-302-CMT-10	Onsite	Water Table	07/14/2016	<0.200	<0.500	<0.500	<1.50
MW-302-CMT-20	Onsite	Water Table	07/21/2015	<0.200	<0.500	<0.500	<1.50
MW-302-CMT-20	Onsite	Water Table	07/14/2016	<0.200	<0.500	<0.500	<1.50
MW-303-CMT-9	Onsite	Water Table	07/29/2015	<0.200	<0.500	<0.500	<1.50
MW-303-CMT-9	Onsite	Water Table	07/14/2016	<0.200	<0.500	<0.500	<1.50
MW-303-CMT-19	Onsite	Water Table	07/29/2015	<0.200	<0.500	<0.500	<1.50
MW-303-CMT-19	Onsite	Water Table	07/14/2016	<0.200	<0.500	<0.500	<1.50
MW-303-CMT-19	Onsite	Water Table	07/28/2017	<0.200	<0.500	<0.500	<1.50
MW-303-CMT-39	Onsite	10-55	8/2/2018	7.01	<0.500	<0.500	<1.50
MW-304-CMT-10	Onsite	Water Table	08/01/2015	<0.200	<0.500	<0.500	<1.50
MW-304-CMT-10	Onsite	Water Table	07/21/2016	<0.200	<0.500	<0.500	<1.50
MW-304-15	Onsite	Water Table	07/28/2015	<0.200	<0.500	<0.500	<1.50
MW-304-15	Onsite	Water Table	07/22/2016	<0.200	<0.500	<0.500	<1.50
MW-304-CMT-20	Onsite	Water Table	08/01/2015	<0.200	<0.500	<0.500	<1.50
MW-304-CMT-20	Onsite	Water Table	10/02/2015	<0.200	<0.500	<0.500	<1.50
MW-304-CMT-20	Onsite	Water Table	07/21/2016	<0.200	<0.500	<0.500	<1.50
MW-304-CMT-20	Onsite	Water Table	07/28/2017	<0.200	<0.500	<0.500	<1.50
MW-304-CMT-40	Onsite	10-55	10/02/2015	<0.200	<0.500	<0.500	<1.50
MW-304-CMT-60	Onsite	10-55	10/02/2015	<0.200	<0.500	<0.500	<1.50
MW-305-CMT-28	Onsite	10-55	07/27/2017	<0.200	<0.500	<0.500	<1.50
MW-309-15	Onsite	Water Table	05/16/2013	<0.240	<0.620	<0.620	<1.86*
MW-309-15	Onsite	Water Table	10/22/2013	<0.240	<0.620	<0.620	<1.88
MW-309-15	Onsite	Water Table	03/03/2014	<0.200	<0.500	<0.500	<1.50
MW-309-15	Onsite	Water Table	08/02/2014	<0.200	<0.500	<0.500	<1.50
MW-309-15	Onsite	Water Table	02/26/2015	<0.200	<0.500	<0.500	<1.50
MW-309-15	Onsite	Water Table	07/29/2015	<0.200	<0.500	<0.500	<1.50
MW-309-15	Onsite	Water Table	07/19/2016	<0.200	<0.500	<0.500	<1.50
MW-309-66	Onsite	10-55	05/16/2013	<0.240	<0.620	<0.620	<1.86*
MW-309-66	Onsite	10-55	10/22/2013	<0.240	<0.620	<0.620	<1.88
MW-321-15	Onsite	Water Table	04/22/2013	58.2	<0.620	<0.620	<1.86*
MW-321-15	Onsite	Water Table	10/25/2013	53.4	<0.620	<0.620	<1.88
MW-321-15	Onsite	Water Table	02/28/2014	52.3	0.360J	<0.500	<1.50

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-321-15	Onsite	Water Table	08/29/2014	32.7	<0.500	<0.500	<1.50
MW-321-15	Onsite	Water Table	08/03/2015	87.1	<1.00B*	<0.500	<1.50
MW-321-15	Onsite	Water Table	02/17/2016	210	<1000B*	0.880J	33.1
MW-321-15	Onsite	Water Table	08/11/2016	138	1.15	0.360J	4.42
MW-321-15	Onsite	Water Table	02/28/2017	175	0.320J	<0.500	8.02
MW-321-15	Onsite	Water Table	08/08/2017	140	0.880J	<0.500	1.09J
MW-321-15	Onsite	Water Table	11/15/2017	181	<0.500	<0.500	2.08J
MW-321-15	Onsite	Water Table	2/15/2018	142	<0.500	<0.500	1.11J
MW-321-15	Onsite	Water Table	4/10/2018	151	<0.500	<0.500	<1.50
MW-321-15	Onsite	Water Table	8/7/2018	127	2.96JH*	1.78	2.49J
MW-334-15	Onsite	Water Table	12/13/2012	<0.240	6340	745	4030*
MW-334-15	Onsite	Water Table	01/31/2013	2430	4420	610	3480*
MW-334-15	Onsite	Water Table	04/01/2013	3690	5730	859	4650*
MW-334-15	Onsite	Water Table	07/23/2013	6010	10800	1090	6390
MW-334-15	Onsite	Water Table	11/07/2013	649	1580	326	1820
MW-334-15	Onsite	Water Table	04/21/2014	337	1000	169	1010
MW-334-15	Onsite	Water Table	07/25/2017	854	2800	814	5010
MW-334-65	Onsite	10-55	12/13/2012	0.290J	0.490J	<0.620	<1.86*
MW-334-65	Onsite	10-55	01/31/2013	<0.240	<0.620	<0.620	<1.86*
MW-334-65	Onsite	10-55	05/21/2013	<0.720B*	0.620J	<0.620	1.14J*
MW-334-65	Onsite	10-55	11/06/2013	<0.240	<0.620	<0.620	<1.88
MW-336-15	Onsite	Water Table	10/09/2013	14900	3360	700J	8350
MW-336-20	Onsite	Water Table	10/09/2013	15300	<620	<620	4720
MW-336-20	Onsite	Water Table	08/26/2014	24600	1290	500	9590
MW-336-20	Onsite	Water Table	10/30/2014	23700	326	483	9280
MW-336-20	Onsite	Water Table	08/11/2015	14500	337	192	6510
MW-336-20	Onsite	Water Table	08/15/2016	<0.200	6510	1960	12200
MW-336-20	Onsite	Water Table	08/15/2017	16400	3840	676	10800
MW-336-20	Onsite	Water Table	11/15/2017	18700	152	394	6640
MW-336-20	Onsite	Water Table	2/15/2018	14800	<50.0	284	6830
MW-336-20	Onsite	Water Table	4/11/2018	18600	182	563	9200
MW-336-20	Onsite	Water Table	8/8/2018	23800	108J	920	13000
MW-336-35	Onsite	10-55	10/09/2013	28.1	1.15	<0.620	5.09
MW-336-35	Onsite	10-55	08/26/2014	55.0	<0.500	<0.500	<1.50
MW-336-35	Onsite	10-55	10/30/2014	27.1	<0.500	<0.500	<1.50
MW-336-35	Onsite	10-55	08/11/2015	14.4	<0.500	<0.500	<1.50
MW-336-35	Onsite	10-55	10/02/2015	46.1	<0.500	2.04	<3.00B*
MW-336-35	Onsite	10-55	08/15/2016	76.8	<0.500	1.09	3.50
MW-336-55	Onsite	10-55	10/09/2013	1.09	<0.620	<0.620	<1.88
MW-336-55	Onsite	10-55	08/26/2014	1.00	<0.500	<0.500	<1.50
MW-336-55	Onsite	10-55	10/30/2014	<0.200	<0.500	<0.500	<1.50
MW-336-55	Onsite	10-55	08/11/2015	0.580J*	<0.500	<0.500	<1.50
MW-336-55	Onsite	10-55	10/02/2015	<0.200	<0.500	<0.500	<1.50
MW-336-55	Onsite	10-55	08/15/2016	<0.200	<0.500	<0.500	<1.50
MW-337-20	Onsite	Water Table	06/05/2014	7390	1770	239	2420
MW-337-20	Onsite	Water Table	08/26/2014	18600	7380	1030	8400
MW-337-20	Onsite	Water Table	10/30/2014	17400	5310	894	8300
MW-337-20	Onsite	Water Table	08/11/2015	16900	7320	847	9180
MW-337-20	Onsite	Water Table	08/17/2016	<0.200	<0.500	1530	14300
MW-344-15	Onsite	Water Table	10/22/2013	2.45	<0.620	<0.620	<1.88
MW-344-15	Onsite	Water Table	02/27/2014	<0.200	<0.500	<0.500	<1.50
MW-344-15	Onsite	Water Table	07/31/2014	0.760	<0.500	<0.500	<1.50

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-344-15	Onsite	Water Table	02/19/2015	<0.200	<0.500	<0.500	<1.50
MW-344-15	Onsite	Water Table	07/30/2015	<0.200	<0.500	<0.500	<1.50
MW-344-15	Onsite	Water Table	08/11/2016	<0.200	<0.500	<0.500	<1.50
MW-344-15	Onsite	Water Table	07/24/2017	<0.200	<0.500	<0.500	<1.50
MW-344-15	Onsite	Water Table	1/19/2018	<0.200	<0.500	<0.500	<1.50
MW-344-55	Onsite	10-55	01/27/2014	<0.200	<0.500	<0.500	<1.50
MW-344-55	Onsite	10-55	07/31/2014	<0.200	<0.500	<0.500	<1.50
MW-344-55	Onsite	10-55	02/19/2015	0.300J	<0.500	<0.500	<1.50
MW-344-55	Onsite	10-55	07/30/2015	<0.200	<0.500	<0.500	<1.50
MW-344-55	Onsite	10-55	02/16/2016	2.31	<0.500	<0.500	<1.50
MW-344-55	Onsite	10-55	08/11/2016	<0.200	<0.500	<0.500	<1.50
MW-344-55	Onsite	10-55	02/28/2017	<0.200	<0.500	<0.500	<1.50
MW-345-15	Onsite	Water Table	10/22/2013	10.9	<0.620	0.780J	1.55J
MW-345-15	Onsite	Water Table	02/27/2014	<0.200	<0.500	<0.500	<1.50
MW-345-15	Onsite	Water Table	07/31/2014	0.880	<0.500	0.840J	<1.50
MW-345-15	Onsite	Water Table	02/25/2015	<0.200	<0.500	<0.500	<1.50
MW-345-15	Onsite	Water Table	07/24/2015	<0.200	<0.500	<0.500	<1.50
MW-345-15	Onsite	Water Table	07/22/2016	<0.200	<0.500	<0.500	<1.50
MW-345-15	Onsite	Water Table	07/24/2017	150	15.8	20.4	123
MW-345-15	Onsite	Water Table	10/24/2017	950	0.640J	155	624
MW-345-15	Onsite	Water Table	2/12/2018	626	0.470J	102	532
MW-345-15	Onsite	Water Table	4/4/2018	617	1.17	95.7	457
MW-345-15	Onsite	Water Table	7/19/2018	501	<0.500	67.9	361
MW-345-55	Onsite	10-55	01/27/2014	<0.200	<0.500	<0.500	<1.50
MW-345-55	Onsite	10-55	07/31/2014	<0.200	<0.500	<0.500	<1.50
MW-345-55	Onsite	10-55	02/25/2015	<0.200	<0.500	<0.500	<1.50
MW-345-55	Onsite	10-55	07/24/2015	<0.200	<0.500	<0.500	<1.50
MW-345-55	Onsite	10-55	07/22/2016	<0.200	<0.500	<0.500	<1.50
MW-348-15	Onsite	Water Table	08/15/2013	6.53	0.310J	76.2	295
MW-348-65	Onsite	10-55	08/15/2013	<0.240	<0.620	<0.620	<1.88
MW-351-15	Onsite	Water Table	02/27/2014	<0.200	<0.500	<0.500	<1.50
MW-351-15	Onsite	Water Table	07/23/2014	<0.200	<0.500	<0.500	<1.50
MW-351-15	Onsite	Water Table	02/20/2015	<0.200	<0.500	<0.500	<1.50
MW-351-15	Onsite	Water Table	08/03/2015	<0.200	<0.500	<0.500	<1.50
MW-351-15	Onsite	Water Table	07/19/2016	<0.200	<0.500	<0.500	<1.50
MW-351-15	Onsite	Water Table	08/01/2017	<0.200	<0.500	<0.500	<1.50
MW-351-55	Onsite	10-55	02/27/2014	<0.200	<0.500	<0.500	<1.50
MW-351-55	Onsite	10-55	07/23/2014	<0.200	<0.500	<0.500	<1.50
MW-351-55	Onsite	10-55	02/20/2015	<0.200	<0.500	<0.500	<1.50
MW-351-55	Onsite	10-55	08/03/2015	<0.200	<0.500	<0.500	<1.50
MW-351-55	Onsite	10-55	07/19/2016	<0.200	<0.500	<0.500	<1.50
MW-354-35	Onsite	10-55	10/11/2013	<0.240	<0.620	4.04	24.0
MW-354-65	Onsite	10-55	10/11/2013	<0.240	<0.620	<0.620	<1.88
MW-355-15	Onsite	Water Table	11/25/2013	<0.200	<0.500	<0.500	<1.50
MW-355-15	Onsite	Water Table	10/10/2013	<0.240	<0.620	<0.620	<1.88
MW-355-55	Onsite	10-55	11/25/2013	<0.200	<0.500	<0.500	<1.50
MW-355-55	Onsite	10-55	10/10/2013	<0.240	<0.620	<0.620	<1.88
MW-358-15	Onsite	Water Table	07/23/2015	<0.200	<0.500	<0.500	<1.50
MW-358-15	Onsite	Water Table	07/18/2016	<0.200	<0.500	<0.500	<1.50
MW-358-15	Onsite	Water Table	08/01/2017	<0.200	<0.500	<0.500	<1.50
MW-358-20	Onsite	Water Table	07/23/2015	<0.200	<0.500	<0.500	<1.50
MW-358-20	Onsite	Water Table	07/18/2016	<0.200	<0.500	<0.500	<1.50

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW-359-15	Onsite	Water Table	07/20/2015	<0.200	<0.500	<0.500	<1.50
MW-359-15	Onsite	Water Table	07/14/2016	<0.200	<0.500	<0.500	<1.50
MW-360-15	Onsite	Water Table	07/20/2015	<0.200	<0.500	<0.500	<1.50
MW-360-15	Onsite	Water Table	07/14/2016	<0.200	<0.500	<0.500	<1.50
MW-360-15	Onsite	Water Table	07/11/2017	<0.200	<0.500	<0.500	<1.50
MW-361-15	Onsite	Water Table	02/03/2014	<0.200	<0.500	<0.500	<1.50
MW-361-15	Onsite	Water Table	08/10/2015	0.660	<0.500	<0.500	<1.50
MW-362-15	Onsite	Water Table	07/18/2016	<0.200	<0.500	<0.500	<1.50
MW-363-15	Onsite	Water Table	07/17/2015	<0.200	<0.500	<0.500	<1.50
MW-363-15	Onsite	Water Table	07/25/2016	<0.200	<0.500	<0.500	<1.50
MW-364-15	Onsite	Water Table	07/17/2015	<0.200	<0.500	<0.500	<1.50
MW-364-15	Onsite	Water Table	07/25/2016	<0.200	<0.500	<0.500	<1.50
MW-365-15	Onsite	Water Table	01/30/2014	<0.200	<0.500	<0.500	<1.50
MW-366-15	Onsite	Water Table	01/30/2014	376	534	281	1140
MW-367-15	Onsite	Water Table	02/03/2014	<0.200	<0.500	<0.500	<1.50
MW-368-15	Onsite	Water Table	01/06/2014	<0.200	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	08/19/2014	<0.200	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	02/19/2015	<0.200	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	07/31/2015	<0.200	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	07/20/2016	<0.200	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	08/16/2017	<0.200	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	11/15/2017	<0.200	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	2/15/2018	0.120J	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	4/11/2018	<0.400B*	<0.500	<0.500	<1.50
MW-369-16	Onsite	Water Table	8/8/2018	<0.200	<0.500	<0.500	<1.50
MW-370-15	Onsite	Water Table	01/22/2014	<0.200	<0.500	<0.500	<1.50
MW-370-15	Onsite	Water Table	08/02/2014	<0.200	<0.500	<0.500	<1.50
MW-370-15	Onsite	Water Table	02/25/2015	<0.200	<0.500	<0.500	<1.50
MW-370-15	Onsite	Water Table	07/29/2015	<0.200	<0.500	<0.500	<1.50
MW-370-15	Onsite	Water Table	07/19/2016	<0.200	<0.500	<0.500	<1.50
MW-370-55	Onsite	10-55	01/22/2014	<0.200	<0.500	<0.500	<1.50
MW-371-15	Onsite	Water Table	07/25/2014	<0.200	<0.500	<0.500	<1.50
MW-371-15	Onsite	Water Table	02/20/2015	<0.200	<0.500	<0.500	<1.50
MW-371-15	Onsite	Water Table	07/24/2015	<0.200	<0.500	<0.500	--
MW-371-15	Onsite	Water Table	07/15/2016	<0.200	<0.500	<0.500	<1.50
MW-371-15	Onsite	Water Table	8/3/2018	4.98	<0.500	<0.500	<1.50
MW-371-55	Onsite	10-55	07/25/2014	<0.200	<0.500	<0.500	<1.50
MW-371-75	Onsite	55-90	07/25/2014	<0.200	<0.500	<0.500	<1.50
MW-371-125	Onsite	90-160	07/25/2014	<0.200	<0.500	<0.500	<1.50
O-1	Onsite	Water Table	10/20/2011	<0.240	<0.620	1.32	<1.86*
O-2	Onsite	Water Table	05/02/2013	79.4	5.07	258	1260*
O-2	Onsite	Water Table	11/16/2013	275J*	5.64J*	376	1940
O-2	Onsite	Water Table	08/20/2014	29.3	0.360J	152	539
O-2	Onsite	Water Table	07/24/2017	58.1	0.570J	78.1	426
O-3	Onsite	Water Table	10/19/2011	6.34	<0.620	<0.620	56.7*
O-3	Onsite	Water Table	05/09/2013	5.06	0.480J	0.310J	20.4*
O-3	Onsite	Water Table	11/16/2013	1.47	<0.500	<0.500	4.35
O-3	Onsite	Water Table	03/10/2014	13.6	<0.500	<0.500	45.1
O-3	Onsite	Water Table	08/13/2014	0.630	<0.500	<0.500	3.55
O-3	Onsite	Water Table	02/24/2015	<0.200	<0.500	<0.500	<1.50
O-3	Onsite	Water Table	08/10/2015	0.830	<0.500	<0.500	<1.50
O-3	Onsite	Water Table	03/01/2016	<0.200	<0.500	<0.500	<1.50

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
O-3	Onsite	Water Table	08/15/2016	<0.200	<0.500	<0.500	<1.50
O-3	Onsite	Water Table	08/02/2017	1.41	<0.500	<0.500	1.34J
O-3	Onsite	Water Table	8/7/2018	1.28	<1.00B*	<0.500	<1.50
O-4	Onsite	Water Table	10/19/2011	<0.240	<0.620	<0.620	<1.86*
O-4	Onsite	Water Table	05/21/2013	<0.400B*	0.360J	0.720J	1.77J*
O-4	Onsite	Water Table	10/16/2013	<0.240	<0.620	1.38	2.72J
O-4	Onsite	Water Table	02/28/2014	<0.200	<0.500	1.49	3.06
O-4	Onsite	Water Table	07/30/2014	<0.200	<0.500	1.89	4.85
O-4	Onsite	Water Table	02/26/2015	<0.200	<0.500	1.19	2.48J
O-4	Onsite	Water Table	07/31/2015	<0.200	<0.500	<0.500	1.11J
O-4	Onsite	Water Table	02/17/2016	<0.200	<0.500	0.360J	<1.50
O-4	Onsite	Water Table	08/04/2016	<0.200	<0.500	<0.500	<1.50
O-4	Onsite	Water Table	02/28/2017	<0.200	<0.500	<0.500	<1.50
O-4	Onsite	Water Table	07/14/2017	<0.200	<0.500	<0.500	<1.50
O-4	Onsite	Water Table	7/19/2018	86.0	<0.500	<0.500	<1.50
O-5	Onsite	Water Table	10/19/2011	9.22	<0.620	2.27	5.27J*
O-5	Onsite	Water Table	10/16/2013	<0.240	<0.620	6.89	10.9
O-5	Onsite	Water Table	02/28/2014	<0.200	<0.500	<0.500	<1.50
O-5	Onsite	Water Table	08/01/2014	8.97	<0.500	<0.500	<1.50
O-5	Onsite	Water Table	02/19/2015	1.88	<0.500	<0.500	<1.50
O-5	Onsite	Water Table	07/31/2015	<0.200	<0.500	<0.500	<1.50
O-5	Onsite	Water Table	02/17/2016	0.160J	<0.500	<0.500	<1.50
O-5	Onsite	Water Table	08/04/2016	0.160J	<0.500	<0.500	<1.50
O-5	Onsite	Water Table	02/28/2017	<0.200	<0.500	<0.500	<1.50
O-5-65	Onsite	10-55	07/29/2013	<0.240	<0.620	<0.620	<1.88
O-5-65	Onsite	10-55	10/16/2013	<0.240	<0.620	<0.620	<1.88
O-6	Onsite	Water Table	10/19/2011	<0.240	<0.620	<0.620	<1.86*
O-6	Onsite	Water Table	05/10/2013	<0.240	<0.620	<0.620	<1.86*
O-6	Onsite	Water Table	10/22/2013	<0.240	<0.620	<0.620	<1.88
O-6	Onsite	Water Table	02/28/2014	<0.200	<0.500	<0.500	<1.50
O-6	Onsite	Water Table	07/31/2014	<0.200	<0.500	<0.500	<1.50
O-6	Onsite	Water Table	02/19/2015	<0.200	<0.500	<0.500	<1.50
O-6	Onsite	Water Table	07/24/2015	<0.200	<0.500	<0.500	<1.50
O-6	Onsite	Water Table	08/08/2016	<0.200	<0.500	<0.500	<1.50
O-8	Onsite	Water Table	10/20/2011	<0.240	<0.620	<0.620	<1.86*
O-11	Onsite	Water Table	08/06/2013	56.0	3.90J	482	2950
O-12	Onsite	Water Table	10/19/2011	0.820	<0.620	<0.620	<1.86*
O-12	Onsite	Water Table	05/07/2012	<0.240	0.480J	<0.620	<1.86*
O-12	Onsite	Water Table	08/09/2012	<0.240	<0.620	<0.620	<1.86*
O-12	Onsite	Water Table	11/15/2012	<0.240	<0.620	<0.620	<1.86*
O-12	Onsite	Water Table	01/14/2013	<0.240	<0.620	<0.620	<1.86*
O-12	Onsite	Water Table	05/09/2013	<0.240	<0.620	<0.620	1.35J*
O-12	Onsite	Water Table	08/08/2013	16.9	<0.620	3.80	16.1
O-12	Onsite	Water Table	10/19/2013	<0.240	<0.620	<0.620	1.41J
O-12	Onsite	Water Table	03/07/2014	4.81	<0.500	<0.500	10.7
O-12	Onsite	Water Table	04/24/2014	0.600	<0.500	0.350J	1.67J
O-12	Onsite	Water Table	08/13/2014	<0.200	<0.500	<0.500	<1.50
O-12	Onsite	Water Table	10/30/2014	<0.200	<0.500	<0.500	2.52J
O-12	Onsite	Water Table	02/21/2015	2.43	<0.500	2.81	8.66
O-12	Onsite	Water Table	08/10/2015	5.90	<0.500	2.57	14.3
O-12	Onsite	Water Table	10/02/2015	1.46J*	<0.500	1.94J*	9.18JH*
O-12	Onsite	Water Table	02/29/2016	<1.16B*	<0.500	0.490J	3.58

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
O-12	Onsite	Water Table	08/10/2016	<0.200	<0.500	<0.500	<1.50
O-12	Onsite	Water Table	02/25/2017	3.01	<0.500	0.322J	<1.50
O-12-65	Onsite	10-55	08/15/2013	<0.240	<0.620	<0.620	<1.88
O-12-65	Onsite	10-55	10/19/2013	<0.240	<0.620	<0.620	<1.88
O-12-65	Onsite	10-55	10/11/2013	<0.240	<0.620	<0.620	<1.88
O-13	Onsite	Water Table	08/06/2013	3200	30.3	938	5940
O-14	Onsite	Water Table	10/20/2011	<0.240	<0.620	<0.620	<1.86*
O-14	Onsite	Water Table	08/09/2012	<0.240	<0.620	<0.620	<1.86*
O-14	Onsite	Water Table	02/05/2013	<0.240	<0.620	<0.620	<1.86*
O-14	Onsite	Water Table	08/29/2013	<0.240	<0.620	<0.620	<1.88
O-14	Onsite	Water Table	11/25/2013	<0.200	<0.500	<0.500	<1.50
O-14	Onsite	Water Table	03/26/2014	<0.200	<0.500	<0.500	<1.50
O-14	Onsite	Water Table	09/03/2014	<0.200	<0.500	<0.500	<1.50
O-14	Onsite	Water Table	10/30/2014	<0.200	<0.500	<0.500	<1.50
O-14	Onsite	Water Table	08/07/2015	<0.200	<0.500	<0.500	<1.50
O-14	Onsite	Water Table	08/17/2016	<0.200	<0.500	<0.500	<1.50
O-15	Onsite	Water Table	10/20/2011	<0.240	<0.620	<0.620	<1.86*
O-15	Onsite	Water Table	08/16/2017	<0.200	<0.500	<0.500	<1.50
O-15	Onsite	Water Table	11/16/2017	<0.200	<0.500	<0.500	<1.50
O-15	Onsite	Water Table	2/15/2018	<0.200	<0.500	<0.500	<1.50
O-15	Onsite	Water Table	4/11/2018	<0.400B*	<0.500	<0.500	<1.50
O-15	Onsite	Water Table	8/7/2018	0.210J	<0.500	<0.500	<1.50
O-16	Onsite	Water Table	10/20/2011	5.10	<0.620	0.440J	<1.86*
O-16	Onsite	Water Table	12/11/2012	2.34	<0.620	1.14	<2.87*
O-16	Onsite	Water Table	11/15/2013	2.88	<0.500	<0.500	<1.50
O-16	Onsite	Water Table	03/26/2014	2.12	<0.500	<0.500	<1.50
O-16	Onsite	Water Table	09/03/2014	1.87	<0.500	0.400J	<1.50
O-16	Onsite	Water Table	08/11/2015	2.28	<0.500	<0.500	<1.50
O-16	Onsite	Water Table	08/16/2016	2.55	<0.500	<0.500	<1.50
O-17	Onsite	Water Table	10/19/2011	<0.240	<0.620	<0.620	<1.86*
O-17	Onsite	Water Table	05/07/2012	<0.240	<0.620	<0.620	<1.86*
O-17	Onsite	Water Table	05/09/2013	<0.240	<0.620	<0.620	<1.86*
O-17	Onsite	Water Table	11/15/2013	<0.200	<0.500	<0.500	<1.50
O-17	Onsite	Water Table	03/26/2014	<0.200	<0.500	<0.500	<1.50
O-17	Onsite	Water Table	08/14/2014	<0.200	<0.500	<0.500	<1.50
O-17	Onsite	Water Table	08/10/2015	0.520	<0.500	<0.500	<1.50
O-17	Onsite	Water Table	08/17/2016	<0.200	<0.500	<0.500	1.57J
O-18	Onsite	Water Table	10/20/2011	<0.240	<0.620	<0.620	<1.86*
O-18	Onsite	Water Table	05/07/2012	0.360J	<0.620	<0.620	<1.86*
O-18	Onsite	Water Table	11/15/2013	<0.200	<0.500	<0.500	<1.50
O-18	Onsite	Water Table	03/26/2014	0.146J	<0.500	<0.500	<1.50
O-18	Onsite	Water Table	08/26/2014	<0.200	<0.500	<0.500	<1.50
O-18	Onsite	Water Table	08/10/2015	<0.200	<0.500	<0.500	<1.50
O-18	Onsite	Water Table	08/17/2016	<0.200	<0.500	<0.500	<1.50
O-19	Onsite	Water Table	06/04/2013	42.9	5.34	31.0	117*
O-19	Onsite	Water Table	11/07/2013	12.8	45.5	59.4	742
O-19	Onsite	Water Table	08/21/2014	97.3	0.540J	12.0	92.7
O-19	Onsite	Water Table	08/04/2015	48.4	<0.500	3.78	88.0
O-19-55	Onsite	10-55	01/03/2014	<0.200	<1.00B*	<1.00B*	<3.70B*
O-19-55	Onsite	10-55	08/14/2014	0.320J	<0.500	<0.500	<1.50
O-19-55	Onsite	10-55	02/20/2015	<0.200	<0.500	<0.500	<1.50
O-19-55	Onsite	10-55	08/04/2015	<0.200	<0.500	<0.500	<1.50

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
O-19-55	Onsite	10-55	08/15/2016	<0.200	<0.500	<0.500	<1.50
O-19-90	Onsite	55-90	01/03/2014	<0.200	<0.500	<0.500	<1.50
O-20	Onsite	Water Table	10/20/2011	1420	2.59	179	1700*
O-21	Onsite	Water Table	10/20/2011	2100	0.490J	403	2850*
O-22	Onsite	Water Table	02/22/2012	<0.240	<0.620	<0.620	<1.86*
O-23	Onsite	Water Table	02/22/2012	<0.240	<0.620	<0.620	<1.86*
O-24	Onsite	Water Table	02/22/2012	4.01	<0.620	<0.620	<1.86*
O-24	Onsite	Water Table	05/09/2013	1.42	<0.620	<0.620	<1.86*
O-24	Onsite	Water Table	11/16/2013	20.4	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	03/07/2014	2.73J*	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	08/13/2014	31.8	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	02/21/2015	21.8	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	08/11/2015	56.4	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	02/29/2016	28.9J*	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	08/15/2016	34.1	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	02/25/2017	10.3	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	07/10/2017	58.5	<0.500	<0.500	<1.50
O-24	Onsite	Water Table	7/19/2018	4.89	0.360J	<0.500	<1.50
O-24-65	Onsite	10-55	10/11/2013	<0.240	<0.620	<0.620	<1.88
O-25	Onsite	Water Table	02/22/2012	179	<0.620	10.6	83.1*
O-25	Onsite	Water Table	10/02/2015	28.4	<0.500	<0.500	<3.00B*
O-26	Onsite	Water Table	02/22/2012	11.3	<0.620	1.08	241J*
O-26	Onsite	Water Table	05/08/2013	9.60	<0.620	0.760J	97.0J*
O-26	Onsite	Water Table	11/16/2013	1.31	<0.500	<0.500	12.3
O-26	Onsite	Water Table	03/02/2014	4.18	<0.500	<0.500	10.0
O-26	Onsite	Water Table	08/13/2014	<0.200	<0.500	<0.500	<1.50
O-26	Onsite	Water Table	02/21/2015	<0.200	<0.500	<0.500	<1.50
O-26	Onsite	Water Table	08/11/2015	<0.200	<0.500	<0.500	<1.50
O-26	Onsite	Water Table	08/10/2016	<0.200	<0.500	<0.500	<1.50
O-26-65	Onsite	10-55	02/27/2014	<0.200	<0.500	<0.500	<1.50
O-27	Onsite	Water Table	02/22/2012	4.54	<0.620	5.18	33.3*
O-27	Onsite	Water Table	05/30/2013	8.80	<6.20	23.5	193*
O-27	Onsite	Water Table	08/09/2013	12.1	<0.620	31.8	182
O-27	Onsite	Water Table	10/30/2013	19.9	0.390J	42.0	183
O-27-65	Onsite	10-55	12/04/2013	<0.200	<0.500	<0.500	<1.50
O-28	Onsite	Water Table	02/22/2012	<0.240	<0.620	<0.620	<1.86*
O-29	Onsite	Water Table	02/22/2012	<0.240	<0.620	<0.620	<1.86*
O-32	Onsite	Water Table	10/01/2013	<0.240	<0.620	0.380J	2.77J
R-21	Onsite	Water Table	01/17/2012	106	26.3	38.1	235*
R-21	Onsite	Water Table	02/15/2012	110	28.3	36.9	218*
R-21	Onsite	Water Table	03/19/2012	76.9	25.7	28.3	161*
R-21	Onsite	Water Table	04/18/2012	114	80.9	56.4	309*
R-21	Onsite	Water Table	05/16/2012	90.4	101	43.4	246*
R-21	Onsite	Water Table	06/18/2012	100	34.4	48.3	226*
R-21	Onsite	Water Table	07/17/2012	132	25.7	43.7	226*
R-21	Onsite	Water Table	08/09/2012	115	22.7	34.1	188*
R-21	Onsite	Water Table	09/13/2012	101	15.9	27.3	154*
R-21	Onsite	Water Table	10/16/2012	85.1	14.4	22.2	138*
R-21	Onsite	Water Table	11/13/2012	83.5	22.5	33.3	217*
R-21	Onsite	Water Table	12/11/2012	63.8	12.1	29.5	177*
R-21	Onsite	Water Table	01/15/2013	60.4	9.89	23.2	146*
R-21	Onsite	Water Table	02/18/2013	59.8	11.9	24.4	134*

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-21	Onsite	Water Table	03/12/2013	97.1	108	47.1	327*
R-21	Onsite	Water Table	04/10/2013	43.0	11.8	18.2	103*
R-21	Onsite	Water Table	05/13/2013	53.5	30.5	29.6	157*
R-21	Onsite	Water Table	06/11/2013	57.0	20.9	27.4	158*
R-21	Onsite	Water Table	06/03/2013	54.7	44.6	44.8	324*
R-21	Onsite	Water Table	06/03/2013	51.1	36.3	36.9	236*
R-21	Onsite	Water Table	06/04/2013	48.7	24.0	30.6	166*
R-21	Onsite	Water Table	06/04/2013	50.1	24.0	31.1	168*
R-21	Onsite	Water Table	06/05/2013	47.9	19.6	25.9	163*
R-21	Onsite	Water Table	06/06/2013	47.8	21.1	26.8	165*
R-21	Onsite	Water Table	07/24/2013	68.2	16.2	22.8	132
R-21	Onsite	Water Table	08/14/2013	66.9	16.4	20.5	123
R-21	Onsite	Water Table	09/17/2013	83.8	19.9	21.4	143
R-21	Onsite	Water Table	10/18/2013	68.4	5.29	13.2	85.7
R-21	Onsite	Water Table	11/14/2013	76.6	39.9	29.9	176
R-21	Onsite	Water Table	12/19/2013	70.9	16.6	37.6	241
R-21	Onsite	Water Table	01/16/2014	53.4	12.5	18.0	120
R-21	Onsite	Water Table	02/13/2014	44.1	11.2	18.8	125
R-21	Onsite	Water Table	03/13/2014	37.8	8.41	17.1	110
R-21	Onsite	Water Table	04/17/2014	57.3	39.6	20.1	147
R-21	Onsite	Water Table	05/15/2014	65.1	25.5	33.0	185
R-21	Onsite	Water Table	06/23/2014	82.6	33.7	28.3	203
R-21	Onsite	Water Table	07/23/2014	120	61.5	34.3	243
R-21	Onsite	Water Table	08/27/2014	97.7	29.6	28.1	208
R-21	Onsite	Water Table	09/18/2014	96.8	26.8	25.5	206
R-21	Onsite	Water Table	10/16/2014	71.8	9.63	19.3	172
R-21	Onsite	Water Table	11/12/2014	67.7	5.90	15.8	158
R-21	Onsite	Water Table	12/10/2014	59.7	4.27	17.6	141
R-21	Onsite	Water Table	01/12/2015	52.7	3.40	14.4	157
R-21	Onsite	Water Table	02/11/2015	44.6	3.27	13.4	116
R-21	Onsite	Water Table	03/11/2015	47.2	20.6	23.6	191
R-21	Onsite	Water Table	06/22/2015	49.8	15.1	23.9	193
R-21	Onsite	Water Table	07/08/2015	72.9	24.8	28.7	232
R-21	Onsite	Water Table	10/06/2015	83.2	21.3	19.8	165
R-21	Onsite	Water Table	01/06/2016	44.2	26.1J*	24.8J*	152
R-21	Onsite	Water Table	02/04/2016	36.0	27.8	65.7	532
R-21	Onsite	Water Table	03/02/2016	34.9	22.1	18.5	153
R-21	Onsite	Water Table	04/14/2016	56.5	25.9	29.5	231
R-21	Onsite	Water Table	05/05/2016	37.0	28.0	26.5	234J*
R-21	Onsite	Water Table	06/01/2016	44.2	27.9	39.3	323
R-21	Onsite	Water Table	07/06/2016	52.2	21.1	27.3	213
R-21	Onsite	Water Table	08/05/2016	102	47.8	33.1	250
R-21	Onsite	Water Table	09/06/2016	82.1	22.5	24.3	202
R-21	Onsite	Water Table	10/03/2016	87.5	11.0	21.2	190
R-21	Onsite	Water Table	11/03/2016	89.2	9.50J	23.1	241
R-21	Onsite	Water Table	12/01/2016	64.6	5.30J	16.5	159
R-21	Onsite	Water Table	01/05/2017	61.4	6.90J	17.5	179
R-21	Onsite	Water Table	02/01/2017	53.3	9.00J	19.4	172
R-21	Onsite	Water Table	03/01/2017	49.1	46.0	74.2	604
R-21	Onsite	Water Table	04/05/2017	36.0	12.9	19.7	214
R-21	Onsite	Water Table	05/03/2017	40.6	22.6	20.5	175
R-21	Onsite	Water Table	06/06/2017	42.0	15.5J*	20.1	167J*

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-21	Onsite	Water Table	07/06/2017	69.5	29.6	25.6	200
R-32	Onsite	Water Table	12/03/2010	<131000	<252000	1.40E+06	1.11e+007*
R-33	Onsite	Water Table	12/03/2010	<128000	1.21E+06	754000	1.04e+007*
R-35R	Onsite	Water Table	01/17/2012	28.5	25.2	21.6	65.6*
R-35R	Onsite	Water Table	02/15/2012	23.7	23.1	19.6	61.4*
R-35R	Onsite	Water Table	03/19/2012	21.9	24.3	15.3	51.7*
R-35R	Onsite	Water Table	04/18/2012	63.9	70.1	51.9	176*
R-35R	Onsite	Water Table	05/16/2012	26.5	19.5	29.1	88.4*
R-35R	Onsite	Water Table	06/18/2012	67.5	90.5	80.5	279*
R-35R	Onsite	Water Table	07/17/2012	54.3	38.2	69.3	182*
R-35R	Onsite	Water Table	08/09/2012	40.5	29.0	56.4	125*
R-35R	Onsite	Water Table	09/13/2012	24.1	7.31	26.5	67.0*
R-35R	Onsite	Water Table	10/16/2012	21.7	3.64	17.8	49.5*
R-35R	Onsite	Water Table	11/13/2012	35.2	24.5	36.4	96.0*
R-35R	Onsite	Water Table	12/11/2012	31.3	5.92	22.4	55.9*
R-35R	Onsite	Water Table	01/15/2013	18.9	3.98	17.1	46.9*
R-35R	Onsite	Water Table	02/18/2013	17.3	7.19	15.8	44.6*
R-35R	Onsite	Water Table	03/12/2013	16.2	7.45	12.3	35.6*
R-35R	Onsite	Water Table	04/10/2013	13.1	7.76	10.1	29.6*
R-35R	Onsite	Water Table	05/13/2013	31.4	40.6	27.1	72.4*
R-35R	Onsite	Water Table	06/11/2013	54.4	45.9	50.4	164*
R-35R	Onsite	Water Table	06/03/2013	43.3	18.7	31.0	109*
R-35R	Onsite	Water Table	06/03/2013	44.4	37.8	39.4	133*
R-35R	Onsite	Water Table	06/04/2013	44.8	55.1	44.3	146*
R-35R	Onsite	Water Table	06/04/2013	41.9	53.9	42.4	140*
R-35R	Onsite	Water Table	06/05/2013	48.5	55.4	46.2	155*
R-35R	Onsite	Water Table	06/06/2013	48.4	55.3	47.2	164*
R-35R	Onsite	Water Table	07/24/2013	32.0	18.6	33.9	78.4
R-35R	Onsite	Water Table	08/14/2013	33.8	26.4	40.7	96.1
R-35R	Onsite	Water Table	09/17/2013	28.3	12.3	32.1	78.0
R-35R	Onsite	Water Table	10/18/2013	16.3	3.00	8.28	25.1
R-35R	Onsite	Water Table	11/14/2013	18.8	0.960J	10.7	29.8
R-35R	Onsite	Water Table	12/19/2013	30.6	5.09	16.9	54.4
R-35R	Onsite	Water Table	01/16/2014	18.1	3.14	10.9	35.3
R-35R	Onsite	Water Table	02/13/2014	11.5	3.43	7.01	25.3
R-35R	Onsite	Water Table	03/13/2014	9.59	1.34	4.68	20.2
R-35R	Onsite	Water Table	04/17/2014	8.28	0.990J	4.25	19.5
R-35R	Onsite	Water Table	05/15/2014	28.9	10.5	13.9	49.5
R-35R	Onsite	Water Table	06/23/2014	38.2	10.2	17.8	74.6
R-35R	Onsite	Water Table	07/23/2014	67.5	32.8	37.8	120
R-35R	Onsite	Water Table	08/27/2014	53.4	22.8	21.5	69.7
R-35R	Onsite	Water Table	09/18/2014	64.6	18.1	21.2	70.1
R-35R	Onsite	Water Table	10/16/2014	58.9	10.8	13.1	46.7
R-35R	Onsite	Water Table	11/12/2014	65.9	7.95	11.5	42.3
R-35R	Onsite	Water Table	12/10/2014	45.8	3.98	7.16	31.2
R-35R	Onsite	Water Table	01/12/2015	24.5	1.60	4.41	17.6
R-35R	Onsite	Water Table	02/11/2015	17.9	0.910J	2.41	10.4
R-35R	Onsite	Water Table	03/11/2015	23.7	1.59	5.33	26.0
R-35R	Onsite	Water Table	03/11/2015	23.7	1.59	5.33	26.0
R-35R	Onsite	Water Table	06/22/2015	29.7	3.19	11.1	51.2
R-35R	Onsite	Water Table	07/08/2015	41.2	4.25	16.3	77.7
R-35R	Onsite	Water Table	10/06/2015	4.64	0.370J	0.500J	2.59J

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-35R	Onsite	Water Table	01/06/2016	41.3	1.86	14.2	68.1
R-35R	Onsite	Water Table	02/04/2016	30.1	0.460J	11.6	54.2
R-35R	Onsite	Water Table	03/02/2016	31.2	<0.500	8.72	43.8
R-35R	Onsite	Water Table	04/14/2016	32.8	4.30	16.0	69.5
R-35R	Onsite	Water Table	05/05/2016	28.0	1.55	9.66	43.8
R-35R	Onsite	Water Table	06/01/2016	34.9	9.22	17.6	74.0
R-35R	Onsite	Water Table	07/06/2016	33.4	8.51	27.0	92.0
R-35R	Onsite	Water Table	08/05/2016	18.7	8.79	13.4	38.5
R-35R	Onsite	Water Table	09/06/2016	18.2	8.38	10.4	34.1
R-35R	Onsite	Water Table	10/03/2016	24.6	7.28	12.8	45.4
R-35R	Onsite	Water Table	11/03/2016	43.1	5.91	21.5	83.2
R-35R	Onsite	Water Table	12/01/2016	31.8	2.56	18.1	65.1
R-35R	Onsite	Water Table	01/05/2017	29.2	2.64	16.8	65.1
R-35R	Onsite	Water Table	02/01/2017	22.3	1.86	12.4	49.0
R-35R	Onsite	Water Table	03/01/2017	19.5	1.38	11.4	45.1
R-35R	Onsite	Water Table	04/05/2017	14.8	1.37	9.07	36.4
R-35R	Onsite	Water Table	05/03/2017	16.1	1.93	12.4	43.3
R-35R	Onsite	Water Table	06/06/2017	17.0	4.44	10.3	37.7
R-35R	Onsite	Water Table	07/06/2017	32.3	9.44	18.8	63.5
R-35R	Onsite	Water Table	07/27/2017	72.5	1.93	37.1	92.7
R-35R	Onsite	Water Table	2/13/2018	178	1.20	47.6	138
R-39	Onsite	Water Table	01/17/2012	46.3	16.5	10.2	70.4*
R-39	Onsite	Water Table	02/15/2012	37.1	14.4	9.39	61.8*
R-39	Onsite	Water Table	03/19/2012	26.5	11.0	7.18	40.4*
R-39	Onsite	Water Table	04/18/2012	22.6	8.24	7.76	36.1*
R-39	Onsite	Water Table	05/16/2012	23.3	4.24	7.44	32.3*
R-39	Onsite	Water Table	06/18/2012	70.1	81.3	23.0	138*
R-39	Onsite	Water Table	07/17/2012	58.4	66.6	21.2	121*
R-39	Onsite	Water Table	08/09/2012	58.9	30.2	23.4	126*
R-39	Onsite	Water Table	09/13/2012	46.1	7.42	13.4	88.4*
R-39	Onsite	Water Table	10/16/2012	38.4	5.87	7.53	60.6*
R-39	Onsite	Water Table	11/13/2012	44.5	26.7	10.9	75.4*
R-39	Onsite	Water Table	12/11/2012	39.1	16.9	9.94	56.5*
R-39	Onsite	Water Table	01/15/2013	21.7	8.32	7.07	45.3*
R-39	Onsite	Water Table	02/18/2013	19.0	7.93	6.78	40.0*
R-39	Onsite	Water Table	03/12/2013	13.1	4.01	3.74	20.5*
R-39	Onsite	Water Table	04/10/2013	11.2	3.49	3.88	19.4*
R-39	Onsite	Water Table	2/12/2018	44.0	<0.500	<0.500	5.80
R-39	Onsite	Water Table	4/10/2018	38.0	<0.500	<0.500	<4.47B*
R-40	Onsite	Water Table	01/17/2012	232	195	58.2	270*
R-40	Onsite	Water Table	02/15/2012	216	222	53.0	217*
R-40	Onsite	Water Table	03/19/2012	228	312	45.7	240*
R-40	Onsite	Water Table	04/18/2012	225	395	61.8	321*
R-40	Onsite	Water Table	05/16/2012	194	256	63.3	269*
R-40	Onsite	Water Table	06/18/2012	272	353	68.7	354*
R-40	Onsite	Water Table	07/17/2012	349	367	84.0	410*
R-40	Onsite	Water Table	08/09/2012	311	329	75.2	356*
R-40	Onsite	Water Table	09/13/2012	253	263	69.3	336*
R-40	Onsite	Water Table	10/16/2012	227	269	61.6	308*
R-40	Onsite	Water Table	11/13/2012	221	281	65.3	299*
R-40	Onsite	Water Table	12/11/2012	156	160	52.0	233*
R-40	Onsite	Water Table	01/15/2013	187	243	43.6	333*

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-40	Onsite	Water Table	02/18/2013	635	866	195	958*
R-40	Onsite	Water Table	03/12/2013	154	198	44.2	214*
R-40	Onsite	Water Table	04/10/2013	112	159	43.6	188*
R-40	Onsite	Water Table	01/12/2015	163	118	87.2	400
R-40	Onsite	Water Table	02/09/2015	370	747	159	897
R-40	Onsite	Water Table	02/11/2015	264	461	125	695
R-40	Onsite	Water Table	03/11/2015	195	532	130	767
R-40	Onsite	Water Table	06/22/2015	178	338	95.8	518
R-40	Onsite	Water Table	07/08/2015	247	592	133	908
R-40	Onsite	Water Table	10/06/2015	237	318	142	790
R-40	Onsite	Water Table	01/06/2016	126	142	83.9	416
R-40	Onsite	Water Table	02/04/2016	132	123	84.8	398
R-40	Onsite	Water Table	03/16/2016	96.4	108	59.4	308
R-40	Onsite	Water Table	04/27/2016	78.0	71.8	48.3	234
R-40	Onsite	Water Table	05/05/2016	95.7	81.0	52.0	249
R-40	Onsite	Water Table	06/01/2016	101	111	55.6	275
R-40	Onsite	Water Table	07/06/2016	138	208	69.8	401
R-40	Onsite	Water Table	08/05/2016	170	230	93.4	524
R-40	Onsite	Water Table	09/06/2016	146	182	89.8	474
R-40	Onsite	Water Table	10/03/2016	189	137	119	542
R-40	Onsite	Water Table	11/03/2016	161	148	97.6	455
R-40	Onsite	Water Table	12/01/2016	105	89.2	70.0	286
R-40	Onsite	Water Table	01/05/2017	98.1	81.0	65.2	269
R-40	Onsite	Water Table	02/01/2017	93.6	80.7	58.6	238
R-40	Onsite	Water Table	03/01/2017	69.8	61.6	45.7	194
R-40	Onsite	Water Table	04/05/2017	65.6	61.2	46.9	204
R-40	Onsite	Water Table	05/03/2017	70.4	97.7	51.1	283
R-40	Onsite	Water Table	06/06/2017	82.3	102	56.0	273
R-40	Onsite	Water Table	07/06/2017	84.7	119	67.0	339
R-42	Onsite	Water Table	01/17/2012	4.88	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	02/15/2012	6.09	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	03/19/2012	6.05	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	04/18/2012	7.30	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	05/16/2012	7.79	0.540J	0.370J	<1.30J*
R-42	Onsite	Water Table	06/18/2012	7.05	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	07/17/2012	6.05	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	08/09/2012	5.77	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	09/13/2012	6.83	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	10/16/2012	6.99	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	11/13/2012	6.13	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	12/11/2012	4.55	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	01/15/2013	5.88	0.380J	<0.620	<1.86*
R-42	Onsite	Water Table	02/18/2013	5.81	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	03/12/2013	6.32	<0.620	<0.620	1.02J*
R-42	Onsite	Water Table	04/10/2013	5.65	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	05/13/2013	9.44	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	06/11/2013	3.32	<0.620	<0.620	1.26J*
R-42	Onsite	Water Table	05/31/2013	<0.240	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	05/31/2013	<0.240	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	05/31/2013	<0.240	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	05/31/2013	<0.240	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	05/31/2013	<0.240	<0.620	<0.620	<1.86*

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-42	Onsite	Water Table	06/03/2013	<0.240	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	06/03/2013	2.15	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	06/04/2013	3.05	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	06/04/2013	3.13	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	06/05/2013	3.11	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	06/06/2013	3.27	<0.620	<0.620	<1.86*
R-42	Onsite	Water Table	07/24/2013	2.38	<0.620	<0.620	<2.00
R-42	Onsite	Water Table	08/14/2013	1.32	<0.620	<0.620	<2.00
R-42	Onsite	Water Table	09/17/2013	1.52	<0.620	<0.620	<2.00
R-42	Onsite	Water Table	10/18/2013	1.75	<0.620	<0.620	<2.00
R-42	Onsite	Water Table	11/14/2013	1.29	<0.500	<0.500	<1.00
R-42	Onsite	Water Table	12/19/2013	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	01/16/2014	0.730	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	02/13/2014	0.450	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	03/13/2014	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	04/17/2014	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	05/15/2014	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	06/23/2014	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	06/27/2014	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	07/21/2014	1.33	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	08/18/2014	1.94	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	09/17/2014	3.97	<0.500	0.460J	<1.50
R-42	Onsite	Water Table	10/16/2014	5.33	<0.500	0.480J	1.15J
R-42	Onsite	Water Table	11/11/2014	4.00	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	12/10/2014	1.62	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	01/13/2015	0.250J	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	01/14/2015	0.250J	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	02/10/2015	0.150J	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	03/10/2015	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	06/22/2015	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	07/06/2015	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	10/07/2015	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	01/05/2016	0.420	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	02/02/2016	0.220J	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	03/01/2016	0.230J	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	04/06/2016	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	05/04/2016	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	06/03/2016	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	07/07/2016	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	08/04/2016	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	09/06/2016	0.850	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	10/03/2016	0.290J	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	11/03/2016	0.410	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	12/01/2016	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	01/05/2017	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	02/01/2017	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	03/01/2017	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	04/05/2017	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	05/03/2017	<0.200	<0.500	<0.500	<1.50
R-42	Onsite	Water Table	06/06/2017	<0.200	0.400J	<0.500	<1.50
R-42	Onsite	Water Table	07/06/2017	<0.200	<0.500	<0.500	<1.50
R-42-surface	Onsite	Water Table	01/14/2015	0.270J	<0.500	<0.500	<1.50

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-43	Onsite	Water Table	05/13/2013	66.3	4.03	5.74	32.9*
R-43	Onsite	Water Table	06/11/2013	69.7	17.4	7.27	40.2*
R-43	Onsite	Water Table	05/29/2013	50.6	6.24	3.83	22.9*
R-43	Onsite	Water Table	05/29/2013	46.0	8.58	4.31	22.5*
R-43	Onsite	Water Table	05/29/2013	48.3	8.49	4.43	23.1*
R-43	Onsite	Water Table	05/29/2013	42.1	7.31	4.15	21.6*
R-43	Onsite	Water Table	05/29/2013	50.1	8.43	4.44	24.7*
R-43	Onsite	Water Table	06/03/2013	91.5	17.2	8.05	40.2*
R-43	Onsite	Water Table	06/03/2013	76.4	12.8	6.80	37.6*
R-43	Onsite	Water Table	06/04/2013	66.7	13.5	7.08	38.8*
R-43	Onsite	Water Table	06/04/2013	74.2	14.4	7.36	40.3*
R-43	Onsite	Water Table	06/05/2013	61.9	13.2	6.15	38.2*
R-43	Onsite	Water Table	06/06/2013	70.0	13.9	6.71	39.2*
R-43	Onsite	Water Table	07/24/2013	44.3	8.29	4.62	21.4
R-43	Onsite	Water Table	08/14/2013	40.4	6.77	4.66	17.5
R-43	Onsite	Water Table	09/17/2013	49.0	8.43	6.21	21.8
R-43	Onsite	Water Table	10/18/2013	50.1	10.4	6.49	21.5
R-43	Onsite	Water Table	11/14/2013	47.9	9.48	5.23	20.9
R-43	Onsite	Water Table	12/19/2013	62.5	9.48	5.59	28.3
R-43	Onsite	Water Table	01/16/2014	52.1	10.5	4.46	20.3
R-43	Onsite	Water Table	02/13/2014	51.6	9.84	4.52	19.6
R-43	Onsite	Water Table	03/13/2014	44.1	8.43	4.15	18.0
R-43	Onsite	Water Table	04/17/2014	28.7	5.66	2.27	11.5
R-43	Onsite	Water Table	05/15/2014	44.7	8.31	4.30	18.9
R-43	Onsite	Water Table	06/23/2014	33.5	5.90	2.74	12.3
R-43	Onsite	Water Table	08/27/2014	59.8	13.0	10.1	40.0
R-43	Onsite	Water Table	09/18/2014	115	42.8	19.2	95.6
R-43	Onsite	Water Table	10/16/2014	82.7	21.9	18.2	69.7
R-43	Onsite	Water Table	11/12/2014	61.9	<0.500	10.4	18.9
R-43	Onsite	Water Table	12/10/2014	60.6	1.12	8.71	19.7
R-43	Onsite	Water Table	01/12/2015	55.3	2.99	7.08	22.8
R-43	Onsite	Water Table	02/11/2015	47.6	5.44	5.40	22.4
R-43	Onsite	Water Table	03/11/2015	50.3	7.74	6.65	30.1
R-43	Onsite	Water Table	06/22/2015	51.8	10.7	9.90	40.1
R-43	Onsite	Water Table	07/08/2015	52.9	10.5	9.68	42.3
R-43	Onsite	Water Table	10/06/2015	60.1	9.69	7.68	44.4
R-43	Onsite	Water Table	01/06/2016	43.0	8.44	5.36	27.3
R-43	Onsite	Water Table	02/04/2016	40.6	8.03	4.90	27.6
R-43	Onsite	Water Table	03/02/2016	38.8	6.68	4.25	24.7
R-43	Onsite	Water Table	04/14/2016	40.4	7.16	4.98	31.1
R-43	Onsite	Water Table	05/05/2016	39.3	7.17	4.84	27.7
R-43	Onsite	Water Table	06/01/2016	34.4	9.40	13.8	107
R-43	Onsite	Water Table	07/06/2016	35.1	7.55	5.58	29.6
R-43	Onsite	Water Table	08/05/2016	45.1	8.48	6.52	34.4
R-43	Onsite	Water Table	09/06/2016	52.4	9.57	6.51	39.6
R-43	Onsite	Water Table	10/03/2016	50.4	6.38	6.64	40.2
R-43	Onsite	Water Table	11/03/2016	61.6	9.11	8.45	47.9
R-43	Onsite	Water Table	12/01/2016	47.1	7.76	5.81	33.8
R-43	Onsite	Water Table	01/05/2017	43.7	7.99	5.27	30.9
R-43	Onsite	Water Table	02/01/2017	33.2	5.28	3.65	20.8
R-43	Onsite	Water Table	03/01/2017	37.0	7.58	4.65	28.9
R-43	Onsite	Water Table	04/05/2017	29.2	6.69	3.45	22.9

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-43	Onsite	Water Table	05/03/2017	28.5	8.11	3.78	24.8
R-43	Onsite	Water Table	06/06/2017	32.8	9.04	5.18	30.1
R-43	Onsite	Water Table	07/06/2017	39.3	9.02	6.40	35.5
R-44	Onsite	Water Table	05/13/2013	3.46	0.310J	3.92	18.9*
R-44	Onsite	Water Table	06/11/2013	9.30	2.45	9.40	43.7*
R-44	Onsite	Water Table	06/01/2013	1.54	6.05	2.32	22.1*
R-44	Onsite	Water Table	06/01/2013	3.30	1.42	3.19	14.4*
R-44	Onsite	Water Table	06/01/2013	4.40	1.02	4.52J*	17.6J**
R-44	Onsite	Water Table	06/01/2013	4.48	0.680J	4.31	16.4*
R-44	Onsite	Water Table	06/01/2013	4.56	0.870J	4.63	18.2*
R-44	Onsite	Water Table	06/03/2013	4.68	1.15	4.20	17.6*
R-44	Onsite	Water Table	06/03/2013	4.83	4.75	4.45	17.2*
R-44	Onsite	Water Table	06/04/2013	4.26	0.540J	4.17	16.6*
R-44	Onsite	Water Table	06/04/2013	4.61	0.560J	4.71	19.1*
R-44	Onsite	Water Table	06/05/2013	5.10	1.23	5.36	21.6*
R-44	Onsite	Water Table	06/06/2013	5.59	0.940J	6.02	26.0*
R-44	Onsite	Water Table	07/24/2013	9.73	3.88	8.18	28.0
R-44	Onsite	Water Table	08/14/2013	17.9	9.37	9.99	29.6
R-44	Onsite	Water Table	09/17/2013	33.1	7.66	11.4	32.8
R-44	Onsite	Water Table	10/18/2013	46.5	1.39	7.88	20.3
R-44	Onsite	Water Table	11/14/2013	36.7	1.40	5.70	8.24
R-44	Onsite	Water Table	12/19/2013	36.5	2.88	8.35	26.4
R-44	Onsite	Water Table	01/16/2014	20.9	1.18	4.86	8.54
R-44	Onsite	Water Table	02/13/2014	24.6	1.58	5.11	8.41
R-44	Onsite	Water Table	03/13/2014	19.2	1.00	3.79	5.73
R-44	Onsite	Water Table	04/17/2014	15.7	0.445J	2.65	4.01
R-44	Onsite	Water Table	05/15/2014	24.1	0.640J	8.76	16.9
R-44	Onsite	Water Table	06/23/2014	35.2	0.830J	8.59	19.8
R-44	Onsite	Water Table	07/23/2014	48.4	1.97	55.7	285
R-44	Onsite	Water Table	08/27/2014	43.3	1.13	12.4	36.1
R-44	Onsite	Water Table	09/18/2014	45.1	0.540J	9.60	22.2
R-44	Onsite	Water Table	10/16/2014	38.7	<0.500	7.18	16.5
R-44	Onsite	Water Table	11/12/2014	31.7	<0.500	3.44	8.61
R-44	Onsite	Water Table	12/10/2014	26.2	<0.500	2.52	8.67
R-44	Onsite	Water Table	01/12/2015	22.8	<0.500	1.44	5.66
R-44	Onsite	Water Table	02/11/2015	14.5	<0.500	0.830J	3.94
R-44	Onsite	Water Table	03/11/2015	18.7	<0.500	1.05	5.69
R-44	Onsite	Water Table	06/22/2015	13.3	<0.500	2.86	10.8
R-44	Onsite	Water Table	07/08/2015	13.3	<0.500	3.06	13.6
R-44	Onsite	Water Table	10/06/2015	31.4	<0.500	2.89	15.7
R-44	Onsite	Water Table	01/06/2016	11.1	<0.500	0.540J	3.82
R-44	Onsite	Water Table	02/04/2016	8.13	<0.500	<0.500	2.55J
R-44	Onsite	Water Table	03/02/2016	7.62	<0.500	<0.500	1.99J
R-44	Onsite	Water Table	04/14/2016	6.40	<0.500	<0.500	1.60J
R-44	Onsite	Water Table	05/05/2016	6.32	<0.500	<0.500	1.74J
R-44	Onsite	Water Table	06/01/2016	6.79	<0.500	0.470J	2.55J
R-44	Onsite	Water Table	07/06/2016	6.19	<0.500	3.63	30.5
R-44	Onsite	Water Table	08/10/2016	6.87	<0.500	5.89	24.7
R-44	Onsite	Water Table	09/06/2016	4.64	<0.500	0.930J	5.50
R-44	Onsite	Water Table	10/03/2016	5.96	<0.500	1.59	16.4
R-44	Onsite	Water Table	11/03/2016	6.06	<0.500	0.580J	2.69J
R-44	Onsite	Water Table	12/01/2016	2.31	<0.500	<0.500	1.27J

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-44	Onsite	Water Table	01/05/2017	1.85	<0.500	<0.500	1.20J
R-44	Onsite	Water Table	02/01/2017	1.54	<0.500	<0.500	<1.50
R-44	Onsite	Water Table	03/01/2017	1.26	<0.500	<0.500	1.17J
R-44	Onsite	Water Table	04/05/2017	1.54	<0.500	<0.500	<1.50
R-44	Onsite	Water Table	05/03/2017	1.26	<0.500	0.420J	2.07J
R-44	Onsite	Water Table	06/06/2017	1.78	<0.500	1.46	5.37
R-44	Onsite	Water Table	07/06/2017	3.04	<0.500	1.76	4.89
R-45	Onsite	Water Table	05/13/2013	165	240	53.9	307*
R-45	Onsite	Water Table	06/11/2013	311	335	64.4	274*
R-45	Onsite	Water Table	05/30/2013	176	568	210	1150*
R-45	Onsite	Water Table	05/30/2013	179	284	91.0	466*
R-45	Onsite	Water Table	05/30/2013	176	273	84.6	429*
R-45	Onsite	Water Table	05/30/2013	175	186	47.6	230*
R-45	Onsite	Water Table	05/30/2013	185	224	46.7	238*
R-45	Onsite	Water Table	06/03/2013	166	246	84.9	427*
R-45	Onsite	Water Table	06/03/2013	135	139	49.5	190*
R-45	Onsite	Water Table	06/04/2013	223	272	49.4	245*
R-45	Onsite	Water Table	06/04/2013	216	257	46.8	230*
R-45	Onsite	Water Table	06/05/2013	245	279	54.1	262*
R-45	Onsite	Water Table	06/06/2013	285	323	56.3	281*
R-45	Onsite	Water Table	07/24/2013	251	186	49.7	186
R-45	Onsite	Water Table	08/14/2013	323	186	47.7	221
R-45	Onsite	Water Table	09/17/2013	229	131	47.0	189
R-45	Onsite	Water Table	10/18/2013	165	62.0	29.0	108
R-45	Onsite	Water Table	11/14/2013	549	3020	794	4500
R-45	Onsite	Water Table	12/19/2013	223	242	62.0	197
R-45	Onsite	Water Table	01/16/2014	172	151	32.2	145
R-45	Onsite	Water Table	02/13/2014	112	77.5	23.3	104
R-45	Onsite	Water Table	03/13/2014	89.4	64.4	22.2	102
R-45	Onsite	Water Table	04/17/2014	102	112	36.1	197
R-45	Onsite	Water Table	05/15/2014	212	195	36.5	188
R-45	Onsite	Water Table	06/23/2014	182	140	24.1	151
R-45	Onsite	Water Table	07/23/2014	443	469	71.0	384
R-45	Onsite	Water Table	08/27/2014	413	457	79.8	423
R-45	Onsite	Water Table	09/18/2014	326	351	69.8	374
R-45	Onsite	Water Table	10/16/2014	230	197	44.3	267
R-45	Onsite	Water Table	11/12/2014	170	108	35.7	205
R-45	Onsite	Water Table	12/10/2014	167	101	48.2	204
R-45	Onsite	Water Table	01/12/2015	129	70.5	30.1	169
R-45	Onsite	Water Table	03/11/2015	129	115	50.1	259
R-45	Onsite	Water Table	06/22/2015	120	48.9	23.7	94.3
R-45	Onsite	Water Table	07/08/2015	193	125	35.3	168
R-45	Onsite	Water Table	10/06/2015	219	142	40.2	201
R-45	Onsite	Water Table	01/06/2016	100	58.8	25.7	142
R-45	Onsite	Water Table	02/04/2016	76.3	46.5	23.6	129
R-45	Onsite	Water Table	03/02/2016	76.0	182	103	723
R-45	Onsite	Water Table	04/14/2016	57.8	60.2	36.2	242
R-45	Onsite	Water Table	05/05/2016	73.4	24.8	15.0	75.1
R-45	Onsite	Water Table	06/01/2016	99.8	62.6	24.7	146
R-45	Onsite	Water Table	07/06/2016	180	112	35.8	192
R-45	Onsite	Water Table	08/05/2016	471	477	88.3	482
R-45	Onsite	Water Table	09/06/2016	344	297	52.8	302

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-45	Onsite	Water Table	10/03/2016	269	192	48.5	284
R-45	Onsite	Water Table	11/03/2016	157	117	56.5	324
R-45	Onsite	Water Table	12/01/2016	131	72.2	34.0	185
R-45	Onsite	Water Table	01/05/2017	110	91.9	52.9	330
R-45	Onsite	Water Table	02/01/2017	87.6	58.5	34.4	205
R-45	Onsite	Water Table	03/01/2017	73.8	51.1	34.0	211
R-45	Onsite	Water Table	04/05/2017	60.6	39.6	27.5	182
R-45	Onsite	Water Table	05/03/2017	50.0	35.3	23.3	125
R-45	Onsite	Water Table	06/06/2017	94.4	47.3	24.2	142
R-45	Onsite	Water Table	07/06/2017	293	243	58.8	309
R-46	Onsite	Water Table	05/13/2013	53.1	46.2	12.7	81.1*
R-46	Onsite	Water Table	06/11/2013	40.9	89.6	20.1	160*
R-46	Onsite	Water Table	06/03/2013	36.5	63.2	17.2	125*
R-46	Onsite	Water Table	06/03/2013	36.4	58.6	19.4	136*
R-46	Onsite	Water Table	06/04/2013	37.2	59.3	20.6	152*
R-46	Onsite	Water Table	06/04/2013	38.8	65.3	21.4	158*
R-46	Onsite	Water Table	06/05/2013	40.9	64.9	20.8	164*
R-46	Onsite	Water Table	06/06/2013	46.2	82.1	22.3	174*
R-46	Onsite	Water Table	07/24/2013	41.4	61.3	23.3	144
R-46	Onsite	Water Table	08/14/2013	65.2	65.2	29.3	159
R-46	Onsite	Water Table	09/17/2013	62.5	57.4	26.6	193
R-46	Onsite	Water Table	10/18/2013	69.9	64.3	16.5	163
R-46	Onsite	Water Table	11/14/2013	61.1	58.4	12.8	136
R-46	Onsite	Water Table	12/19/2013	46.3	53.8	20.2	107
R-46	Onsite	Water Table	01/16/2014	39.5	47.1	11.3	96.2
R-46	Onsite	Water Table	02/13/2014	45.3	52.1	12.0	108
R-46	Onsite	Water Table	03/13/2014	35.5	42.2	10.1	93.8
R-46	Onsite	Water Table	04/17/2014	28.8	39.0	7.91	76.3
R-46	Onsite	Water Table	05/15/2014	65.7	166	39.7	189
R-46	Onsite	Water Table	06/23/2014	53.0	119	22.4	147
R-46	Onsite	Water Table	07/23/2014	69.8	124	39.3	247
R-46	Onsite	Water Table	08/27/2014	115	135	48.7	303
R-46	Onsite	Water Table	09/18/2014	114	127	45.1	307
R-46	Onsite	Water Table	10/16/2014	140	141	41.4	354
R-46	Onsite	Water Table	11/12/2014	104	101	27.9	224
R-46	Onsite	Water Table	12/10/2014	90.4	84.5	30.8	210
R-46	Onsite	Water Table	01/12/2015	93.3	90.9	29.4	236
R-46	Onsite	Water Table	02/11/2015	94.5	87.9	27.9	222
R-46	Onsite	Water Table	03/11/2015	74.5	71.6	28.7	212
R-46	Onsite	Water Table	06/22/2015	73.5	128	39.5	250
R-46	Onsite	Water Table	07/08/2015	75.6	112	38.3	297
R-46	Onsite	Water Table	10/06/2015	93.6	85.8	36.4	367
R-46	Onsite	Water Table	01/06/2016	67.4	67.7	26.1	227
R-46	Onsite	Water Table	02/04/2016	58.2	68.6	23.4	183
R-46	Onsite	Water Table	03/02/2016	54.3	65.5	20.3	179
R-46	Onsite	Water Table	04/14/2016	60.8	81.7	24.3	248
R-46	Onsite	Water Table	05/05/2016	47.1	62.2	18.7	177
R-46	Onsite	Water Table	06/01/2016	57.1	78.5	23.4	227
R-46	Onsite	Water Table	07/06/2016	45.2	51.9	21.8	186
R-46	Onsite	Water Table	08/05/2016	55.9	81.5	30.4	241
R-46	Onsite	Water Table	09/06/2016	66.8	77.5	25.9	252
R-46	Onsite	Water Table	10/03/2016	78.9	88.5	31.6	311

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-46	Onsite	Water Table	11/03/2016	71.1	75.7	31.8	282
R-46	Onsite	Water Table	12/01/2016	42.5	43.8	18.8	185
R-46	Onsite	Water Table	01/05/2017	49.8	61.0	21.6	192
R-46	Onsite	Water Table	02/01/2017	37.8	46.2	14.8	146
R-46	Onsite	Water Table	03/01/2017	39.8	48.8	20.3	200
R-46	Onsite	Water Table	04/05/2017	27.6	30.0	13.4	138
R-46	Onsite	Water Table	05/03/2017	27.7	29.8	15.1	143
R-46	Onsite	Water Table	06/06/2017	27.4	39.6	18.1	137
R-46	Onsite	Water Table	07/06/2017	37.2	61.3	26.7	209
R-47	Onsite	10-55	06/26/2014	<0.200	0.940J	<0.500	<1.50
R-47	Onsite	10-55	06/27/2014	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	07/03/2014	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	07/21/2014	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	08/18/2014	<0.200	0.330J	<0.500	<1.50
R-47	Onsite	10-55	09/17/2014	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	10/15/2014	0.260J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	11/11/2014	0.350J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	12/09/2014	0.310J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	01/13/2015	0.290J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	01/14/2015	0.300J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	02/10/2015	0.210J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	03/10/2015	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	06/22/2015	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	07/06/2015	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	10/07/2015	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	01/05/2016	0.440	<0.500	<0.500	<1.50
R-47	Onsite	10-55	02/02/2016	0.380J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	03/01/2016	0.560	<0.500	<0.500	<1.50
R-47	Onsite	10-55	04/06/2016	0.280J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	05/04/2016	0.200J	<0.500	<0.500	<1.50
R-47	Onsite	10-55	06/03/2016	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	07/07/2016	<0.200	<0.500	<0.500	<1.50
R-47	Onsite	10-55	08/04/2016	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	06/26/2014	<0.200	0.970J	<0.500	<1.50
R-48	Onsite	10-55	06/27/2014	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	07/03/2014	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	07/21/2014	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	08/18/2014	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	09/17/2014	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	10/15/2014	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	11/11/2014	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	12/09/2014	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	01/13/2015	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	01/14/2015	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	02/10/2015	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	03/10/2015	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	06/22/2015	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	07/06/2015	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	10/07/2015	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	01/05/2016	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	02/02/2016	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	03/01/2016	<0.200	<0.500	<0.500	<1.50

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
R-48	Onsite	10-55	04/06/2016	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	05/04/2016	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	06/03/2016	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	07/07/2016	<0.200	<0.500	<0.500	<1.50
R-48	Onsite	10-55	08/04/2016	<0.200	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	05/18/2012	0.170J	<0.620	<0.620	<1.30J*
S-9	Onsite	Water Table	07/26/2012	0.880	<0.620	<0.620	<1.86*
S-9	Onsite	Water Table	12/13/2012	<0.240	<0.620	<0.620	<1.86*
S-9	Onsite	Water Table	01/11/2013	<0.240	<0.620	<0.620	<1.86*
S-9	Onsite	Water Table	04/12/2013	<0.240	<0.620	<0.620	<1.86*
S-9	Onsite	Water Table	08/06/2013	12.4	<0.620	<0.620	1.72J
S-9	Onsite	Water Table	10/19/2013	36.8	<0.620	<0.620	3.67
S-9	Onsite	Water Table	03/02/2014	0.220J	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	04/24/2014	<0.200	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	08/13/2014	5.41	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	10/30/2014	<0.200	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	08/11/2015	3.06	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	10/02/2015	5.02	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	08/10/2016	<0.200	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	08/02/2017	7.34	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	2/12/2018	0.240J	<0.500	<0.500	<1.50
S-9	Onsite	Water Table	8/3/2018	<0.200	<0.500	<0.500	<1.50
S-19	Onsite	Water Table	09/03/2008	<0.500	<2.00	<2.00	<4.00*
S-23	Onsite	Water Table	04/06/2011	1.17	<1.00	2.14	<3.00*
S-41R	Onsite	Water Table	09/02/2008	2400	41.0	33.2	347*
S-41R	Onsite	Water Table	04/14/2011	1240	2.91	9.61	414*
S-41R	Onsite	Water Table	01/30/2014	2410	6.84	5.79	277
S-43	Onsite	Water Table	06/12/2013	2.87	0.390J	0.430J	5.45*
S-43	Onsite	Water Table	11/04/2013	954	18.0J	76.0	727
S-43	Onsite	Water Table	02/20/2015	805	<12.5	39.5	1010
S-43	Onsite	Water Table	08/05/2015	100	0.660J	21.2	288
S-43	Onsite	Water Table	02/27/2017	106	<0.500	12.3	366
S-44	Onsite	Water Table	05/22/2012	460	766	168	1060*
S-44	Onsite	Water Table	05/02/2013	830	1140	311	1850*
S-44	Onsite	Water Table	11/04/2013	1420	780	532	2470
S-44	Onsite	Water Table	08/20/2014	1480	2100	746	3580
S-50	Onsite	Water Table	09/02/2008	3010	3480	569	5910*
S-50	Onsite	Water Table	05/02/2013	570	1080	199	2810*

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Well ID	Proximity	Zone	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
S-51	Onsite	Water Table	08/05/2015	976	2.48	23.9	646

General Notes:

Higher result of field-duplicate pair is reported.

Date listed is the sample date for recent samples; prior to 2006 however, the date listed is likely the event date as sample dates were not always available.

MW-148A-15/B-30 and MW-153A-15/B-55 are offsite wells, but are reported along with the Onsite data

Acronyms and Abbreviations:

< = not detected, LOD or limit of quantitation (LOQ for older data) listed; flag applied by laboratory

* = total xylenes calculated in database (total value not supplied by lab in original report); flag applied by Shannon & Wilson, Inc.

-- = not analyzed/reported

B* = result is considered not detected at the LOQ or reported concentration (higher value), due to contamination identified in a blank QC sample. Flag is reported as <...B*. Flag applied by Shannon & Wilson, Inc.

E = result was above laboratory calibration range, flag applied by laboratory

J = estimated concentration, detected above the detection limit (DL) and below the LOQ; flag applied by laboratory

J* = result is considered estimated (no direction of bias), due to QC failures or sample-handling anomalies; flag applied by Shannon & Wilson, Inc.

JH* = result is considered estimated (biased high), due to QC failures or sample-handling anomalies; flag applied by Shannon & Wilson, Inc.

ND = analyte not detected, unknown limit of detection (LOD)

µg/L = micrograms per liter

Appendix A-3
Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
AS-MW-8	Onsite	Water Table	11/07/2014	17.7
MW-101A-25	Onsite	10-55	04/19/2006	360
MW-101A-25	Onsite	10-55	05/16/2006	410
MW-101A-25	Onsite	10-55	06/21/2006	390
MW-101A-25	Onsite	10-55	07/19/2006	320
MW-101A-25	Onsite	10-55	11/16/2006	260
MW-101A-25	Onsite	10-55	12/08/2006	380
MW-101A-25	Onsite	10-55	01/15/2007	250
MW-101A-25	Onsite	10-55	02/13/2007	270
MW-101A-25	Onsite	10-55	03/19/2007	360
MW-101A-25	Onsite	10-55	04/17/2007	251
MW-101A-25	Onsite	10-55	05/22/2007	204
MW-101A-25	Onsite	10-55	06/20/2007	316
MW-101A-25	Onsite	10-55	07/18/2007	231
MW-101A-25	Onsite	10-55	08/21/2007	214
MW-101A-25	Onsite	10-55	09/20/2007	266
MW-101A-25	Onsite	10-55	10/17/2007	251
MW-101A-25	Onsite	10-55	11/15/2007	313
MW-101A-25	Onsite	10-55	01/03/2008	127
MW-101A-25	Onsite	10-55	02/13/2008	185
MW-101A-25	Onsite	10-55	03/05/2008	156
MW-101A-25	Onsite	10-55	04/03/2008	149
MW-101A-25	Onsite	10-55	05/08/2008	153
MW-101A-25	Onsite	10-55	06/10/2008	156
MW-101A-25	Onsite	10-55	07/01/2008	129
MW-101A-25	Onsite	10-55	08/07/2008	150
MW-101A-25	Onsite	10-55	09/04/2008	193
MW-101A-25	Onsite	10-55	10/02/2008	140
MW-101A-25	Onsite	10-55	11/06/2008	129
MW-101A-25	Onsite	10-55	12/04/2008	131
MW-101A-25	Onsite	10-55	01/13/2009	110
MW-101A-25	Onsite	10-55	02/09/2009	101
MW-101A-25	Onsite	10-55	03/03/2009	121
MW-101A-25	Onsite	10-55	04/09/2009	87.9
MW-101A-25	Onsite	10-55	05/06/2009	77.8
MW-101A-25	Onsite	10-55	06/05/2009	96.8
MW-101A-25	Onsite	10-55	07/06/2009	110
MW-101A-25	Onsite	10-55	08/03/2009	72.0
MW-101A-25	Onsite	10-55	09/02/2009	78.1
MW-101A-25	Onsite	10-55	10/01/2009	72.5
MW-101A-25	Onsite	10-55	11/03/2009	86.4
MW-101A-25	Onsite	10-55	12/01/2009	80.8
MW-101A-25	Onsite	10-55	01/21/2010	90.6
MW-101A-25	Onsite	10-55	02/12/2010	55.5
MW-101A-25	Onsite	10-55	03/04/2010	63.8
MW-101A-25	Onsite	10-55	04/05/2010	54.4
MW-101A-25	Onsite	10-55	05/03/2010	60.5
MW-101A-25	Onsite	10-55	07/19/2010	53.1
MW-101A-25	Onsite	10-55	07/16/2010	66.7
MW-101A-25	Onsite	10-55	08/10/2010	67.1
MW-101A-25	Onsite	10-55	09/02/2010	54.0
MW-101A-25	Onsite	10-55	10/05/2010	67.6

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-101A-25	Onsite	10-55	11/04/2010	67.6
MW-101A-25	Onsite	10-55	02/25/2011	55.7
MW-101A-25	Onsite	10-55	04/12/2011	37.0
MW-101A-25	Onsite	10-55	08/15/2011	70.7
MW-101A-25	Onsite	10-55	02/21/2012	73.3
MW-101A-25	Onsite	10-55	05/03/2012	48.6JL *
MW-101A-25	Onsite	10-55	07/24/2012	63.5
MW-101A-25	Onsite	10-55	01/21/2013	52.3
MW-101A-25	Onsite	10-55	04/17/2013	44.0
MW-101A-25	Onsite	10-55	07/25/2013	52.6
MW-101A-25	Onsite	10-55	10/14/2013	49.2
MW-101A-25	Onsite	10-55	07/22/2014	39.3
MW-101A-25	Onsite	10-55	02/18/2015	6.96J
MW-101A-25	Onsite	10-55	04/15/2015	5.06J
MW-101A-25	Onsite	10-55	07/31/2015	4.08J
MW-101A-25	Onsite	10-55	02/12/2016	3.67J
MW-101A-25	Onsite	10-55	07/19/2016	<5.10
MW-101A-25	Onsite	10-55	02/14/2017	10.3
MW-101-60	Onsite	10-55	04/19/2006	100
MW-101-60	Onsite	10-55	05/16/2006	160
MW-101-60	Onsite	10-55	06/21/2006	160
MW-101-60	Onsite	10-55	07/19/2006	96.0
MW-101-60	Onsite	10-55	01/15/2007	120
MW-101-60	Onsite	10-55	04/17/2007	123
MW-101-60	Onsite	10-55	07/18/2007	109
MW-101-60	Onsite	10-55	10/17/2007	80.9
MW-101-60	Onsite	10-55	01/03/2008	65.6
MW-101-60	Onsite	10-55	04/03/2008	70.6
MW-101-60	Onsite	10-55	07/01/2008	53.8
MW-101-60	Onsite	10-55	10/02/2008	44.0
MW-101-60	Onsite	10-55	04/09/2009	32.1
MW-101-60	Onsite	10-55	07/06/2009	46.3
MW-101-60	Onsite	10-55	08/03/2009	34.9
MW-101-60	Onsite	10-55	10/01/2009	20.8
MW-101-60	Onsite	10-55	01/21/2010	38.8
MW-101-60	Onsite	10-55	04/05/2010	14.7
MW-101-60	Onsite	10-55	07/16/2010	29.4
MW-101-60	Onsite	10-55	10/05/2010	23.8
MW-101-60	Onsite	10-55	02/09/2011	18.6
MW-101-60	Onsite	10-55	04/12/2011	21.1
MW-101-60	Onsite	10-55	08/15/2011	40.7
MW-101-60	Onsite	10-55	10/11/2011	35.6
MW-101-60	Onsite	10-55	02/21/2012	37.0
MW-101-60	Onsite	10-55	05/03/2012	32.9JL *
MW-101-60	Onsite	10-55	07/24/2012	33.7
MW-101-60	Onsite	10-55	04/17/2013	18.5
MW-101-60	Onsite	10-55	07/25/2013	20.0
MW-101-60	Onsite	10-55	10/14/2013	19.4
MW-101-60	Onsite	10-55	07/23/2014	18.2
MW-101-60	Onsite	10-55	02/18/2015	3.50J
MW-101-60	Onsite	10-55	04/15/2015	<5.40
MW-101-60	Onsite	10-55	07/21/2015	<5.00

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-101-60	Onsite	10-55	07/14/2016	<5.10
MW-102-70	Onsite	55-90	04/18/2006	<10.0
MW-102-70	Onsite	55-90	05/16/2006	<10.0
MW-102-70	Onsite	55-90	06/20/2006	<10.0
MW-102-70	Onsite	55-90	07/18/2006	<10.0
MW-102-70	Onsite	55-90	04/18/2007	<10.3
MW-102-70	Onsite	55-90	10/16/2007	<10.5
MW-102-70	Onsite	55-90	04/02/2008	<10.2
MW-102-70	Onsite	55-90	10/01/2008	<10.0
MW-102-70	Onsite	55-90	04/09/2009	<10.2
MW-102-70	Onsite	55-90	08/03/2009	<10.4
MW-102-70	Onsite	55-90	10/01/2009	<10.3
MW-102-70	Onsite	55-90	04/02/2010	<10.0
MW-102-70	Onsite	55-90	10/06/2010	<10.3
MW-104-65	Onsite	10-55	08/03/2009	<10.9
MW-104-65	Onsite	10-55	02/08/2011	<10.2
MW-104-65	Onsite	10-55	04/01/2011	<10.5
MW-104-65	Onsite	10-55	10/11/2011	<6.20
MW-104-65	Onsite	10-55	05/02/2012	<6.32
MW-104-65	Onsite	10-55	11/14/2012	<6.20
MW-104-65	Onsite	10-55	04/23/2013	<6.20
MW-104-65	Onsite	10-55	10/31/2013	<6.20
MW-104-65	Onsite	10-55	07/28/2014	<5.40J*
MW-104-65	Onsite	10-55	07/30/2015	<5.00
MW-105A-25	Onsite	10-55	09/03/2008	<10.5
MW-105A-25	Onsite	10-55	04/18/2011	<11.1
MW-105A-25	Onsite	10-55	10/17/2011	<6.20
MW-105A-25	Onsite	10-55	05/04/2012	<6.20
MW-105A-25	Onsite	10-55	07/19/2012	<6.32
MW-105A-25	Onsite	10-55	09/17/2012	155
MW-105A-25	Onsite	10-55	10/11/2012	<6.20
MW-105A-25	Onsite	10-55	05/22/2013	<6.20
MW-105A-25	Onsite	10-55	08/20/2014	<5.25
MW-105A-25	Onsite	10-55	08/04/2015	R*
MW-105A-25	Onsite	10-55	07/26/2016	<5.15
MW-105-65	Onsite	10-55	09/03/2008	<10.6
MW-105-65	Onsite	10-55	04/18/2011	<11.0
MW-105-65	Onsite	10-55	10/17/2011	<6.40
MW-105-65	Onsite	10-55	05/04/2012	<6.20
MW-105-65	Onsite	10-55	07/19/2012	<6.32
MW-105-65	Onsite	10-55	11/12/2012	<6.66
MW-105-65	Onsite	10-55	01/14/2013	<6.88
MW-105-65	Onsite	10-55	05/22/2013	<6.32
MW-105-65	Onsite	10-55	07/23/2013	<6.20
MW-105-65	Onsite	10-55	10/28/2013	<6.20
MW-105-65	Onsite	10-55	08/29/2014	<5.00
MW-105-65	Onsite	10-55	08/04/2015	<5.00
MW-105-65	Onsite	10-55	07/26/2016	<5.05
MW-106-25	Onsite	10-55	08/22/2006	<100
MW-106-25	Onsite	10-55	09/18/2006	110
MW-106-25	Onsite	10-55	04/17/2007	<10.8
MW-106-25	Onsite	10-55	09/19/2007	<10.0

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-106-25	Onsite	10-55	04/02/2008	<10.2
MW-106-25	Onsite	10-55	09/04/2008	<10.4
MW-106-25	Onsite	10-55	04/08/2009	<10.0
MW-106-25	Onsite	10-55	09/02/2009	<11.1
MW-106-25	Onsite	10-55	04/02/2010	<10.0
MW-106-25	Onsite	10-55	09/03/2010	<10.0
MW-106-25	Onsite	10-55	02/24/2011	<10.9
MW-106-25	Onsite	10-55	04/15/2011	<10.9
MW-106-25	Onsite	10-55	10/11/2011	<6.20
MW-106-25	Onsite	10-55	04/27/2012	<6.74
MW-106-25	Onsite	10-55	05/04/2012	<6.20J*
MW-106-25	Onsite	10-55	11/15/2012	<6.20
MW-106-25	Onsite	10-55	05/13/2013	<6.46
MW-106-25	Onsite	10-55	03/10/2014	<5.00
MW-106-25	Onsite	10-55	03/17/2014	<5.00
MW-106-25	Onsite	10-55	04/04/2014	<5.00
MW-106-25	Onsite	10-55	04/05/2014	<5.00
MW-106-25	Onsite	10-55	04/06/2014	<5.00
MW-106-25	Onsite	10-55	04/07/2014	<5.00
MW-106-25	Onsite	10-55	04/09/2014	<5.00
MW-106-25	Onsite	10-55	04/10/2014	<5.40
MW-106-25	Onsite	10-55	04/11/2014	<5.00
MW-106-25	Onsite	10-55	04/12/2014	<5.00
MW-106-25	Onsite	10-55	04/13/2014	<5.00
MW-106-25	Onsite	10-55	04/14/2014	<5.00
MW-106-25	Onsite	10-55	04/15/2014	<5.25
MW-106-25	Onsite	10-55	04/16/2014	<5.15
MW-106-25	Onsite	10-55	04/17/2014	<5.25
MW-106-25	Onsite	10-55	04/18/2014	<5.25
MW-106-25	Onsite	10-55	04/19/2014	<5.30
MW-106-25	Onsite	10-55	04/20/2014	<5.00
MW-106-25	Onsite	10-55	04/21/2014	<5.00
MW-106-25	Onsite	10-55	04/22/2014	<5.20
MW-106-25	Onsite	10-55	04/23/2014	<5.25
MW-106-25	Onsite	10-55	08/15/2014	<5.25
MW-106-25	Onsite	10-55	02/20/2015	<5.00
MW-106-25	Onsite	10-55	07/31/2015	<5.00
MW-106-25	Onsite	10-55	07/27/2016	<5.15
MW-109-15	Onsite	Water Table	04/18/2006	11.0
MW-109-15	Onsite	Water Table	05/16/2006	13.0
MW-109-15	Onsite	Water Table	06/20/2006	<10.0
MW-109-15	Onsite	Water Table	07/18/2006	<10.0
MW-109-15	Onsite	Water Table	01/15/2007	28.0
MW-109-15	Onsite	Water Table	04/17/2007	<10.8
MW-109-15	Onsite	Water Table	07/17/2007	<10.8
MW-109-15	Onsite	Water Table	10/16/2007	<10.4
MW-109-15	Onsite	Water Table	01/03/2008	64.0
MW-109-15	Onsite	Water Table	04/02/2008	<10.4
MW-109-15	Onsite	Water Table	07/01/2008	<10.3
MW-109-15	Onsite	Water Table	10/02/2008	<10.0
MW-109-15	Onsite	Water Table	01/12/2009	<10.4
MW-109-15	Onsite	Water Table	04/08/2009	<10.4

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-109-15	Onsite	Water Table	07/07/2009	<10.0
MW-109-15	Onsite	Water Table	10/01/2009	<10.5
MW-109-15	Onsite	Water Table	01/19/2010	14.8
MW-109-15	Onsite	Water Table	04/02/2010	<10.4
MW-109-15	Onsite	Water Table	07/16/2010	<10.0
MW-109-15	Onsite	Water Table	10/06/2010	<10.0
MW-109-15	Onsite	Water Table	02/10/2011	<11.6
MW-109-15	Onsite	Water Table	06/01/2011	<3.10
MW-109-15	Onsite	Water Table	10/17/2011	<6.20
MW-109-15	Onsite	Water Table	05/04/2012	<6.20
MW-109-15	Onsite	Water Table	11/14/2012	<6.60
MW-109-15	Onsite	Water Table	06/06/2013	<6.20
MW-109-15	Onsite	Water Table	11/01/2013	<6.46
MW-109-15	Onsite	Water Table	08/19/2014	<5.45
MW-109-15	Onsite	Water Table	07/31/2015	<5.00
MW-109-15	Onsite	Water Table	07/20/2016	<5.10
MW-110-20	Onsite	Water Table	07/18/2006	11000
MW-110-20	Onsite	Water Table	08/22/2006	11000
MW-110-20	Onsite	Water Table	09/18/2006	8800
MW-110-20	Onsite	Water Table	11/15/2006	4100
MW-110-20	Onsite	Water Table	12/08/2006	4600
MW-110-20	Onsite	Water Table	01/17/2007	4100
MW-110-20	Onsite	Water Table	07/17/2007	4050
MW-110-20	Onsite	Water Table	08/21/2007	7600
MW-110-20	Onsite	Water Table	10/16/2007	7740
MW-110-20	Onsite	Water Table	11/15/2007	4300
MW-110-20	Onsite	Water Table	12/07/2007	4070
MW-110-20	Onsite	Water Table	01/04/2008	2310
MW-110-20	Onsite	Water Table	07/01/2008	4700
MW-110-20	Onsite	Water Table	08/07/2008	12100
MW-110-20	Onsite	Water Table	09/04/2008	5500
MW-110-20	Onsite	Water Table	10/02/2008	4200
MW-110-20	Onsite	Water Table	11/06/2008	2820
MW-110-20	Onsite	Water Table	12/04/2008	2160
MW-110-20	Onsite	Water Table	01/12/2009	979
MW-110-20	Onsite	Water Table	07/07/2009	2850
MW-110-20	Onsite	Water Table	08/03/2009	1280
MW-110-20	Onsite	Water Table	09/02/2009	1280
MW-110-20	Onsite	Water Table	10/01/2009	822
MW-110-20	Onsite	Water Table	11/03/2009	515
MW-110-20	Onsite	Water Table	12/22/2009	227
MW-110-20	Onsite	Water Table	01/19/2010	251
MW-110-20	Onsite	Water Table	07/23/2010	668
MW-110-20	Onsite	Water Table	08/11/2010	1160
MW-110-20	Onsite	Water Table	09/02/2010	1270
MW-110-20	Onsite	Water Table	10/06/2010	1390
MW-110-20	Onsite	Water Table	11/04/2010	1580
MW-110-20	Onsite	Water Table	02/10/2011	233
MW-110-20	Onsite	Water Table	08/23/2011	1240
MW-110-20	Onsite	Water Table	10/18/2011	1150
MW-110-20	Onsite	Water Table	02/21/2012	317JL*
MW-110-20	Onsite	Water Table	06/15/2012	1740

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-110-20	Onsite	Water Table	07/26/2012	1340J*
MW-110-20	Onsite	Water Table	10/18/2012	608
MW-110-20	Onsite	Water Table	01/11/2013	398
MW-110-20	Onsite	Water Table	07/30/2013	538
MW-110-20	Onsite	Water Table	10/15/2013	448
MW-110-20	Onsite	Water Table	03/12/2014	81.6
MW-110-20	Onsite	Water Table	04/25/2014	3310
MW-110-20	Onsite	Water Table	05/28/2014	1090
MW-110-20	Onsite	Water Table	06/04/2014	899
MW-110-20	Onsite	Water Table	09/03/2014	702
MW-110-20	Onsite	Water Table	10/28/2014	621
MW-110-20	Onsite	Water Table	02/20/2015	158
MW-110-20	Onsite	Water Table	04/23/2015	215
MW-110-20	Onsite	Water Table	07/31/2015	285
MW-110-20	Onsite	Water Table	10/20/2015	435
MW-110-20	Onsite	Water Table	02/17/2016	106
MW-110-20	Onsite	Water Table	04/11/2016	90.5
MW-110-20	Onsite	Water Table	08/09/2016	357J*
MW-110-20	Onsite	Water Table	10/20/2016	302
MW-110-20	Onsite	Water Table	02/16/2017	69.2
MW-110-20	Onsite	Water Table	04/10/2017	62.2
MW-110-65	Onsite	10-55	09/04/2013	<6.50
MW-110-65	Onsite	10-55	10/25/2013	<6.52
MW-110-65	Onsite	10-55	03/12/2014	<5.30
MW-110-65	Onsite	10-55	04/22/2014	<5.00
MW-110-65	Onsite	10-55	08/29/2014	<5.25
MW-110-65	Onsite	10-55	10/28/2014	<5.00
MW-110-65	Onsite	10-55	07/31/2015	<5.20J*
MW-110-65	Onsite	10-55	08/09/2016	4.01J
MW-111-15	Onsite	Water Table	08/22/2006	120
MW-111-15	Onsite	Water Table	09/18/2006	<100
MW-111-15	Onsite	Water Table	04/18/2007	115
MW-111-15	Onsite	Water Table	10/16/2007	91.1
MW-111-15	Onsite	Water Table	04/02/2008	80.9
MW-111-15	Onsite	Water Table	10/02/2008	85.0
MW-111-15	Onsite	Water Table	04/08/2009	49.1
MW-111-15	Onsite	Water Table	10/01/2009	49.4
MW-111-15	Onsite	Water Table	04/02/2010	38.9
MW-111-15	Onsite	Water Table	10/12/2010	55.4
MW-111-15	Onsite	Water Table	02/24/2011	51.0
MW-111-15	Onsite	Water Table	04/14/2011	40.6
MW-111-15	Onsite	Water Table	10/11/2011	78.2
MW-113-15	Onsite	Water Table	04/18/2006	250
MW-113-15	Onsite	Water Table	05/16/2006	280
MW-113-15	Onsite	Water Table	06/21/2006	290
MW-113-15	Onsite	Water Table	07/18/2006	190
MW-113-15	Onsite	Water Table	01/16/2007	250
MW-113-15	Onsite	Water Table	04/18/2007	257
MW-113-15	Onsite	Water Table	07/17/2007	526
MW-113-15	Onsite	Water Table	10/17/2007	153
MW-113-15	Onsite	Water Table	01/03/2008	122
MW-113-15	Onsite	Water Table	04/02/2008	158

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-113-15	Onsite	Water Table	07/01/2008	528
MW-113-15	Onsite	Water Table	10/02/2008	72.0
MW-113-15	Onsite	Water Table	01/12/2009	108
MW-113-15	Onsite	Water Table	04/09/2009	118
MW-113-15	Onsite	Water Table	07/07/2009	112
MW-113-15	Onsite	Water Table	10/01/2009	81.5
MW-113-15	Onsite	Water Table	01/19/2010	90.3
MW-113-15	Onsite	Water Table	04/02/2010	98.1
MW-113-15	Onsite	Water Table	07/22/2010	118
MW-113-15	Onsite	Water Table	10/06/2010	143
MW-113-15	Onsite	Water Table	02/08/2011	121
MW-113-15	Onsite	Water Table	04/14/2011	68.9
MW-113-15	Onsite	Water Table	08/17/2011	115
MW-113-15	Onsite	Water Table	10/14/2011	118
MW-113-15	Onsite	Water Table	02/14/2012	203
MW-113-15	Onsite	Water Table	05/17/2012	266JL*
MW-113-15	Onsite	Water Table	07/26/2012	335
MW-113-15	Onsite	Water Table	11/14/2012	310
MW-113-15	Onsite	Water Table	01/14/2013	283
MW-113-15	Onsite	Water Table	05/20/2013	234
MW-113-15	Onsite	Water Table	07/18/2013	199
MW-113-15	Onsite	Water Table	10/22/2013	61.6
MW-113-15	Onsite	Water Table	02/28/2014	63.7
MW-113-15	Onsite	Water Table	04/21/2014	55.0
MW-113-15	Onsite	Water Table	07/31/2014	46.4
MW-113-15	Onsite	Water Table	11/07/2014	57.5
MW-113-15	Onsite	Water Table	04/23/2015	177
MW-113-15	Onsite	Water Table	07/28/2015	153
MW-113-15	Onsite	Water Table	10/20/2015	69.1
MW-113-15	Onsite	Water Table	02/04/2016	90.9
MW-113-15	Onsite	Water Table	04/11/2016	120
MW-113-15	Onsite	Water Table	08/08/2016	119
MW-113-15	Onsite	Water Table	10/20/2016	62.2
MW-113-15	Onsite	Water Table	02/27/2017	30.2
MW-113-15	Onsite	Water Table	04/10/2017	26.8
MW-115-15	Onsite	Water Table	05/17/2006	310
MW-115-15	Onsite	Water Table	06/21/2006	700
MW-115-15	Onsite	Water Table	07/19/2006	500
MW-115-15	Onsite	Water Table	01/16/2007	770
MW-115-15	Onsite	Water Table	04/17/2007	413
MW-115-15	Onsite	Water Table	07/19/2007	447
MW-115-15	Onsite	Water Table	10/17/2007	220
MW-115-15	Onsite	Water Table	01/03/2008	79.4
MW-115-15	Onsite	Water Table	04/04/2008	94.7
MW-115-15	Onsite	Water Table	07/01/2008	91.4
MW-115-15	Onsite	Water Table	10/03/2008	75.0
MW-115-15	Onsite	Water Table	01/13/2009	42.6
MW-115-15	Onsite	Water Table	04/10/2009	33.1
MW-115-15	Onsite	Water Table	07/07/2009	34.2
MW-115-15	Onsite	Water Table	10/02/2009	<10.6
MW-115-15	Onsite	Water Table	01/20/2010	<10.8
MW-115-15	Onsite	Water Table	04/03/2010	<105

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-115-15	Onsite	Water Table	05/31/2012	15.6
MW-115-15	Onsite	Water Table	04/11/2013	10.2
MW-115-15	Onsite	Water Table	11/17/2013	13.7
MW-115-15	Onsite	Water Table	03/27/2014	5.56J
MW-115-15	Onsite	Water Table	09/03/2014	10.1
MW-115-15	Onsite	Water Table	02/24/2015	5.91J
MW-115-15	Onsite	Water Table	08/07/2015	9.02JL*
MW-115-15	Onsite	Water Table	02/26/2016	5.12J
MW-115-15	Onsite	Water Table	08/17/2016	<5.05
MW-116-15	Onsite	Water Table	05/17/2006	40.0
MW-116-15	Onsite	Water Table	06/21/2006	43.0
MW-116-15	Onsite	Water Table	07/19/2006	27.0
MW-116-15	Onsite	Water Table	01/16/2007	38.0
MW-116-15	Onsite	Water Table	04/17/2007	38.0
MW-116-15	Onsite	Water Table	07/19/2007	<105
MW-116-15	Onsite	Water Table	10/17/2007	37.7
MW-116-15	Onsite	Water Table	01/03/2008	21.1
MW-116-15	Onsite	Water Table	04/04/2008	33.0
MW-116-15	Onsite	Water Table	07/01/2008	46.1
MW-116-15	Onsite	Water Table	10/03/2008	69.0
MW-116-15	Onsite	Water Table	01/13/2009	24.5
MW-116-15	Onsite	Water Table	04/10/2009	25.6
MW-116-15	Onsite	Water Table	07/07/2009	20.3
MW-116-15	Onsite	Water Table	10/02/2009	<10.6
MW-116-15	Onsite	Water Table	01/20/2010	<10.5
MW-116-15	Onsite	Water Table	04/03/2010	11.4
MW-116-15	Onsite	Water Table	07/26/2010	13.4
MW-116-15	Onsite	Water Table	10/14/2010	<10.6
MW-116-15	Onsite	Water Table	04/13/2011	41.8
MW-116-15	Onsite	Water Table	10/20/2011	28.2JH*
MW-116-15	Onsite	Water Table	05/21/2012	27.6
MW-116-15	Onsite	Water Table	06/12/2013	47.4
MW-116-15	Onsite	Water Table	11/17/2013	45.5
MW-116-15	Onsite	Water Table	06/04/2014	47.8
MW-116-15	Onsite	Water Table	09/04/2014	38.5
MW-116-15	Onsite	Water Table	08/10/2015	35.5JL*
MW-116-15	Onsite	Water Table	10/22/2015	54.6
MW-116-15	Onsite	Water Table	02/29/2016	9.50JL*
MW-116-15	Onsite	Water Table	08/16/2016	11.2J*
MW-118-45	Onsite	10-55	04/18/2006	<10.0
MW-118-45	Onsite	10-55	04/18/2007	<10.8
MW-118-45	Onsite	10-55	10/16/2007	<10.3
MW-118-45	Onsite	10-55	04/02/2008	<10.3
MW-118-45	Onsite	10-55	10/01/2008	<10.4
MW-118-45	Onsite	10-55	04/09/2009	<10.2
MW-118-45	Onsite	10-55	10/01/2009	<10.3
MW-118-45	Onsite	10-55	04/02/2010	<10.4
MW-124-25	Onsite	10-55	06/20/2006	<10.0
MW-124-25	Onsite	10-55	07/18/2006	<10.0
MW-124-25	Onsite	10-55	10/16/2007	<10.6
MW-124-25	Onsite	10-55	10/02/2008	<11.0
MW-124-25	Onsite	10-55	10/02/2009	<10.4

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-124-25	Onsite	10-55	10/07/2010	<10.3
MW-125-25	Onsite	10-55	09/02/2008	<10.6
MW-125-25	Onsite	10-55	08/17/2011	24.5
MW-125-25	Onsite	10-55	10/18/2011	11.1
MW-125-25	Onsite	10-55	02/17/2012	<7.12
MW-125-25	Onsite	10-55	05/22/2012	<6.32
MW-125-25	Onsite	10-55	08/08/2012	<6.74
MW-125-25	Onsite	10-55	11/14/2012	<6.20
MW-125-25	Onsite	10-55	02/02/2013	<6.40
MW-125-25	Onsite	10-55	04/16/2013	<6.40
MW-125-25	Onsite	10-55	07/20/2013	<6.20
MW-125-25	Onsite	10-55	11/01/2013	<6.20
MW-125-25	Onsite	10-55	03/04/2014	<5.00
MW-125-25	Onsite	10-55	04/23/2014	<5.15
MW-125-25	Onsite	10-55	08/12/2014	<5.25
MW-125-25	Onsite	10-55	10/23/2014	<5.00
MW-125-25	Onsite	10-55	02/20/2015	3.32J
MW-125-25	Onsite	10-55	04/23/2015	<5.00
MW-125-25	Onsite	10-55	08/04/2015	<5.00
MW-125-25	Onsite	10-55	10/22/2015	<5.00
MW-125-25	Onsite	10-55	02/25/2016	3.14J
MW-125-25	Onsite	10-55	08/18/2016	<5.05
MW-125-25	Onsite	10-55	02/24/2017	<5.10
MW-125-25	Onsite	10-55	04/11/2017	<5.55J*
MW-126-25	Onsite	10-55	09/03/2008	<10.5
MW-127-25	Onsite	10-55	04/18/2006	110
MW-127-25	Onsite	10-55	04/18/2007	216
MW-127-25	Onsite	10-55	10/18/2007	291
MW-127-25	Onsite	10-55	04/02/2008	372
MW-127-25	Onsite	10-55	10/02/2008	290
MW-127-25	Onsite	10-55	04/10/2009	341
MW-127-25	Onsite	10-55	10/02/2009	146
MW-127-25	Onsite	10-55	04/06/2010	209
MW-127-25	Onsite	10-55	10/07/2010	199
MW-127-25	Onsite	10-55	03/09/2011	147
MW-127-25	Onsite	10-55	04/12/2011	138
MW-127-25	Onsite	10-55	08/18/2011	176
MW-127-25	Onsite	10-55	10/20/2011	142
MW-127-25	Onsite	10-55	02/21/2012	74.4
MW-127-25	Onsite	10-55	05/18/2012	81.6
MW-127-25	Onsite	10-55	08/08/2012	75.0
MW-127-25	Onsite	10-55	11/12/2012	55.1
MW-127-25	Onsite	10-55	01/11/2013	51.0
MW-127-25	Onsite	10-55	04/16/2013	36.1
MW-127-25	Onsite	10-55	07/20/2013	23.5
MW-127-25	Onsite	10-55	10/19/2013	18.7
MW-127-25	Onsite	10-55	03/07/2014	8.67J
MW-127-25	Onsite	10-55	04/24/2014	8.22J
MW-127-25	Onsite	10-55	08/14/2014	7.44J
MW-127-25	Onsite	10-55	10/30/2014	7.56J
MW-127-25	Onsite	10-55	02/21/2015	3.27J
MW-127-25	Onsite	10-55	04/24/2015	4.88J

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-127-25	Onsite	10-55	08/07/2015	4.33J
MW-127-25	Onsite	10-55	10/21/2015	4.28J
MW-127-25	Onsite	10-55	03/01/2016	<5.00
MW-127-25	Onsite	10-55	04/08/2016	<5.15
MW-127-25	Onsite	10-55	08/15/2016	4.62J*
MW-127-25	Onsite	10-55	10/21/2016	4.49J
MW-127-25	Onsite	10-55	02/27/2017	<5.20
MW-127-25	Onsite	10-55	04/11/2017	<5.40
MW-127-25	Onsite	10-55	08/02/2017	<5.05
MW-127-25	Onsite	10-55	10/19/2017	7.04J
MW-127-25	Onsite	10-55	01/15/2018	26.8
MW-127-25	Onsite	10-55	04/05/2018	28.4
MW-127-25	Onsite	10-55	07/10/2018	34.5
MW-129-40	Onsite	10-55	04/18/2006	<10.0
MW-129-40	Onsite	10-55	04/18/2007	<10.8
MW-129-40	Onsite	10-55	09/20/2007	<10.9
MW-129-40	Onsite	10-55	04/02/2008	<10.2
MW-129-40	Onsite	10-55	09/04/2008	<10.4
MW-129-40	Onsite	10-55	04/10/2009	<10.3
MW-129-40	Onsite	10-55	09/02/2009	<10.0
MW-129-40	Onsite	10-55	04/06/2010	<20.6
MW-129-40	Onsite	10-55	09/03/2010	<10.3
MW-129-40	Onsite	10-55	02/10/2011	<10.7
MW-129-40	Onsite	10-55	04/07/2011	<10.7
MW-129-40	Onsite	10-55	10/19/2011	<6.20
MW-129-40	Onsite	10-55	05/03/2012	<6.32
MW-129-40	Onsite	10-55	11/15/2012	<6.20
MW-129-40	Onsite	10-55	01/31/2013	<6.60
MW-129-40	Onsite	10-55	05/20/2013	<6.20
MW-129-40	Onsite	10-55	07/20/2013	<6.20
MW-129-40	Onsite	10-55	10/19/2013	<6.20
MW-129-40	Onsite	10-55	03/02/2014	<5.15
MW-129-40	Onsite	10-55	04/24/2014	<5.00
MW-129-40	Onsite	10-55	08/13/2014	<5.20
MW-129-40	Onsite	10-55	11/04/2014	<5.00
MW-129-40	Onsite	10-55	02/24/2015	<5.00
MW-129-40	Onsite	10-55	04/24/2015	<5.15
MW-129-40	Onsite	10-55	08/07/2015	<5.00
MW-129-40	Onsite	10-55	10/21/2015	<5.25
MW-129-40	Onsite	10-55	03/01/2016	<5.05
MW-129-40	Onsite	10-55	08/10/2016	<5.50
MW-129-40	Onsite	10-55	02/25/2017	<5.50
MW-130-25	Onsite	10-55	02/10/2011	930
MW-130-25	Onsite	10-55	04/06/2011	629
MW-130-25	Onsite	10-55	10/19/2011	1080
MW-130-25	Onsite	10-55	12/13/2011	1130
MW-130-25	Onsite	10-55	02/07/2012	993
MW-130-25	Onsite	10-55	05/19/2012	1210
MW-130-25	Onsite	10-55	07/23/2012	994
MW-130-25	Onsite	10-55	10/22/2012	854
MW-130-25	Onsite	10-55	01/11/2013	899
MW-130-25	Onsite	10-55	04/12/2013	776

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-130-25	Onsite	10-55	07/21/2013	734
MW-130-25	Onsite	10-55	11/11/2013	750
MW-130-25	Onsite	10-55	03/05/2014	809
MW-130-25	Onsite	10-55	05/14/2014	990
MW-130-25	Onsite	10-55	09/03/2014	1140JL*
MW-130-25	Onsite	10-55	10/22/2014	1680
MW-130-25	Onsite	10-55	02/20/2015	841
MW-130-25	Onsite	10-55	04/23/2015	562
MW-130-25	Onsite	10-55	08/07/2015	249
MW-130-25	Onsite	10-55	10/22/2015	76.3
MW-130-25	Onsite	10-55	03/07/2016	265
MW-130-25	Onsite	10-55	04/08/2016	176
MW-130-25	Onsite	10-55	08/18/2016	143
MW-130-25	Onsite	10-55	10/20/2016	147
MW-130-25	Onsite	10-55	02/24/2017	204J*
MW-130-25	Onsite	10-55	04/11/2017	181
MW-130-25	Onsite	10-55	08/03/2017	134
MW-130-25	Onsite	10-55	02/14/2018	79.1
MW-130-25	Onsite	10-55	04/10/2018	81.9
MW-130-25	Onsite	10-55	10/20/2017	77.3
MW-131-25	Onsite	10-55	04/18/2006	67.0
MW-131-25	Onsite	10-55	05/16/2006	96.0
MW-131-25	Onsite	10-55	06/20/2006	88.0
MW-131-25	Onsite	10-55	07/18/2006	44.0
MW-131-25	Onsite	10-55	11/15/2006	62.0
MW-131-25	Onsite	10-55	12/08/2006	92.0
MW-131-25	Onsite	10-55	01/15/2007	81.0
MW-131-25	Onsite	10-55	02/13/2007	91.0
MW-131-25	Onsite	10-55	03/19/2007	27.0
MW-131-25	Onsite	10-55	04/18/2007	75.4
MW-131-25	Onsite	10-55	05/22/2007	59.8
MW-131-25	Onsite	10-55	06/20/2007	74.6
MW-131-25	Onsite	10-55	07/17/2007	59.0
MW-131-25	Onsite	10-55	08/21/2007	69.9
MW-131-25	Onsite	10-55	09/20/2007	46.0
MW-131-25	Onsite	10-55	10/16/2007	39.7
MW-131-25	Onsite	10-55	11/12/2007	55.7
MW-131-25	Onsite	10-55	12/07/2007	44.0
MW-131-25	Onsite	10-55	01/03/2008	49.6
MW-131-25	Onsite	10-55	02/12/2008	66.1
MW-131-25	Onsite	10-55	03/05/2008	69.8
MW-131-25	Onsite	10-55	04/02/2008	75.2
MW-131-25	Onsite	10-55	05/07/2008	89.9
MW-131-25	Onsite	10-55	06/10/2008	79.1
MW-131-25	Onsite	10-55	07/01/2008	76.7
MW-131-25	Onsite	10-55	08/07/2008	54.0
MW-131-25	Onsite	10-55	09/04/2008	58.9
MW-131-25	Onsite	10-55	10/02/2008	37.0
MW-131-25	Onsite	10-55	11/06/2008	61.3
MW-131-25	Onsite	10-55	12/04/2008	64.0
MW-131-25	Onsite	10-55	01/12/2009	53.9
MW-131-25	Onsite	10-55	02/09/2009	74.4

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-131-25	Onsite	10-55	03/03/2009	87.0
MW-131-25	Onsite	10-55	04/08/2009	66.9
MW-131-25	Onsite	10-55	05/06/2009	35.0
MW-131-25	Onsite	10-55	06/05/2009	39.7
MW-131-25	Onsite	10-55	07/07/2009	63.8
MW-131-25	Onsite	10-55	08/03/2009	36.7
MW-131-25	Onsite	10-55	09/02/2009	53.1
MW-131-25	Onsite	10-55	10/01/2009	35.1
MW-131-25	Onsite	10-55	11/03/2009	77.5
MW-131-25	Onsite	10-55	12/01/2009	59.3
MW-131-25	Onsite	10-55	01/19/2010	66.8
MW-131-25	Onsite	10-55	02/12/2010	52.9
MW-131-25	Onsite	10-55	03/04/2010	70.1
MW-131-25	Onsite	10-55	04/02/2010	54.2
MW-131-25	Onsite	10-55	05/03/2010	56.4
MW-131-25	Onsite	10-55	07/19/2010	68.9
MW-131-25	Onsite	10-55	07/23/2010	76.3
MW-131-25	Onsite	10-55	08/10/2010	42.9
MW-131-25	Onsite	10-55	09/02/2010	42.4
MW-131-25	Onsite	10-55	10/06/2010	41.5
MW-131-25	Onsite	10-55	11/04/2010	46.4
MW-131-25	Onsite	10-55	03/09/2011	36.8
MW-131-25	Onsite	10-55	04/08/2011	32.7
MW-131-25	Onsite	10-55	08/12/2011	36.8
MW-131-25	Onsite	10-55	10/18/2011	37.3
MW-131-25	Onsite	10-55	02/13/2012	43.6
MW-131-25	Onsite	10-55	05/05/2012	30.5
MW-131-25	Onsite	10-55	07/24/2012	27.1
MW-131-25	Onsite	10-55	11/14/2012	24.8
MW-131-25	Onsite	10-55	01/11/2013	21.3
MW-131-25	Onsite	10-55	06/06/2013	13.7
MW-131-25	Onsite	10-55	07/18/2013	10.8
MW-131-25	Onsite	10-55	10/22/2013	6.47J
MW-131-25	Onsite	10-55	02/28/2014	5.75J
MW-131-25	Onsite	10-55	04/22/2014	5.56J
MW-131-25	Onsite	10-55	07/25/2014	5.36J
MW-131-25	Onsite	10-55	10/28/2014	<5.00
MW-131-25	Onsite	10-55	02/26/2015	<5.00
MW-131-25	Onsite	10-55	04/22/2015	<5.00
MW-131-25	Onsite	10-55	07/27/2015	<5.00
MW-131-25	Onsite	10-55	07/28/2016	<5.15
MW-132-20	Onsite	Water Table	04/19/2006	<10.0
MW-132-20	Onsite	Water Table	04/17/2007	<11.0
MW-132-20	Onsite	Water Table	10/16/2007	<11.1
MW-132-20	Onsite	Water Table	04/03/2008	<10.3
MW-132-20	Onsite	Water Table	10/02/2008	<10.0
MW-132-20	Onsite	Water Table	04/08/2009	<10.2
MW-132-20	Onsite	Water Table	10/12/2009	<10.0
MW-132-20	Onsite	Water Table	04/06/2010	<10.3
MW-132-20	Onsite	Water Table	10/13/2010	<10.5
MW-132-20	Onsite	Water Table	02/18/2011	<10.9
MW-132-20	Onsite	Water Table	04/11/2011	<10.5

Appendix A-3
Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-132-20	Onsite	Water Table	10/18/2011	<6.20
MW-132-20	Onsite	Water Table	05/05/2012	<6.20
MW-132-20	Onsite	Water Table	04/13/2013	<6.20
MW-132-20	Onsite	Water Table	11/07/2013	<6.20
MW-132-20	Onsite	Water Table	08/11/2014	<5.10
MW-132-20	Onsite	Water Table	08/06/2015	<5.00J*
MW-132-20	Onsite	Water Table	08/15/2016	<5.30J*
MW-133-20	Onsite	Water Table	08/17/2011	<6.20
MW-133-20	Onsite	Water Table	10/18/2011	<6.40
MW-133-20	Onsite	Water Table	02/17/2012	<6.74
MW-133-20	Onsite	Water Table	05/19/2012	<6.32J*
MW-133-20	Onsite	Water Table	08/08/2012	<6.20
MW-133-20	Onsite	Water Table	11/15/2012	<6.60
MW-133-20	Onsite	Water Table	02/02/2013	<6.46
MW-133-20	Onsite	Water Table	04/26/2013	<6.52
MW-133-20	Onsite	Water Table	07/21/2013	<6.60
MW-133-20	Onsite	Water Table	11/07/2013	<6.32
MW-133-20	Onsite	Water Table	08/11/2014	<5.00
MW-133-20	Onsite	Water Table	08/06/2015	<5.00
MW-133-20	Onsite	Water Table	08/15/2016	<5.40J*
MW-134-20	Onsite	Water Table	09/20/2007	115
MW-134-20	Onsite	Water Table	09/04/2008	26.2
MW-134-20	Onsite	Water Table	09/03/2009	<10.5
MW-134-20	Onsite	Water Table	09/15/2010	<10.0
MW-134-20	Onsite	Water Table	08/16/2011	<6.52
MW-134-20	Onsite	Water Table	08/09/2012	<6.20
MW-134-20	Onsite	Water Table	07/23/2013	<6.20
MW-134-20	Onsite	Water Table	11/16/2013	<5.10
MW-134-20	Onsite	Water Table	09/03/2014	<5.00
MW-134-20	Onsite	Water Table	08/07/2015	7.85J
MW-134-20	Onsite	Water Table	02/29/2016	<5.10
MW-134-20	Onsite	Water Table	08/17/2016	<5.05
MW-135-20	Onsite	Water Table	07/14/2008	24.6
MW-135-20	Onsite	Water Table	10/14/2011	<6.20
MW-135-20	Onsite	Water Table	08/01/2012	15.4
MW-135-20	Onsite	Water Table	01/31/2013	<6.74
MW-135-20	Onsite	Water Table	07/21/2013	6.39J
MW-135-20	Onsite	Water Table	11/07/2013	<6.20
MW-135-20	Onsite	Water Table	03/14/2014	<5.20
MW-135-20	Onsite	Water Table	09/03/2014	<5.00
MW-135-20	Onsite	Water Table	02/20/2015	<5.30
MW-135-20	Onsite	Water Table	08/05/2015	3.14J
MW-135-20	Onsite	Water Table	02/26/2016	<5.00J*
MW-135-20	Onsite	Water Table	08/18/2016	4.55J
MW-135-20	Onsite	Water Table	02/24/2017	<5.40
MW-136-20	Onsite	Water Table	07/14/2008	<10.4
MW-137-20	Onsite	Water Table	07/14/2008	<10.5
MW-138-20	Onsite	Water Table	05/17/2006	4500
MW-138-20	Onsite	Water Table	06/21/2006	2200
MW-138-20	Onsite	Water Table	11/16/2006	<2100
MW-138-20	Onsite	Water Table	12/08/2006	1800
MW-138-20	Onsite	Water Table	01/15/2007	7800

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-138-20	Onsite	Water Table	02/13/2007	11000
MW-138-20	Onsite	Water Table	03/19/2007	7700
MW-138-20	Onsite	Water Table	04/17/2007	5430
MW-138-20	Onsite	Water Table	05/22/2007	4840
MW-138-20	Onsite	Water Table	06/20/2007	1090
MW-138-20	Onsite	Water Table	07/19/2007	528
MW-138-20	Onsite	Water Table	08/21/2007	<230
MW-138-20	Onsite	Water Table	09/20/2007	325
MW-138-20	Onsite	Water Table	10/17/2007	2780
MW-138-20	Onsite	Water Table	11/12/2007	<3200
MW-138-20	Onsite	Water Table	01/03/2008	779
MW-138-20	Onsite	Water Table	02/12/2008	1140
MW-138-20	Onsite	Water Table	03/05/2008	4690
MW-138-20	Onsite	Water Table	04/04/2008	5120
MW-138-20	Onsite	Water Table	05/07/2008	1950
MW-138-20	Onsite	Water Table	06/10/2008	3160
MW-138-20	Onsite	Water Table	07/01/2008	<100
MW-138-20	Onsite	Water Table	08/07/2008	<10.0
MW-138-20	Onsite	Water Table	09/04/2008	1290
MW-138-20	Onsite	Water Table	10/01/2008	1280
MW-138-20	Onsite	Water Table	11/06/2008	1410
MW-138-20	Onsite	Water Table	12/04/2008	1770
MW-138-20	Onsite	Water Table	01/12/2009	<104
MW-138-20	Onsite	Water Table	02/10/2009	1460
MW-138-20	Onsite	Water Table	03/03/2009	3120
MW-138-20	Onsite	Water Table	04/08/2009	<5100
MW-138-20	Onsite	Water Table	05/06/2009	1840
MW-138-20	Onsite	Water Table	06/05/2009	1780
MW-138-20	Onsite	Water Table	07/07/2009	900
MW-138-20	Onsite	Water Table	08/03/2009	813
MW-138-20	Onsite	Water Table	09/02/2009	131
MW-138-20	Onsite	Water Table	10/02/2009	<447
MW-138-20	Onsite	Water Table	11/03/2009	<222
MW-138-20	Onsite	Water Table	12/01/2009	2910
MW-138-20	Onsite	Water Table	01/19/2010	4010
MW-138-20	Onsite	Water Table	02/17/2010	7380
MW-138-20	Onsite	Water Table	03/04/2010	9690
MW-138-20	Onsite	Water Table	04/03/2010	10700
MW-138-20	Onsite	Water Table	06/14/2010	3040
MW-138-20	Onsite	Water Table	02/23/2012	523
MW-138-20	Onsite	Water Table	05/31/2012	1350JL*
MW-138-20	Onsite	Water Table	08/02/2012	116
MW-138-20	Onsite	Water Table	12/13/2012	1210
MW-138-20	Onsite	Water Table	01/12/2013	1680JL*
MW-138-20	Onsite	Water Table	04/02/2013	1200JL*
MW-138-20	Onsite	Water Table	09/04/2013	32.3J
MW-138-20	Onsite	Water Table	11/14/2013	1250
MW-138-20	Onsite	Water Table	03/12/2014	1140J*
MW-138-20	Onsite	Water Table	04/22/2014	529
MW-138-20	Onsite	Water Table	09/03/2014	34.0J*
MW-138-20	Onsite	Water Table	10/30/2014	377
MW-138-20	Onsite	Water Table	08/11/2015	27.2J*

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-138-20	Onsite	Water Table	10/28/2015	70.0
MW-138-20	Onsite	Water Table	04/11/2016	12.2
MW-138-20	Onsite	Water Table	08/17/2016	52.8
MW-138-20	Onsite	Water Table	10/26/2016	739
MW-138-20	Onsite	Water Table	04/13/2017	16900JL*
MW-139-25	Onsite	10-55	04/18/2006	450
MW-139-25	Onsite	10-55	05/16/2006	530
MW-139-25	Onsite	10-55	06/20/2006	580
MW-139-25	Onsite	10-55	07/18/2006	450
MW-139-25	Onsite	10-55	11/15/2006	340
MW-139-25	Onsite	10-55	12/08/2006	580
MW-139-25	Onsite	10-55	01/17/2007	530
MW-139-25	Onsite	10-55	02/13/2007	650
MW-139-25	Onsite	10-55	03/19/2007	380
MW-139-25	Onsite	10-55	04/18/2007	765
MW-139-25	Onsite	10-55	05/22/2007	500
MW-139-25	Onsite	10-55	06/20/2007	498
MW-139-25	Onsite	10-55	07/17/2007	414
MW-139-25	Onsite	10-55	08/21/2007	427
MW-139-25	Onsite	10-55	09/20/2007	543
MW-139-25	Onsite	10-55	10/16/2007	447
MW-139-25	Onsite	10-55	11/12/2007	435
MW-139-25	Onsite	10-55	12/07/2007	487
MW-139-25	Onsite	10-55	01/03/2008	480
MW-139-25	Onsite	10-55	02/12/2008	507
MW-139-25	Onsite	10-55	03/05/2008	741
MW-139-25	Onsite	10-55	04/02/2008	700
MW-139-25	Onsite	10-55	05/07/2008	612
MW-139-25	Onsite	10-55	06/10/2008	691
MW-139-25	Onsite	10-55	07/01/2008	93.9
MW-139-25	Onsite	10-55	08/07/2008	601
MW-139-25	Onsite	10-55	09/04/2008	591
MW-139-25	Onsite	10-55	10/02/2008	540
MW-139-25	Onsite	10-55	11/06/2008	528
MW-139-25	Onsite	10-55	12/04/2008	567
MW-139-25	Onsite	10-55	01/12/2009	472
MW-139-25	Onsite	10-55	02/10/2009	624
MW-139-25	Onsite	10-55	03/03/2009	706
MW-139-25	Onsite	10-55	04/09/2009	578
MW-139-25	Onsite	10-55	05/06/2009	450
MW-139-25	Onsite	10-55	06/05/2009	649
MW-139-25	Onsite	10-55	07/07/2009	636
MW-139-25	Onsite	10-55	08/03/2009	303
MW-139-25	Onsite	10-55	09/02/2009	447
MW-139-25	Onsite	10-55	10/01/2009	331
MW-139-25	Onsite	10-55	11/03/2009	535
MW-139-25	Onsite	10-55	12/01/2009	395
MW-139-25	Onsite	10-55	01/19/2010	447
MW-139-25	Onsite	10-55	02/12/2010	345
MW-139-25	Onsite	10-55	03/04/2010	400
MW-139-25	Onsite	10-55	04/02/2010	358
MW-139-25	Onsite	10-55	05/03/2010	630

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-139-25	Onsite	10-55	07/19/2010	411
MW-139-25	Onsite	10-55	07/07/2010	361
MW-139-25	Onsite	10-55	08/10/2010	427
MW-139-25	Onsite	10-55	09/02/2010	337
MW-139-25	Onsite	10-55	10/06/2010	439
MW-139-25	Onsite	10-55	11/05/2010	374
MW-139-25	Onsite	10-55	02/09/2011	279
MW-139-25	Onsite	10-55	04/11/2011	201
MW-139-25	Onsite	10-55	08/17/2011	258
MW-139-25	Onsite	10-55	10/12/2011	326JL *
MW-139-25	Onsite	10-55	02/14/2012	265
MW-139-25	Onsite	10-55	05/21/2012	318
MW-139-25	Onsite	10-55	07/26/2012	271
MW-139-25	Onsite	10-55	11/14/2012	218
MW-139-25	Onsite	10-55	01/11/2013	150
MW-139-25	Onsite	10-55	05/13/2013	94.1
MW-139-25	Onsite	10-55	07/18/2013	137
MW-139-25	Onsite	10-55	10/16/2013	160
MW-139-25	Onsite	10-55	02/28/2014	83.3
MW-139-25	Onsite	10-55	04/16/2014	66.3
MW-139-25	Onsite	10-55	07/30/2014	65.3
MW-139-25	Onsite	10-55	10/25/2014	41.2
MW-139-25	Onsite	10-55	02/26/2015	31.7
MW-139-25	Onsite	10-55	04/22/2015	28.4
MW-139-25	Onsite	10-55	07/31/2015	27.8
MW-139-25	Onsite	10-55	10/02/2015	24.6
MW-139-25	Onsite	10-55	02/04/2016	27.3
MW-139-25	Onsite	10-55	04/28/2016	27.4
MW-139-25	Onsite	10-55	07/21/2016	21.8
MW-139-25	Onsite	10-55	10/14/2016	24.0
MW-139-25	Onsite	10-55	02/28/2017	27.7
MW-139-25	Onsite	10-55	04/10/2017	27.6
MW-139-25	Onsite	10-55	07/14/2017	25.9
MW-139-25	Onsite	10-55	10/20/2017	55.8
MW-139-25	Onsite	10-55	01/19/2018	97.1
MW-139-25	Onsite	10-55	04/04/2018	138
MW-139-25	Onsite	10-55	08/08/2018	157
MW-140-25	Onsite	10-55	09/04/2008	<10.4
MW-141-20	Onsite	Water Table	05/22/2007	<10.0
MW-141-20	Onsite	Water Table	06/20/2007	<10.0
MW-141-20	Onsite	Water Table	07/17/2007	198
MW-141-20	Onsite	Water Table	11/12/2007	<10.0
MW-141-20	Onsite	Water Table	01/03/2008	<10.1
MW-141-20	Onsite	Water Table	04/03/2008	<10.2
MW-141-20	Onsite	Water Table	07/01/2008	<10.3
MW-141-20	Onsite	Water Table	10/01/2008	<10.6
MW-141-20	Onsite	Water Table	01/12/2009	<10.3
MW-141-20	Onsite	Water Table	04/08/2009	<10.2
MW-141-20	Onsite	Water Table	07/06/2009	<10.3
MW-141-20	Onsite	Water Table	10/01/2009	<10.0
MW-141-20	Onsite	Water Table	01/18/2010	<10.3
MW-141-20	Onsite	Water Table	04/02/2010	<10.4

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-141-20	Onsite	Water Table	07/22/2010	<10.5
MW-141-20	Onsite	Water Table	10/06/2010	<10.8
MW-141-20	Onsite	Water Table	02/09/2011	<10.9
MW-141-20	Onsite	Water Table	04/15/2011	<10.5
MW-141-20	Onsite	Water Table	08/17/2011	<7.12
MW-141-20	Onsite	Water Table	10/14/2011	<6.20
MW-141-20	Onsite	Water Table	02/14/2012	<6.96
MW-141-20	Onsite	Water Table	04/27/2012	<6.40
MW-141-20	Onsite	Water Table	05/17/2012	<6.52
MW-141-20	Onsite	Water Table	07/26/2012	<6.20
MW-141-20	Onsite	Water Table	11/15/2012	<6.20
MW-141-20	Onsite	Water Table	02/02/2013	<6.20
MW-141-20	Onsite	Water Table	05/08/2013	<6.20
MW-141-20	Onsite	Water Table	07/25/2013	<6.20
MW-141-20	Onsite	Water Table	03/07/2014	<5.00
MW-141-20	Onsite	Water Table	07/31/2014	<5.25
MW-141-20	Onsite	Water Table	04/07/2015	<5.00
MW-141-20	Onsite	Water Table	08/03/2015	<5.00
MW-141-20	Onsite	Water Table	08/04/2016	<5.45
MW-142-20	Onsite	Water Table	04/18/2006	450
MW-142-20	Onsite	Water Table	05/16/2006	450
MW-142-20	Onsite	Water Table	06/20/2006	450
MW-142-20	Onsite	Water Table	07/18/2006	230
MW-142-20	Onsite	Water Table	11/15/2006	310
MW-142-20	Onsite	Water Table	12/08/2006	580
MW-142-20	Onsite	Water Table	01/17/2007	560
MW-142-20	Onsite	Water Table	02/13/2007	670
MW-142-20	Onsite	Water Table	03/19/2007	550
MW-142-20	Onsite	Water Table	04/18/2007	527
MW-142-20	Onsite	Water Table	05/22/2007	415
MW-142-20	Onsite	Water Table	06/20/2007	399
MW-142-20	Onsite	Water Table	07/17/2007	307
MW-142-20	Onsite	Water Table	08/21/2007	277
MW-142-20	Onsite	Water Table	09/20/2007	283
MW-142-20	Onsite	Water Table	10/16/2007	371
MW-142-20	Onsite	Water Table	11/12/2007	331
MW-142-20	Onsite	Water Table	12/07/2007	376
MW-142-20	Onsite	Water Table	01/04/2008	371
MW-142-20	Onsite	Water Table	02/12/2008	318
MW-142-20	Onsite	Water Table	03/05/2008	669
MW-142-20	Onsite	Water Table	04/02/2008	432
MW-142-20	Onsite	Water Table	05/07/2008	422
MW-142-20	Onsite	Water Table	06/10/2008	524
MW-142-20	Onsite	Water Table	07/01/2008	78.6
MW-142-20	Onsite	Water Table	08/07/2008	287
MW-142-20	Onsite	Water Table	09/04/2008	538
MW-142-20	Onsite	Water Table	10/02/2008	610
MW-142-20	Onsite	Water Table	11/06/2008	667
MW-142-20	Onsite	Water Table	12/04/2008	650
MW-142-20	Onsite	Water Table	01/12/2009	422
MW-142-20	Onsite	Water Table	02/09/2009	759
MW-142-20	Onsite	Water Table	03/03/2009	861

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-142-20	Onsite	Water Table	04/08/2009	562
MW-142-20	Onsite	Water Table	05/06/2009	458
MW-142-20	Onsite	Water Table	06/05/2009	589
MW-142-20	Onsite	Water Table	07/07/2009	570
MW-142-20	Onsite	Water Table	08/03/2009	370
MW-142-20	Onsite	Water Table	09/02/2009	485
MW-142-20	Onsite	Water Table	10/01/2009	423
MW-142-20	Onsite	Water Table	11/03/2009	580
MW-142-20	Onsite	Water Table	12/01/2009	476
MW-142-20	Onsite	Water Table	01/19/2010	562
MW-142-20	Onsite	Water Table	02/12/2010	498
MW-142-20	Onsite	Water Table	03/04/2010	510
MW-142-20	Onsite	Water Table	04/02/2010	380
MW-142-20	Onsite	Water Table	05/03/2010	689
MW-142-20	Onsite	Water Table	07/19/2010	559
MW-142-20	Onsite	Water Table	07/07/2010	527
MW-142-20	Onsite	Water Table	08/11/2010	398
MW-142-20	Onsite	Water Table	09/02/2010	392
MW-142-20	Onsite	Water Table	10/06/2010	514
MW-142-20	Onsite	Water Table	11/05/2010	689
MW-142-20	Onsite	Water Table	03/09/2011	455
MW-142-20	Onsite	Water Table	04/08/2011	335
MW-142-20	Onsite	Water Table	08/12/2011	379
MW-142-20	Onsite	Water Table	10/18/2011	489
MW-142-20	Onsite	Water Table	02/14/2012	383
MW-142-20	Onsite	Water Table	05/03/2012	369
MW-142-20	Onsite	Water Table	07/19/2012	275
MW-142-20	Onsite	Water Table	09/17/2012	321
MW-142-20	Onsite	Water Table	11/12/2012	284
MW-142-20	Onsite	Water Table	01/06/2013	248
MW-142-20	Onsite	Water Table	03/06/2013	235
MW-142-20	Onsite	Water Table	06/12/2013	215
MW-142-20	Onsite	Water Table	07/18/2013	183
MW-142-20	Onsite	Water Table	10/15/2013	192
MW-142-20	Onsite	Water Table	02/28/2014	142
MW-142-20	Onsite	Water Table	04/16/2014	124
MW-142-20	Onsite	Water Table	09/03/2014	102
MW-142-20	Onsite	Water Table	10/25/2014	110
MW-142-20	Onsite	Water Table	02/26/2015	89.5
MW-142-20	Onsite	Water Table	04/18/2015	70.8
MW-142-20	Onsite	Water Table	07/31/2015	44.1
MW-142-20	Onsite	Water Table	10/16/2015	47.2
MW-142-20	Onsite	Water Table	02/04/2016	40.6
MW-142-20	Onsite	Water Table	04/08/2016	33.4
MW-142-20	Onsite	Water Table	08/09/2016	20.0
MW-142-20	Onsite	Water Table	10/14/2016	22.5
MW-142-20	Onsite	Water Table	02/16/2017	18.4
MW-142-20	Onsite	Water Table	04/10/2017	17.6
MW-142-20	Onsite	Water Table	08/09/2017	15.8
MW-142-20	Onsite	Water Table	02/13/2018	32.4
MW-142-20	Onsite	Water Table	08/03/2018	74.4
MW-142-65	Onsite	10-55	12/06/2013	6.63J

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-142-65	Onsite	10-55	03/13/2014	5.35J
MW-142-65	Onsite	10-55	04/16/2014	5.71J
MW-142-65	Onsite	10-55	07/25/2014	5.49J
MW-142-65	Onsite	10-55	10/15/2014	3.22J
MW-142-65	Onsite	10-55	02/17/2015	<5.00
MW-142-65	Onsite	10-55	07/24/2015	4.70J
MW-142-65	Onsite	10-55	02/23/2016	4.21J
MW-142-65	Onsite	10-55	07/15/2016	4.76J
MW-142-65	Onsite	10-55	02/28/2017	7.23J
MW-142-150	Onsite	90-160	12/06/2013	<5.00
MW-142-150	Onsite	90-160	03/13/2014	<5.00
MW-142-150	Onsite	90-160	04/16/2014	<5.20
MW-142-150	Onsite	90-160	07/25/2014	<5.00
MW-142-150	Onsite	90-160	10/15/2014	<5.00
MW-142-150	Onsite	90-160	07/24/2015	<5.15
MW-142-150	Onsite	90-160	07/15/2016	<5.10
MW-143-20	Onsite	Water Table	04/19/2006	290
MW-143-20	Onsite	Water Table	05/16/2006	360
MW-143-20	Onsite	Water Table	06/21/2006	380
MW-143-20	Onsite	Water Table	07/19/2006	<120
MW-143-20	Onsite	Water Table	11/16/2006	150
MW-143-20	Onsite	Water Table	12/08/2006	290
MW-143-20	Onsite	Water Table	01/17/2007	350
MW-143-20	Onsite	Water Table	02/13/2007	400
MW-143-20	Onsite	Water Table	03/19/2007	360
MW-143-20	Onsite	Water Table	04/17/2007	297
MW-143-20	Onsite	Water Table	05/22/2007	522
MW-143-20	Onsite	Water Table	06/20/2007	88.5
MW-143-20	Onsite	Water Table	07/18/2007	51.0
MW-143-20	Onsite	Water Table	08/21/2007	142
MW-143-20	Onsite	Water Table	09/20/2007	94.1
MW-143-20	Onsite	Water Table	10/17/2007	42.5
MW-143-20	Onsite	Water Table	11/12/2007	228
MW-143-20	Onsite	Water Table	01/04/2008	192
MW-143-20	Onsite	Water Table	02/13/2008	249
MW-143-20	Onsite	Water Table	03/05/2008	355
MW-143-20	Onsite	Water Table	04/03/2008	246
MW-143-20	Onsite	Water Table	05/07/2008	200
MW-143-20	Onsite	Water Table	06/10/2008	149
MW-143-20	Onsite	Water Table	07/01/2008	136
MW-143-20	Onsite	Water Table	08/07/2008	12.9
MW-143-20	Onsite	Water Table	09/04/2008	33.3
MW-143-20	Onsite	Water Table	10/02/2008	52.0
MW-143-20	Onsite	Water Table	11/06/2008	189
MW-143-20	Onsite	Water Table	12/04/2008	215
MW-143-20	Onsite	Water Table	01/13/2009	171
MW-143-20	Onsite	Water Table	02/09/2009	132
MW-143-20	Onsite	Water Table	03/03/2009	280
MW-143-20	Onsite	Water Table	04/09/2009	111
MW-143-20	Onsite	Water Table	05/06/2009	111
MW-143-20	Onsite	Water Table	06/08/2009	102
MW-143-20	Onsite	Water Table	07/06/2009	98.2

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-143-20	Onsite	Water Table	08/03/2009	105
MW-143-20	Onsite	Water Table	09/02/2009	44.8
MW-143-20	Onsite	Water Table	10/01/2009	59.1
MW-143-20	Onsite	Water Table	11/03/2009	172
MW-143-20	Onsite	Water Table	12/01/2009	155
MW-143-20	Onsite	Water Table	01/21/2010	145
MW-143-20	Onsite	Water Table	02/12/2010	163
MW-143-20	Onsite	Water Table	03/04/2010	179
MW-143-20	Onsite	Water Table	04/05/2010	137
MW-143-20	Onsite	Water Table	05/03/2010	107
MW-143-20	Onsite	Water Table	06/14/2010	89.8
MW-143-20	Onsite	Water Table	07/23/2010	79.4
MW-143-20	Onsite	Water Table	08/10/2010	37.8
MW-143-20	Onsite	Water Table	09/03/2010	32.2
MW-143-20	Onsite	Water Table	10/05/2010	56.4
MW-143-20	Onsite	Water Table	11/04/2010	68.7
MW-143-20	Onsite	Water Table	03/09/2011	134
MW-143-20	Onsite	Water Table	04/08/2011	76.1
MW-143-20	Onsite	Water Table	08/12/2011	58.0
MW-143-20	Onsite	Water Table	10/20/2011	56.4
MW-143-20	Onsite	Water Table	02/08/2012	117
MW-143-20	Onsite	Water Table	05/03/2012	35.8JL *
MW-143-20	Onsite	Water Table	08/15/2012	36.8
MW-143-20	Onsite	Water Table	11/15/2012	70.1
MW-143-20	Onsite	Water Table	01/21/2013	66.6
MW-143-20	Onsite	Water Table	04/18/2013	64.7
MW-143-20	Onsite	Water Table	07/25/2013	26.1
MW-143-20	Onsite	Water Table	10/15/2013	15.7
MW-143-20	Onsite	Water Table	02/27/2014	21.9
MW-143-20	Onsite	Water Table	04/15/2014	17.5
MW-143-20	Onsite	Water Table	07/22/2014	5.25J
MW-143-20	Onsite	Water Table	10/15/2014	5.56J
MW-143-20	Onsite	Water Table	02/18/2015	16.4
MW-143-20	Onsite	Water Table	04/16/2015	14.3
MW-143-20	Onsite	Water Table	07/24/2015	7.61J
MW-143-20	Onsite	Water Table	02/09/2016	12.3
MW-143-20	Onsite	Water Table	07/18/2016	7.33J
MW-143-20	Onsite	Water Table	02/14/2017	8.88J
MW-144A-25	Onsite	10-55	04/18/2006	<10.0
MW-144A-25	Onsite	10-55	04/18/2007	<10.6
MW-144A-25	Onsite	10-55	10/16/2007	<10.5
MW-144A-25	Onsite	10-55	04/02/2008	<10.3
MW-144A-25	Onsite	10-55	10/02/2008	<10.0
MW-144A-25	Onsite	10-55	04/09/2009	<10.2
MW-144A-25	Onsite	10-55	10/02/2009	<10.3
MW-144A-25	Onsite	10-55	04/02/2010	<10.5
MW-144A-25	Onsite	10-55	10/05/2010	<10.4
MW-144A-25	Onsite	10-55	02/08/2011	<11.0
MW-144A-25	Onsite	10-55	04/26/2011	<10.9
MW-144A-25	Onsite	10-55	10/14/2011	<6.20
MW-144A-25	Onsite	10-55	05/02/2012	<6.20J*
MW-144A-25	Onsite	10-55	11/14/2012	<6.20

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-144A-25	Onsite	10-55	04/27/2013	<6.40
MW-144A-25	Onsite	10-55	10/30/2013	<6.20
MW-144A-25	Onsite	10-55	07/30/2014	<5.00
MW-144A-25	Onsite	10-55	07/24/2015	<5.00
MW-144A-25	Onsite	10-55	07/21/2016	<5.10
MW-144BR-90	Onsite	55-90	10/20/2010	<10.0
MW-144BR-90	Onsite	55-90	02/08/2011	<11.5
MW-144BR-90	Onsite	55-90	04/13/2011	<10.5
MW-144BR-90	Onsite	55-90	08/15/2011	<6.20
MW-144BR-90	Onsite	55-90	10/13/2011	<6.20
MW-144BR-90	Onsite	55-90	11/04/2011	<6.32
MW-144BR-90	Onsite	55-90	02/21/2012	<6.96
MW-144BR-90	Onsite	55-90	05/02/2012	<6.32
MW-144BR-90	Onsite	55-90	08/07/2012	<6.88
MW-144BR-90	Onsite	55-90	11/14/2012	<6.60
MW-144BR-90	Onsite	55-90	02/04/2013	<6.74
MW-144BR-90	Onsite	55-90	05/01/2013	<6.20
MW-144BR-90	Onsite	55-90	08/15/2013	<6.20
MW-144BR-90	Onsite	55-90	10/30/2013	<6.32
MW-144BR-90	Onsite	55-90	07/29/2014	<5.20
MW-144BR-90	Onsite	55-90	07/24/2015	<5.10
MW-144BR-90	Onsite	55-90	07/21/2016	<5.05
MW-145-20	Onsite	Water Table	04/18/2006	<10.0
MW-145-20	Onsite	Water Table	04/18/2007	<10.9
MW-145-20	Onsite	Water Table	10/18/2007	<10.6
MW-145-20	Onsite	Water Table	04/02/2008	<10.3
MW-145-20	Onsite	Water Table	10/02/2008	<11.0
MW-145-20	Onsite	Water Table	04/10/2009	<10.4
MW-145-20	Onsite	Water Table	10/02/2009	<10.4
MW-145-20	Onsite	Water Table	04/06/2010	<10.4
MW-145-20	Onsite	Water Table	10/07/2010	<10.3
MW-145-20	Onsite	Water Table	02/10/2011	<10.9
MW-145-20	Onsite	Water Table	04/07/2011	<10.8
MW-145-20	Onsite	Water Table	10/19/2011	<6.20
MW-145-20	Onsite	Water Table	05/03/2012	<6.32
MW-145-20	Onsite	Water Table	11/15/2012	<6.20
MW-145-20	Onsite	Water Table	01/31/2013	<6.20
MW-145-20	Onsite	Water Table	04/27/2013	<6.40
MW-145-20	Onsite	Water Table	07/20/2013	<6.20
MW-145-20	Onsite	Water Table	10/19/2013	<6.46
MW-145-20	Onsite	Water Table	03/02/2014	<5.00
MW-145-20	Onsite	Water Table	06/17/2014	<5.00
MW-145-20	Onsite	Water Table	08/13/2014	<5.00
MW-145-20	Onsite	Water Table	11/06/2014	<5.00
MW-145-20	Onsite	Water Table	02/24/2015	<5.00
MW-145-20	Onsite	Water Table	04/24/2015	<5.00
MW-145-20	Onsite	Water Table	08/10/2015	<5.00
MW-145-20	Onsite	Water Table	10/21/2015	<5.10
MW-145-20	Onsite	Water Table	03/01/2016	<5.10
MW-145-20	Onsite	Water Table	08/10/2016	<5.05
MW-145-20	Onsite	Water Table	02/27/2017	<5.40
MW-145-20	Onsite	Water Table	08/10/2017	<5.20

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-146A-15	Onsite	Water Table	10/05/2008	<10.4
MW-146A-15	Onsite	Water Table	01/15/2009	<10.3
MW-146A-15	Onsite	Water Table	04/09/2009	<10.0
MW-146A-15	Onsite	Water Table	07/07/2009	<10.3
MW-146A-15	Onsite	Water Table	10/01/2009	<10.8
MW-146A-15	Onsite	Water Table	01/21/2010	<10.8
MW-146A-15	Onsite	Water Table	04/05/2010	<10.3
MW-146A-15	Onsite	Water Table	07/22/2010	<11.0
MW-146A-15	Onsite	Water Table	10/06/2010	<10.6
MW-146A-15	Onsite	Water Table	11/12/2013	<5.25
MW-146B-30	Onsite	10-55	10/05/2008	<10.5
MW-146B-30	Onsite	10-55	01/15/2009	<10.4
MW-146B-30	Onsite	10-55	04/09/2009	<10.3
MW-146B-30	Onsite	10-55	07/07/2009	<10.0
MW-146B-30	Onsite	10-55	10/01/2009	<11.1
MW-146B-30	Onsite	10-55	01/21/2010	<10.9
MW-146B-30	Onsite	10-55	04/05/2010	<10.9
MW-146B-30	Onsite	10-55	07/21/2010	<10.0
MW-146B-30	Onsite	10-55	10/06/2010	<10.5
MW-146B-30	Onsite	10-55	11/12/2013	<5.30
MW-147A-15	Onsite	Water Table	10/05/2008	<10.4
MW-147A-15	Onsite	Water Table	01/15/2009	<10.2
MW-147A-15	Onsite	Water Table	04/09/2009	<10.9
MW-147A-15	Onsite	Water Table	07/07/2009	<10.0
MW-147A-15	Onsite	Water Table	10/01/2009	<10.5
MW-147A-15	Onsite	Water Table	01/18/2010	<10.5
MW-147A-15	Onsite	Water Table	04/05/2010	<10.3
MW-147A-15	Onsite	Water Table	07/22/2010	<10.0
MW-147A-15	Onsite	Water Table	10/06/2010	<10.6
MW-147A-15	Onsite	Water Table	11/12/2013	<5.45
MW-147B-25	Onsite	10-55	10/05/2008	<10.5
MW-147B-25	Onsite	10-55	01/15/2009	<10.3
MW-147B-25	Onsite	10-55	04/09/2009	<10.6
MW-147B-25	Onsite	10-55	07/06/2009	<10.4
MW-147B-25	Onsite	10-55	10/01/2009	<10.3
MW-147B-25	Onsite	10-55	01/18/2010	<10.0
MW-147B-25	Onsite	10-55	04/05/2010	<10.2
MW-147B-25	Onsite	10-55	07/22/2010	<10.5
MW-147B-25	Onsite	10-55	10/06/2010	<10.5
MW-147B-25	Onsite	10-55	02/24/2011	<11.3
MW-147B-25	Onsite	10-55	04/29/2011	<11.0
MW-147B-25	Onsite	10-55	08/15/2011	<6.20
MW-147B-25	Onsite	10-55	10/11/2011	<6.20
MW-147B-25	Onsite	10-55	02/13/2012	<6.66
MW-147B-25	Onsite	10-55	05/02/2012	<6.40
MW-147B-25	Onsite	10-55	07/24/2012	<6.74
MW-147B-25	Onsite	10-55	02/01/2013	<6.60
MW-147B-25	Onsite	10-55	04/23/2013	<6.20
MW-147B-25	Onsite	10-55	07/25/2013	<6.32
MW-147B-25	Onsite	10-55	10/28/2013	<6.20
MW-147B-25	Onsite	10-55	03/21/2014	<5.40
MW-147B-25	Onsite	10-55	04/18/2014	<5.00

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-147B-25	Onsite	10-55	07/29/2014	<5.00
MW-147B-25	Onsite	10-55	10/18/2014	<5.00
MW-147B-25	Onsite	10-55	08/03/2015	<5.40
MW-147B-25	Onsite	10-55	07/20/2016	<4.71
MW-148A-15	Offsite	Water Table	10/04/2008	133
MW-148A-15	Offsite	Water Table	01/15/2009	334
MW-148A-15	Offsite	Water Table	02/10/2009	342
MW-148A-15	Offsite	Water Table	03/03/2009	348
MW-148A-15	Offsite	Water Table	04/21/2009	264
MW-148A-15	Offsite	Water Table	05/06/2009	12.2
MW-148A-15	Offsite	Water Table	06/08/2009	<10.0
MW-148A-15	Offsite	Water Table	07/07/2009	63.5
MW-148A-15	Offsite	Water Table	08/03/2009	105
MW-148A-15	Offsite	Water Table	09/02/2009	14.5
MW-148A-15	Offsite	Water Table	10/01/2009	61.5
MW-148A-15	Offsite	Water Table	11/03/2009	121
MW-148A-15	Offsite	Water Table	12/01/2009	203
MW-148A-15	Offsite	Water Table	01/22/2010	202
MW-148A-15	Offsite	Water Table	02/17/2010	176
MW-148A-15	Offsite	Water Table	03/04/2010	184
MW-148A-15	Offsite	Water Table	04/06/2010	177
MW-148A-15	Offsite	Water Table	05/14/2010	84.1
MW-148A-15	Offsite	Water Table	06/14/2010	<10.0
MW-148A-15	Offsite	Water Table	07/22/2010	143
MW-148A-15	Offsite	Water Table	08/11/2010	149
MW-148A-15	Offsite	Water Table	09/02/2010	37.0
MW-148A-15	Offsite	Water Table	10/13/2010	64.6
MW-148A-15	Offsite	Water Table	11/08/2010	54.4
MW-148A-15	Offsite	Water Table	12/30/2010	173
MW-148A-15	Offsite	Water Table	03/07/2011	132
MW-148A-15	Offsite	Water Table	04/08/2011	113
MW-148A-15	Offsite	Water Table	08/18/2011	182
MW-148A-15	Offsite	Water Table	10/07/2011	139
MW-148A-15	Offsite	Water Table	02/12/2012	212
MW-148A-15	Offsite	Water Table	05/03/2012	155
MW-148A-15	Offsite	Water Table	07/23/2012	190
MW-148A-15	Offsite	Water Table	10/22/2012	96.9
MW-148A-15	Offsite	Water Table	01/02/2013	194
MW-148A-15	Offsite	Water Table	03/02/2013	180
MW-148A-15	Offsite	Water Table	05/06/2013	102
MW-148A-15	Offsite	Water Table	07/09/2013	95.0
MW-148A-15	Offsite	Water Table	10/11/2013	32.8
MW-148A-15	Offsite	Water Table	01/21/2014	97.5
MW-148A-15	Offsite	Water Table	04/09/2014	104
MW-148A-15	Offsite	Water Table	08/04/2014	<5.40
MW-148A-15	Offsite	Water Table	10/09/2014	3.41J
MW-148A-15	Offsite	Water Table	01/15/2015	34.6
MW-148A-15	Offsite	Water Table	04/08/2015	26.4
MW-148A-15	Offsite	Water Table	07/17/2015	16.1
MW-148A-15	Offsite	Water Table	10/14/2015	<5.00
MW-148A-15	Offsite	Water Table	02/08/2016	18.7J*
MW-148A-15	Offsite	Water Table	07/25/2016	26.7

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-148A-15	Offsite	Water Table	02/13/2017	20.6
MW-148A-15	Offsite	Water Table	07/10/2017	14.2
MW-148A-15	Onsite	Water Table	01/16/2018	13.4
MW-148A-15	Onsite	Water Table	07/16/2018	12.1
MW-148B-30	Offsite	10-55	10/04/2008	143
MW-148B-30	Offsite	10-55	01/15/2009	298
MW-148B-30	Offsite	10-55	02/10/2009	338
MW-148B-30	Offsite	10-55	03/03/2009	390
MW-148B-30	Offsite	10-55	04/21/2009	263
MW-148B-30	Offsite	10-55	05/06/2009	159
MW-148B-30	Offsite	10-55	06/05/2009	276
MW-148B-30	Offsite	10-55	07/07/2009	308
MW-148B-30	Offsite	10-55	08/03/2009	140
MW-148B-30	Offsite	10-55	09/02/2009	210
MW-148B-30	Offsite	10-55	10/01/2009	165
MW-148B-30	Offsite	10-55	11/03/2009	323
MW-148B-30	Offsite	10-55	12/01/2009	244
MW-148B-30	Offsite	10-55	01/22/2010	252
MW-148B-30	Offsite	10-55	02/17/2010	284
MW-148B-30	Offsite	10-55	03/03/2010	255
MW-148B-30	Offsite	10-55	04/06/2010	239
MW-148B-30	Offsite	10-55	05/14/2010	330
MW-148B-30	Offsite	10-55	07/19/2010	219
MW-148B-30	Offsite	10-55	07/22/2010	230
MW-148B-30	Offsite	10-55	08/11/2010	284
MW-148B-30	Offsite	10-55	09/02/2010	219
MW-148B-30	Offsite	10-55	10/13/2010	316
MW-148B-30	Offsite	10-55	11/08/2010	209
MW-148B-30	Offsite	10-55	12/30/2010	243
MW-148B-30	Offsite	10-55	03/07/2011	501
MW-148B-30	Offsite	10-55	04/08/2011	205
MW-148B-30	Offsite	10-55	08/12/2011	251
MW-148B-30	Offsite	10-55	10/07/2011	284
MW-148B-30	Offsite	10-55	02/12/2012	252
MW-148B-30	Offsite	10-55	05/01/2012	237
MW-148B-30	Offsite	10-55	07/23/2012	214
MW-148B-30	Offsite	10-55	11/11/2012	193
MW-148B-30	Offsite	10-55	01/12/2013	174
MW-148B-30	Offsite	10-55	04/15/2013	140
MW-148B-30	Offsite	10-55	07/09/2013	136
MW-148B-30	Offsite	10-55	10/11/2013	112
MW-148B-30	Offsite	10-55	01/21/2014	92.9
MW-148B-30	Offsite	10-55	04/03/2014	87.8
MW-148B-30	Offsite	10-55	08/04/2014	100
MW-148B-30	Offsite	10-55	10/09/2014	83.9
MW-148B-30	Offsite	10-55	01/15/2015	64.5
MW-148B-30	Offsite	10-55	04/08/2015	46.7
MW-148B-30	Offsite	10-55	07/17/2015	41.7
MW-148B-30	Offsite	10-55	10/14/2015	38.4
MW-148B-30	Offsite	10-55	02/08/2016	28.3
MW-148B-30	Offsite	10-55	07/25/2016	19.9
MW-148B-30	Offsite	10-55	02/13/2017	13.7

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Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-148B-30	Offsite	10-55	07/10/2017	11.0
MW-148B-30	Onsite	10-55	01/16/2018	9.73
MW-148B-30	Onsite	10-55	07/16/2018	8.19J
MW-148C-55	Offsite	10-55	10/05/2011	170
MW-148C-55	Offsite	10-55	02/12/2012	139
MW-148C-55	Offsite	10-55	05/01/2012	143
MW-148C-55	Offsite	10-55	07/23/2012	129
MW-148C-55	Offsite	10-55	10/31/2012	109
MW-148C-55	Offsite	10-55	01/10/2013	102
MW-148C-55	Offsite	10-55	04/05/2013	76.2JL *
MW-148C-55	Offsite	10-55	07/09/2013	75.4
MW-148C-55	Offsite	10-55	10/11/2013	63.8
MW-148C-55	Offsite	10-55	01/21/2014	67.8
MW-148C-55	Offsite	10-55	04/03/2014	46.3
MW-148C-55	Offsite	10-55	07/11/2014	47.3
MW-148C-55	Offsite	10-55	10/09/2014	36.2
MW-148C-55	Offsite	10-55	01/15/2015	32.6
MW-148C-55	Offsite	10-55	04/08/2015	25.5
MW-148C-55	Offsite	10-55	07/17/2015	23.7
MW-148C-55	Offsite	10-55	10/14/2015	18.1
MW-148C-55	Offsite	10-55	02/08/2016	15.9
MW-148C-55	Offsite	10-55	07/25/2016	13.1
MW-148C-55	Offsite	10-55	02/13/2017	9.78J
MW-148C-55	Offsite	10-55	07/10/2017	8.43J
MW-148C-55	Onsite	10-55	01/18/2018	8.48
MW-148C-55	Onsite	10-55	07/16/2018	14.9
MW-148-80	Offsite	55-90	10/31/2013	13.6
MW-148-80	Offsite	55-90	01/21/2014	6.97J
MW-148-80	Offsite	55-90	04/03/2014	6.78J
MW-148-80	Offsite	55-90	07/11/2014	8.20J
MW-148-80	Offsite	55-90	10/10/2014	10.2J
MW-148-80	Offsite	55-90	01/15/2015	6.83J
MW-148-80	Offsite	55-90	07/17/2015	<5.20J*
MW-148-80	Offsite	55-90	02/08/2016	4.30J
MW-148-80	Offsite	55-90	07/25/2016	<5.05
MW-148-80	Offsite	55-90	02/13/2017	<5.10
MW-148-80	Offsite	55-90	07/12/2017	<5.30
MW-148-80	Onsite	55-90	01/18/2018	3.77
MW-148-80	Onsite	55-90	07/16/2018	11.4
MW-148-100	Offsite	55-90	10/31/2013	<6.66
MW-148-100	Offsite	55-90	01/21/2014	<5.40
MW-148-100	Offsite	55-90	04/03/2014	<5.25
MW-148-100	Offsite	55-90	07/12/2014	<5.20
MW-148-100	Offsite	55-90	10/09/2014	<5.25
MW-148-100	Offsite	55-90	07/17/2015	<5.30
MW-148-100	Offsite	55-90	07/25/2016	<5.10
MW-148D-150	Offsite	90-160	10/05/2011	<6.20
MW-148D-150	Offsite	90-160	02/18/2012	<6.82
MW-148D-150	Offsite	90-160	05/01/2012	<6.96
MW-148D-150	Offsite	90-160	07/23/2012	<6.20
MW-148D-150	Offsite	90-160	10/31/2012	<6.20
MW-148D-150	Offsite	90-160	01/10/2013	<6.52

Appendix A-3
Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-148D-150	Offsite	90-160	03/02/2013	<6.88
MW-148D-150	Offsite	90-160	07/09/2013	<6.20
MW-148D-150	Offsite	90-160	10/11/2013	<6.20
MW-148D-150	Offsite	90-160	01/21/2014	<5.20
MW-148D-150	Offsite	90-160	04/03/2014	<5.00
MW-148D-150	Offsite	90-160	07/11/2014	<5.20
MW-148D-150	Offsite	90-160	10/09/2014	<5.10
MW-148D-150	Offsite	90-160	07/17/2015	<5.50
MW-148D-150	Offsite	90-160	07/25/2016	<5.10
MW-149A-15	Onsite	Water Table	10/04/2008	<10.0
MW-149A-15	Onsite	Water Table	01/15/2009	18.0
MW-149A-15	Onsite	Water Table	02/10/2009	36.9
MW-149A-15	Onsite	Water Table	03/03/2009	48.5
MW-149A-15	Onsite	Water Table	04/21/2009	35.3
MW-149A-15	Onsite	Water Table	05/06/2009	30.5
MW-149A-15	Onsite	Water Table	06/05/2009	<10.3
MW-149A-15	Onsite	Water Table	07/07/2009	<10.3
MW-149A-15	Onsite	Water Table	08/03/2009	29.9
MW-149A-15	Onsite	Water Table	09/02/2009	<10.4
MW-149A-15	Onsite	Water Table	10/01/2009	<10.5
MW-149A-15	Onsite	Water Table	11/03/2009	<10.4
MW-149A-15	Onsite	Water Table	12/01/2009	<10.0
MW-149A-15	Onsite	Water Table	01/22/2010	<10.4
MW-149A-15	Onsite	Water Table	02/17/2010	<10.3
MW-149A-15	Onsite	Water Table	03/03/2010	10.9
MW-149A-15	Onsite	Water Table	04/06/2010	<10.3
MW-149A-15	Onsite	Water Table	05/14/2010	<10.0
MW-149A-15	Onsite	Water Table	06/14/2010	24.3
MW-149A-15	Onsite	Water Table	07/22/2010	38.5
MW-149A-15	Onsite	Water Table	08/11/2010	26.4
MW-149A-15	Onsite	Water Table	09/02/2010	13.4
MW-149A-15	Onsite	Water Table	10/13/2010	<10.9
MW-149A-15	Onsite	Water Table	11/08/2010	<10.0
MW-149A-15	Onsite	Water Table	03/07/2011	15.5
MW-149A-15	Onsite	Water Table	04/18/2011	<11.1
MW-149A-15	Onsite	Water Table	08/18/2011	<6.66
MW-149A-15	Onsite	Water Table	10/13/2011	<6.20
MW-149A-15	Onsite	Water Table	02/12/2012	<6.88
MW-149A-15	Onsite	Water Table	05/17/2012	<6.74
MW-149A-15	Onsite	Water Table	07/31/2012	<6.60
MW-149A-15	Onsite	Water Table	11/10/2012	<6.20
MW-149A-15	Onsite	Water Table	01/10/2013	<6.46
MW-149A-15	Onsite	Water Table	04/10/2013	<6.32
MW-149A-15	Onsite	Water Table	07/09/2013	<6.20
MW-149A-15	Onsite	Water Table	10/09/2013	<6.46
MW-149A-15	Onsite	Water Table	03/24/2014	<5.00
MW-149A-15	Onsite	Water Table	04/30/2014	<5.20
MW-149A-15	Onsite	Water Table	07/26/2014	<5.00
MW-149A-15	Onsite	Water Table	10/10/2014	<5.20
MW-149A-15	Onsite	Water Table	07/17/2015	<5.00
MW-149A-15	Onsite	Water Table	07/25/2016	<5.00
MW-149A-15	Onsite	Water Table	07/10/2017	<5.25

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-149B-20	Onsite	Water Table	10/04/2008	<10.5
MW-149B-20	Onsite	Water Table	01/15/2009	<10.3
MW-149B-20	Onsite	Water Table	02/10/2009	<10.0
MW-149B-20	Onsite	Water Table	03/03/2009	17.5
MW-149B-20	Onsite	Water Table	04/21/2009	26.4
MW-149B-20	Onsite	Water Table	05/06/2009	28.5
MW-149B-20	Onsite	Water Table	06/05/2009	19.5
MW-149B-20	Onsite	Water Table	07/07/2009	20.8
MW-149B-20	Onsite	Water Table	08/03/2009	14.6
MW-149B-20	Onsite	Water Table	09/02/2009	17.8
MW-149B-20	Onsite	Water Table	10/01/2009	<10.5
MW-149B-20	Onsite	Water Table	11/03/2009	<10.5
MW-149B-20	Onsite	Water Table	12/01/2009	<10.4
MW-149B-20	Onsite	Water Table	01/22/2010	<10.3
MW-149B-20	Onsite	Water Table	02/17/2010	<10.3
MW-149B-20	Onsite	Water Table	03/03/2010	<10.0
MW-149B-20	Onsite	Water Table	04/06/2010	<10.2
MW-149B-20	Onsite	Water Table	05/14/2010	<10.0
MW-149B-20	Onsite	Water Table	07/19/2010	<10.6
MW-149B-20	Onsite	Water Table	07/22/2010	15.0
MW-149B-20	Onsite	Water Table	08/11/2010	12.7
MW-149B-20	Onsite	Water Table	09/02/2010	18.7
MW-149B-20	Onsite	Water Table	10/13/2010	<10.5
MW-149B-20	Onsite	Water Table	11/08/2010	<10.0
MW-149B-20	Onsite	Water Table	02/12/2012	<6.82
MW-149B-20	Onsite	Water Table	05/17/2012	<6.20
MW-149B-20	Onsite	Water Table	07/23/2012	<6.74
MW-149B-20	Onsite	Water Table	11/10/2012	<6.52
MW-149B-20	Onsite	Water Table	01/10/2013	<6.52
MW-149B-20	Onsite	Water Table	04/10/2013	<6.46
MW-149B-20	Onsite	Water Table	07/09/2013	<6.20
MW-149B-20	Onsite	Water Table	10/09/2013	<6.20
MW-149B-20	Onsite	Water Table	03/24/2014	<5.00
MW-149B-20	Onsite	Water Table	04/30/2014	<5.15
MW-149B-20	Onsite	Water Table	07/26/2014	<5.25
MW-149B-20	Onsite	Water Table	10/10/2014	<5.30
MW-149B-20	Onsite	Water Table	07/17/2015	<5.00
MW-149B-20	Onsite	Water Table	07/25/2016	<5.05
MW-154A-75	Onsite	55-90	10/12/2009	42.6
MW-154A-75	Onsite	55-90	01/21/2010	42.1
MW-154A-75	Onsite	55-90	02/17/2010	35.4
MW-154A-75	Onsite	55-90	03/17/2010	42.0
MW-154A-75	Onsite	55-90	04/30/2010	60.5
MW-154A-75	Onsite	55-90	05/04/2010	27.3
MW-154A-75	Onsite	55-90	07/19/2010	36.2
MW-154A-75	Onsite	55-90	07/07/2010	18.8
MW-154A-75	Onsite	55-90	08/11/2010	10.3
MW-154A-75	Onsite	55-90	10/07/2010	22.1
MW-154A-75	Onsite	55-90	11/05/2010	42.5
MW-154A-75	Onsite	55-90	01/31/2011	<10.2
MW-154A-75	Onsite	55-90	04/26/2011	14.3
MW-154A-75	Onsite	55-90	08/10/2011	8.85J

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-154A-75	Onsite	55-90	10/13/2011	33.1
MW-154A-75	Onsite	55-90	02/14/2012	25.6
MW-154A-75	Onsite	55-90	05/03/2012	23.2
MW-154A-75	Onsite	55-90	08/09/2012	12.6
MW-154A-75	Onsite	55-90	11/15/2012	18.5
MW-154A-75	Onsite	55-90	02/01/2013	15.3
MW-154A-75	Onsite	55-90	05/20/2013	15.2
MW-154A-75	Onsite	55-90	07/17/2013	3.70J
MW-154A-75	Onsite	55-90	10/17/2013	3.93J
MW-154A-75	Onsite	55-90	03/05/2014	<5.00
MW-154A-75	Onsite	55-90	04/21/2014	3.93J
MW-154A-75	Onsite	55-90	08/05/2014	9.59J
MW-154A-75	Onsite	55-90	10/25/2014	7.63J
MW-154A-75	Onsite	55-90	02/26/2015	11.5
MW-154A-75	Onsite	55-90	04/22/2015	13.9
MW-154A-75	Onsite	55-90	08/14/2015	7.84J
MW-154A-75	Onsite	55-90	10/16/2015	13.2
MW-154A-75	Onsite	55-90	02/04/2016	11.9
MW-154A-75	Onsite	55-90	04/08/2016	11.4
MW-154A-75	Onsite	55-90	07/29/2016	5.78J
MW-154A-75	Onsite	55-90	10/18/2016	20.3
MW-154A-75	Onsite	55-90	02/14/2017	11.2J
MW-154A-75	Onsite	55-90	04/10/2017	10.8
MW-154B-95	Onsite	55-90	02/23/2010	<10.6
MW-154B-95	Onsite	55-90	03/17/2010	56.2
MW-154B-95	Onsite	55-90	04/30/2010	46.5
MW-154B-95	Onsite	55-90	05/04/2010	49.2
MW-154B-95	Onsite	55-90	07/19/2010	53.3
MW-154B-95	Onsite	55-90	07/26/2010	44.3
MW-154B-95	Onsite	55-90	08/11/2010	58.6
MW-154B-95	Onsite	55-90	10/07/2010	29.8
MW-154B-95	Onsite	55-90	11/05/2010	39.1
MW-154B-95	Onsite	55-90	04/26/2011	24.5
MW-154B-95	Onsite	55-90	08/10/2011	29.0
MW-154B-95	Onsite	55-90	10/13/2011	35.1
MW-154B-95	Onsite	55-90	02/14/2012	19.6
MW-154B-95	Onsite	55-90	05/21/2012	59.3
MW-154B-95	Onsite	55-90	08/01/2012	103
MW-154B-95	Onsite	55-90	11/15/2012	94.3
MW-154B-95	Onsite	55-90	02/01/2013	79.3
MW-154B-95	Onsite	55-90	05/17/2013	70.4
MW-154B-95	Onsite	55-90	07/17/2013	67.1
MW-154B-95	Onsite	55-90	10/17/2013	26.8
MW-154B-95	Onsite	55-90	03/05/2014	30.5
MW-154B-95	Onsite	55-90	04/21/2014	22.2
MW-154B-95	Onsite	55-90	08/19/2014	11.6
MW-154B-95	Onsite	55-90	10/25/2014	14.6
MW-154B-95	Onsite	55-90	02/26/2015	14.9
MW-154B-95	Onsite	55-90	04/18/2015	17.9
MW-154B-95	Onsite	55-90	08/14/2015	9.48J
MW-154B-95	Onsite	55-90	10/16/2015	17.1
MW-154B-95	Onsite	55-90	02/04/2016	13.9

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-154B-95	Onsite	55-90	04/08/2016	6.86J
MW-154B-95	Onsite	55-90	07/29/2016	6.96J
MW-154B-95	Onsite	55-90	10/18/2016	21.8
MW-154B-95	Onsite	55-90	02/14/2017	20.0
MW-154B-95	Onsite	55-90	04/10/2017	14.9
MW-154B-95	Onsite	55-90	07/25/2017	18.8
MW-154B-95	Onsite	55-90	10/20/2017	83.2
MW-154B-95	Onsite	55-90	02/13/2018	119
MW-154B-95	Onsite	55-90	04/06/2018	112
MW-154B-95	Onsite	55-90	08/07/2018	144
MW-173A-15	Onsite	Water Table	04/09/2010	<10.0
MW-173A-15	Onsite	Water Table	05/04/2010	<10.0
MW-173A-15	Onsite	Water Table	06/14/2010	<10.0
MW-173A-15	Onsite	Water Table	07/07/2010	<10.0
MW-173A-15	Onsite	Water Table	08/06/2010	<10.3
MW-173A-15	Onsite	Water Table	10/05/2010	<10.8
MW-173A-15	Onsite	Water Table	11/05/2010	<10.0
MW-173A-15	Onsite	Water Table	02/08/2011	<11.0
MW-173A-15	Onsite	Water Table	04/01/2011	<10.6
MW-173A-15	Onsite	Water Table	08/10/2011	<6.20
MW-173A-15	Onsite	Water Table	10/12/2011	<6.20
MW-173A-15	Onsite	Water Table	02/13/2012	<7.04
MW-173A-15	Onsite	Water Table	05/02/2012	<6.20
MW-173A-15	Onsite	Water Table	07/25/2012	<6.20
MW-173A-15	Onsite	Water Table	02/01/2013	<6.66
MW-173A-15	Onsite	Water Table	04/25/2013	<6.20
MW-173A-15	Onsite	Water Table	07/18/2013	<6.32
MW-173A-15	Onsite	Water Table	10/29/2013	<6.20
MW-173A-15	Onsite	Water Table	07/28/2014	<5.20J*
MW-173A-15	Onsite	Water Table	07/23/2015	<5.00
MW-173A-15	Onsite	Water Table	07/27/2016	<5.20
MW-173B-150	Onsite	90-160	04/09/2010	<10.0
MW-173B-150	Onsite	90-160	05/04/2010	<10.1
MW-173B-150	Onsite	90-160	06/14/2010	<10.3
MW-173B-150	Onsite	90-160	07/26/2010	<10.0
MW-173B-150	Onsite	90-160	08/06/2010	<10.0
MW-173B-150	Onsite	90-160	10/05/2010	<10.3
MW-173B-150	Onsite	90-160	11/05/2010	<10.0
MW-173B-150	Onsite	90-160	02/08/2011	<11.3
MW-173B-150	Onsite	90-160	04/13/2011	<10.6
MW-173B-150	Onsite	90-160	08/10/2011	<6.20
MW-173B-150	Onsite	90-160	10/11/2011	<6.20
MW-173B-150	Onsite	90-160	02/13/2012	<6.88
MW-173B-150	Onsite	90-160	05/02/2012	<6.20
MW-173B-150	Onsite	90-160	08/06/2012	<6.82
MW-173B-150	Onsite	90-160	03/06/2013	<6.20
MW-173B-150	Onsite	90-160	04/23/2013	<6.20
MW-173B-150	Onsite	90-160	07/18/2013	<6.32
MW-173B-150	Onsite	90-160	10/29/2013	<6.32
MW-173B-150	Onsite	90-160	07/28/2014	<5.00J*
MW-173B-150	Onsite	90-160	07/23/2015	<5.15
MW-173B-150	Onsite	90-160	07/29/2016	<5.10

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-174-15	Onsite	Water Table	04/04/2013	66.4
MW-174-15	Onsite	Water Table	10/23/2013	55.4
MW-174-15	Onsite	Water Table	03/20/2014	46.9
MW-174-15	Onsite	Water Table	04/22/2014	43.3
MW-174-15	Onsite	Water Table	08/28/2014	182
MW-174-15	Onsite	Water Table	10/22/2014	57.8
MW-174-15	Onsite	Water Table	02/20/2015	35.9
MW-174-15	Onsite	Water Table	04/24/2015	36.3
MW-174-15	Onsite	Water Table	07/29/2015	58.8
MW-174-15	Onsite	Water Table	10/21/2015	180J*
MW-174-15	Onsite	Water Table	02/11/2016	27.9
MW-174-15	Onsite	Water Table	07/20/2016	146
MW-174-15	Onsite	Water Table	02/25/2017	12.1
MW-174A-50	Onsite	10-55	10/20/2010	32.4
MW-174A-50	Onsite	10-55	01/27/2011	66.7
MW-174A-50	Onsite	10-55	04/13/2011	41.0
MW-174A-50	Onsite	10-55	08/15/2011	43.5
MW-174A-50	Onsite	10-55	10/13/2011	37.3
MW-174A-50	Onsite	10-55	02/14/2012	41.6
MW-174A-50	Onsite	10-55	05/04/2012	34.6
MW-174A-50	Onsite	10-55	07/25/2012	31.5
MW-174A-50	Onsite	10-55	10/16/2012	21.9
MW-174A-50	Onsite	10-55	02/02/2013	18.4
MW-174A-50	Onsite	10-55	05/01/2013	11.0
MW-174A-50	Onsite	10-55	07/17/2013	14.7
MW-174A-50	Onsite	10-55	10/23/2013	9.30J
MW-174A-50	Onsite	10-55	03/20/2014	9.18J
MW-174A-50	Onsite	10-55	04/22/2014	11.7
MW-174A-50	Onsite	10-55	08/28/2014	9.13J
MW-174A-50	Onsite	10-55	10/22/2014	6.17J
MW-174A-50	Onsite	10-55	02/24/2015	4.92J
MW-174A-50	Onsite	10-55	07/29/2015	6.80J
MW-174A-50	Onsite	10-55	02/11/2016	3.18J
MW-174A-50	Onsite	10-55	07/20/2016	4.63J
MW-174A-50	Onsite	10-55	02/25/2017	<5.30
MW-174B-90	Onsite	55-90	10/20/2010	<10.0
MW-174B-90	Onsite	55-90	01/27/2011	<10.3
MW-174B-90	Onsite	55-90	04/08/2011	<12.0
MW-174B-90	Onsite	55-90	08/15/2011	<6.20
MW-174B-90	Onsite	55-90	10/13/2011	<6.20
MW-174B-90	Onsite	55-90	02/14/2012	<6.74
MW-174B-90	Onsite	55-90	08/03/2012	<6.52
MW-174B-90	Onsite	55-90	02/02/2013	<6.74
MW-174B-90	Onsite	55-90	05/01/2013	<6.40
MW-174B-90	Onsite	55-90	07/17/2013	<6.20
MW-174B-90	Onsite	55-90	10/23/2013	<6.20
MW-174B-90	Onsite	55-90	03/20/2014	<5.00
MW-174B-90	Onsite	55-90	09/03/2014	<5.20
MW-174B-90	Onsite	55-90	07/29/2015	<5.00
MW-174B-90	Onsite	55-90	08/09/2016	5.30J
MW-175-90	Onsite	55-90	10/21/2010	<10.2
MW-175-90	Onsite	55-90	04/12/2011	<10.6

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-175-90	Onsite	55-90	08/16/2011	<6.96
MW-175-90	Onsite	55-90	10/19/2011	<6.20
MW-175-90	Onsite	55-90	02/21/2012	<6.88
MW-175-90	Onsite	55-90	06/14/2012	<6.40
MW-175-90	Onsite	55-90	07/26/2012	<6.66
MW-175-90	Onsite	55-90	11/14/2012	<6.20
MW-175-90	Onsite	55-90	02/05/2013	<6.20
MW-175-90	Onsite	55-90	05/21/2013	<6.20
MW-175-90	Onsite	55-90	08/08/2013	<6.20
MW-175-90	Onsite	55-90	11/04/2013	<6.20
MW-175-90	Onsite	55-90	03/05/2014	<5.00J*
MW-175-90	Onsite	55-90	04/23/2014	<5.40
MW-175-90	Onsite	55-90	08/12/2014	<5.00
MW-175-90	Onsite	55-90	11/06/2014	<5.00
MW-175-90	Onsite	55-90	02/20/2015	<5.00
MW-175-90	Onsite	55-90	04/23/2015	<5.10
MW-175-90	Onsite	55-90	08/05/2015	<5.00
MW-175-90	Onsite	55-90	10/22/2015	<5.15
MW-175-90	Onsite	55-90	02/23/2016	<5.10
MW-175-90	Onsite	55-90	08/19/2016	<5.05
MW-175-90	Onsite	55-90	02/24/2017	<5.05
MW-176A-15	Onsite	Water Table	10/25/2010	2050
MW-176A-15	Onsite	Water Table	05/22/2012	3420
MW-176A-15	Onsite	Water Table	08/02/2012	2230
MW-176A-15	Onsite	Water Table	12/12/2012	2070
MW-176A-15	Onsite	Water Table	01/12/2013	1800JL*
MW-176A-15	Onsite	Water Table	04/02/2013	1360
MW-176A-15	Onsite	Water Table	08/07/2013	1340JL*
MW-176A-15	Onsite	Water Table	11/11/2013	1510JL*
MW-176A-15	Onsite	Water Table	03/11/2014	1280JL*
MW-176A-15	Onsite	Water Table	06/04/2014	1480
MW-176A-15	Onsite	Water Table	09/03/2014	1300
MW-176A-15	Onsite	Water Table	10/29/2014	1490
MW-176A-15	Onsite	Water Table	02/21/2015	1870
MW-176A-15	Onsite	Water Table	04/21/2015	2300
MW-176A-15	Onsite	Water Table	08/06/2015	2080
MW-176A-15	Onsite	Water Table	10/28/2015	3060
MW-176A-15	Onsite	Water Table	02/22/2016	1880
MW-176A-15	Onsite	Water Table	04/11/2016	2190J*
MW-176A-15	Onsite	Water Table	08/16/2016	1010
MW-176A-15	Onsite	Water Table	10/26/2016	1620
MW-176A-15	Onsite	Water Table	03/10/2017	1720
MW-176A-15	Onsite	Water Table	07/13/2017	1540
MW-176A-15	Onsite	Water Table	01/19/2018	689
MW-176A-15	Onsite	Water Table	08/08/2018	893
MW-176B-50	Onsite	10-55	10/25/2010	<10.0
MW-176B-50	Onsite	10-55	01/31/2011	<11.6
MW-176B-50	Onsite	10-55	08/02/2012	<6.82
MW-176B-50	Onsite	10-55	12/12/2012	<6.60
MW-176B-50	Onsite	10-55	01/12/2013	<6.74
MW-176B-50	Onsite	10-55	08/07/2013	<6.40
MW-176B-50	Onsite	10-55	11/11/2013	3.61J

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-176B-50	Onsite	10-55	03/07/2014	<5.45
MW-176B-50	Onsite	10-55	04/23/2014	<5.00
MW-176B-50	Onsite	10-55	08/14/2014	<5.00
MW-176B-50	Onsite	10-55	10/24/2014	10.2
MW-176B-50	Onsite	10-55	02/21/2015	<5.00
MW-176B-50	Onsite	10-55	08/05/2015	<5.25
MW-176B-50	Onsite	10-55	08/15/2016	<5.05J*
MW-176C-90	Onsite	55-90	10/22/2010	<10.0
MW-176C-90	Onsite	55-90	12/30/2010	<12.0
MW-176C-90	Onsite	55-90	08/16/2011	<6.46
MW-176C-90	Onsite	55-90	10/19/2011	<6.20
MW-176C-90	Onsite	55-90	02/17/2012	<7.46
MW-176C-90	Onsite	55-90	07/25/2012	<6.20
MW-176C-90	Onsite	55-90	12/12/2012	<6.20
MW-176C-90	Onsite	55-90	01/14/2013	<6.74
MW-176C-90	Onsite	55-90	08/07/2013	<6.20
MW-176C-90	Onsite	55-90	11/27/2013	<5.00
MW-176C-90	Onsite	55-90	03/07/2014	<5.25
MW-176C-90	Onsite	55-90	08/14/2014	<5.15
MW-176C-90	Onsite	55-90	08/05/2015	<5.00
MW-176C-90	Onsite	55-90	08/15/2016	<5.05J*
MW-177-90	Onsite	55-90	10/27/2010	<10.0
MW-177-90	Onsite	55-90	08/16/2011	<6.60
MW-177-90	Onsite	55-90	10/13/2011	<6.20
MW-177-90	Onsite	55-90	07/26/2012	<6.20
MW-177-90	Onsite	55-90	07/23/2013	<6.20
MW-177-90	Onsite	55-90	10/31/2013	<6.20
MW-177-90	Onsite	55-90	08/28/2014	<5.25
MW-177-90	Onsite	55-90	08/04/2015	<5.00
MW-177-90	Onsite	55-90	08/10/2016	<5.10
MW-178A-15	Onsite	Water Table	10/22/2010	124
MW-178A-15	Onsite	Water Table	01/27/2011	236
MW-178A-15	Onsite	Water Table	08/17/2011	144
MW-178A-15	Onsite	Water Table	10/14/2011	100
MW-178A-15	Onsite	Water Table	07/24/2012	63.6
MW-178A-15	Onsite	Water Table	12/13/2012	27.2
MW-178A-15	Onsite	Water Table	07/19/2013	26.8
MW-178A-15	Onsite	Water Table	11/07/2013	25.0
MW-178A-15	Onsite	Water Table	03/06/2014	21.4
MW-178A-15	Onsite	Water Table	08/05/2014	7.77J
MW-178A-15	Onsite	Water Table	10/27/2014	6.92J
MW-178A-15	Onsite	Water Table	08/05/2015	6.53J
MW-178A-15	Onsite	Water Table	02/29/2016	8.12JL*
MW-178A-15	Onsite	Water Table	08/12/2016	3.88JH*
MW-178B-50	Onsite	10-55	10/22/2010	237
MW-178B-50	Onsite	10-55	01/27/2011	72.9
MW-178B-50	Onsite	10-55	08/15/2011	52.2
MW-178B-50	Onsite	10-55	10/14/2011	243
MW-178B-50	Onsite	10-55	07/24/2012	153
MW-178B-50	Onsite	10-55	12/13/2012	304
MW-178B-50	Onsite	10-55	07/19/2013	85.6
MW-178B-50	Onsite	10-55	11/11/2013	211

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-178B-50	Onsite	10-55	03/06/2014	74.7
MW-178B-50	Onsite	10-55	06/04/2014	91.9
MW-178B-50	Onsite	10-55	08/05/2014	101
MW-178B-50	Onsite	10-55	10/27/2014	273
MW-178B-50	Onsite	10-55	08/05/2015	195
MW-178B-50	Onsite	10-55	10/21/2015	293J*
MW-178B-50	Onsite	10-55	02/29/2016	231
MW-178B-50	Onsite	10-55	08/12/2016	178JH*
MW-178B-50	Onsite	10-55	10/20/2016	170
MW-178C-90	Onsite	55-90	10/22/2010	<10.0
MW-178C-90	Onsite	55-90	08/15/2011	<6.20
MW-178C-90	Onsite	55-90	10/14/2011	<6.20
MW-178C-90	Onsite	55-90	07/25/2012	<6.32
MW-178C-90	Onsite	55-90	12/13/2012	<6.32
MW-178C-90	Onsite	55-90	07/19/2013	<6.52
MW-178C-90	Onsite	55-90	11/15/2013	<5.00
MW-178C-90	Onsite	55-90	03/06/2014	<5.00
MW-178C-90	Onsite	55-90	08/09/2014	<5.15
MW-178C-90	Onsite	55-90	08/06/2015	<5.00
MW-178C-90	Onsite	55-90	08/12/2016	<5.05
MW-179A-15	Onsite	Water Table	10/21/2010	29.3
MW-179A-15	Onsite	Water Table	08/15/2011	25.4
MW-179A-15	Onsite	Water Table	10/11/2011	18.4
MW-179A-15	Onsite	Water Table	07/24/2012	4.83J
MW-179A-15	Onsite	Water Table	07/19/2013	9.79J
MW-179A-15	Onsite	Water Table	11/12/2013	5.37J
MW-179A-15	Onsite	Water Table	08/14/2014	6.28J
MW-179A-15	Onsite	Water Table	10/27/2014	6.26J
MW-179A-15	Onsite	Water Table	08/06/2015	9.66J
MW-179A-15	Onsite	Water Table	02/29/2016	5.86J
MW-179A-15	Onsite	Water Table	08/12/2016	<5.10
MW-179B-50	Onsite	10-55	10/21/2010	<10.2
MW-179B-50	Onsite	10-55	08/15/2011	3.40J
MW-179B-50	Onsite	10-55	10/14/2011	4.80J
MW-179B-50	Onsite	10-55	07/24/2012	<6.20
MW-179B-50	Onsite	10-55	08/09/2013	3.64J
MW-179B-50	Onsite	10-55	11/12/2013	6.08J
MW-179B-50	Onsite	10-55	08/12/2014	7.68J
MW-179B-50	Onsite	10-55	08/06/2015	4.92J
MW-179B-50	Onsite	10-55	02/29/2016	3.51J
MW-179B-50	Onsite	10-55	08/12/2016	8.79JH*
MW-179C-90	Onsite	55-90	10/21/2010	<10.0
MW-179C-90	Onsite	55-90	08/15/2011	<6.66
MW-179C-90	Onsite	55-90	10/14/2011	<6.20
MW-179C-90	Onsite	55-90	07/25/2012	<6.26
MW-179C-90	Onsite	55-90	08/09/2013	<6.20
MW-179C-90	Onsite	55-90	11/15/2013	<5.10
MW-179C-90	Onsite	55-90	08/14/2014	<5.15
MW-179C-90	Onsite	55-90	08/06/2015	<5.00
MW-179C-90	Onsite	55-90	08/12/2016	5.41J
MW-179D-135	Onsite	90-160	08/23/2011	<6.20
MW-179D-135	Onsite	90-160	08/07/2012	<6.40

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-179D-135	Onsite	90-160	07/19/2013	<6.52
MW-179D-135	Onsite	90-160	11/12/2013	<5.00
MW-179D-135	Onsite	90-160	08/14/2014	<5.30
MW-179D-135	Onsite	90-160	08/06/2015	<5.00
MW-180A-15	Onsite	Water Table	10/25/2010	<10.0
MW-180A-15	Onsite	Water Table	01/27/2011	<10.5
MW-180A-15	Onsite	Water Table	08/15/2011	<6.46
MW-180A-15	Onsite	Water Table	11/04/2011	<6.20
MW-180A-15	Onsite	Water Table	07/24/2012	<6.20
MW-180A-15	Onsite	Water Table	11/12/2012	<6.20
MW-180A-15	Onsite	Water Table	08/07/2013	<6.20
MW-180A-15	Onsite	Water Table	11/11/2013	<5.10
MW-180A-15	Onsite	Water Table	03/25/2014	<5.00
MW-180A-15	Onsite	Water Table	08/13/2014	<5.20
MW-180A-15	Onsite	Water Table	08/07/2015	<5.00
MW-180A-15	Onsite	Water Table	08/12/2016	<5.20
MW-180B-50	Onsite	10-55	10/25/2010	<10.0
MW-180B-50	Onsite	10-55	01/27/2011	<11.1
MW-180B-50	Onsite	10-55	08/15/2011	<6.88
MW-180B-50	Onsite	10-55	10/24/2011	<6.20
MW-180B-50	Onsite	10-55	07/24/2012	<6.20
MW-180B-50	Onsite	10-55	11/12/2012	<6.46
MW-180B-50	Onsite	10-55	08/07/2013	<6.20
MW-180B-50	Onsite	10-55	11/11/2013	<5.00
MW-180B-50	Onsite	10-55	08/13/2014	<5.35
MW-180B-50	Onsite	10-55	08/06/2015	<5.00
MW-180B-50	Onsite	10-55	08/12/2016	<5.10
MW-180C-90	Onsite	55-90	10/25/2010	<10.1
MW-180C-90	Onsite	55-90	01/27/2011	<10.4
MW-180C-90	Onsite	55-90	06/01/2011	<3.10
MW-180C-90	Onsite	55-90	08/15/2011	<6.20
MW-180C-90	Onsite	55-90	10/24/2011	<6.20
MW-180C-90	Onsite	55-90	07/26/2012	<6.66
MW-180C-90	Onsite	55-90	11/12/2012	<6.20
MW-180C-90	Onsite	55-90	08/07/2013	<6.46
MW-180C-90	Onsite	55-90	11/11/2013	<5.00
MW-180C-90	Onsite	55-90	08/13/2014	<5.35
MW-180C-90	Onsite	55-90	08/07/2015	<5.00
MW-180C-90	Onsite	55-90	08/12/2016	<5.05
MW-186A-15	Onsite	Water Table	05/07/2012	559
MW-186A-15	Onsite	Water Table	08/01/2012	360
MW-186A-15	Onsite	Water Table	12/13/2012	313
MW-186A-15	Onsite	Water Table	01/12/2013	284
MW-186A-15	Onsite	Water Table	05/24/2013	251
MW-186A-15	Onsite	Water Table	07/23/2013	171
MW-186A-15	Onsite	Water Table	11/05/2013	163
MW-186A-15	Onsite	Water Table	03/11/2014	177JL*
MW-186A-15	Onsite	Water Table	04/16/2014	161
MW-186A-15	Onsite	Water Table	09/03/2014	177
MW-186A-15	Onsite	Water Table	10/29/2014	231
MW-186A-15	Onsite	Water Table	02/20/2015	190JL*
MW-186A-15	Onsite	Water Table	04/21/2015	164

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-186A-15	Onsite	Water Table	08/05/2015	203
MW-186A-15	Onsite	Water Table	10/15/2015	224
MW-186A-15	Onsite	Water Table	02/22/2016	182
MW-186A-15	Onsite	Water Table	04/11/2016	182
MW-186A-15	Onsite	Water Table	08/18/2016	166
MW-186A-15	Onsite	Water Table	10/25/2016	195
MW-186A-15	Onsite	Water Table	02/22/2017	187
MW-186A-15	Onsite	Water Table	04/13/2017	182
MW-186A-15	Onsite	Water Table	07/13/2017	155
MW-186A-15	Onsite	Water Table	10/18/2017	237
MW-186A-15	Onsite	Water Table	02/13/2018	286
MW-186A-15	Onsite	Water Table	04/03/2018	287JL*
MW-186A-15	Onsite	Water Table	07/17/2018	206
MW-186B-60	Onsite	10-55	09/07/2011	33.6
MW-186B-60	Onsite	10-55	10/12/2011	35.8
MW-186B-60	Onsite	10-55	02/21/2012	24.6
MW-186B-60	Onsite	10-55	08/01/2012	23.4
MW-186B-60	Onsite	10-55	11/15/2012	25.2
MW-186B-60	Onsite	10-55	01/12/2013	26.9
MW-186B-60	Onsite	10-55	05/22/2013	25.9
MW-186B-60	Onsite	10-55	07/02/2013	17.3
MW-186B-60	Onsite	10-55	11/05/2013	23.2
MW-186B-60	Onsite	10-55	03/04/2014	18.5
MW-186B-60	Onsite	10-55	04/22/2014	21.3
MW-186B-60	Onsite	10-55	08/12/2014	31.3
MW-186B-60	Onsite	10-55	10/23/2014	27.4
MW-186B-60	Onsite	10-55	02/20/2015	30.4
MW-186B-60	Onsite	10-55	04/23/2015	27.4
MW-186B-60	Onsite	10-55	08/03/2015	22.3
MW-186B-60	Onsite	10-55	10/15/2015	37.7
MW-186B-60	Onsite	10-55	02/05/2016	23.9
MW-186B-60	Onsite	10-55	04/07/2016	23.4
MW-186B-60	Onsite	10-55	08/12/2016	28.2JH*
MW-186B-60	Onsite	10-55	10/20/2016	33.7
MW-186B-60	Onsite	10-55	02/22/2017	16.2
MW-186B-60	Onsite	10-55	04/11/2017	13.3
MW-186B-60	Onsite	10-55	07/12/2017	12.7
MW-186B-60	Onsite	10-55	07/18/2018	31.6
MW-186E-75	Onsite	55-90	04/27/2012	7.62J
MW-186E-75	Onsite	55-90	08/01/2012	11.2
MW-186E-75	Onsite	55-90	11/15/2012	16.7
MW-186E-75	Onsite	55-90	01/12/2013	15.4
MW-186E-75	Onsite	55-90	05/22/2013	13.9
MW-186E-75	Onsite	55-90	08/20/2013	11.7
MW-186E-75	Onsite	55-90	11/05/2013	8.30J
MW-186E-75	Onsite	55-90	03/04/2014	7.38J
MW-186E-75	Onsite	55-90	04/22/2014	9.62J
MW-186E-75	Onsite	55-90	08/12/2014	9.68J
MW-186E-75	Onsite	55-90	10/23/2014	7.64J
MW-186E-75	Onsite	55-90	02/20/2015	7.03J
MW-186E-75	Onsite	55-90	04/23/2015	6.89J
MW-186E-75	Onsite	55-90	08/03/2015	9.03J

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-186E-75	Onsite	55-90	10/15/2015	12.8
MW-186E-75	Onsite	55-90	02/05/2016	20.5
MW-186E-75	Onsite	55-90	04/07/2016	7.37J
MW-186E-75	Onsite	55-90	08/12/2016	11.2JH*
MW-186E-75	Onsite	55-90	10/20/2016	14.7
MW-186E-75	Onsite	55-90	02/22/2017	7.80J
MW-186E-75	Onsite	55-90	04/13/2017	6.93J
MW-186E-75	Onsite	55-90	08/03/2017	7.17J
MW-186E-75	Onsite	55-90	10/19/2017	15.2
MW-186E-75	Onsite	55-90	01/18/2018	15.0
MW-186E-75	Onsite	55-90	04/05/2018	16.6
MW-186C-100	Onsite	55-90	09/07/2011	<6.20
MW-186C-100	Onsite	55-90	10/19/2011	<6.20
MW-186C-100	Onsite	55-90	02/21/2012	<6.74
MW-186C-100	Onsite	55-90	06/14/2012	<6.20
MW-186C-100	Onsite	55-90	08/01/2012	<6.20
MW-186C-100	Onsite	55-90	11/12/2012	<6.20
MW-186C-100	Onsite	55-90	02/28/2013	<6.66
MW-186C-100	Onsite	55-90	05/21/2013	<6.20
MW-186C-100	Onsite	55-90	07/02/2013	<6.20
MW-186C-100	Onsite	55-90	11/05/2013	<6.32
MW-186C-100	Onsite	55-90	08/12/2014	<5.05
MW-186C-100	Onsite	55-90	08/03/2015	<5.10
MW-186C-100	Onsite	55-90	08/12/2016	5.88JH*
MW-186D-135	Onsite	90-160	02/21/2012	<6.66
MW-186D-135	Onsite	90-160	06/14/2012	<6.52
MW-186D-135	Onsite	90-160	08/01/2012	<6.20
MW-186D-135	Onsite	90-160	11/12/2012	<6.20
MW-186D-135	Onsite	90-160	03/06/2013	<6.20
MW-186D-135	Onsite	90-160	05/10/2013	<6.20
MW-186D-135	Onsite	90-160	07/02/2013	<6.20
MW-186D-135	Onsite	90-160	11/05/2013	<6.32
MW-186D-135	Onsite	90-160	08/12/2014	<5.00
MW-186D-135	Onsite	90-160	08/03/2015	<5.00
MW-192A-15	Onsite	Water Table	10/10/2011	<6.20
MW-192A-15	Onsite	Water Table	05/05/2012	<6.46J*
MW-192A-15	Onsite	Water Table	10/15/2012	<6.20
MW-192A-15	Onsite	Water Table	04/27/2013	<6.20
MW-192A-15	Onsite	Water Table	08/20/2014	<5.15
MW-192A-15	Onsite	Water Table	08/04/2015	<5.00
MW-192A-15	Onsite	Water Table	07/26/2016	<5.10J*
MW-192B-55	Onsite	10-55	10/10/2011	<6.20
MW-192B-55	Onsite	10-55	05/04/2012	<6.20
MW-192B-55	Onsite	10-55	05/10/2013	<6.20
MW-192B-55	Onsite	10-55	08/20/2014	<5.20
MW-192B-55	Onsite	10-55	08/04/2015	<5.00J*
MW-192B-55	Onsite	10-55	07/26/2016	<5.05
MW-195A-15	Onsite	Water Table	10/15/2011	319
MW-195A-15	Onsite	Water Table	02/18/2012	240
MW-195A-15	Onsite	Water Table	05/04/2012	210
MW-195A-15	Onsite	Water Table	07/25/2012	198
MW-195A-15	Onsite	Water Table	11/15/2012	174

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-195A-15	Onsite	Water Table	02/04/2013	162
MW-195A-15	Onsite	Water Table	04/23/2013	174
MW-195A-15	Onsite	Water Table	08/06/2013	201
MW-195A-15	Onsite	Water Table	10/23/2013	213
MW-195A-15	Onsite	Water Table	03/04/2014	136
MW-195A-15	Onsite	Water Table	04/29/2014	127
MW-195A-15	Onsite	Water Table	08/15/2014	135
MW-195A-15	Onsite	Water Table	10/28/2014	186
MW-195A-15	Onsite	Water Table	02/20/2015	152
MW-195A-15	Onsite	Water Table	04/24/2015	129
MW-195A-15	Onsite	Water Table	07/30/2015	87.5
MW-195A-15	Onsite	Water Table	10/21/2015	746J*
MW-195A-15	Onsite	Water Table	02/09/2016	421
MW-195A-15	Onsite	Water Table	04/07/2016	277
MW-195A-15	Onsite	Water Table	07/20/2016	816
MW-195A-15	Onsite	Water Table	10/19/2016	503
MW-195A-15	Onsite	Water Table	02/16/2017	170
MW-195A-15	Onsite	Water Table	04/10/2017	134
MW-195B-150	Onsite	90-160	02/18/2012	<6.60
MW-195B-150	Onsite	90-160	06/14/2012	<6.20
MW-195B-150	Onsite	90-160	07/27/2012	<6.40
MW-195B-150	Onsite	90-160	10/15/2012	<6.20
MW-195B-150	Onsite	90-160	03/11/2013	<6.20
MW-195B-150	Onsite	90-160	04/23/2013	<6.20
MW-195B-150	Onsite	90-160	08/06/2013	<6.20
MW-195B-150	Onsite	90-160	10/23/2013	<6.20
MW-195B-150	Onsite	90-160	08/15/2014	<5.55
MW-195B-150	Onsite	90-160	07/30/2015	<5.15J*
MW-196-15	Onsite	Water Table	10/15/2011	<6.20
MW-196-15	Onsite	Water Table	02/17/2012	<6.66
MW-196-15	Onsite	Water Table	05/04/2012	<6.20
MW-196-15	Onsite	Water Table	08/03/2012	<6.46
MW-196-15	Onsite	Water Table	12/11/2012	<6.46
MW-196-15	Onsite	Water Table	02/02/2013	<6.40
MW-196-15	Onsite	Water Table	06/06/2013	<6.20
MW-196-15	Onsite	Water Table	07/30/2013	<6.46
MW-196-15	Onsite	Water Table	10/15/2013	<6.96
MW-196-15	Onsite	Water Table	08/20/2014	<5.40
MW-196-15	Onsite	Water Table	08/04/2015	<5.00
MW-196-15	Onsite	Water Table	08/09/2016	3.27J
MW-197A-65	Onsite	10-55	06/12/2012	<6.20
MW-197A-65	Onsite	10-55	08/03/2012	<6.46
MW-197A-65	Onsite	10-55	11/14/2012	<6.20
MW-197A-65	Onsite	10-55	02/04/2013	<6.60
MW-197A-65	Onsite	10-55	04/25/2013	<6.20
MW-197A-65	Onsite	10-55	07/21/2013	<6.20
MW-197A-65	Onsite	10-55	11/04/2013	<6.20
MW-197A-65	Onsite	10-55	03/25/2014	<5.25
MW-197A-65	Onsite	10-55	04/23/2014	<5.00
MW-197A-65	Onsite	10-55	08/13/2014	<5.00
MW-197A-65	Onsite	10-55	10/23/2014	<5.00
MW-197A-65	Onsite	10-55	08/04/2015	<5.15

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-197A-65	Onsite	10-55	08/18/2016	<5.05
MW-197B-150	Onsite	90-160	02/21/2012	<6.60
MW-197B-150	Onsite	90-160	06/14/2012	<6.20
MW-197B-150	Onsite	90-160	08/06/2012	<6.46
MW-197B-150	Onsite	90-160	03/08/2013	<6.46
MW-197B-150	Onsite	90-160	04/25/2013	<6.20
MW-197B-150	Onsite	90-160	07/21/2013	<6.20
MW-197B-150	Onsite	90-160	11/04/2013	<6.20
MW-197B-150	Onsite	90-160	08/13/2014	<5.35
MW-197B-150	Onsite	90-160	08/04/2015	<5.00
MW-198-150	Onsite	90-160	02/22/2012	R*
MW-198-150	Onsite	90-160	04/20/2012	<6.20
MW-198-150	Onsite	90-160	08/07/2012	<6.46
MW-198-150	Onsite	90-160	08/23/2013	<6.32
MW-198-150	Onsite	90-160	11/15/2013	<5.00
MW-198-150	Onsite	90-160	03/24/2014	<5.00
MW-198-150	Onsite	90-160	04/24/2014	<5.00
MW-198-150	Onsite	90-160	09/01/2014	<5.00
MW-198-150	Onsite	90-160	10/29/2014	<5.00
MW-198-150	Onsite	90-160	08/11/2015	<5.00
MW-199-150	Onsite	90-160	02/18/2012	<6.60
MW-199-150	Onsite	90-160	06/14/2012	<6.74J*
MW-199-150	Onsite	90-160	08/07/2012	<6.20
MW-199-150	Onsite	90-160	03/08/2013	<6.66
MW-199-150	Onsite	90-160	04/25/2013	<6.32
MW-199-150	Onsite	90-160	07/18/2013	<6.20
MW-199-150	Onsite	90-160	10/30/2013	<6.32
MW-199-150	Onsite	90-160	02/28/2014	<5.00
MW-199-150	Onsite	90-160	04/21/2014	<5.00
MW-199-150	Onsite	90-160	08/01/2014	<5.00
MW-199-150	Onsite	90-160	10/28/2014	<5.00
MW-199-150	Onsite	90-160	02/24/2015	<5.00
MW-199-150	Onsite	90-160	04/23/2015	<5.00
MW-199-150	Onsite	90-160	07/31/2015	<5.00J*
MW-199-150	Onsite	90-160	10/20/2015	<5.05
MW-199-150	Onsite	90-160	02/12/2016	<5.25
MW-199-150	Onsite	90-160	08/09/2016	<5.10
MW-199-150	Onsite	90-160	02/14/2017	<5.50
MW-300-150	Onsite	90-160	02/18/2012	<6.82
MW-300-150	Onsite	90-160	06/14/2012	<6.46
MW-300-150	Onsite	90-160	08/07/2012	<6.32
MW-300-150	Onsite	90-160	03/11/2013	<6.40
MW-300-150	Onsite	90-160	05/14/2013	<6.20
MW-300-150	Onsite	90-160	07/23/2013	<6.20
MW-300-150	Onsite	90-160	11/06/2013	<6.20
MW-300-150	Onsite	90-160	09/04/2014	<5.00
MW-300-150	Onsite	90-160	08/07/2015	<5.00
MW-301-CMT-10	Onsite	Water Table	11/08/2011	<6.20
MW-301-CMT-10	Onsite	Water Table	08/14/2012	<6.40J*
MW-301-CMT-10	Onsite	Water Table	12/09/2012	<6.66
MW-301-CMT-10	Onsite	Water Table	01/22/2013	<6.66
MW-301-CMT-10	Onsite	Water Table	07/31/2013	<6.20

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-301-CMT-10	Onsite	Water Table	10/16/2013	<6.20
MW-301-CMT-10	Onsite	Water Table	03/11/2014	<5.75
MW-301-CMT-10	Onsite	Water Table	04/17/2014	<5.25J*
MW-301-CMT-10	Onsite	Water Table	07/17/2014	<5.00
MW-301-CMT-10	Onsite	Water Table	10/20/2014	<5.00
MW-301-CMT-10	Onsite	Water Table	07/30/2015	<5.00
MW-301-CMT-10	Onsite	Water Table	07/15/2016	<5.15
MW-301-CMT-20	Onsite	Water Table	11/07/2011	<6.20
MW-301-CMT-20	Onsite	Water Table	08/14/2012	<6.40
MW-301-CMT-20	Onsite	Water Table	12/09/2012	<6.60
MW-301-CMT-20	Onsite	Water Table	01/22/2013	<6.46
MW-301-CMT-20	Onsite	Water Table	07/31/2013	<6.32
MW-301-CMT-20	Onsite	Water Table	10/16/2013	<6.20
MW-301-CMT-20	Onsite	Water Table	03/11/2014	<5.50
MW-301-CMT-20	Onsite	Water Table	04/17/2014	<5.00
MW-301-CMT-20	Onsite	Water Table	07/17/2014	<5.20
MW-301-CMT-20	Onsite	Water Table	10/20/2014	<5.00J*
MW-301-CMT-20	Onsite	Water Table	07/30/2015	<5.00
MW-301-CMT-20	Onsite	Water Table	07/15/2016	<5.00
MW-301-CMT-20	Onsite	Water Table	07/26/2017	<5.40
MW-301-CMT-20	Onsite	Water Table	10/16/2017	<5.15
MW-301-CMT-20	Onsite	Water Table	01/18/2018	<5.30
MW-301-CMT-20	Onsite	Water Table	04/04/2018	<5.20
MW-301-CMT-30	Onsite	10-55	11/07/2011	<6.20
MW-301-CMT-30	Onsite	10-55	08/14/2012	<6.32
MW-301-CMT-30	Onsite	10-55	01/22/2013	<6.52
MW-301-CMT-30	Onsite	10-55	07/31/2013	<6.20
MW-301-CMT-30	Onsite	10-55	10/16/2013	<6.20
MW-301-CMT-30	Onsite	10-55	03/11/2014	<5.45
MW-301-CMT-30	Onsite	10-55	04/17/2014	<5.00
MW-301-CMT-30	Onsite	10-55	07/17/2014	<5.40
MW-301-CMT-30	Onsite	10-55	10/20/2014	<5.00
MW-301-CMT-30	Onsite	10-55	07/30/2015	<5.00
MW-301-CMT-30	Onsite	10-55	07/15/2016	<5.00
MW-301-CMT-40	Onsite	10-55	11/07/2011	3.24J
MW-301-CMT-40	Onsite	10-55	03/30/2012	<6.20
MW-301-CMT-40	Onsite	10-55	08/14/2012	<6.40
MW-301-CMT-40	Onsite	10-55	12/09/2012	<6.74
MW-301-CMT-40	Onsite	10-55	01/22/2013	<6.46
MW-301-CMT-40	Onsite	10-55	07/31/2013	<6.46
MW-301-CMT-40	Onsite	10-55	10/16/2013	<6.20
MW-301-CMT-40	Onsite	10-55	03/11/2014	<5.45
MW-301-CMT-40	Onsite	10-55	04/17/2014	<5.25
MW-301-CMT-40	Onsite	10-55	07/17/2014	<5.25
MW-301-CMT-40	Onsite	10-55	10/20/2014	<5.00
MW-301-CMT-40	Onsite	10-55	07/30/2015	<5.15
MW-301-CMT-40	Onsite	10-55	07/15/2016	<5.10
MW-301-CMT-50	Onsite	10-55	11/07/2011	5.35J
MW-301-CMT-50	Onsite	10-55	03/30/2012	6.53J
MW-301-CMT-50	Onsite	10-55	06/06/2012	7.71J
MW-301-CMT-50	Onsite	10-55	08/14/2012	7.96J
MW-301-CMT-50	Onsite	10-55	01/22/2013	3.89J

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-301-CMT-50	Onsite	10-55	07/31/2013	<6.40
MW-301-CMT-50	Onsite	10-55	10/16/2013	<6.20
MW-301-CMT-50	Onsite	10-55	03/11/2014	3.88J
MW-301-CMT-50	Onsite	10-55	04/17/2014	3.79J
MW-301-CMT-50	Onsite	10-55	07/17/2014	3.89J
MW-301-CMT-50	Onsite	10-55	10/20/2014	<5.00
MW-301-CMT-50	Onsite	10-55	02/26/2015	<5.00
MW-301-CMT-50	Onsite	10-55	07/30/2015	<5.00
MW-301-CMT-50	Onsite	10-55	07/15/2016	<5.10
MW-301-60	Onsite	10-55	11/10/2011	7.02J
MW-301-60	Onsite	10-55	03/30/2012	13.6
MW-301-60	Onsite	10-55	06/06/2012	12.3
MW-301-60	Onsite	10-55	08/16/2012	7.08J
MW-301-60	Onsite	10-55	01/14/2013	4.64J
MW-301-60	Onsite	10-55	07/31/2013	3.71J
MW-301-60	Onsite	10-55	10/16/2013	3.73J
MW-301-60	Onsite	10-55	03/07/2014	4.71J
MW-301-60	Onsite	10-55	04/17/2014	5.36J
MW-301-60	Onsite	10-55	07/29/2014	5.70J*
MW-301-60	Onsite	10-55	10/27/2014	3.95J
MW-301-60	Onsite	10-55	02/17/2015	5.29J
MW-301-60	Onsite	10-55	04/18/2015	4.30J
MW-301-60	Onsite	10-55	07/28/2015	<5.00J*
MW-301-60	Onsite	10-55	02/17/2016	3.38J
MW-301-60	Onsite	10-55	07/21/2016	3.78J
MW-301-60	Onsite	10-55	02/14/2017	<5.95
MW-301-60	Onsite	10-55	07/14/2017	<5.05
MW-301-60	Onsite	10-55	10/16/2017	<5.05
MW-301-60	Onsite	10-55	01/16/2018	<5.25
MW-301-60	Onsite	10-55	04/06/2018	<5.10
MW-301-70	Onsite	55-90	10/17/2011	5.72J
MW-301-70	Onsite	55-90	03/30/2012	11.6
MW-301-70	Onsite	55-90	06/06/2012	10.3J
MW-301-70	Onsite	55-90	08/16/2012	6.27J
MW-301-70	Onsite	55-90	01/15/2013	4.31JL*
MW-301-70	Onsite	55-90	04/16/2013	4.71J
MW-301-70	Onsite	55-90	07/31/2013	<6.20
MW-301-70	Onsite	55-90	10/16/2013	5.63J
MW-301-70	Onsite	55-90	03/07/2014	4.92J
MW-301-70	Onsite	55-90	04/17/2014	4.96J
MW-301-70	Onsite	55-90	07/29/2014	5.60J
MW-301-70	Onsite	55-90	10/27/2014	3.26J
MW-301-70	Onsite	55-90	02/17/2015	4.55J
MW-301-70	Onsite	55-90	04/18/2015	4.61J
MW-301-70	Onsite	55-90	07/28/2015	<5.15
MW-301-70	Onsite	55-90	02/17/2016	<5.25
MW-301-70	Onsite	55-90	07/21/2016	<5.40
MW-302-CMT-10	Onsite	Water Table	11/10/2011	55.5
MW-302-CMT-10	Onsite	Water Table	03/26/2012	66.1
MW-302-CMT-10	Onsite	Water Table	06/06/2012	32.7
MW-302-CMT-10	Onsite	Water Table	08/15/2012	62.2
MW-302-CMT-10	Onsite	Water Table	01/22/2013	56.6

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-302-CMT-10	Onsite	Water Table	04/17/2013	50.1
MW-302-CMT-10	Onsite	Water Table	08/28/2013	43.3
MW-302-CMT-10	Onsite	Water Table	10/14/2013	37.2
MW-302-CMT-10	Onsite	Water Table	03/12/2014	46.6
MW-302-CMT-10	Onsite	Water Table	04/15/2014	41.7
MW-302-CMT-10	Onsite	Water Table	07/16/2014	14.4
MW-302-CMT-10	Onsite	Water Table	10/20/2014	19.9
MW-302-CMT-10	Onsite	Water Table	02/19/2015	17.3
MW-302-CMT-10	Onsite	Water Table	04/16/2015	11.4
MW-302-CMT-10	Onsite	Water Table	07/21/2015	6.04J
MW-302-CMT-10	Onsite	Water Table	02/08/2016	3.64J
MW-302-CMT-10	Onsite	Water Table	07/14/2016	3.25J
MW-302-CMT-10	Onsite	Water Table	02/17/2017	5.82J
MW-302-CMT-20	Onsite	Water Table	11/10/2011	76.2
MW-302-CMT-20	Onsite	Water Table	03/26/2012	66.1
MW-302-CMT-20	Onsite	Water Table	06/06/2012	70.3
MW-302-CMT-20	Onsite	Water Table	08/15/2012	68.5
MW-302-CMT-20	Onsite	Water Table	12/09/2012	59.4
MW-302-CMT-20	Onsite	Water Table	01/22/2013	61.0
MW-302-CMT-20	Onsite	Water Table	04/17/2013	46.4
MW-302-CMT-20	Onsite	Water Table	08/28/2013	47.4
MW-302-CMT-20	Onsite	Water Table	10/14/2013	52.7
MW-302-CMT-20	Onsite	Water Table	03/12/2014	45.2
MW-302-CMT-20	Onsite	Water Table	04/15/2014	42.9
MW-302-CMT-20	Onsite	Water Table	07/16/2014	36.2
MW-302-CMT-20	Onsite	Water Table	10/20/2014	19.4
MW-302-CMT-20	Onsite	Water Table	02/19/2015	8.48J
MW-302-CMT-20	Onsite	Water Table	04/16/2015	5.03J
MW-302-CMT-20	Onsite	Water Table	07/21/2015	3.98J
MW-302-CMT-20	Onsite	Water Table	02/08/2016	<5.20
MW-302-CMT-20	Onsite	Water Table	07/14/2016	<5.05
MW-302-CMT-20	Onsite	Water Table	10/19/2016	3.38J
MW-302-CMT-20	Onsite	Water Table	02/17/2017	9.99J
MW-302-CMT-20	Onsite	Water Table	04/10/2017	10.7J
MW-302-CMT-20	Onsite	Water Table	07/31/2017	12.8
MW-302-CMT-20	Onsite	Water Table	10/17/2017	11.6
MW-302-CMT-20	Onsite	Water Table	02/12/2018	13.2
MW-302-CMT-20	Onsite	Water Table	04/05/2018	14.0
MW-302-CMT-20	Onsite	Water Table	07/11/2018	18.1
MW-302-CMT-30	Onsite	10-55	11/10/2011	63.0
MW-302-CMT-30	Onsite	10-55	03/26/2012	59.0
MW-302-CMT-30	Onsite	10-55	06/06/2012	50.3
MW-302-CMT-30	Onsite	10-55	01/22/2013	52.3
MW-302-CMT-30	Onsite	10-55	04/17/2013	37.8
MW-302-CMT-30	Onsite	10-55	08/28/2013	43.9
MW-302-CMT-30	Onsite	10-55	10/14/2013	43.4
MW-302-CMT-30	Onsite	10-55	03/12/2014	42.8
MW-302-CMT-30	Onsite	10-55	04/15/2014	40.0
MW-302-CMT-30	Onsite	10-55	07/16/2014	38.6
MW-302-CMT-30	Onsite	10-55	10/20/2014	24.2
MW-302-CMT-30	Onsite	10-55	02/19/2015	7.94J
MW-302-CMT-30	Onsite	10-55	04/16/2015	5.01J

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-302-CMT-30	Onsite	10-55	07/21/2015	5.14J
MW-302-CMT-30	Onsite	10-55	02/08/2016	3.54J
MW-302-CMT-30	Onsite	10-55	07/14/2016	3.50J
MW-302-CMT-30	Onsite	10-55	02/17/2017	6.97J
MW-302-CMT-40	Onsite	10-55	11/10/2011	33.2
MW-302-CMT-40	Onsite	10-55	03/26/2012	28.5
MW-302-CMT-40	Onsite	10-55	06/06/2012	21.9
MW-302-CMT-40	Onsite	10-55	12/09/2012	18.1
MW-302-CMT-40	Onsite	10-55	01/22/2013	17.4
MW-302-CMT-40	Onsite	10-55	04/17/2013	13.7
MW-302-CMT-40	Onsite	10-55	08/28/2013	14.9
MW-302-CMT-40	Onsite	10-55	10/14/2013	14.9
MW-302-CMT-40	Onsite	10-55	03/12/2014	15.4
MW-302-CMT-40	Onsite	10-55	04/15/2014	14.0
MW-302-CMT-40	Onsite	10-55	07/16/2014	12.4
MW-302-CMT-40	Onsite	10-55	10/20/2014	21.8
MW-302-CMT-40	Onsite	10-55	02/19/2015	<5.00
MW-302-CMT-40	Onsite	10-55	04/16/2015	<5.25
MW-302-CMT-40	Onsite	10-55	07/21/2015	<5.15
MW-302-CMT-40	Onsite	10-55	07/14/2016	<5.05
MW-302-CMT-50	Onsite	10-55	11/10/2011	33.1
MW-302-CMT-50	Onsite	10-55	03/26/2012	28.4
MW-302-CMT-50	Onsite	10-55	06/06/2012	26.3
MW-302-CMT-50	Onsite	10-55	01/22/2013	20.5
MW-302-CMT-50	Onsite	10-55	04/17/2013	16.0
MW-302-CMT-50	Onsite	10-55	08/28/2013	17.9
MW-302-CMT-50	Onsite	10-55	10/14/2013	17.9
MW-302-CMT-50	Onsite	10-55	03/12/2014	17.3
MW-302-CMT-50	Onsite	10-55	04/15/2014	16.5
MW-302-CMT-50	Onsite	10-55	07/16/2014	14.7
MW-302-CMT-50	Onsite	10-55	10/20/2014	<5.00
MW-302-CMT-50	Onsite	10-55	02/19/2015	3.17J
MW-302-CMT-50	Onsite	10-55	04/16/2015	<5.10
MW-302-CMT-50	Onsite	10-55	07/21/2015	<5.00
MW-302-CMT-50	Onsite	10-55	07/14/2016	<5.10
MW-302-CMT-50	Onsite	10-55	07/31/2017	4.46J
MW-302-CMT-50	Onsite	10-55	10/17/2017	4.70J
MW-302-CMT-50	Onsite	10-55	02/12/2018	6.71J
MW-302-CMT-50	Onsite	10-55	04/05/2018	6.31J
MW-302-70	Onsite	55-90	11/10/2011	28.7
MW-302-70	Onsite	55-90	03/26/2012	32.7
MW-302-70	Onsite	55-90	06/06/2012	31.0
MW-302-70	Onsite	55-90	08/15/2012	27.4
MW-302-70	Onsite	55-90	01/22/2013	21.6
MW-302-70	Onsite	55-90	04/17/2013	17.1
MW-302-70	Onsite	55-90	08/28/2013	17.2
MW-302-70	Onsite	55-90	10/14/2013	16.4
MW-302-70	Onsite	55-90	03/13/2014	16.9
MW-302-70	Onsite	55-90	04/16/2014	16.1
MW-302-70	Onsite	55-90	07/22/2014	15.7
MW-302-70	Onsite	55-90	10/16/2014	7.15J
MW-302-70	Onsite	55-90	02/18/2015	4.15J

Appendix A-3
Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-302-70	Onsite	55-90	04/16/2015	<5.00
MW-302-70	Onsite	55-90	07/21/2015	<5.10
MW-302-70	Onsite	55-90	07/14/2016	<5.05
MW-302-70	Onsite	55-90	02/14/2017	4.50J
MW-302-80	Onsite	55-90	11/10/2011	3.39J
MW-302-80	Onsite	55-90	03/26/2012	27.6
MW-302-80	Onsite	55-90	06/06/2012	26.1
MW-302-80	Onsite	55-90	08/15/2012	23.8
MW-302-80	Onsite	55-90	01/21/2013	18.0
MW-302-80	Onsite	55-90	04/17/2013	14.9
MW-302-80	Onsite	55-90	08/28/2013	16.6
MW-302-80	Onsite	55-90	10/14/2013	14.7
MW-302-80	Onsite	55-90	03/13/2014	14.3
MW-302-80	Onsite	55-90	04/16/2014	12.3
MW-302-80	Onsite	55-90	07/21/2014	18.4
MW-302-80	Onsite	55-90	10/16/2014	7.23J
MW-302-80	Onsite	55-90	02/18/2015	3.94J
MW-302-80	Onsite	55-90	04/16/2015	<5.15
MW-302-80	Onsite	55-90	07/21/2015	<5.15
MW-302-80	Onsite	55-90	07/14/2016	<5.15
MW-302-80	Onsite	55-90	08/01/2017	3.86J
MW-302-80	Onsite	55-90	10/16/2017	3.20J
MW-302-80	Onsite	55-90	02/13/2018	3.40J
MW-302-80	Onsite	55-90	04/05/2018	3.43J
MW-302-95	Onsite	55-90	06/07/2012	<6.26
MW-302-95	Onsite	55-90	08/15/2012	<6.20
MW-302-95	Onsite	55-90	01/21/2013	<6.46
MW-302-95	Onsite	55-90	04/17/2013	<6.20
MW-302-95	Onsite	55-90	08/28/2013	<6.32
MW-302-95	Onsite	55-90	10/14/2013	<6.20
MW-302-95	Onsite	55-90	03/13/2014	<5.00
MW-302-95	Onsite	55-90	04/16/2014	<5.20
MW-302-95	Onsite	55-90	07/21/2014	<5.00
MW-302-95	Onsite	55-90	10/16/2014	<5.00
MW-302-95	Onsite	55-90	07/21/2015	<5.00
MW-302-95	Onsite	55-90	07/14/2016	<5.25
MW-302-110	Onsite	90-160	11/10/2011	<6.20
MW-302-110	Onsite	90-160	03/26/2012	<6.20
MW-302-110	Onsite	90-160	06/06/2012	<6.52
MW-302-110	Onsite	90-160	08/15/2012	<6.20
MW-302-110	Onsite	90-160	01/21/2013	<6.32
MW-302-110	Onsite	90-160	03/22/2013	<6.40
MW-302-110	Onsite	90-160	08/28/2013	<6.20
MW-302-110	Onsite	90-160	10/14/2013	<6.20
MW-302-110	Onsite	90-160	03/13/2014	<5.00
MW-302-110	Onsite	90-160	07/23/2014	<5.00
MW-302-110	Onsite	90-160	07/21/2015	<5.00
MW-302-110	Onsite	90-160	07/14/2016	<5.05
MW-303-CMT-9	Onsite	Water Table	11/11/2011	4.22J
MW-303-CMT-9	Onsite	Water Table	03/27/2012	5.25J
MW-303-CMT-9	Onsite	Water Table	06/07/2012	<6.32
MW-303-CMT-9	Onsite	Water Table	08/15/2012	<6.20

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-303-CMT-9	Onsite	Water Table	12/09/2012	6.07J
MW-303-CMT-9	Onsite	Water Table	01/21/2013	9.56J
MW-303-CMT-9	Onsite	Water Table	04/18/2013	6.77J
MW-303-CMT-9	Onsite	Water Table	08/08/2013	6.87J
MW-303-CMT-9	Onsite	Water Table	10/15/2013	<6.32
MW-303-CMT-9	Onsite	Water Table	03/13/2014	<5.00
MW-303-CMT-9	Onsite	Water Table	04/15/2014	<5.15
MW-303-CMT-9	Onsite	Water Table	07/16/2014	<5.20
MW-303-CMT-9	Onsite	Water Table	10/18/2014	<5.40
MW-303-CMT-9	Onsite	Water Table	02/19/2015	<5.00
MW-303-CMT-9	Onsite	Water Table	04/16/2015	<5.10
MW-303-CMT-9	Onsite	Water Table	07/29/2015	<5.10
MW-303-CMT-9	Onsite	Water Table	07/14/2016	<5.00
MW-303-CMT-19	Onsite	Water Table	11/11/2011	123
MW-303-CMT-19	Onsite	Water Table	03/27/2012	94.6
MW-303-CMT-19	Onsite	Water Table	06/07/2012	97.8
MW-303-CMT-19	Onsite	Water Table	08/15/2012	56.7
MW-303-CMT-19	Onsite	Water Table	12/09/2012	61.2
MW-303-CMT-19	Onsite	Water Table	01/21/2013	69.9
MW-303-CMT-19	Onsite	Water Table	04/18/2013	61.6
MW-303-CMT-19	Onsite	Water Table	08/08/2013	59.2
MW-303-CMT-19	Onsite	Water Table	10/15/2013	44.4
MW-303-CMT-19	Onsite	Water Table	03/13/2014	54.2
MW-303-CMT-19	Onsite	Water Table	04/15/2014	48.9
MW-303-CMT-19	Onsite	Water Table	07/16/2014	32.0
MW-303-CMT-19	Onsite	Water Table	10/18/2014	25.1
MW-303-CMT-19	Onsite	Water Table	02/19/2015	19.7
MW-303-CMT-19	Onsite	Water Table	04/16/2015	18.8
MW-303-CMT-19	Onsite	Water Table	07/29/2015	12.8
MW-303-CMT-19	Onsite	Water Table	10/20/2015	10.4
MW-303-CMT-19	Onsite	Water Table	02/16/2016	11.1J
MW-303-CMT-19	Onsite	Water Table	07/14/2016	9.40J
MW-303-CMT-19	Onsite	Water Table	02/17/2017	8.40J
MW-303-CMT-19	Onsite	Water Table	07/28/2017	9.82J
MW-303-CMT-19	Onsite	Water Table	10/17/2017	10.8
MW-303-CMT-19	Onsite	Water Table	02/12/2018	31.9
MW-303-CMT-19	Onsite	Water Table	04/05/2018	47.1
MW-303-CMT-19	Onsite	Water Table	07/11/2018	90.6
MW-303-CMT-29	Onsite	10-55	11/11/2011	88.5
MW-303-CMT-29	Onsite	10-55	03/27/2012	57.9
MW-303-CMT-29	Onsite	10-55	06/07/2012	54.3
MW-303-CMT-29	Onsite	10-55	08/15/2012	61.5
MW-303-CMT-29	Onsite	10-55	01/21/2013	37.6
MW-303-CMT-29	Onsite	10-55	04/18/2013	33.6
MW-303-CMT-29	Onsite	10-55	08/08/2013	29.3
MW-303-CMT-29	Onsite	10-55	10/15/2013	51.2
MW-303-CMT-29	Onsite	10-55	03/13/2014	20.2
MW-303-CMT-29	Onsite	10-55	04/15/2014	18.6
MW-303-CMT-29	Onsite	10-55	07/16/2014	31.7J*
MW-303-CMT-29	Onsite	10-55	10/18/2014	24.7
MW-303-CMT-29	Onsite	10-55	02/19/2015	9.56J
MW-303-CMT-29	Onsite	10-55	04/16/2015	8.96J

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-303-CMT-29	Onsite	10-55	07/29/2015	8.46J*
MW-303-CMT-29	Onsite	10-55	02/16/2016	9.42J
MW-303-CMT-29	Onsite	10-55	07/14/2016	6.11J
MW-303-CMT-29	Onsite	10-55	02/17/2017	5.68J
MW-303-CMT-39	Onsite	10-55	11/11/2011	47.5
MW-303-CMT-39	Onsite	10-55	03/27/2012	28.6
MW-303-CMT-39	Onsite	10-55	06/07/2012	27.8
MW-303-CMT-39	Onsite	10-55	08/15/2012	22.1
MW-303-CMT-39	Onsite	10-55	12/09/2012	35.2
MW-303-CMT-39	Onsite	10-55	01/21/2013	21.9
MW-303-CMT-39	Onsite	10-55	04/18/2013	19.0
MW-303-CMT-39	Onsite	10-55	08/08/2013	14.8
MW-303-CMT-39	Onsite	10-55	10/15/2013	13.4
MW-303-CMT-39	Onsite	10-55	03/13/2014	9.42J
MW-303-CMT-39	Onsite	10-55	04/15/2014	8.74J
MW-303-CMT-39	Onsite	10-55	07/16/2014	7.89J
MW-303-CMT-39	Onsite	10-55	10/18/2014	6.16J
MW-303-CMT-39	Onsite	10-55	02/19/2015	5.67J
MW-303-CMT-39	Onsite	10-55	04/16/2015	4.76J
MW-303-CMT-39	Onsite	10-55	07/29/2015	3.85J
MW-303-CMT-39	Onsite	10-55	02/12/2016	5.32J
MW-303-CMT-39	Onsite	10-55	07/14/2016	3.49J
MW-303-CMT-39	Onsite	10-55	02/17/2017	5.14J*
MW-303-CMT-39	Onsite	10-55	07/28/2017	4.25J
MW-303-CMT-39	Onsite	10-55	10/17/2017	9.67J
MW-303-CMT-39	Onsite	10-55	02/12/2018	64.8
MW-303-CMT-39	Onsite	10-55	04/05/2018	79.1
MW-303-CMT-39	Onsite	10-55	08/02/2018	102
MW-303-CMT-49	Onsite	10-55	11/11/2011	29.3
MW-303-CMT-49	Onsite	10-55	03/27/2012	20.8
MW-303-CMT-49	Onsite	10-55	06/07/2012	18.7
MW-303-CMT-49	Onsite	10-55	08/15/2012	20.9
MW-303-CMT-49	Onsite	10-55	01/21/2013	17.1
MW-303-CMT-49	Onsite	10-55	04/18/2013	12.4
MW-303-CMT-49	Onsite	10-55	08/08/2013	13.3
MW-303-CMT-49	Onsite	10-55	10/15/2013	11.8
MW-303-CMT-49	Onsite	10-55	03/13/2014	7.97J
MW-303-CMT-49	Onsite	10-55	04/15/2014	7.98J
MW-303-CMT-49	Onsite	10-55	07/16/2014	8.25J
MW-303-CMT-49	Onsite	10-55	10/18/2014	4.49J
MW-303-CMT-49	Onsite	10-55	02/19/2015	3.36J
MW-303-CMT-49	Onsite	10-55	04/16/2015	<5.00
MW-303-CMT-49	Onsite	10-55	07/29/2015	3.34J
MW-303-CMT-49	Onsite	10-55	02/16/2016	<6.30
MW-303-CMT-49	Onsite	10-55	07/14/2016	<5.05
MW-303-CMT-59	Onsite	10-55	11/11/2011	26.8
MW-303-CMT-59	Onsite	10-55	03/27/2012	17.0
MW-303-CMT-59	Onsite	10-55	06/07/2012	16.3
MW-303-CMT-59	Onsite	10-55	08/15/2012	15.1
MW-303-CMT-59	Onsite	10-55	01/21/2013	12.2
MW-303-CMT-59	Onsite	10-55	04/18/2013	10.1
MW-303-CMT-59	Onsite	10-55	08/08/2013	8.87J

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-303-CMT-59	Onsite	10-55	10/15/2013	9.56J
MW-303-CMT-59	Onsite	10-55	03/13/2014	5.91J
MW-303-CMT-59	Onsite	10-55	04/15/2014	5.58J
MW-303-CMT-59	Onsite	10-55	07/16/2014	5.99J
MW-303-CMT-59	Onsite	10-55	10/18/2014	4.06J
MW-303-CMT-59	Onsite	10-55	02/19/2015	<5.00
MW-303-CMT-59	Onsite	10-55	07/29/2015	<5.00
MW-303-CMT-59	Onsite	10-55	07/14/2016	<5.10
MW-303-CMT-59	Onsite	10-55	07/28/2017	<5.45
MW-303-CMT-59	Onsite	10-55	10/17/2017	9.38J
MW-303-CMT-59	Onsite	10-55	02/12/2018	38.7
MW-303-CMT-59	Onsite	10-55	04/05/2018	39.9
MW-303-CMT-59	Onsite	10-55	07/11/2018	49.5
MW-303-70	Onsite	55-90	11/11/2011	19.3
MW-303-70	Onsite	55-90	03/27/2012	14.8
MW-303-70	Onsite	55-90	06/07/2012	10.7J
MW-303-70	Onsite	55-90	08/15/2012	9.79J
MW-303-70	Onsite	55-90	01/21/2013	6.64J
MW-303-70	Onsite	55-90	04/18/2013	6.78J
MW-303-70	Onsite	55-90	08/08/2013	5.70J
MW-303-70	Onsite	55-90	10/15/2013	5.95J
MW-303-70	Onsite	55-90	03/13/2014	4.62J
MW-303-70	Onsite	55-90	04/15/2014	4.23J
MW-303-70	Onsite	55-90	07/22/2014	3.89J
MW-303-70	Onsite	55-90	10/15/2014	3.19J
MW-303-70	Onsite	55-90	02/19/2015	<5.00
MW-303-70	Onsite	55-90	07/22/2015	<5.00
MW-303-70	Onsite	55-90	07/18/2016	<5.25
MW-303-80	Onsite	55-90	11/11/2011	10.2
MW-303-80	Onsite	55-90	03/27/2012	5.38J
MW-303-80	Onsite	55-90	06/07/2012	3.61J
MW-303-80	Onsite	55-90	08/15/2012	<6.20
MW-303-80	Onsite	55-90	01/21/2013	<6.20
MW-303-80	Onsite	55-90	04/18/2013	<6.20
MW-303-80	Onsite	55-90	08/08/2013	<6.20
MW-303-80	Onsite	55-90	10/15/2013	<6.20
MW-303-80	Onsite	55-90	03/13/2014	<5.00
MW-303-80	Onsite	55-90	04/15/2014	<5.30
MW-303-80	Onsite	55-90	07/22/2014	<5.00
MW-303-80	Onsite	55-90	10/15/2014	<5.00
MW-303-80	Onsite	55-90	02/19/2015	<5.00
MW-303-80	Onsite	55-90	07/22/2015	<5.00
MW-303-80	Onsite	55-90	07/18/2016	<5.30
MW-303-80	Onsite	55-90	08/01/2017	<5.05
MW-303-80	Onsite	55-90	10/16/2017	<5.10
MW-303-80	Onsite	55-90	02/15/2018	<5.35
MW-303-80	Onsite	55-90	04/05/2018	<5.25
MW-303-95	Onsite	55-90	06/07/2012	<6.20
MW-303-95	Onsite	55-90	08/15/2012	<6.20
MW-303-95	Onsite	55-90	01/21/2013	<6.20
MW-303-95	Onsite	55-90	04/18/2013	<6.20
MW-303-95	Onsite	55-90	08/08/2013	<6.20

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-303-95	Onsite	55-90	10/15/2013	<6.20
MW-303-95	Onsite	55-90	03/13/2014	<5.00
MW-303-95	Onsite	55-90	04/15/2014	<5.20
MW-303-95	Onsite	55-90	07/22/2014	<5.00
MW-303-95	Onsite	55-90	10/15/2014	<5.00
MW-303-95	Onsite	55-90	07/22/2015	<5.00J*
MW-303-95	Onsite	55-90	07/18/2016	<5.25
MW-303-130	Onsite	90-160	11/11/2011	<6.20
MW-303-130	Onsite	90-160	03/27/2012	<6.20
MW-303-130	Onsite	90-160	06/07/2012	<6.88
MW-303-130	Onsite	90-160	08/16/2012	<6.20
MW-303-130	Onsite	90-160	01/21/2013	<7.04
MW-303-130	Onsite	90-160	03/22/2013	<6.46
MW-303-130	Onsite	90-160	07/25/2013	<6.64
MW-303-130	Onsite	90-160	10/15/2013	<6.20
MW-303-130	Onsite	90-160	03/13/2014	<5.00
MW-303-130	Onsite	90-160	07/22/2014	<5.00
MW-303-130	Onsite	90-160	07/24/2015	<5.00
MW-303-130	Onsite	90-160	07/18/2016	<5.15
MW-304-CMT-10	Onsite	Water Table	08/14/2012	<6.66
MW-304-CMT-10	Onsite	Water Table	07/11/2013	<6.88
MW-304-CMT-10	Onsite	Water Table	07/29/2014	5.04J
MW-304-CMT-10	Onsite	Water Table	08/01/2015	36.9
MW-304-CMT-10	Onsite	Water Table	07/21/2016	27.0
MW-304-15	Onsite	Water Table	04/27/2012	412
MW-304-15	Onsite	Water Table	08/14/2012	284
MW-304-15	Onsite	Water Table	12/10/2012	299
MW-304-15	Onsite	Water Table	01/14/2013	337
MW-304-15	Onsite	Water Table	06/10/2013	248
MW-304-15	Onsite	Water Table	07/30/2013	296
MW-304-15	Onsite	Water Table	11/18/2013	352
MW-304-15	Onsite	Water Table	03/13/2014	316
MW-304-15	Onsite	Water Table	05/14/2014	232
MW-304-15	Onsite	Water Table	07/24/2014	99.1J*
MW-304-15	Onsite	Water Table	10/25/2014	120
MW-304-15	Onsite	Water Table	02/26/2015	113
MW-304-15	Onsite	Water Table	04/22/2015	74.3
MW-304-15	Onsite	Water Table	07/28/2015	40.6
MW-304-15	Onsite	Water Table	10/16/2015	18.1
MW-304-15	Onsite	Water Table	02/08/2016	31.5
MW-304-15	Onsite	Water Table	04/06/2016	19.4
MW-304-15	Onsite	Water Table	07/22/2016	10.9
MW-304-15	Onsite	Water Table	10/14/2016	12.0
MW-304-15	Onsite	Water Table	02/13/2017	12.8
MW-304-15	Onsite	Water Table	04/10/2017	8.09J
MW-304-CMT-20	Onsite	Water Table	11/03/2011	262
MW-304-CMT-20	Onsite	Water Table	03/30/2012	300
MW-304-CMT-20	Onsite	Water Table	06/07/2012	295
MW-304-CMT-20	Onsite	Water Table	08/14/2012	208
MW-304-CMT-20	Onsite	Water Table	12/10/2012	5.00J
MW-304-CMT-20	Onsite	Water Table	01/31/2013	3.45J
MW-304-CMT-20	Onsite	Water Table	04/17/2013	6.53J

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-304-CMT-20	Onsite	Water Table	07/11/2013	<6.20
MW-304-CMT-20	Onsite	Water Table	11/19/2013	46.4
MW-304-CMT-20	Onsite	Water Table	03/12/2014	182
MW-304-CMT-20	Onsite	Water Table	04/16/2014	87.6
MW-304-CMT-20	Onsite	Water Table	07/29/2014	12.6
MW-304-CMT-20	Onsite	Water Table	10/28/2014	144
MW-304-CMT-20	Onsite	Water Table	02/26/2015	100
MW-304-CMT-20	Onsite	Water Table	04/19/2015	104
MW-304-CMT-20	Onsite	Water Table	08/01/2015	117
MW-304-CMT-20	Onsite	Water Table	10/02/2015	76.8
MW-304-CMT-20	Onsite	Water Table	02/08/2016	67.1
MW-304-CMT-20	Onsite	Water Table	04/11/2016	45.8
MW-304-CMT-20	Onsite	Water Table	07/21/2016	34.0
MW-304-CMT-20	Onsite	Water Table	10/19/2016	44.4
MW-304-CMT-20	Onsite	Water Table	02/16/2017	22.0
MW-304-CMT-20	Onsite	Water Table	04/11/2017	12.5
MW-304-CMT-20	Onsite	Water Table	07/28/2017	10.5
MW-304-CMT-20	Onsite	Water Table	10/17/2017	8.34J
MW-304-CMT-20	Onsite	Water Table	02/12/2018	6.76J
MW-304-CMT-20	Onsite	Water Table	04/11/2018	4.29J
MW-304-CMT-20	Onsite	Water Table	07/13/2018	4.88J
MW-304-CMT-30	Onsite	10-55	11/03/2011	215JL *
MW-304-CMT-30	Onsite	10-55	03/30/2012	155
MW-304-CMT-30	Onsite	10-55	06/07/2012	118
MW-304-CMT-30	Onsite	10-55	08/14/2012	104
MW-304-CMT-30	Onsite	10-55	12/14/2012	79.5
MW-304-CMT-30	Onsite	10-55	01/31/2013	81.9
MW-304-CMT-30	Onsite	10-55	04/17/2013	63.4
MW-304-CMT-30	Onsite	10-55	07/11/2013	63.1
MW-304-CMT-30	Onsite	10-55	11/19/2013	41.6
MW-304-CMT-30	Onsite	10-55	03/12/2014	33.0
MW-304-CMT-30	Onsite	10-55	04/16/2014	29.3
MW-304-CMT-30	Onsite	10-55	07/29/2014	24.4
MW-304-CMT-30	Onsite	10-55	10/28/2014	17.4
MW-304-CMT-30	Onsite	10-55	02/26/2015	8.52J
MW-304-CMT-30	Onsite	10-55	04/19/2015	5.84J
MW-304-CMT-30	Onsite	10-55	08/01/2015	5.29J
MW-304-CMT-30	Onsite	10-55	02/08/2016	4.69J
MW-304-CMT-30	Onsite	10-55	07/21/2016	<5.15
MW-304-CMT-30	Onsite	10-55	02/16/2017	<6.00
MW-304-CMT-40	Onsite	10-55	11/03/2011	172
MW-304-CMT-40	Onsite	10-55	03/30/2012	113
MW-304-CMT-40	Onsite	10-55	06/07/2012	81.2
MW-304-CMT-40	Onsite	10-55	08/14/2012	78.7
MW-304-CMT-40	Onsite	10-55	01/31/2013	67.1
MW-304-CMT-40	Onsite	10-55	04/17/2013	52.0JL *
MW-304-CMT-40	Onsite	10-55	07/11/2013	49.2
MW-304-CMT-40	Onsite	10-55	11/19/2013	25.4
MW-304-CMT-40	Onsite	10-55	03/12/2014	18.3
MW-304-CMT-40	Onsite	10-55	04/16/2014	15.1
MW-304-CMT-40	Onsite	10-55	07/29/2014	10.4J
MW-304-CMT-40	Onsite	10-55	10/28/2014	8.36J

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-304-CMT-40	Onsite	10-55	02/26/2015	3.74J
MW-304-CMT-40	Onsite	10-55	04/19/2015	<5.15
MW-304-CMT-40	Onsite	10-55	08/01/2015	<5.00
MW-304-CMT-40	Onsite	10-55	07/21/2016	<5.15
MW-304-CMT-40	Onsite	10-55	07/28/2017	<5.40
MW-304-CMT-40	Onsite	10-55	10/17/2017	<5.15
MW-304-CMT-40	Onsite	10-55	02/13/2018	22.4
MW-304-CMT-40	Onsite	10-55	04/11/2018	33.0
MW-304-CMT-40	Onsite	10-55	07/17/2018	41.3
MW-304-CMT-50	Onsite	10-55	11/03/2011	24.2
MW-304-CMT-50	Onsite	10-55	03/30/2012	10.7
MW-304-CMT-50	Onsite	10-55	06/07/2012	5.11J
MW-304-CMT-50	Onsite	10-55	08/14/2012	12.3
MW-304-CMT-50	Onsite	10-55	12/14/2012	11.4
MW-304-CMT-50	Onsite	10-55	01/31/2013	10.8
MW-304-CMT-50	Onsite	10-55	04/17/2013	7.57J
MW-304-CMT-50	Onsite	10-55	07/11/2013	10.2
MW-304-CMT-50	Onsite	10-55	11/19/2013	<5.00
MW-304-CMT-50	Onsite	10-55	03/12/2014	<5.00
MW-304-CMT-50	Onsite	10-55	04/16/2014	<5.20
MW-304-CMT-50	Onsite	10-55	07/29/2014	<5.20
MW-304-CMT-50	Onsite	10-55	10/28/2014	<5.00
MW-304-CMT-50	Onsite	10-55	02/26/2015	<5.10
MW-304-CMT-50	Onsite	10-55	04/19/2015	<5.00
MW-304-CMT-50	Onsite	10-55	08/01/2015	<5.00
MW-304-CMT-50	Onsite	10-55	07/21/2016	<5.20
MW-304-CMT-60	Onsite	10-55	11/03/2011	12.8
MW-304-CMT-60	Onsite	10-55	03/30/2012	4.67J
MW-304-CMT-60	Onsite	10-55	06/07/2012	<6.52
MW-304-CMT-60	Onsite	10-55	08/14/2012	5.77J
MW-304-CMT-60	Onsite	10-55	12/14/2012	6.45J
MW-304-CMT-60	Onsite	10-55	01/31/2013	5.43J
MW-304-CMT-60	Onsite	10-55	04/17/2013	4.07J
MW-304-CMT-60	Onsite	10-55	07/11/2013	4.47J
MW-304-CMT-60	Onsite	10-55	11/19/2013	<5.10
MW-304-CMT-60	Onsite	10-55	03/12/2014	<5.00
MW-304-CMT-60	Onsite	10-55	04/16/2014	<5.15
MW-304-CMT-60	Onsite	10-55	07/29/2014	<5.45
MW-304-CMT-60	Onsite	10-55	10/28/2014	<5.00
MW-304-CMT-60	Onsite	10-55	02/26/2015	<5.15
MW-304-CMT-60	Onsite	10-55	08/01/2015	<5.00
MW-304-CMT-60	Onsite	10-55	07/21/2016	<5.10
MW-304-CMT-60	Onsite	10-55	07/28/2017	<5.45
MW-304-CMT-60	Onsite	10-55	10/17/2017	<5.15
MW-304-CMT-60	Onsite	10-55	02/13/2018	4.02J
MW-304-CMT-60	Onsite	10-55	04/11/2018	5.91J
MW-304-CMT-60	Onsite	10-55	07/17/2018	7.47J
MW-304-70	Onsite	55-90	10/25/2011	22.3
MW-304-70	Onsite	55-90	03/30/2012	7.98J
MW-304-70	Onsite	55-90	06/07/2012	3.71J
MW-304-70	Onsite	55-90	08/14/2012	3.89J
MW-304-70	Onsite	55-90	12/14/2012	4.79J

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-304-70	Onsite	55-90	01/22/2013	4.47J
MW-304-70	Onsite	55-90	04/16/2013	4.13J
MW-304-70	Onsite	55-90	07/30/2013	<6.20
MW-304-70	Onsite	55-90	11/18/2013	<5.00
MW-304-70	Onsite	55-90	03/14/2014	<5.15
MW-304-70	Onsite	55-90	04/16/2014	<5.15
MW-304-70	Onsite	55-90	07/24/2014	<5.00
MW-304-70	Onsite	55-90	10/25/2014	<5.00
MW-304-70	Onsite	55-90	02/26/2015	<5.20
MW-304-70	Onsite	55-90	07/28/2015	<5.00
MW-304-70	Onsite	55-90	07/27/2016	<5.00
MW-304-80	Onsite	55-90	11/12/2011	6.65J
MW-304-80	Onsite	55-90	03/30/2012	<6.20
MW-304-80	Onsite	55-90	06/07/2012	<6.66
MW-304-80	Onsite	55-90	08/14/2012	<6.20
MW-304-80	Onsite	55-90	12/14/2012	4.66J
MW-304-80	Onsite	55-90	01/14/2013	4.68J
MW-304-80	Onsite	55-90	04/16/2013	3.28J
MW-304-80	Onsite	55-90	08/28/2013	3.53J
MW-304-80	Onsite	55-90	10/15/2013	<6.20
MW-304-80	Onsite	55-90	03/14/2014	<5.00
MW-304-80	Onsite	55-90	04/16/2014	<5.20
MW-304-80	Onsite	55-90	07/24/2014	<5.00J*
MW-304-80	Onsite	55-90	10/25/2014	<5.25
MW-304-80	Onsite	55-90	02/26/2015	<5.00
MW-304-80	Onsite	55-90	07/28/2015	<5.15
MW-304-80	Onsite	55-90	07/22/2016	<5.15
MW-304-80	Onsite	55-90	07/25/2017	<5.20J*
MW-304-80	Onsite	55-90	10/16/2017	<5.10
MW-304-80	Onsite	55-90	02/13/2018	5.00J
MW-304-80	Onsite	55-90	04/06/2018	5.67J
MW-304-96	Onsite	55-90	04/24/2012	4.46J
MW-304-96	Onsite	55-90	08/14/2012	4.03J
MW-304-96	Onsite	55-90	12/14/2012	4.65J
MW-304-96	Onsite	55-90	01/14/2013	5.05J
MW-304-96	Onsite	55-90	04/16/2013	4.24J
MW-304-96	Onsite	55-90	07/30/2013	3.21J
MW-304-96	Onsite	55-90	10/15/2013	<6.20
MW-304-96	Onsite	55-90	03/14/2014	<5.00
MW-304-96	Onsite	55-90	04/16/2014	<5.00
MW-304-96	Onsite	55-90	07/24/2014	<5.15
MW-304-96	Onsite	55-90	10/25/2014	<5.35
MW-304-96	Onsite	55-90	02/26/2015	<5.00
MW-304-96	Onsite	55-90	07/28/2015	<5.00
MW-304-96	Onsite	55-90	07/27/2016	<5.10
MW-304-125	Onsite	90-160	10/25/2011	<6.20
MW-304-125	Onsite	90-160	03/30/2012	<6.20
MW-304-125	Onsite	90-160	06/07/2012	<6.66
MW-304-125	Onsite	90-160	08/16/2012	<6.20
MW-304-125	Onsite	90-160	01/14/2013	<6.74
MW-304-125	Onsite	90-160	04/16/2013	<6.20
MW-304-125	Onsite	90-160	07/30/2013	<6.32

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-304-125	Onsite	90-160	10/16/2013	<6.32
MW-304-125	Onsite	90-160	03/14/2014	<5.00
MW-304-125	Onsite	90-160	07/24/2014	<5.25
MW-304-125	Onsite	90-160	07/28/2015	<5.15
MW-304-125	Onsite	90-160	07/22/2016	<5.10
MW-304-150	Onsite	90-160	02/22/2012	<7.30
MW-304-150	Onsite	90-160	06/14/2012	<6.52
MW-304-150	Onsite	90-160	08/16/2012	<6.20
MW-304-150	Onsite	90-160	01/22/2013	<6.52
MW-304-150	Onsite	90-160	04/16/2013	<6.20
MW-304-150	Onsite	90-160	07/30/2013	<6.20
MW-304-150	Onsite	90-160	11/18/2013	<5.00
MW-304-150	Onsite	90-160	07/25/2014	<5.00
MW-304-150	Onsite	90-160	07/28/2015	<5.00
MW-304-150	Onsite	90-160	07/27/2016	<5.05
MW-305-CMT-8	Onsite	Water Table	07/17/2014	<5.25
MW-305-CMT-18	Onsite	Water Table	11/08/2011	23.5
MW-305-CMT-18	Onsite	Water Table	03/31/2012	28.2
MW-305-CMT-18	Onsite	Water Table	06/05/2012	23.7
MW-305-CMT-18	Onsite	Water Table	08/13/2012	21.4
MW-305-CMT-18	Onsite	Water Table	12/10/2012	10.0J
MW-305-CMT-18	Onsite	Water Table	01/17/2013	8.98J
MW-305-CMT-18	Onsite	Water Table	04/19/2013	5.80JL*
MW-305-CMT-18	Onsite	Water Table	07/11/2013	5.09J
MW-305-CMT-18	Onsite	Water Table	11/18/2013	3.80J
MW-305-CMT-18	Onsite	Water Table	03/13/2014	3.87J
MW-305-CMT-18	Onsite	Water Table	04/16/2014	<5.30
MW-305-CMT-18	Onsite	Water Table	07/17/2014	<5.80
MW-305-CMT-18	Onsite	Water Table	10/20/2014	<5.00
MW-305-CMT-18	Onsite	Water Table	02/26/2015	<5.15
MW-305-CMT-18	Onsite	Water Table	04/19/2015	<5.15
MW-305-CMT-18	Onsite	Water Table	07/30/2015	<5.00
MW-305-CMT-18	Onsite	Water Table	07/22/2016	<5.80
MW-305-CMT-28	Onsite	10-55	11/08/2011	53.8
MW-305-CMT-28	Onsite	10-55	03/31/2012	23.8
MW-305-CMT-28	Onsite	10-55	06/05/2012	23.5
MW-305-CMT-28	Onsite	10-55	08/13/2012	14.1
MW-305-CMT-28	Onsite	10-55	01/17/2013	14.0
MW-305-CMT-28	Onsite	10-55	04/19/2013	11.2
MW-305-CMT-28	Onsite	10-55	07/11/2013	13.2
MW-305-CMT-28	Onsite	10-55	11/18/2013	6.71J
MW-305-CMT-28	Onsite	10-55	03/13/2014	4.11J
MW-305-CMT-28	Onsite	10-55	04/16/2014	3.68J
MW-305-CMT-28	Onsite	10-55	07/17/2014	4.60J
MW-305-CMT-28	Onsite	10-55	10/20/2014	<5.00
MW-305-CMT-28	Onsite	10-55	02/26/2015	<5.20
MW-305-CMT-28	Onsite	10-55	07/30/2015	<5.00
MW-305-CMT-28	Onsite	10-55	07/22/2016	<5.70
MW-305-CMT-28	Onsite	10-55	07/27/2017	<5.25
MW-305-CMT-28	Onsite	10-55	10/17/2017	<5.10
MW-305-CMT-28	Onsite	10-55	01/18/2018	7.08
MW-305-CMT-28	Onsite	10-55	04/11/2018	8.23J

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-305-CMT-28	Onsite	10-55	07/18/2018	10.4
MW-305-CMT-38	Onsite	10-55	11/08/2011	10.9
MW-305-CMT-38	Onsite	10-55	03/31/2012	<7.12
MW-305-CMT-38	Onsite	10-55	06/05/2012	<6.52
MW-305-CMT-38	Onsite	10-55	08/13/2012	<6.20
MW-305-CMT-38	Onsite	10-55	12/10/2012	<6.52
MW-305-CMT-38	Onsite	10-55	01/17/2013	<6.40
MW-305-CMT-38	Onsite	10-55	04/19/2013	<6.40
MW-305-CMT-38	Onsite	10-55	07/11/2013	<6.88
MW-305-CMT-38	Onsite	10-55	11/18/2013	<5.10
MW-305-CMT-38	Onsite	10-55	03/13/2014	<5.00
MW-305-CMT-38	Onsite	10-55	04/16/2014	<5.00
MW-305-CMT-38	Onsite	10-55	07/17/2014	<5.20
MW-305-CMT-38	Onsite	10-55	10/20/2014	<5.00
MW-305-CMT-38	Onsite	10-55	07/30/2015	<5.15
MW-305-CMT-38	Onsite	10-55	07/27/2016	<5.70
MW-305-CMT-48	Onsite	10-55	11/08/2011	7.67J
MW-305-CMT-48	Onsite	10-55	03/31/2012	<6.20
MW-305-CMT-48	Onsite	10-55	06/05/2012	<6.46
MW-305-CMT-48	Onsite	10-55	08/13/2012	<6.20
MW-305-CMT-48	Onsite	10-55	01/17/2013	<6.52
MW-305-CMT-48	Onsite	10-55	04/19/2013	<6.46
MW-305-CMT-48	Onsite	10-55	07/11/2013	<6.20
MW-305-CMT-48	Onsite	10-55	11/18/2013	<5.00
MW-305-CMT-48	Onsite	10-55	03/13/2014	<5.00
MW-305-CMT-48	Onsite	10-55	07/17/2014	<5.00
MW-305-CMT-48	Onsite	10-55	07/30/2015	<5.10
MW-305-CMT-48	Onsite	10-55	07/27/2016	<5.60
MW-305-CMT-48	Onsite	10-55	07/27/2017	<5.30
MW-305-CMT-48	Onsite	10-55	10/17/2017	<5.05
MW-305-CMT-48	Onsite	10-55	01/18/2018	<5.30
MW-305-CMT-48	Onsite	10-55	04/11/2018	<5.40
MW-305-CMT-58	Onsite	10-55	11/08/2011	4.96J
MW-305-CMT-58	Onsite	10-55	03/31/2012	<6.20
MW-305-CMT-58	Onsite	10-55	06/05/2012	<6.74
MW-305-CMT-58	Onsite	10-55	08/13/2012	<6.20
MW-305-CMT-58	Onsite	10-55	01/17/2013	<6.40
MW-305-CMT-58	Onsite	10-55	04/19/2013	<6.52
MW-305-CMT-58	Onsite	10-55	07/11/2013	<6.74
MW-305-CMT-58	Onsite	10-55	11/18/2013	<5.00
MW-305-CMT-58	Onsite	10-55	03/13/2014	<5.00
MW-305-CMT-58	Onsite	10-55	07/17/2014	<5.30
MW-305-CMT-58	Onsite	10-55	07/30/2015	<5.10
MW-305-CMT-58	Onsite	10-55	07/27/2016	<5.15
MW-305-70	Onsite	55-90	10/25/2011	<6.20
MW-305-70	Onsite	55-90	04/02/2012	<6.52
MW-305-70	Onsite	55-90	06/05/2012	<6.74
MW-305-70	Onsite	55-90	08/13/2012	<6.20
MW-305-70	Onsite	55-90	11/14/2012	<6.74
MW-305-70	Onsite	55-90	01/15/2013	<6.20
MW-305-70	Onsite	55-90	04/16/2013	<6.20
MW-305-70	Onsite	55-90	07/18/2013	<6.20

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-305-70	Onsite	55-90	11/18/2013	<5.00
MW-305-70	Onsite	55-90	03/14/2014	<5.00
MW-305-70	Onsite	55-90	07/25/2014	<5.15
MW-305-70	Onsite	55-90	07/27/2015	<5.00
MW-305-70	Onsite	55-90	07/27/2016	<5.15
MW-305-80	Onsite	55-90	11/12/2011	<6.20
MW-305-80	Onsite	55-90	04/02/2012	<6.52
MW-305-80	Onsite	55-90	06/05/2012	<6.52
MW-305-80	Onsite	55-90	08/13/2012	<6.20
MW-305-80	Onsite	55-90	01/15/2013	<6.20
MW-305-80	Onsite	55-90	04/16/2013	<6.20
MW-305-80	Onsite	55-90	07/18/2013	<6.20
MW-305-80	Onsite	55-90	11/18/2013	<5.10
MW-305-80	Onsite	55-90	03/14/2014	<5.00
MW-305-80	Onsite	55-90	07/25/2014	<5.25
MW-305-80	Onsite	55-90	07/27/2015	<5.20
MW-305-80	Onsite	55-90	07/27/2016	<5.10
MW-305-100	Onsite	55-90	10/17/2011	4.45J
MW-305-100	Onsite	55-90	04/02/2012	<6.74
MW-305-100	Onsite	55-90	06/05/2012	<6.88
MW-305-100	Onsite	55-90	08/13/2012	<6.20
MW-305-100	Onsite	55-90	02/01/2013	<6.20
MW-305-100	Onsite	55-90	03/22/2013	<6.46
MW-305-100	Onsite	55-90	07/18/2013	<6.46
MW-305-100	Onsite	55-90	11/18/2013	<5.00
MW-305-100	Onsite	55-90	03/21/2014	<5.00
MW-305-100	Onsite	55-90	07/25/2014	<5.20
MW-305-100	Onsite	55-90	07/27/2015	<5.00
MW-305-100	Onsite	55-90	07/27/2016	<5.05
MW-306-CMT-10	Onsite	Water Table	08/13/2012	<6.20
MW-306-CMT-10	Onsite	Water Table	12/10/2012	<6.40
MW-306-CMT-10	Onsite	Water Table	02/11/2013	<6.66
MW-306-CMT-10	Onsite	Water Table	04/18/2013	<6.40
MW-306-CMT-10	Onsite	Water Table	07/11/2013	<6.82
MW-306-CMT-10	Onsite	Water Table	07/29/2014	<5.00
MW-306-CMT-10	Onsite	Water Table	10/20/2014	<5.00
MW-306-CMT-10	Onsite	Water Table	07/31/2015	<5.00
MW-306-CMT-10	Onsite	Water Table	07/22/2016	<5.40
MW-306-15	Onsite	Water Table	06/07/2012	<6.20
MW-306-15	Onsite	Water Table	08/14/2012	<6.20
MW-306-15	Onsite	Water Table	02/02/2013	<6.46
MW-306-15	Onsite	Water Table	04/18/2013	<6.20
MW-306-15	Onsite	Water Table	07/18/2013	<6.20
MW-306-15	Onsite	Water Table	10/17/2013	<6.20
MW-306-15	Onsite	Water Table	07/28/2014	<5.00J*
MW-306-15	Onsite	Water Table	07/27/2015	<5.00
MW-306-15	Onsite	Water Table	07/20/2016	<4.71
MW-306-CMT-20	Onsite	Water Table	11/09/2011	<6.20
MW-306-CMT-20	Onsite	Water Table	03/31/2012	<6.20
MW-306-CMT-20	Onsite	Water Table	06/05/2012	<6.52
MW-306-CMT-20	Onsite	Water Table	08/13/2012	<6.20
MW-306-CMT-20	Onsite	Water Table	12/10/2012	<7.04

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-306-CMT-20	Onsite	Water Table	02/11/2013	<6.66
MW-306-CMT-20	Onsite	Water Table	04/18/2013	<6.40
MW-306-CMT-20	Onsite	Water Table	08/05/2013	<6.20
MW-306-CMT-20	Onsite	Water Table	10/17/2013	<6.20
MW-306-CMT-20	Onsite	Water Table	07/18/2014	<5.25
MW-306-CMT-20	Onsite	Water Table	07/31/2015	<5.10
MW-306-CMT-20	Onsite	Water Table	07/22/2016	<5.80
MW-306-CMT-30	Onsite	10-55	11/09/2011	<6.20
MW-306-CMT-30	Onsite	10-55	03/31/2012	<6.96
MW-306-CMT-30	Onsite	10-55	06/05/2012	<6.46
MW-306-CMT-30	Onsite	10-55	08/13/2012	<6.20
MW-306-CMT-30	Onsite	10-55	02/11/2013	<6.66
MW-306-CMT-30	Onsite	10-55	04/18/2013	<6.20
MW-306-CMT-30	Onsite	10-55	08/05/2013	<6.20
MW-306-CMT-30	Onsite	10-55	10/17/2013	<6.20
MW-306-CMT-30	Onsite	10-55	07/18/2014	<5.55
MW-306-CMT-30	Onsite	10-55	07/31/2015	<5.00
MW-306-CMT-30	Onsite	10-55	07/22/2016	<5.80
MW-306-CMT-40	Onsite	10-55	11/09/2011	<6.20
MW-306-CMT-40	Onsite	10-55	06/05/2012	<6.52
MW-306-CMT-40	Onsite	10-55	08/13/2012	<6.20J*
MW-306-CMT-40	Onsite	10-55	12/10/2012	<6.66
MW-306-CMT-40	Onsite	10-55	02/11/2013	<6.20
MW-306-CMT-40	Onsite	10-55	04/18/2013	<6.20
MW-306-CMT-40	Onsite	10-55	08/05/2013	<6.32
MW-306-CMT-40	Onsite	10-55	10/17/2013	<6.20
MW-306-CMT-40	Onsite	10-55	07/18/2014	<5.20
MW-306-CMT-40	Onsite	10-55	07/31/2015	<5.15
MW-306-CMT-40	Onsite	10-55	07/22/2016	<5.70
MW-306-CMT-50	Onsite	10-55	11/09/2011	<6.20
MW-306-CMT-50	Onsite	10-55	06/05/2012	<6.46
MW-306-CMT-50	Onsite	10-55	08/13/2012	<6.20
MW-306-CMT-50	Onsite	10-55	02/11/2013	<6.66
MW-306-CMT-50	Onsite	10-55	04/18/2013	<6.40
MW-306-CMT-50	Onsite	10-55	08/05/2013	<6.20
MW-306-CMT-50	Onsite	10-55	10/17/2013	<6.20
MW-306-CMT-50	Onsite	10-55	07/18/2014	<5.20
MW-306-CMT-50	Onsite	10-55	07/31/2015	<5.15
MW-306-CMT-50	Onsite	10-55	07/22/2016	<5.60
MW-306-CMT-60	Onsite	10-55	11/09/2011	<6.20
MW-306-CMT-60	Onsite	10-55	06/05/2012	<6.20
MW-306-CMT-60	Onsite	10-55	08/13/2012	<6.20
MW-306-CMT-60	Onsite	10-55	02/11/2013	<6.74
MW-306-CMT-60	Onsite	10-55	04/18/2013	<6.46
MW-306-CMT-60	Onsite	10-55	08/05/2013	<6.20
MW-306-CMT-60	Onsite	10-55	10/17/2013	<6.20
MW-306-CMT-60	Onsite	10-55	07/18/2014	<5.20
MW-306-CMT-60	Onsite	10-55	07/31/2015	<5.20
MW-306-CMT-60	Onsite	10-55	07/22/2016	<5.60
MW-306-70	Onsite	55-90	11/12/2011	<6.20
MW-306-70	Onsite	55-90	04/02/2012	<6.40
MW-306-70	Onsite	55-90	06/05/2012	<6.52

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-306-70	Onsite	55-90	08/13/2012	<6.20
MW-306-70	Onsite	55-90	02/02/2013	<6.60
MW-306-70	Onsite	55-90	04/18/2013	<6.20
MW-306-70	Onsite	55-90	07/18/2013	<6.20
MW-306-70	Onsite	55-90	10/17/2013	<6.20
MW-306-70	Onsite	55-90	07/28/2014	<5.00J*
MW-306-70	Onsite	55-90	07/27/2015	<5.00
MW-306-70	Onsite	55-90	07/26/2016	<5.10
MW-306-80	Onsite	55-90	11/12/2011	<6.20
MW-306-80	Onsite	55-90	04/02/2012	<6.60
MW-306-80	Onsite	55-90	06/05/2012	<6.20
MW-306-80	Onsite	55-90	08/14/2012	<6.20
MW-306-80	Onsite	55-90	02/02/2013	<6.88
MW-306-80	Onsite	55-90	04/18/2013	<6.20
MW-306-80	Onsite	55-90	07/18/2013	<6.20
MW-306-80	Onsite	55-90	10/17/2013	<6.20
MW-306-80	Onsite	55-90	07/28/2014	<5.00J*
MW-306-80	Onsite	55-90	07/27/2015	<5.00
MW-306-80	Onsite	55-90	07/26/2016	<5.15
MW-306-100	Onsite	55-90	10/17/2011	<6.52
MW-306-100	Onsite	55-90	04/02/2012	<6.40
MW-306-100	Onsite	55-90	06/05/2012	<6.74
MW-306-100	Onsite	55-90	08/13/2012	<6.20
MW-306-100	Onsite	55-90	02/02/2013	<6.74
MW-306-100	Onsite	55-90	04/18/2013	<6.20
MW-306-100	Onsite	55-90	07/18/2013	<6.20
MW-306-100	Onsite	55-90	10/17/2013	<6.20
MW-306-100	Onsite	55-90	07/28/2014	<5.00J*
MW-306-100	Onsite	55-90	07/27/2015	<5.00
MW-306-100	Onsite	55-90	07/26/2016	<5.15
MW-306-150	Onsite	90-160	10/17/2011	<6.20
MW-306-150	Onsite	90-160	04/02/2012	<6.60
MW-306-150	Onsite	90-160	06/05/2012	<6.82
MW-306-150	Onsite	90-160	08/16/2012	<6.20
MW-306-150	Onsite	90-160	03/08/2013	<6.52
MW-306-150	Onsite	90-160	04/18/2013	<6.20
MW-306-150	Onsite	90-160	07/18/2013	<6.20
MW-306-150	Onsite	90-160	10/17/2013	<6.20
MW-306-150	Onsite	90-160	07/28/2014	<5.00J*
MW-306-150	Onsite	90-160	08/13/2015	<5.00
MW-306-150	Onsite	90-160	07/26/2016	<5.05
MW-307-150	Onsite	90-160	08/06/2012	<6.40
MW-307-150	Onsite	90-160	11/12/2012	<6.20
MW-307-150	Onsite	90-160	07/20/2013	<6.20
MW-307-150	Onsite	90-160	11/01/2013	<6.20
MW-307-150	Onsite	90-160	03/25/2014	<5.70
MW-307-150	Onsite	90-160	04/23/2014	<5.15
MW-307-150	Onsite	90-160	09/04/2014	<5.00
MW-307-150	Onsite	90-160	10/23/2014	<5.25
MW-307-150	Onsite	90-160	08/05/2015	<5.15
MW-309-15	Onsite	Water Table	04/27/2012	88.5
MW-309-15	Onsite	Water Table	07/25/2012	66.6

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-309-15	Onsite	Water Table	11/11/2012	77.2
MW-309-15	Onsite	Water Table	01/31/2013	74.3
MW-309-15	Onsite	Water Table	05/16/2013	68.0
MW-309-15	Onsite	Water Table	07/17/2013	65.9
MW-309-15	Onsite	Water Table	10/22/2013	21.6
MW-309-15	Onsite	Water Table	03/03/2014	51.9
MW-309-15	Onsite	Water Table	04/22/2014	45.1
MW-309-15	Onsite	Water Table	08/02/2014	15.7
MW-309-15	Onsite	Water Table	10/27/2014	34.1
MW-309-15	Onsite	Water Table	02/26/2015	41.1
MW-309-15	Onsite	Water Table	04/22/2015	44.5
MW-309-15	Onsite	Water Table	07/29/2015	33.7
MW-309-15	Onsite	Water Table	10/16/2015	20.4
MW-309-15	Onsite	Water Table	02/11/2016	34.2
MW-309-15	Onsite	Water Table	04/06/2016	32.2
MW-309-15	Onsite	Water Table	07/19/2016	26.5
MW-309-15	Onsite	Water Table	10/14/2016	25.0
MW-309-15	Onsite	Water Table	02/17/2017	31.0
MW-309-15	Onsite	Water Table	04/10/2017	32.2
MW-309-15	Onsite	Water Table	08/08/2017	31.2
MW-309-15	Onsite	Water Table	08/07/2018	63.7
MW-309-66	Onsite	10-55	04/24/2012	24.2
MW-309-66	Onsite	10-55	07/31/2012	21.8
MW-309-66	Onsite	10-55	11/11/2012	16.6
MW-309-66	Onsite	10-55	01/31/2013	14.3
MW-309-66	Onsite	10-55	05/16/2013	12.4
MW-309-66	Onsite	10-55	07/17/2013	11.2
MW-309-66	Onsite	10-55	10/22/2013	10.3
MW-309-66	Onsite	10-55	03/03/2014	8.82J
MW-309-66	Onsite	10-55	04/22/2014	7.84J
MW-309-66	Onsite	10-55	08/02/2014	7.83J
MW-309-66	Onsite	10-55	10/27/2014	4.72J
MW-309-66	Onsite	10-55	02/26/2015	<5.20
MW-309-66	Onsite	10-55	04/22/2015	<5.00
MW-309-66	Onsite	10-55	07/28/2015	<5.25
MW-309-66	Onsite	10-55	10/16/2015	<5.35
MW-309-66	Onsite	10-55	02/11/2016	<5.05
MW-309-66	Onsite	10-55	07/19/2016	<5.20
MW-309-66	Onsite	10-55	02/17/2017	6.85J
MW-309-150	Onsite	90-160	04/24/2012	<6.20
MW-309-150	Onsite	90-160	07/31/2012	<6.60
MW-309-150	Onsite	90-160	11/11/2012	<6.40
MW-309-150	Onsite	90-160	01/31/2013	<6.46
MW-309-150	Onsite	90-160	04/29/2013	<6.32
MW-309-150	Onsite	90-160	07/17/2013	<6.40
MW-309-150	Onsite	90-160	10/22/2013	<6.36
MW-309-150	Onsite	90-160	08/02/2014	<5.00
MW-309-150	Onsite	90-160	07/29/2015	<5.00
MW-310-15	Onsite	Water Table	04/27/2012	264
MW-310-15	Onsite	Water Table	07/25/2012	252
MW-310-15	Onsite	Water Table	11/15/2012	235
MW-310-15	Onsite	Water Table	02/01/2013	242

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-310-15	Onsite	Water Table	05/16/2013	227
MW-310-15	Onsite	Water Table	07/17/2013	205
MW-310-15	Onsite	Water Table	10/16/2013	201
MW-310-15	Onsite	Water Table	03/03/2014	193
MW-310-15	Onsite	Water Table	04/22/2014	163
MW-310-15	Onsite	Water Table	07/29/2014	202
MW-310-15	Onsite	Water Table	10/21/2014	185
MW-310-15	Onsite	Water Table	02/20/2015	198
MW-310-15	Onsite	Water Table	04/24/2015	192
MW-310-15	Onsite	Water Table	07/31/2015	153
MW-310-15	Onsite	Water Table	10/21/2015	203J*
MW-310-15	Onsite	Water Table	02/09/2016	196
MW-310-15	Onsite	Water Table	07/20/2016	196
MW-310-15	Onsite	Water Table	02/25/2017	200
MW-310-15	Onsite	Water Table	07/10/2017	158
MW-310-15	Onsite	Water Table	07/10/2018	83.7
MW-310-65	Onsite	10-55	04/27/2012	<6.20
MW-310-65	Onsite	10-55	08/01/2012	<6.46
MW-310-65	Onsite	10-55	11/15/2012	<6.20
MW-310-65	Onsite	10-55	02/01/2013	<6.40
MW-310-65	Onsite	10-55	04/29/2013	<6.20
MW-310-65	Onsite	10-55	07/17/2013	<6.20
MW-310-65	Onsite	10-55	10/16/2013	<6.40
MW-310-65	Onsite	10-55	03/03/2014	<5.00
MW-310-65	Onsite	10-55	04/22/2014	<5.00
MW-310-65	Onsite	10-55	07/29/2014	<5.00
MW-310-65	Onsite	10-55	10/21/2014	<5.00
MW-310-65	Onsite	10-55	07/31/2015	<5.10
MW-310-65	Onsite	10-55	07/20/2016	<5.10
MW-310-110	Onsite	90-160	06/06/2012	<6.20
MW-310-110	Onsite	90-160	08/01/2012	<6.20
MW-310-110	Onsite	90-160	02/01/2013	<6.66
MW-310-110	Onsite	90-160	05/16/2013	<6.20
MW-310-110	Onsite	90-160	07/17/2013	<6.60
MW-310-110	Onsite	90-160	10/28/2013	<6.20
MW-310-110	Onsite	90-160	07/29/2014	<5.30
MW-310-110	Onsite	90-160	07/31/2015	<5.00
MW-310-110	Onsite	90-160	08/10/2016	<5.25
MW-321-15	Onsite	Water Table	06/06/2012	199
MW-321-15	Onsite	Water Table	07/27/2012	158J*
MW-321-15	Onsite	Water Table	10/15/2012	140
MW-321-15	Onsite	Water Table	01/12/2013	170
MW-321-15	Onsite	Water Table	04/22/2013	160
MW-321-15	Onsite	Water Table	08/06/2013	125
MW-321-15	Onsite	Water Table	10/25/2013	126
MW-321-15	Onsite	Water Table	02/28/2014	111
MW-321-15	Onsite	Water Table	04/22/2014	105
MW-321-15	Onsite	Water Table	06/04/2014	91.4
MW-321-15	Onsite	Water Table	08/29/2014	61.7
MW-321-15	Onsite	Water Table	10/22/2014	92.9
MW-321-15	Onsite	Water Table	02/20/2015	93.9
MW-321-15	Onsite	Water Table	04/23/2015	88.0

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-321-15	Onsite	Water Table	08/03/2015	62.8
MW-321-15	Onsite	Water Table	10/21/2015	52.1J*
MW-321-15	Onsite	Water Table	02/17/2016	58.3
MW-321-15	Onsite	Water Table	08/11/2016	46.4
MW-321-15	Onsite	Water Table	02/28/2017	36.2
MW-321-65	Onsite	10-55	06/06/2012	3.50J
MW-321-65	Onsite	10-55	07/27/2012	3.54J
MW-321-65	Onsite	10-55	12/13/2012	<6.32
MW-321-65	Onsite	10-55	01/12/2013	<6.60
MW-321-65	Onsite	10-55	04/25/2013	<6.20
MW-321-65	Onsite	10-55	08/06/2013	<6.20
MW-321-65	Onsite	10-55	10/25/2013	<6.46
MW-321-65	Onsite	10-55	03/26/2014	<5.30
MW-321-65	Onsite	10-55	04/22/2014	<5.00
MW-321-65	Onsite	10-55	09/03/2014	<5.15
MW-321-65	Onsite	10-55	10/22/2014	<5.00
MW-321-65	Onsite	10-55	08/03/2015	<5.00
MW-321-65	Onsite	10-55	08/11/2016	6.64J*
MW-321-151	Onsite	90-160	06/06/2012	<6.20
MW-321-151	Onsite	90-160	07/27/2012	<6.20
MW-321-151	Onsite	90-160	12/13/2012	<7.12
MW-321-151	Onsite	90-160	01/12/2013	<6.20
MW-321-151	Onsite	90-160	04/26/2013	<6.40
MW-321-151	Onsite	90-160	07/30/2013	<6.20
MW-321-151	Onsite	90-160	10/25/2013	<7.04
MW-321-151	Onsite	90-160	09/03/2014	<5.15
MW-321-151	Onsite	90-160	08/03/2015	<5.00
MW-330-20	Onsite	Water Table	06/07/2012	355
MW-330-20	Onsite	Water Table	07/25/2012	541
MW-330-20	Onsite	Water Table	11/15/2012	269
MW-330-20	Onsite	Water Table	02/01/2013	191
MW-330-20	Onsite	Water Table	04/19/2013	108J*
MW-330-20	Onsite	Water Table	07/17/2013	298
MW-330-20	Onsite	Water Table	10/23/2013	300
MW-330-20	Onsite	Water Table	03/03/2014	155
MW-330-20	Onsite	Water Table	04/29/2014	130
MW-330-20	Onsite	Water Table	08/15/2014	277
MW-330-20	Onsite	Water Table	10/18/2014	350
MW-330-20	Onsite	Water Table	02/17/2015	238
MW-330-20	Onsite	Water Table	04/24/2015	185
MW-330-20	Onsite	Water Table	07/28/2015	193
MW-330-20	Onsite	Water Table	10/15/2015	399
MW-330-20	Onsite	Water Table	02/09/2016	344
MW-330-20	Onsite	Water Table	04/11/2016	297
MW-330-20	Onsite	Water Table	07/20/2016	358
MW-330-20	Onsite	Water Table	10/18/2016	829
MW-330-20	Onsite	Water Table	02/25/2017	780
MW-330-20	Onsite	Water Table	04/10/2017	677
MW-330-20	Onsite	Water Table	07/10/2017	473
MW-330-20	Onsite	Water Table	01/16/2018	356
MW-330-20	Onsite	Water Table	07/10/2018	264
MW-330-65	Onsite	10-55	06/07/2012	<6.20

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-330-65	Onsite	10-55	07/27/2012	<6.20
MW-330-65	Onsite	10-55	11/15/2012	<6.20
MW-330-65	Onsite	10-55	02/01/2013	<6.88
MW-330-65	Onsite	10-55	04/19/2013	<6.46
MW-330-65	Onsite	10-55	07/17/2013	<6.32
MW-330-65	Onsite	10-55	10/23/2013	<6.20
MW-330-65	Onsite	10-55	03/03/2014	<5.00
MW-330-65	Onsite	10-55	08/15/2014	<5.00
MW-330-65	Onsite	10-55	07/28/2015	<5.00
MW-330-65	Onsite	10-55	07/20/2016	<4.90
MW-330-150	Onsite	90-160	06/06/2012	<6.52
MW-330-150	Onsite	90-160	07/27/2012	<6.82
MW-330-150	Onsite	90-160	02/01/2013	<6.66J*
MW-330-150	Onsite	90-160	04/19/2013	<6.20
MW-330-150	Onsite	90-160	07/17/2013	<6.32
MW-330-150	Onsite	90-160	10/23/2013	<6.60
MW-330-150	Onsite	90-160	08/15/2014	<5.00
MW-330-150	Onsite	90-160	07/29/2015	<5.20
MW-331-150	Onsite	90-160	06/12/2012	<6.20
MW-331-150	Onsite	90-160	08/06/2012	<6.66
MW-331-150	Onsite	90-160	11/11/2012	<6.46
MW-331-150	Onsite	90-160	03/08/2013	<6.74
MW-331-150	Onsite	90-160	04/23/2013	<6.20
MW-331-150	Onsite	90-160	08/06/2013	<6.20
MW-331-150	Onsite	90-160	10/30/2013	<6.20
MW-331-150	Onsite	90-160	07/28/2014	<5.20J*
MW-331-150	Onsite	90-160	07/23/2015	<5.00
MW-334-15	Onsite	Water Table	08/28/2012	354
MW-334-15	Onsite	Water Table	12/13/2012	265
MW-334-15	Onsite	Water Table	01/31/2013	189
MW-334-15	Onsite	Water Table	04/01/2013	205
MW-334-15	Onsite	Water Table	07/23/2013	72.4
MW-334-15	Onsite	Water Table	11/07/2013	30.9
MW-334-15	Onsite	Water Table	02/27/2014	38.7
MW-334-15	Onsite	Water Table	04/21/2014	18.2
MW-334-15	Onsite	Water Table	09/03/2014	91.4
MW-334-15	Onsite	Water Table	11/10/2014	37.8
MW-334-15	Onsite	Water Table	02/21/2015	77.6
MW-334-15	Onsite	Water Table	04/29/2015	67.1
MW-334-15	Onsite	Water Table	08/11/2015	64.4
MW-334-15	Onsite	Water Table	10/28/2015	72.8
MW-334-15	Onsite	Water Table	02/25/2016	61.5
MW-334-15	Onsite	Water Table	04/11/2016	21.3
MW-334-15	Onsite	Water Table	08/18/2016	50.8
MW-334-15	Onsite	Water Table	10/25/2016	66.4
MW-334-15	Onsite	Water Table	02/27/2017	71.9JL *
MW-334-15	Onsite	Water Table	04/12/2017	45.6
MW-334-15	Onsite	Water Table	07/25/2017	126
MW-334-15	Onsite	Water Table	08/31/2017	181
MW-334-15	Onsite	Water Table	09/20/2017	149
MW-334-15	Onsite	Water Table	10/25/2017	121
MW-334-15	Onsite	Water Table	02/13/2018	148

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-334-15	Onsite	Water Table	04/03/2018	161JL*
MW-334-15	Onsite	Water Table	07/10/2018	115
MW-334-65	Onsite	10-55	08/28/2012	6.21J
MW-334-65	Onsite	10-55	12/13/2012	5.63J
MW-334-65	Onsite	10-55	01/31/2013	4.42J
MW-334-65	Onsite	10-55	05/21/2013	3.16J
MW-334-65	Onsite	10-55	07/23/2013	<6.20
MW-334-65	Onsite	10-55	11/06/2013	<6.40
MW-334-65	Onsite	10-55	03/04/2014	<5.20
MW-334-65	Onsite	10-55	04/23/2014	3.30J
MW-334-65	Onsite	10-55	08/13/2014	<5.25
MW-334-65	Onsite	10-55	10/24/2014	<5.00
MW-334-65	Onsite	10-55	02/20/2015	<5.00J*
MW-334-65	Onsite	10-55	04/23/2015	<5.10
MW-334-65	Onsite	10-55	08/04/2015	4.47J
MW-334-65	Onsite	10-55	10/22/2015	<5.00
MW-334-65	Onsite	10-55	02/18/2016	<5.00
MW-334-65	Onsite	10-55	04/08/2016	<5.10
MW-334-65	Onsite	10-55	08/12/2016	5.06JH*
MW-334-65	Onsite	10-55	10/20/2016	<5.00
MW-334-65	Onsite	10-55	02/24/2017	<5.10
MW-334-65	Onsite	10-55	04/13/2017	<5.10
MW-334-65	Onsite	10-55	08/03/2017	5.32J
MW-334-65	Onsite	10-55	10/19/2017	7.14J
MW-334-65	Onsite	10-55	01/18/2018	9.86
MW-334-65	Onsite	10-55	04/06/2018	8.38J
MW-334-85	Onsite	55-90	11/01/2013	<6.40
MW-334-85	Onsite	55-90	03/04/2014	<5.00
MW-334-85	Onsite	55-90	04/23/2014	<5.55
MW-334-85	Onsite	55-90	08/13/2014	<5.20
MW-334-85	Onsite	55-90	10/24/2014	<5.00
MW-334-85	Onsite	55-90	08/04/2015	<5.00
MW-334-85	Onsite	55-90	08/12/2016	7.22JH*
MW-336-15	Onsite	Water Table	10/09/2013	17600
MW-336-15	Onsite	Water Table	09/03/2014	13400JL*
MW-336-15	Onsite	Water Table	10/30/2014	10900
MW-336-15	Onsite	Water Table	08/07/2015	18100JL*
MW-336-15	Onsite	Water Table	10/28/2015	7830
MW-336-15	Onsite	Water Table	08/17/2016	8070J*
MW-336-15	Onsite	Water Table	10/26/2016	4200
MW-336-20	Onsite	Water Table	10/09/2013	34800
MW-336-20	Onsite	Water Table	08/26/2014	32500JL*
MW-336-20	Onsite	Water Table	10/30/2014	27700
MW-336-20	Onsite	Water Table	08/11/2015	22500JL*
MW-336-20	Onsite	Water Table	10/22/2015	14300JL*
MW-336-20	Onsite	Water Table	08/15/2016	11500JL*
MW-336-20	Onsite	Water Table	10/21/2016	4940
MW-336-20	Onsite	Water Table	08/15/2017	10400JL*
MW-336-20	Onsite	Water Table	02/15/2018	24500JL*
MW-336-20	Onsite	Water Table	08/08/2018	22200JL*
MW-336-35	Onsite	10-55	10/09/2013	377
MW-336-35	Onsite	10-55	08/26/2014	440

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-336-35	Onsite	10-55	10/30/2014	282
MW-336-35	Onsite	10-55	08/11/2015	268
MW-336-35	Onsite	10-55	10/02/2015	403
MW-336-35	Onsite	10-55	10/22/2015	292
MW-336-35	Onsite	10-55	08/15/2016	451J*
MW-336-35	Onsite	10-55	10/21/2016	247
MW-336-55	Onsite	10-55	10/09/2013	4.32J
MW-336-55	Onsite	10-55	08/26/2014	<5.00
MW-336-55	Onsite	10-55	10/30/2014	4.25J
MW-336-55	Onsite	10-55	08/11/2015	<5.00
MW-336-55	Onsite	10-55	08/15/2016	<5.15J*
MW-337-20	Onsite	Water Table	06/05/2014	5810
MW-337-20	Onsite	Water Table	08/26/2014	8800JL*
MW-337-20	Onsite	Water Table	10/30/2014	5410
MW-337-20	Onsite	Water Table	08/11/2015	4860JL*
MW-337-20	Onsite	Water Table	10/22/2015	2960JL*
MW-337-20	Onsite	Water Table	08/17/2016	1930JL*
MW-337-20	Onsite	Water Table	10/21/2016	1700
MW-344-15	Onsite	Water Table	07/30/2013	104
MW-344-15	Onsite	Water Table	10/22/2013	51.6
MW-344-15	Onsite	Water Table	02/27/2014	55.3
MW-344-15	Onsite	Water Table	04/22/2014	50.6
MW-344-15	Onsite	Water Table	07/31/2014	28.3
MW-344-15	Onsite	Water Table	10/22/2014	38.7
MW-344-15	Onsite	Water Table	02/19/2015	85.3
MW-344-15	Onsite	Water Table	04/24/2015	51.4
MW-344-15	Onsite	Water Table	07/30/2015	42.6
MW-344-15	Onsite	Water Table	10/20/2015	26.9
MW-344-15	Onsite	Water Table	02/16/2016	63.4
MW-344-15	Onsite	Water Table	04/07/2016	56.5
MW-344-15	Onsite	Water Table	08/11/2016	27.6
MW-344-15	Onsite	Water Table	10/19/2016	31.1
MW-344-15	Onsite	Water Table	02/27/2017	45.9
MW-344-15	Onsite	Water Table	04/11/2017	49.9
MW-344-15	Onsite	Water Table	07/24/2017	17.8
MW-344-15	Onsite	Water Table	08/29/2017	11.4
MW-344-15	Onsite	Water Table	09/19/2017	18.9
MW-344-15	Onsite	Water Table	10/24/2017	20.6
MW-344-15	Onsite	Water Table	01/19/2018	44.8
MW-344-15	Onsite	Water Table	04/04/2018	82.2
MW-344-55	Onsite	10-55	01/27/2014	7.57J
MW-344-55	Onsite	10-55	04/22/2014	7.01J
MW-344-55	Onsite	10-55	07/31/2014	5.58J
MW-344-55	Onsite	10-55	10/22/2014	<5.30
MW-344-55	Onsite	10-55	02/19/2015	5.37J
MW-344-55	Onsite	10-55	04/24/2015	3.91J
MW-344-55	Onsite	10-55	07/30/2015	3.67J
MW-344-55	Onsite	10-55	10/20/2015	3.64J
MW-344-55	Onsite	10-55	02/16/2016	4.57J
MW-344-55	Onsite	10-55	04/07/2016	<5.30
MW-344-55	Onsite	10-55	08/11/2016	3.13J
MW-344-55	Onsite	10-55	10/19/2016	3.18J

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-344-55	Onsite	10-55	02/28/2017	<5.30
MW-344-55	Onsite	10-55	04/11/2017	4.80J
MW-344-75	Onsite	55-90	11/01/2013	<6.46
MW-344-75	Onsite	55-90	02/27/2014	<5.20
MW-344-75	Onsite	55-90	04/22/2014	<5.00
MW-344-75	Onsite	55-90	07/31/2014	<5.00
MW-344-75	Onsite	55-90	10/22/2014	<5.00
MW-344-75	Onsite	55-90	02/17/2015	<5.00
MW-344-75	Onsite	55-90	04/24/2015	<5.00
MW-344-75	Onsite	55-90	07/30/2015	<5.40
MW-344-75	Onsite	55-90	10/20/2015	<5.00
MW-344-75	Onsite	55-90	02/16/2016	<5.00
MW-344-75	Onsite	55-90	08/11/2016	<5.15
MW-344-75	Onsite	55-90	02/27/2017	<5.10
MW-345-15	Onsite	Water Table	07/29/2013	165
MW-345-15	Onsite	Water Table	10/22/2013	98.8
MW-345-15	Onsite	Water Table	02/27/2014	43.3
MW-345-15	Onsite	Water Table	07/31/2014	11.5
MW-345-15	Onsite	Water Table	10/23/2014	16.7
MW-345-15	Onsite	Water Table	02/25/2015	22.9
MW-345-15	Onsite	Water Table	07/24/2015	15.0
MW-345-15	Onsite	Water Table	10/15/2015	20.4
MW-345-15	Onsite	Water Table	02/04/2016	13.5
MW-345-15	Onsite	Water Table	04/06/2016	13.8
MW-345-15	Onsite	Water Table	07/22/2016	8.61J
MW-345-15	Onsite	Water Table	10/19/2016	14.1
MW-345-15	Onsite	Water Table	02/13/2017	8.10J
MW-345-15	Onsite	Water Table	07/24/2017	61.0
MW-345-15	Onsite	Water Table	08/29/2017	173
MW-345-15	Onsite	Water Table	09/20/2017	252
MW-345-15	Onsite	Water Table	10/24/2017	256
MW-345-15	Onsite	Water Table	02/12/2018	238
MW-345-15	Onsite	Water Table	04/04/2018	250
MW-345-15	Onsite	Water Table	07/19/2018	182
MW-345-55	Onsite	10-55	01/27/2014	19.3
MW-345-55	Onsite	10-55	07/31/2014	25.5
MW-345-55	Onsite	10-55	10/23/2014	19.7
MW-345-55	Onsite	10-55	02/25/2015	23.2
MW-345-55	Onsite	10-55	07/24/2015	33.0
MW-345-55	Onsite	10-55	10/15/2015	30.8
MW-345-55	Onsite	10-55	02/04/2016	26.8
MW-345-55	Onsite	10-55	07/22/2016	31.1
MW-345-55	Onsite	10-55	10/19/2016	36.7
MW-345-55	Onsite	10-55	02/14/2017	32.1
MW-345-55	Onsite	10-55	07/14/2017	28.7
MW-345-55	Onsite	10-55	10/20/2017	49.6
MW-345-55	Onsite	10-55	01/16/2018	67.5
MW-345-55	Onsite	10-55	04/04/2018	62.8
MW-345-55	Onsite	10-55	07/13/2018	61.2
MW-345-75	Onsite	55-90	11/01/2013	7.03J
MW-345-75	Onsite	55-90	02/27/2014	9.38J
MW-345-75	Onsite	55-90	07/31/2014	13.1

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-345-75	Onsite	55-90	10/23/2014	9.89J
MW-345-75	Onsite	55-90	07/24/2015	18.9
MW-345-75	Onsite	55-90	10/15/2015	16.6
MW-345-75	Onsite	55-90	02/04/2016	13.2
MW-345-75	Onsite	55-90	07/22/2016	21.1
MW-345-75	Onsite	55-90	10/19/2016	22.2
MW-345-75	Onsite	55-90	07/13/2018	46.8
MW-348-15	Onsite	Water Table	08/15/2013	1660JL*
MW-348-15	Onsite	Water Table	11/15/2013	1280
MW-348-15	Onsite	Water Table	03/11/2014	951
MW-348-15	Onsite	Water Table	04/22/2014	1210
MW-348-15	Onsite	Water Table	09/02/2014	722
MW-348-15	Onsite	Water Table	10/29/2014	565
MW-348-15	Onsite	Water Table	02/21/2015	600
MW-348-15	Onsite	Water Table	04/21/2015	209
MW-348-15	Onsite	Water Table	08/06/2015	1220
MW-348-15	Onsite	Water Table	10/28/2015	541
MW-348-15	Onsite	Water Table	02/22/2016	682
MW-348-15	Onsite	Water Table	08/17/2016	770
MW-348-15	Onsite	Water Table	03/10/2017	988
MW-348-65	Onsite	10-55	08/15/2013	6.04J
MW-348-65	Onsite	10-55	11/15/2013	8.25J
MW-348-65	Onsite	10-55	03/11/2014	5.87J
MW-348-65	Onsite	10-55	04/22/2014	4.95J
MW-348-65	Onsite	10-55	08/09/2014	6.29J
MW-348-65	Onsite	10-55	10/28/2014	12.1
MW-348-65	Onsite	10-55	02/21/2015	14.4
MW-348-65	Onsite	10-55	08/06/2015	14.4
MW-348-65	Onsite	10-55	03/03/2016	30.9
MW-348-65	Onsite	10-55	08/11/2016	15.4
MW-348-65	Onsite	10-55	11/16/2016	18.4
MW-348-65	Onsite	10-55	02/27/2017	9.83J
MW-348-65	Onsite	10-55	04/11/2017	7.52J
MW-351-15	Onsite	Water Table	02/26/2014	40.0
MW-351-15	Onsite	Water Table	04/16/2014	47.8
MW-351-15	Onsite	Water Table	07/23/2014	11.4
MW-351-15	Onsite	Water Table	10/16/2014	<5.00
MW-351-15	Onsite	Water Table	02/20/2015	38.1
MW-351-15	Onsite	Water Table	04/22/2015	34.6
MW-351-15	Onsite	Water Table	08/03/2015	7.94J
MW-351-15	Onsite	Water Table	10/16/2015	<5.05
MW-351-15	Onsite	Water Table	02/11/2016	<5.30
MW-351-15	Onsite	Water Table	04/07/2016	<5.05
MW-351-15	Onsite	Water Table	07/19/2016	<5.00
MW-351-15	Onsite	Water Table	10/19/2016	<5.05
MW-351-15	Onsite	Water Table	01/25/2017	4.32J
MW-351-15	Onsite	Water Table	04/10/2017	8.41J
MW-351-55	Onsite	10-55	01/02/2014	15.5
MW-351-55	Onsite	10-55	04/16/2014	18.4
MW-351-55	Onsite	10-55	07/23/2014	4.07J
MW-351-55	Onsite	10-55	10/16/2014	4.53J
MW-351-55	Onsite	10-55	02/20/2015	<5.15J*

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-351-55	Onsite	10-55	04/22/2015	<5.10
MW-351-55	Onsite	10-55	08/03/2015	<5.15
MW-351-55	Onsite	10-55	10/16/2015	3.47J
MW-351-55	Onsite	10-55	02/11/2016	<5.10
MW-351-55	Onsite	10-55	07/19/2016	<5.10
MW-351-55	Onsite	10-55	10/19/2016	5.57J
MW-351-55	Onsite	10-55	01/25/2017	6.06J
MW-351-55	Onsite	10-55	04/10/2017	5.01J
MW-351-75	Onsite	55-90	02/26/2014	9.07J
MW-351-75	Onsite	55-90	04/17/2014	9.71J
MW-351-75	Onsite	55-90	07/23/2014	<5.00
MW-351-75	Onsite	55-90	10/16/2014	<5.00
MW-351-75	Onsite	55-90	02/19/2015	<5.00
MW-351-75	Onsite	55-90	04/22/2015	<5.00
MW-351-75	Onsite	55-90	07/29/2015	<5.00
MW-351-75	Onsite	55-90	10/16/2015	<5.10
MW-351-75	Onsite	55-90	02/11/2016	<5.10
MW-351-75	Onsite	55-90	07/19/2016	<5.05
MW-351-75	Onsite	55-90	10/19/2016	<5.10
MW-351-75	Onsite	55-90	01/25/2017	<5.10
MW-351-75	Onsite	55-90	04/11/2017	<5.15
MW-351-150	Onsite	90-160	01/02/2014	<5.25
MW-351-150	Onsite	90-160	04/16/2014	<5.00
MW-351-150	Onsite	90-160	07/23/2014	<5.00
MW-351-150	Onsite	90-160	10/16/2014	<5.25
MW-351-150	Onsite	90-160	02/19/2015	<5.00
MW-351-150	Onsite	90-160	04/22/2015	<5.00
MW-351-150	Onsite	90-160	07/29/2015	<5.00
MW-351-150	Onsite	90-160	10/16/2015	<5.10
MW-351-150	Onsite	90-160	02/11/2016	<5.05
MW-351-150	Onsite	90-160	07/19/2016	<5.00
MW-351-150	Onsite	90-160	01/25/2017	<5.05
MW-354-15	Onsite	Water Table	10/11/2013	1060
MW-354-15	Onsite	Water Table	03/11/2014	792
MW-354-15	Onsite	Water Table	04/22/2014	201
MW-354-15	Onsite	Water Table	09/02/2014	480
MW-354-15	Onsite	Water Table	10/29/2014	378
MW-354-15	Onsite	Water Table	02/21/2015	414
MW-354-15	Onsite	Water Table	04/21/2015	7.52J
MW-354-15	Onsite	Water Table	08/06/2015	216
MW-354-15	Onsite	Water Table	10/28/2015	381
MW-354-15	Onsite	Water Table	02/26/2016	436
MW-354-15	Onsite	Water Table	08/17/2016	134
MW-354-15	Onsite	Water Table	02/28/2017	352
MW-354-35	Onsite	10-55	10/11/2013	849
MW-354-35	Onsite	10-55	03/06/2014	879
MW-354-35	Onsite	10-55	04/22/2014	840
MW-354-35	Onsite	10-55	08/09/2014	808
MW-354-35	Onsite	10-55	10/28/2014	672
MW-354-35	Onsite	10-55	02/21/2015	862
MW-354-35	Onsite	10-55	04/23/2015	1010
MW-354-35	Onsite	10-55	08/06/2015	940

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Historical Sulfolane Summary

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-354-35	Onsite	10-55	10/21/2015	813J*
MW-354-35	Onsite	10-55	02/25/2016	741
MW-354-35	Onsite	10-55	08/10/2016	867
MW-354-35	Onsite	10-55	02/24/2017	444
MW-354-35	Onsite	10-55	07/12/2017	371
MW-354-35	Onsite	10-55	01/16/2018	408
MW-354-35	Onsite	10-55	07/18/2018	611
MW-354-65	Onsite	10-55	10/11/2013	<6.74
MW-354-65	Onsite	10-55	03/06/2014	<5.15
MW-354-65	Onsite	10-55	04/22/2014	<5.00
MW-354-65	Onsite	10-55	08/09/2014	<5.20
MW-354-65	Onsite	10-55	10/28/2014	<5.00
MW-354-65	Onsite	10-55	08/06/2015	10.2
MW-354-65	Onsite	10-55	02/25/2016	<5.05
MW-354-65	Onsite	10-55	08/10/2016	8.29J
MW-354-65	Onsite	10-55	02/24/2017	<5.45
MW-355-15	Onsite	Water Table	11/25/2013	5.69J
MW-355-15	Onsite	Water Table	10/10/2013	4.60J
MW-355-15	Onsite	Water Table	03/04/2014	3.49J
MW-355-15	Onsite	Water Table	04/22/2014	<5.00
MW-355-15	Onsite	Water Table	08/20/2014	17.6
MW-355-15	Onsite	Water Table	10/21/2014	77.0
MW-355-15	Onsite	Water Table	02/17/2015	37.3
MW-355-15	Onsite	Water Table	05/15/2015	18.2
MW-355-15	Onsite	Water Table	07/28/2015	22.8
MW-355-15	Onsite	Water Table	10/15/2015	10.9
MW-355-15	Onsite	Water Table	02/23/2016	29.7
MW-355-15	Onsite	Water Table	04/07/2016	24.3
MW-355-15	Onsite	Water Table	07/20/2016	6.21J*
MW-355-15	Onsite	Water Table	10/18/2016	6.81J
MW-355-15	Onsite	Water Table	02/27/2017	<5.25
MW-355-15	Onsite	Water Table	04/11/2017	<5.00
MW-355-55	Onsite	10-55	11/25/2013	<5.00
MW-355-55	Onsite	10-55	10/10/2013	<6.40
MW-355-55	Onsite	10-55	03/04/2014	<5.15
MW-355-55	Onsite	10-55	04/22/2014	<5.00
MW-355-55	Onsite	10-55	08/20/2014	<5.25
MW-355-55	Onsite	10-55	10/21/2014	<5.00
MW-355-55	Onsite	10-55	07/28/2015	<5.00
MW-355-55	Onsite	10-55	02/23/2016	<5.00
MW-355-55	Onsite	10-55	07/20/2016	<5.15
MW-355-55	Onsite	10-55	02/27/2017	<5.10
MW-358-15	Onsite	Water Table	11/05/2013	<6.70
MW-358-15	Onsite	Water Table	03/11/2014	3.43J
MW-358-15	Onsite	Water Table	04/15/2014	3.85J
MW-358-15	Onsite	Water Table	07/21/2014	<5.00
MW-358-15	Onsite	Water Table	10/15/2014	<5.20
MW-358-15	Onsite	Water Table	02/16/2015	<5.00
MW-358-15	Onsite	Water Table	07/23/2015	<5.10
MW-358-15	Onsite	Water Table	07/18/2016	<5.10
MW-358-20	Onsite	Water Table	11/05/2013	24.7
MW-358-20	Onsite	Water Table	03/11/2014	29.5

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-358-20	Onsite	Water Table	04/15/2014	28.8
MW-358-20	Onsite	Water Table	07/21/2014	18.8
MW-358-20	Onsite	Water Table	10/15/2014	12.0
MW-358-20	Onsite	Water Table	02/16/2015	17.9
MW-358-20	Onsite	Water Table	04/15/2015	15.8
MW-358-20	Onsite	Water Table	07/23/2015	8.81J
MW-358-20	Onsite	Water Table	10/19/2015	3.47J
MW-358-20	Onsite	Water Table	02/09/2016	5.68J
MW-358-20	Onsite	Water Table	07/18/2016	4.04J
MW-358-20	Onsite	Water Table	01/26/2017	4.68J
MW-358-20	Onsite	Water Table	08/08/2017	7.81J
MW-358-20	Onsite	Water Table	08/07/2018	38.0
MW-358-40	Onsite	10-55	11/05/2013	39.0
MW-358-40	Onsite	10-55	03/11/2014	34.8
MW-358-40	Onsite	10-55	04/15/2014	33.2
MW-358-40	Onsite	10-55	07/21/2014	26.5
MW-358-40	Onsite	10-55	10/15/2014	23.6
MW-358-40	Onsite	10-55	02/16/2015	19.9
MW-358-40	Onsite	10-55	04/15/2015	18.7
MW-358-40	Onsite	10-55	07/22/2015	14.1
MW-358-40	Onsite	10-55	10/19/2015	8.02J
MW-358-40	Onsite	10-55	02/09/2016	5.60J
MW-358-40	Onsite	10-55	07/18/2016	4.98J
MW-358-40	Onsite	10-55	01/26/2017	3.86J
MW-358-40	Onsite	10-55	07/11/2017	<5.15
MW-358-40	Onsite	10-55	07/11/2018	26.8
MW-358-60	Onsite	10-55	11/04/2013	25.2
MW-358-60	Onsite	10-55	03/11/2014	23.6
MW-358-60	Onsite	10-55	04/15/2014	22.4
MW-358-60	Onsite	10-55	07/21/2014	25.0
MW-358-60	Onsite	10-55	10/15/2014	20.4
MW-358-60	Onsite	10-55	02/16/2015	10.6
MW-358-60	Onsite	10-55	04/15/2015	8.15J
MW-358-60	Onsite	10-55	07/22/2015	5.55J
MW-358-60	Onsite	10-55	02/09/2016	<5.15
MW-358-60	Onsite	10-55	07/19/2016	3.62J
MW-358-60	Onsite	10-55	01/26/2017	3.85J
MW-358-60	Onsite	10-55	07/11/2017	7.09J
MW-358-60	Onsite	10-55	08/02/2018	6.45J
MW-358-150	Onsite	90-160	11/04/2013	<6.40
MW-358-150	Onsite	90-160	03/11/2014	<5.00
MW-358-150	Onsite	90-160	04/15/2014	<5.00
MW-358-150	Onsite	90-160	07/21/2014	<5.00
MW-358-150	Onsite	90-160	10/15/2014	<5.00
MW-358-150	Onsite	90-160	07/22/2015	<5.15
MW-358-150	Onsite	90-160	07/19/2016	<5.00
MW-359-15	Onsite	Water Table	01/02/2014	38.5
MW-359-15	Onsite	Water Table	04/15/2014	25.1
MW-359-15	Onsite	Water Table	07/18/2014	12.0
MW-359-15	Onsite	Water Table	10/14/2014	9.66J
MW-359-15	Onsite	Water Table	02/16/2015	22.8
MW-359-15	Onsite	Water Table	04/15/2015	18.3

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-359-15	Onsite	Water Table	07/20/2015	13.8
MW-359-15	Onsite	Water Table	10/19/2015	5.10J
MW-359-15	Onsite	Water Table	02/08/2016	11.9
MW-359-15	Onsite	Water Table	04/07/2016	8.36J
MW-359-15	Onsite	Water Table	07/14/2016	5.73J
MW-359-15	Onsite	Water Table	10/19/2016	4.15J
MW-359-15	Onsite	Water Table	01/26/2017	8.34J
MW-359-15	Onsite	Water Table	08/08/2017	5.36J
MW-359-15	Onsite	Water Table	08/07/2018	26.2
MW-359-35	Onsite	10-55	02/26/2014	52.4
MW-359-35	Onsite	10-55	01/02/2014	54.7
MW-359-35	Onsite	10-55	04/14/2014	50.2
MW-359-35	Onsite	10-55	07/18/2014	45.8
MW-359-35	Onsite	10-55	10/14/2014	44.4
MW-359-35	Onsite	10-55	02/16/2015	41.1
MW-359-35	Onsite	10-55	04/15/2015	36.9
MW-359-35	Onsite	10-55	07/20/2015	28.0J*
MW-359-35	Onsite	10-55	10/19/2015	23.3
MW-359-35	Onsite	10-55	02/08/2016	23.3
MW-359-35	Onsite	10-55	07/14/2016	18.7
MW-359-35	Onsite	10-55	01/26/2017	15.6
MW-359-35	Onsite	10-55	08/08/2017	13.8
MW-359-35	Onsite	10-55	08/07/2018	41.6
MW-359-60	Onsite	10-55	11/05/2013	16.9
MW-359-60	Onsite	10-55	02/26/2014	12.6
MW-359-60	Onsite	10-55	04/15/2014	10.0
MW-359-60	Onsite	10-55	07/18/2014	11.1
MW-359-60	Onsite	10-55	10/14/2014	8.75J
MW-359-60	Onsite	10-55	02/16/2015	7.67J
MW-359-60	Onsite	10-55	07/20/2015	6.06J
MW-359-60	Onsite	10-55	02/08/2016	6.58J
MW-359-60	Onsite	10-55	07/14/2016	4.41J
MW-359-60	Onsite	10-55	01/26/2017	7.37J
MW-359-60	Onsite	10-55	07/11/2017	7.20J
MW-359-60	Onsite	10-55	08/02/2018	41.2
MW-359-80	Onsite	55-90	01/02/2014	3.93J
MW-359-80	Onsite	55-90	04/14/2014	3.50J
MW-359-80	Onsite	55-90	07/18/2014	<5.50
MW-359-80	Onsite	55-90	10/14/2014	<5.20
MW-359-80	Onsite	55-90	02/16/2015	<5.15
MW-359-80	Onsite	55-90	07/20/2015	<5.00
MW-359-80	Onsite	55-90	07/14/2016	<4.71
MW-359-80	Onsite	55-90	07/11/2017	<5.10
MW-359-150	Onsite	90-160	11/05/2013	<6.60
MW-359-150	Onsite	90-160	02/26/2014	<5.00
MW-359-150	Onsite	90-160	04/15/2014	<5.55
MW-359-150	Onsite	90-160	07/18/2014	<5.00
MW-359-150	Onsite	90-160	10/14/2014	<5.20
MW-359-150	Onsite	90-160	07/20/2015	<5.25
MW-359-150	Onsite	90-160	07/14/2016	<5.15
MW-360-15	Onsite	Water Table	11/13/2013	21.7
MW-360-15	Onsite	Water Table	02/25/2014	30.6

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-360-15	Onsite	Water Table	04/14/2014	32.0
MW-360-15	Onsite	Water Table	07/17/2014	11.5
MW-360-15	Onsite	Water Table	10/14/2014	7.63J
MW-360-15	Onsite	Water Table	07/20/2015	5.57J
MW-360-15	Onsite	Water Table	02/08/2016	8.73J
MW-360-15	Onsite	Water Table	07/14/2016	<5.05
MW-360-15	Onsite	Water Table	01/26/2017	3.76J
MW-360-15	Onsite	Water Table	07/11/2017	<5.15
MW-360-15	Onsite	Water Table	07/11/2018	<5.15
MW-360-35	Onsite	10-55	11/13/2013	82.6
MW-360-35	Onsite	10-55	02/25/2014	74.3
MW-360-35	Onsite	10-55	04/14/2014	70.8
MW-360-35	Onsite	10-55	07/17/2014	61.1
MW-360-35	Onsite	10-55	10/14/2014	42.9
MW-360-35	Onsite	10-55	02/16/2015	28.7
MW-360-35	Onsite	10-55	04/15/2015	28.8
MW-360-35	Onsite	10-55	07/20/2015	24.6
MW-360-35	Onsite	10-55	10/16/2015	22.4
MW-360-35	Onsite	10-55	02/08/2016	14.4
MW-360-35	Onsite	10-55	07/14/2016	11.5
MW-360-35	Onsite	10-55	01/26/2017	8.16J*
MW-360-35	Onsite	10-55	07/11/2017	5.97J
MW-360-35	Onsite	10-55	07/11/2018	9.54J
MW-360-50	Onsite	10-55	11/11/2013	92.7
MW-360-50	Onsite	10-55	02/25/2014	90.6
MW-360-50	Onsite	10-55	04/14/2014	88.8J*
MW-360-50	Onsite	10-55	07/17/2014	73.4
MW-360-50	Onsite	10-55	10/14/2014	54.7
MW-360-50	Onsite	10-55	02/16/2015	43.8
MW-360-50	Onsite	10-55	04/15/2015	39.5
MW-360-50	Onsite	10-55	07/20/2015	32.5
MW-360-50	Onsite	10-55	10/16/2015	27.5
MW-360-50	Onsite	10-55	02/08/2016	20.0
MW-360-50	Onsite	10-55	07/14/2016	16.8
MW-360-50	Onsite	10-55	01/26/2017	9.85J
MW-360-50	Onsite	10-55	07/11/2017	7.55J
MW-360-50	Onsite	10-55	07/11/2018	13.0
MW-360-80	Onsite	55-90	11/15/2013	6.52J
MW-360-80	Onsite	55-90	02/25/2014	<5.00
MW-360-80	Onsite	55-90	04/14/2014	<5.00
MW-360-80	Onsite	55-90	07/17/2014	<5.45
MW-360-80	Onsite	55-90	10/14/2014	4.68J
MW-360-80	Onsite	55-90	07/20/2015	<5.20
MW-360-80	Onsite	55-90	02/08/2016	<5.10
MW-360-80	Onsite	55-90	07/14/2016	<5.05
MW-360-80	Onsite	55-90	07/11/2017	3.13J
MW-360-150	Onsite	90-160	11/14/2013	<6.52
MW-360-150	Onsite	90-160	02/25/2014	<5.00
MW-360-150	Onsite	90-160	04/14/2014	<5.00
MW-360-150	Onsite	90-160	07/17/2014	<5.00
MW-360-150	Onsite	90-160	10/14/2014	<5.20
MW-360-150	Onsite	90-160	07/20/2015	<5.15

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-360-150	Onsite	90-160	07/14/2016	<5.00
MW-361-15	Onsite	Water Table	02/03/2014	<5.25
MW-361-15	Onsite	Water Table	04/23/2014	<5.15
MW-361-15	Onsite	Water Table	08/26/2014	<5.00
MW-361-15	Onsite	Water Table	10/29/2014	<5.00
MW-361-15	Onsite	Water Table	08/10/2015	33.7
MW-361-15	Onsite	Water Table	10/22/2015	11.7
MW-361-15	Onsite	Water Table	02/29/2016	<5.10
MW-361-15	Onsite	Water Table	08/15/2016	<5.15
MW-361-15	Onsite	Water Table	10/21/2016	<5.15
MW-361-15	Onsite	Water Table	02/23/2017	<5.10
MW-362-15	Onsite	Water Table	12/10/2013	<5.40
MW-362-15	Onsite	Water Table	03/19/2014	<5.00
MW-362-15	Onsite	Water Table	04/17/2014	<5.20
MW-362-15	Onsite	Water Table	07/24/2014	<5.00
MW-362-15	Onsite	Water Table	10/15/2014	<5.00
MW-362-15	Onsite	Water Table	07/23/2015	<5.00
MW-362-15	Onsite	Water Table	07/18/2016	<5.05
MW-362-15	Onsite	Water Table	08/08/2017	<5.10
MW-362-25	Onsite	10-55	12/10/2013	<5.50
MW-362-25	Onsite	10-55	03/12/2014	<5.00
MW-362-25	Onsite	10-55	04/17/2014	<5.00
MW-362-25	Onsite	10-55	07/24/2014	<5.15J*
MW-362-25	Onsite	10-55	10/15/2014	<5.00
MW-362-25	Onsite	10-55	07/23/2015	<5.10
MW-362-25	Onsite	10-55	07/18/2016	<5.10
MW-362-35	Onsite	10-55	12/10/2013	<5.00
MW-362-35	Onsite	10-55	03/12/2014	<5.00
MW-362-35	Onsite	10-55	04/17/2014	<5.00
MW-362-35	Onsite	10-55	07/24/2014	<5.00
MW-362-35	Onsite	10-55	10/15/2014	<5.00
MW-362-35	Onsite	10-55	07/23/2015	<5.10
MW-362-35	Onsite	10-55	07/18/2016	<5.05
MW-362-50	Onsite	10-55	12/10/2013	<5.00
MW-362-50	Onsite	10-55	03/19/2014	<5.00
MW-362-50	Onsite	10-55	04/17/2014	<5.00
MW-362-50	Onsite	10-55	07/24/2014	<5.00
MW-362-50	Onsite	10-55	10/15/2014	<5.25
MW-362-50	Onsite	10-55	07/23/2015	<5.00
MW-362-50	Onsite	10-55	07/18/2016	<5.10
MW-362-50	Onsite	10-55	07/12/2017	<5.25
MW-362-80	Onsite	55-90	12/10/2013	3.85J
MW-362-80	Onsite	55-90	03/12/2014	5.61J
MW-362-80	Onsite	55-90	04/17/2014	5.36J
MW-362-80	Onsite	55-90	07/24/2014	4.20J
MW-362-80	Onsite	55-90	10/15/2014	3.41J
MW-362-80	Onsite	55-90	02/17/2015	3.99J
MW-362-80	Onsite	55-90	07/23/2015	4.46J
MW-362-80	Onsite	55-90	02/11/2016	<5.00
MW-362-80	Onsite	55-90	07/19/2016	4.74J
MW-362-80	Onsite	55-90	02/28/2017	<5.15
MW-362-150	Onsite	90-160	11/14/2013	<6.36

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-362-150	Onsite	90-160	03/19/2014	<5.00
MW-362-150	Onsite	90-160	04/17/2014	<5.20
MW-362-150	Onsite	90-160	07/24/2014	<5.00
MW-362-150	Onsite	90-160	10/15/2014	<5.00
MW-362-150	Onsite	90-160	07/23/2015	<5.00
MW-362-150	Onsite	90-160	07/19/2016	<5.15
MW-363-15	Onsite	Water Table	11/12/2013	<6.74
MW-363-15	Onsite	Water Table	03/26/2014	<5.30
MW-363-15	Onsite	Water Table	04/30/2014	<5.00
MW-363-15	Onsite	Water Table	07/30/2014	<5.15
MW-363-15	Onsite	Water Table	10/10/2014	<5.40
MW-363-15	Onsite	Water Table	07/17/2015	<5.25
MW-363-15	Onsite	Water Table	07/25/2016	<5.25
MW-364-15	Onsite	Water Table	01/07/2014	32.2
MW-364-15	Onsite	Water Table	04/04/2014	22.7
MW-364-15	Onsite	Water Table	07/16/2014	<5.00
MW-364-15	Onsite	Water Table	10/10/2014	6.24J
MW-364-15	Onsite	Water Table	01/15/2015	9.52J
MW-364-15	Onsite	Water Table	04/08/2015	6.24J
MW-364-15	Onsite	Water Table	07/17/2015	3.25J
MW-364-15	Onsite	Water Table	02/08/2016	<5.10
MW-364-15	Onsite	Water Table	07/25/2016	<5.50
MW-364-15	Onsite	Water Table	08/08/2017	<5.15
MW-364-30	Onsite	10-55	01/07/2014	25.8
MW-364-30	Onsite	10-55	04/04/2014	22.3
MW-364-30	Onsite	10-55	07/16/2014	17.3
MW-364-30	Onsite	10-55	10/10/2014	9.91J
MW-364-30	Onsite	10-55	01/15/2015	6.52J
MW-364-30	Onsite	10-55	04/08/2015	4.23J
MW-364-30	Onsite	10-55	07/17/2015	4.09J
MW-364-30	Onsite	10-55	02/08/2016	<5.25
MW-364-30	Onsite	10-55	07/25/2016	<5.05
MW-364-30	Onsite	10-55	08/08/2017	<5.00
MW-364-65	Onsite	10-55	11/18/2013	9.60J
MW-364-65	Onsite	10-55	11/22/2013	10.1J
MW-364-65	Onsite	10-55	02/24/2014	8.94J
MW-364-65	Onsite	10-55	04/04/2014	7.51J
MW-364-65	Onsite	10-55	07/16/2014	4.60J
MW-364-65	Onsite	10-55	10/10/2014	3.38J
MW-364-65	Onsite	10-55	01/15/2015	3.29J
MW-364-65	Onsite	10-55	07/17/2015	<5.00
MW-364-65	Onsite	10-55	02/08/2016	<5.05
MW-364-65	Onsite	10-55	07/25/2016	<5.15
MW-364-65	Onsite	10-55	07/12/2017	3.46J
MW-364-90	Onsite	55-90	01/07/2014	13.8
MW-364-90	Onsite	55-90	04/04/2014	10.5
MW-364-90	Onsite	55-90	07/16/2014	7.48J
MW-364-90	Onsite	55-90	10/10/2014	5.91J
MW-364-90	Onsite	55-90	01/15/2015	4.80J
MW-364-90	Onsite	55-90	07/17/2015	<5.15
MW-364-90	Onsite	55-90	02/08/2016	3.52J
MW-364-90	Onsite	55-90	07/25/2016	<5.10

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-364-90	Onsite	55-90	02/13/2017	<5.15
MW-364-90	Onsite	55-90	07/12/2017	3.62J
MW-364-150	Onsite	90-160	11/22/2013	<5.00
MW-364-150	Onsite	90-160	02/24/2014	<5.00
MW-364-150	Onsite	90-160	04/04/2014	<5.00
MW-364-150	Onsite	90-160	07/16/2014	<5.00
MW-364-150	Onsite	90-160	10/10/2014	<5.00
MW-364-150	Onsite	90-160	07/17/2015	<5.00
MW-364-150	Onsite	90-160	07/25/2016	<5.05
MW-365-15	Onsite	Water Table	01/30/2014	<5.00
MW-365-15	Onsite	Water Table	04/29/2014	<5.00
MW-365-15	Onsite	Water Table	09/01/2014	<5.25
MW-365-15	Onsite	Water Table	10/29/2014	<5.00
MW-365-15	Onsite	Water Table	08/11/2015	<5.00J*
MW-365-15	Onsite	Water Table	08/17/2016	<5.05
MW-366-15	Onsite	Water Table	01/30/2014	<5.00
MW-366-15	Onsite	Water Table	04/24/2014	4.65J
MW-366-15	Onsite	Water Table	09/02/2014	<5.20
MW-366-15	Onsite	Water Table	10/30/2014	<5.10
MW-366-15	Onsite	Water Table	02/24/2015	<5.40
MW-366-15	Onsite	Water Table	08/07/2015	5.70J
MW-366-15	Onsite	Water Table	02/26/2016	<5.20
MW-366-15	Onsite	Water Table	08/17/2016	<5.25
MW-367-15	Onsite	Water Table	02/03/2014	<5.30
MW-367-15	Onsite	Water Table	04/22/2014	<5.40
MW-367-15	Onsite	Water Table	08/26/2014	<5.00
MW-367-15	Onsite	Water Table	10/29/2014	<5.00
MW-367-15	Onsite	Water Table	08/10/2015	<5.00
MW-367-15	Onsite	Water Table	08/15/2016	<5.05J*
MW-368-15	Onsite	Water Table	01/06/2014	<5.55
MW-368-15	Onsite	Water Table	04/22/2014	<5.55
MW-368-15	Onsite	Water Table	08/26/2014	<5.00
MW-368-15	Onsite	Water Table	10/29/2014	<5.00
MW-368-15	Onsite	Water Table	08/10/2015	<5.00
MW-368-15	Onsite	Water Table	08/15/2016	<5.15J*
MW-369-16	Onsite	Water Table	06/10/2014	90.4
MW-369-16	Onsite	Water Table	08/19/2014	88.0
MW-369-16	Onsite	Water Table	10/24/2014	67.7
MW-369-16	Onsite	Water Table	02/19/2015	77.9
MW-369-16	Onsite	Water Table	04/25/2015	88.2
MW-369-16	Onsite	Water Table	07/31/2015	68.7
MW-369-16	Onsite	Water Table	10/20/2015	60.9
MW-369-16	Onsite	Water Table	02/11/2016	72.6
MW-369-16	Onsite	Water Table	04/08/2016	78.0
MW-369-16	Onsite	Water Table	07/20/2016	66.4
MW-369-16	Onsite	Water Table	10/20/2016	71.3
MW-369-16	Onsite	Water Table	02/25/2017	92.6
MW-369-16	Onsite	Water Table	04/11/2017	98.4
MW-369-55	Onsite	10-55	06/10/2014	27.6
MW-369-55	Onsite	10-55	08/19/2014	36.6
MW-369-55	Onsite	10-55	10/24/2014	40.4
MW-369-55	Onsite	10-55	02/17/2015	33.7

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-369-55	Onsite	10-55	04/25/2015	28.6
MW-369-55	Onsite	10-55	07/31/2015	23.1
MW-369-55	Onsite	10-55	10/20/2015	24.6
MW-369-55	Onsite	10-55	02/11/2016	29.6
MW-369-55	Onsite	10-55	04/08/2016	26.1
MW-369-55	Onsite	10-55	07/20/2016	19.0
MW-369-55	Onsite	10-55	10/20/2016	20.8
MW-369-55	Onsite	10-55	02/25/2017	17.0
MW-369-55	Onsite	10-55	04/11/2017	14.4
MW-369-75	Onsite	55-90	06/10/2014	8.91J
MW-369-75	Onsite	55-90	08/19/2014	7.96J*
MW-369-75	Onsite	55-90	10/24/2014	9.43J
MW-369-75	Onsite	55-90	02/17/2015	4.90J
MW-369-75	Onsite	55-90	04/25/2015	4.19J
MW-369-75	Onsite	55-90	07/31/2015	<5.00
MW-369-75	Onsite	55-90	10/20/2015	6.16J
MW-369-75	Onsite	55-90	02/11/2016	<5.05
MW-369-75	Onsite	55-90	04/08/2016	<5.20
MW-369-75	Onsite	55-90	07/20/2016	<5.15
MW-369-75	Onsite	55-90	10/20/2016	7.75J
MW-369-75	Onsite	55-90	02/25/2017	6.29J
MW-370-15	Onsite	Water Table	01/22/2014	40.4
MW-370-15	Onsite	Water Table	04/18/2014	45.7
MW-370-15	Onsite	Water Table	08/02/2014	19.4
MW-370-15	Onsite	Water Table	10/21/2014	<5.00
MW-370-15	Onsite	Water Table	02/25/2015	3.79J
MW-370-15	Onsite	Water Table	04/17/2015	<5.10
MW-370-15	Onsite	Water Table	07/29/2015	<5.00
MW-370-15	Onsite	Water Table	10/17/2015	<5.20
MW-370-15	Onsite	Water Table	02/11/2016	5.65J
MW-370-15	Onsite	Water Table	07/19/2016	<5.00
MW-370-15	Onsite	Water Table	10/18/2016	34.8
MW-370-15	Onsite	Water Table	02/17/2017	29.4
MW-370-15	Onsite	Water Table	04/10/2017	27.4
MW-370-55	Onsite	10-55	01/22/2014	19.4
MW-370-55	Onsite	10-55	04/25/2014	22.8
MW-370-55	Onsite	10-55	08/02/2014	9.59J
MW-370-55	Onsite	10-55	10/21/2014	9.78J
MW-370-55	Onsite	10-55	02/25/2015	8.35J
MW-370-55	Onsite	10-55	04/17/2015	7.05J
MW-370-55	Onsite	10-55	07/29/2015	6.74J*
MW-370-55	Onsite	10-55	10/17/2015	6.37J
MW-370-55	Onsite	10-55	02/11/2016	6.89J
MW-370-55	Onsite	10-55	04/06/2016	7.68J
MW-370-55	Onsite	10-55	07/19/2016	6.42J
MW-370-55	Onsite	10-55	10/18/2016	11.4
MW-370-55	Onsite	10-55	02/17/2017	9.36J
MW-370-55	Onsite	10-55	04/10/2017	8.69J
MW-370-75	Onsite	55-90	01/21/2014	<5.20
MW-370-75	Onsite	55-90	04/18/2014	<5.00
MW-370-75	Onsite	55-90	08/02/2014	<5.00
MW-370-75	Onsite	55-90	10/21/2014	<5.00J*

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-370-75	Onsite	55-90	02/25/2015	<5.25
MW-370-75	Onsite	55-90	04/17/2015	<5.00
MW-370-75	Onsite	55-90	07/29/2015	<5.00J*
MW-370-75	Onsite	55-90	10/17/2015	<5.15
MW-370-75	Onsite	55-90	02/11/2016	<5.00
MW-370-75	Onsite	55-90	07/19/2016	<5.05
MW-370-75	Onsite	55-90	02/17/2017	<5.15
MW-371-15	Onsite	Water Table	06/05/2014	32.0
MW-371-15	Onsite	Water Table	07/25/2014	71.0
MW-371-15	Onsite	Water Table	10/17/2014	15.1
MW-371-15	Onsite	Water Table	02/20/2015	5.99JL*
MW-371-15	Onsite	Water Table	04/17/2015	7.73J
MW-371-15	Onsite	Water Table	07/24/2015	7.04J
MW-371-15	Onsite	Water Table	10/19/2015	5.27J
MW-371-15	Onsite	Water Table	02/11/2016	6.14J
MW-371-15	Onsite	Water Table	04/07/2016	4.78J
MW-371-15	Onsite	Water Table	07/15/2016	3.52J
MW-371-15	Onsite	Water Table	10/19/2016	6.38J
MW-371-15	Onsite	Water Table	02/14/2017	24.8
MW-371-15	Onsite	Water Table	04/10/2017	19.4
MW-371-15	Onsite	Water Table	07/11/2017	18.9
MW-371-15	Onsite	Water Table	08/03/2018	146
MW-371-55	Onsite	10-55	06/06/2014	5.50JL*
MW-371-55	Onsite	10-55	07/25/2014	7.18J
MW-371-55	Onsite	10-55	10/17/2014	4.83J
MW-371-55	Onsite	10-55	02/19/2015	4.75J
MW-371-55	Onsite	10-55	04/17/2015	4.15J
MW-371-55	Onsite	10-55	07/24/2015	3.40J
MW-371-55	Onsite	10-55	10/19/2015	<5.15
MW-371-55	Onsite	10-55	02/11/2016	<5.30
MW-371-55	Onsite	10-55	04/07/2016	<5.10
MW-371-55	Onsite	10-55	07/15/2016	<5.05
MW-371-55	Onsite	10-55	10/19/2016	<5.10
MW-371-55	Onsite	10-55	02/14/2017	3.21J
MW-371-75	Onsite	55-90	06/06/2014	5.41JL*
MW-371-75	Onsite	55-90	07/25/2014	4.86J
MW-371-75	Onsite	55-90	10/17/2014	5.29J
MW-371-75	Onsite	55-90	02/19/2015	4.47J
MW-371-75	Onsite	55-90	04/17/2015	3.80J
MW-371-75	Onsite	55-90	07/24/2015	<5.00
MW-371-75	Onsite	55-90	10/19/2015	<5.00
MW-371-75	Onsite	55-90	02/11/2016	3.36J
MW-371-75	Onsite	55-90	04/07/2016	3.32J
MW-371-75	Onsite	55-90	07/15/2016	<5.10
MW-371-75	Onsite	55-90	10/19/2016	3.48J
MW-371-75	Onsite	55-90	02/14/2017	<5.10
MW-371-75	Onsite	55-90	04/11/2017	<5.10
MW-371-125	Onsite	90-160	06/06/2014	<5.45J*
MW-371-125	Onsite	90-160	07/25/2014	<5.00
MW-371-125	Onsite	90-160	10/17/2014	<5.00
MW-371-125	Onsite	90-160	02/19/2015	<5.00
MW-371-125	Onsite	90-160	04/17/2015	<5.10

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
MW-371-125	Onsite	90-160	07/24/2015	<5.00
MW-371-125	Onsite	90-160	10/19/2015	<5.10
MW-371-125	Onsite	90-160	02/11/2016	<5.15
MW-371-125	Onsite	90-160	07/15/2016	<5.00
MW-371-125	Onsite	90-160	02/14/2017	<5.15
MW-372-15	Onsite	Water Table	10/22/2015	676
MW-372-15	Onsite	Water Table	02/09/2016	886
MW-372-15	Onsite	Water Table	04/07/2016	634
MW-372-15	Onsite	Water Table	07/27/2016	379J*
MW-372-15	Onsite	Water Table	10/18/2016	908
MW-372-15	Onsite	Water Table	02/16/2017	977
MW-372-15	Onsite	Water Table	04/11/2017	1060
MW-372-15	Onsite	Water Table	07/10/2017	1510
MW-372-15	Onsite	Water Table	01/16/2018	407
MW-372-15	Onsite	Water Table	08/08/2018	505
MW-373-15	Onsite	Water Table	10/23/2015	608
MW-373-15	Onsite	Water Table	02/09/2016	14.8
MW-373-15	Onsite	Water Table	04/07/2016	12.1
MW-373-15	Onsite	Water Table	07/27/2016	34.4
MW-373-15	Onsite	Water Table	10/18/2016	193
MW-373-15	Onsite	Water Table	02/17/2017	9.01J
MW-373-15	Onsite	Water Table	04/10/2017	4.69J
O-1	Onsite	Water Table	10/20/2011	10400
O-1	Onsite	Water Table	08/01/2012	4940
O-1	Onsite	Water Table	12/13/2012	6090
O-1	Onsite	Water Table	01/14/2013	6520JL*
O-1	Onsite	Water Table	07/30/2013	6590
O-1	Onsite	Water Table	11/11/2013	5080JL*
O-1	Onsite	Water Table	03/07/2014	6110JL*
O-1	Onsite	Water Table	07/09/2014	89.3
O-1	Onsite	Water Table	10/28/2014	4200
O-1	Onsite	Water Table	08/05/2015	2640
O-1	Onsite	Water Table	10/21/2015	2480
O-1	Onsite	Water Table	02/29/2016	3450JL*
O-1	Onsite	Water Table	08/11/2016	2200
O-1	Onsite	Water Table	07/12/2017	1990
O-1	Onsite	Water Table	01/16/2018	2340
O-1	Onsite	Water Table	07/18/2018	1420
O-2	Onsite	Water Table	02/12/2013	374
O-2	Onsite	Water Table	05/02/2013	348
O-2	Onsite	Water Table	09/05/2013	111
O-2	Onsite	Water Table	11/16/2013	95.6
O-2	Onsite	Water Table	03/11/2014	89.1
O-2	Onsite	Water Table	04/16/2014	108
O-2	Onsite	Water Table	08/20/2014	147
O-2	Onsite	Water Table	10/30/2014	154
O-2	Onsite	Water Table	02/24/2015	189
O-2	Onsite	Water Table	04/21/2015	190
O-2	Onsite	Water Table	08/07/2015	147
O-2	Onsite	Water Table	10/27/2015	168J*
O-2	Onsite	Water Table	02/26/2016	187
O-2	Onsite	Water Table	04/11/2016	178

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-2	Onsite	Water Table	08/17/2016	164
O-2	Onsite	Water Table	10/25/2016	181
O-2	Onsite	Water Table	02/24/2017	172
O-2	Onsite	Water Table	04/12/2017	166
O-2	Onsite	Water Table	07/24/2017	199
O-2	Onsite	Water Table	08/29/2017	277
O-2	Onsite	Water Table	09/20/2017	253
O-2	Onsite	Water Table	10/25/2017	238
O-2	Onsite	Water Table	01/19/2018	272
O-2	Onsite	Water Table	04/03/2018	288JL *
O-2	Onsite	Water Table	07/10/2018	234
O-3	Onsite	Water Table	10/19/2011	10.1J
O-3	Onsite	Water Table	11/15/2012	11.1
O-3	Onsite	Water Table	02/02/2013	9.98J
O-3	Onsite	Water Table	05/09/2013	8.02J
O-3	Onsite	Water Table	08/08/2013	<6.52
O-3	Onsite	Water Table	11/16/2013	<5.00
O-3	Onsite	Water Table	03/10/2014	6.44J
O-3	Onsite	Water Table	04/24/2014	5.87J
O-3	Onsite	Water Table	08/13/2014	<5.20
O-3	Onsite	Water Table	11/06/2014	<5.00
O-3	Onsite	Water Table	02/24/2015	<5.00
O-3	Onsite	Water Table	04/29/2015	<5.30
O-3	Onsite	Water Table	08/10/2015	<5.00
O-3	Onsite	Water Table	10/21/2015	<5.10
O-3	Onsite	Water Table	03/01/2016	<5.05
O-3	Onsite	Water Table	08/15/2016	<5.05J*
O-3	Onsite	Water Table	02/27/2017	<5.15
O-4	Onsite	Water Table	10/19/2011	112
O-4	Onsite	Water Table	11/09/2012	149
O-4	Onsite	Water Table	02/28/2013	210
O-4	Onsite	Water Table	05/21/2013	194
O-4	Onsite	Water Table	08/06/2013	172
O-4	Onsite	Water Table	10/16/2013	172
O-4	Onsite	Water Table	02/28/2014	70.7
O-4	Onsite	Water Table	04/22/2014	54.3
O-4	Onsite	Water Table	07/30/2014	19.8
O-4	Onsite	Water Table	10/28/2014	14.8
O-4	Onsite	Water Table	02/26/2015	10.3
O-4	Onsite	Water Table	04/18/2015	9.88J
O-4	Onsite	Water Table	07/31/2015	5.05J
O-4	Onsite	Water Table	10/16/2015	5.21J
O-4	Onsite	Water Table	02/17/2016	4.81J
O-4	Onsite	Water Table	04/08/2016	4.87J
O-4	Onsite	Water Table	08/04/2016	<5.20
O-4	Onsite	Water Table	10/14/2016	<5.05
O-4	Onsite	Water Table	02/28/2017	4.77J
O-4	Onsite	Water Table	04/10/2017	5.77J
O-5	Onsite	Water Table	10/19/2011	171
O-5	Onsite	Water Table	08/07/2013	247
O-5	Onsite	Water Table	10/16/2013	130
O-5	Onsite	Water Table	02/28/2014	161

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-5	Onsite	Water Table	04/21/2014	180
O-5	Onsite	Water Table	08/01/2014	101
O-5	Onsite	Water Table	10/28/2014	105
O-5	Onsite	Water Table	02/19/2015	256
O-5	Onsite	Water Table	04/23/2015	239
O-5	Onsite	Water Table	07/31/2015	207
O-5	Onsite	Water Table	10/20/2015	108J*
O-5	Onsite	Water Table	02/17/2016	196
O-5	Onsite	Water Table	06/16/2016	205
O-5	Onsite	Water Table	08/04/2016	95.7
O-5	Onsite	Water Table	10/14/2016	97.0
O-5	Onsite	Water Table	02/28/2017	158J*
O-5	Onsite	Water Table	04/10/2017	154
O-5-65	Onsite	10-55	07/29/2013	<6.20
O-5-65	Onsite	10-55	10/16/2013	<6.32
O-5-65	Onsite	10-55	02/28/2014	<5.00
O-5-65	Onsite	10-55	04/21/2014	<5.15
O-5-65	Onsite	10-55	08/01/2014	6.18J
O-5-65	Onsite	10-55	10/28/2014	11.9
O-5-65	Onsite	10-55	02/17/2015	7.94J
O-5-65	Onsite	10-55	04/23/2015	11.0
O-5-65	Onsite	10-55	07/31/2015	<5.20
O-5-65	Onsite	10-55	10/20/2015	9.37J
O-5-65	Onsite	10-55	02/17/2016	4.61J
O-5-65	Onsite	10-55	06/16/2016	4.23J
O-5-65	Onsite	10-55	08/04/2016	<5.75
O-5-65	Onsite	10-55	10/18/2016	12.4
O-5-65	Onsite	10-55	02/28/2017	3.49J
O-5-65	Onsite	10-55	04/10/2017	3.79J
O-6	Onsite	Water Table	10/19/2011	198
O-6	Onsite	Water Table	11/09/2012	8.18J
O-6	Onsite	Water Table	02/11/2013	28.8
O-6	Onsite	Water Table	05/10/2013	21.9
O-6	Onsite	Water Table	08/07/2013	23.9
O-6	Onsite	Water Table	10/22/2013	13.1
O-6	Onsite	Water Table	02/28/2014	13.9
O-6	Onsite	Water Table	04/22/2014	18.9
O-6	Onsite	Water Table	07/31/2014	17.2
O-6	Onsite	Water Table	10/23/2014	40.4
O-6	Onsite	Water Table	02/19/2015	15.8
O-6	Onsite	Water Table	04/23/2015	13.2
O-6	Onsite	Water Table	07/24/2015	15.4
O-6	Onsite	Water Table	10/21/2015	16.2
O-6	Onsite	Water Table	02/08/2016	58.4
O-6	Onsite	Water Table	06/16/2016	24.6
O-6	Onsite	Water Table	08/08/2016	25.4
O-6	Onsite	Water Table	10/18/2016	27.0
O-6	Onsite	Water Table	02/27/2017	14.7
O-6	Onsite	Water Table	04/11/2017	15.9
O-8	Onsite	Water Table	10/20/2011	13.0
O-11	Onsite	Water Table	08/06/2013	252J*
O-11	Onsite	Water Table	08/02/2017	52.0

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-11	Onsite	Water Table	10/18/2017	129
O-11	Onsite	Water Table	01/15/2018	203JL*
O-11	Onsite	Water Table	04/03/2018	234JL*
O-11	Onsite	Water Table	07/10/2018	141
O-12	Onsite	Water Table	10/19/2011	309
O-12	Onsite	Water Table	11/15/2012	103
O-12	Onsite	Water Table	01/14/2013	75.0
O-12	Onsite	Water Table	05/09/2013	74.4
O-12	Onsite	Water Table	08/08/2013	91.1
O-12	Onsite	Water Table	10/19/2013	40.4
O-12	Onsite	Water Table	03/07/2014	25.8
O-12	Onsite	Water Table	04/24/2014	16.8
O-12	Onsite	Water Table	08/13/2014	8.06J
O-12	Onsite	Water Table	10/30/2014	<5.00
O-12	Onsite	Water Table	02/21/2015	7.20J
O-12	Onsite	Water Table	04/24/2015	5.10J
O-12	Onsite	Water Table	08/10/2015	3.94J
O-12	Onsite	Water Table	10/02/2015	<5.10
O-12	Onsite	Water Table	02/29/2016	4.30J
O-12	Onsite	Water Table	06/16/2016	3.85J
O-12	Onsite	Water Table	08/10/2016	<5.20
O-12	Onsite	Water Table	10/21/2016	<5.00
O-12	Onsite	Water Table	02/25/2017	<5.40
O-12	Onsite	Water Table	04/11/2017	<5.55
O-12	Onsite	Water Table	08/02/2017	<5.20
O-12	Onsite	Water Table	10/19/2017	<10.4
O-12	Onsite	Water Table	01/15/2018	31.8
O-12	Onsite	Water Table	04/05/2018	55.1
O-12-65	Onsite	10-55	08/15/2013	<6.82
O-12-65	Onsite	10-55	10/19/2013	<6.20
O-12-65	Onsite	10-55	10/11/2013	<6.56
O-12-65	Onsite	10-55	03/07/2014	<5.00
O-12-65	Onsite	10-55	04/24/2014	<5.20
O-12-65	Onsite	10-55	08/12/2014	<5.30
O-12-65	Onsite	10-55	10/30/2014	<5.00
O-12-65	Onsite	10-55	02/21/2015	<5.15
O-12-65	Onsite	10-55	04/24/2015	<5.10
O-12-65	Onsite	10-55	08/10/2015	<5.00
O-12-65	Onsite	10-55	10/21/2015	<5.30
O-12-65	Onsite	10-55	02/29/2016	<5.10
O-12-65	Onsite	10-55	08/09/2016	<5.10
O-12-65	Onsite	10-55	02/25/2017	<5.40
O-13	Onsite	Water Table	08/06/2013	192
O-13	Onsite	Water Table	08/02/2017	29.5
O-13	Onsite	Water Table	10/18/2017	23.8JL*
O-13	Onsite	Water Table	01/19/2018	21.5
O-13	Onsite	Water Table	04/03/2018	22.4JL*
O-14	Onsite	Water Table	10/20/2011	<6.40
O-14	Onsite	Water Table	08/09/2012	<6.20
O-14	Onsite	Water Table	02/05/2013	<6.40
O-14	Onsite	Water Table	08/29/2013	<6.20
O-14	Onsite	Water Table	11/25/2013	<5.00

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-14	Onsite	Water Table	09/03/2014	<5.25
O-14	Onsite	Water Table	08/07/2015	7.32J
O-14	Onsite	Water Table	08/17/2016	<5.10
O-15	Onsite	Water Table	10/20/2011	<6.20
O-16	Onsite	Water Table	10/20/2011	<6.20
O-16	Onsite	Water Table	04/20/2012	<6.66
O-17	Onsite	Water Table	10/19/2011	346
O-18	Onsite	Water Table	10/20/2011	23.4
O-19	Onsite	Water Table	02/12/2013	683
O-19	Onsite	Water Table	06/04/2013	722JL *
O-19	Onsite	Water Table	07/23/2013	803
O-19	Onsite	Water Table	11/07/2013	745
O-19	Onsite	Water Table	03/11/2014	524
O-19	Onsite	Water Table	04/16/2014	724
O-19	Onsite	Water Table	08/21/2014	575
O-19	Onsite	Water Table	10/22/2014	609J*
O-19	Onsite	Water Table	02/20/2015	488
O-19	Onsite	Water Table	04/20/2015	530
O-19	Onsite	Water Table	08/04/2015	593
O-19	Onsite	Water Table	10/23/2015	561
O-19	Onsite	Water Table	02/22/2016	531
O-19	Onsite	Water Table	06/16/2016	487
O-19	Onsite	Water Table	08/18/2016	427
O-19	Onsite	Water Table	10/25/2016	491
O-19	Onsite	Water Table	02/22/2017	428
O-19	Onsite	Water Table	04/12/2017	395
O-19	Onsite	Water Table	07/13/2017	337
O-19	Onsite	Water Table	10/18/2017	295
O-19	Onsite	Water Table	01/19/2018	251
O-19	Onsite	Water Table	04/03/2018	243JL *
O-19-55	Onsite	10-55	01/03/2014	27.0
O-19-55	Onsite	10-55	04/22/2014	28.7
O-19-55	Onsite	10-55	08/14/2014	42.5
O-19-55	Onsite	10-55	10/24/2014	38.8
O-19-55	Onsite	10-55	02/20/2015	37.4
O-19-55	Onsite	10-55	04/23/2015	31.6
O-19-55	Onsite	10-55	08/04/2015	26.9
O-19-55	Onsite	10-55	10/22/2015	53.4
O-19-55	Onsite	10-55	02/05/2016	30.3
O-19-55	Onsite	10-55	06/16/2016	23.2
O-19-55	Onsite	10-55	08/15/2016	27.6J*
O-19-55	Onsite	10-55	10/20/2016	37.5
O-19-55	Onsite	10-55	02/22/2017	17.6
O-19-55	Onsite	10-55	04/11/2017	13.3
O-19-90	Onsite	55-90	01/03/2014	<5.00
O-19-90	Onsite	55-90	04/22/2014	<5.00
O-19-90	Onsite	55-90	08/14/2014	<5.20
O-19-90	Onsite	55-90	10/24/2014	<5.00
O-19-90	Onsite	55-90	02/20/2015	<5.00
O-19-90	Onsite	55-90	04/23/2015	<5.15
O-19-90	Onsite	55-90	08/04/2015	<5.00
O-19-90	Onsite	55-90	10/22/2015	4.67J

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-19-90	Onsite	55-90	02/05/2016	3.21J
O-19-90	Onsite	55-90	08/15/2016	4.06J
O-19-90	Onsite	55-90	02/22/2017	<5.50
O-19-90	Onsite	55-90	04/13/2017	<5.05
O-19-90	Onsite	55-90	08/03/2017	<5.10
O-19-90	Onsite	55-90	10/19/2017	<10.4
O-19-90	Onsite	55-90	01/18/2018	<5.20
O-19-90	Onsite	55-90	04/05/2018	<5.10
O-20	Onsite	Water Table	10/20/2011	1920
O-20	Onsite	Water Table	03/25/2014	1070
O-20	Onsite	Water Table	04/22/2014	810
O-20	Onsite	Water Table	08/09/2014	573
O-20	Onsite	Water Table	10/28/2014	915
O-20	Onsite	Water Table	02/24/2015	1140
O-20	Onsite	Water Table	08/05/2015	677
O-20	Onsite	Water Table	10/21/2015	720
O-20	Onsite	Water Table	03/03/2016	617
O-20	Onsite	Water Table	08/11/2016	383
O-21	Onsite	Water Table	10/20/2011	136
O-22	Onsite	Water Table	02/22/2012	<7.38
O-23	Onsite	Water Table	02/22/2012	<6.88
O-24	Onsite	Water Table	02/22/2012	<7.12
O-24	Onsite	Water Table	11/14/2012	5.02J
O-24	Onsite	Water Table	02/02/2013	<6.40
O-24	Onsite	Water Table	05/09/2013	<6.40
O-24	Onsite	Water Table	08/08/2013	<6.20
O-24	Onsite	Water Table	11/16/2013	3.43J
O-24	Onsite	Water Table	03/07/2014	<5.00
O-24	Onsite	Water Table	04/24/2014	<5.00
O-24	Onsite	Water Table	08/13/2014	<5.00
O-24	Onsite	Water Table	10/30/2014	4.04J
O-24	Onsite	Water Table	02/21/2015	<5.00
O-24	Onsite	Water Table	04/29/2015	<5.00
O-24	Onsite	Water Table	08/11/2015	<5.00
O-24	Onsite	Water Table	10/21/2015	3.78J*
O-24	Onsite	Water Table	02/29/2016	<5.10
O-24	Onsite	Water Table	06/16/2016	<5.10
O-24	Onsite	Water Table	08/15/2016	<5.15J*
O-24	Onsite	Water Table	10/21/2016	4.12J
O-24	Onsite	Water Table	02/25/2017	<5.40
O-24	Onsite	Water Table	07/10/2017	<5.30
O-24	Onsite	Water Table	01/15/2018	<5.50
O-24	Onsite	Water Table	07/19/2018	<5.20
O-24-65	Onsite	10-55	10/11/2013	<6.60
O-24-65	Onsite	10-55	03/07/2014	<5.00
O-24-65	Onsite	10-55	04/24/2014	<5.15
O-24-65	Onsite	10-55	08/12/2014	<5.70J*
O-24-65	Onsite	10-55	10/30/2014	<5.45
O-24-65	Onsite	10-55	02/21/2015	<5.00
O-24-65	Onsite	10-55	04/29/2015	<5.15
O-24-65	Onsite	10-55	08/11/2015	<5.00
O-24-65	Onsite	10-55	10/21/2015	<5.20

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-24-65	Onsite	10-55	02/29/2016	<5.00
O-24-65	Onsite	10-55	08/15/2016	<5.00J*
O-24-65	Onsite	10-55	02/25/2017	<5.20
O-25	Onsite	Water Table	02/22/2012	145
O-26	Onsite	Water Table	02/22/2012	892
O-26	Onsite	Water Table	11/14/2012	671
O-26	Onsite	Water Table	01/14/2013	488
O-26	Onsite	Water Table	05/08/2013	468
O-26	Onsite	Water Table	07/02/2013	376
O-26	Onsite	Water Table	11/16/2013	218
O-26	Onsite	Water Table	03/02/2014	297
O-26	Onsite	Water Table	04/24/2014	261
O-26	Onsite	Water Table	08/13/2014	196
O-26	Onsite	Water Table	10/30/2014	194
O-26	Onsite	Water Table	02/21/2015	116
O-26	Onsite	Water Table	04/24/2015	86.0
O-26	Onsite	Water Table	08/11/2015	57.8
O-26	Onsite	Water Table	10/21/2015	27.4
O-26	Onsite	Water Table	03/01/2016	46.2
O-26	Onsite	Water Table	06/16/2016	30.7
O-26	Onsite	Water Table	08/10/2016	14.3
O-26	Onsite	Water Table	10/21/2016	38.7
O-26	Onsite	Water Table	02/24/2017	15.3
O-26	Onsite	Water Table	04/11/2017	13.8
O-26	Onsite	Water Table	07/10/2017	11.5
O-26	Onsite	Water Table	01/15/2018	22.6
O-26	Onsite	Water Table	07/10/2018	55.3J*
O-26-65	Onsite	10-55	03/02/2014	<5.00
O-26-65	Onsite	10-55	02/27/2014	<5.20
O-26-65	Onsite	10-55	04/24/2014	<5.15
O-26-65	Onsite	10-55	08/12/2014	<5.25
O-26-65	Onsite	10-55	10/30/2014	<5.00
O-26-65	Onsite	10-55	02/21/2015	<5.00
O-26-65	Onsite	10-55	04/24/2015	<5.00
O-26-65	Onsite	10-55	08/11/2015	<5.00J*
O-26-65	Onsite	10-55	10/21/2015	<5.10
O-26-65	Onsite	10-55	03/01/2016	<5.05
O-26-65	Onsite	10-55	08/10/2016	<5.05
O-26-65	Onsite	10-55	02/24/2017	<5.10
O-26-65	Onsite	10-55	07/10/2017	<5.30
O-26-65	Onsite	10-55	07/18/2018	19.8
O-27	Onsite	Water Table	02/22/2012	160
O-27	Onsite	Water Table	03/12/2014	18.5
O-27	Onsite	Water Table	04/16/2014	14.4
O-27	Onsite	Water Table	08/19/2014	29.9
O-27	Onsite	Water Table	10/28/2014	27.9
O-27	Onsite	Water Table	02/24/2015	26.2
O-27	Onsite	Water Table	04/21/2015	23.7
O-27	Onsite	Water Table	08/07/2015	22.0
O-27	Onsite	Water Table	10/15/2015	23.1
O-27	Onsite	Water Table	02/26/2016	24.5
O-27	Onsite	Water Table	04/11/2016	20.9

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-27	Onsite	Water Table	08/17/2016	23.2
O-27	Onsite	Water Table	10/25/2016	24.1
O-27	Onsite	Water Table	02/17/2017	22.4
O-27	Onsite	Water Table	04/12/2017	17.6
O-27	Onsite	Water Table	07/13/2017	15.5J*
O-27	Onsite	Water Table	10/18/2017	61.7JL*
O-27	Onsite	Water Table	02/13/2018	147
O-27	Onsite	Water Table	04/03/2018	167JL*
O-27	Onsite	Water Table	07/17/2018	193
O-27-65	Onsite	10-55	12/04/2013	5.94J
O-27-65	Onsite	10-55	03/21/2014	<5.00
O-27-65	Onsite	10-55	04/25/2014	<5.35
O-27-65	Onsite	10-55	08/14/2014	9.80J
O-27-65	Onsite	10-55	10/28/2014	10.2
O-27-65	Onsite	10-55	02/25/2015	14.4
O-27-65	Onsite	10-55	07/31/2015	7.25J
O-27-65	Onsite	10-55	02/18/2016	13.4
O-27-65	Onsite	10-55	07/28/2016	6.45J
O-27-65	Onsite	10-55	10/18/2016	19.1
O-27-65	Onsite	10-55	02/16/2017	9.76J
O-27-65	Onsite	10-55	04/10/2017	8.95J
O-27-65	Onsite	10-55	07/10/2017	7.37J
O-27-65	Onsite	10-55	07/13/2018	46.2
O-27-150	Onsite	90-160	12/03/2013	<5.00
O-27-150	Onsite	90-160	03/21/2014	<5.40
O-27-150	Onsite	90-160	04/25/2014	<5.45
O-27-150	Onsite	90-160	08/14/2014	<5.55
O-27-150	Onsite	90-160	10/28/2014	<5.00
O-27-150	Onsite	90-160	07/31/2015	<5.15
O-27-150	Onsite	90-160	07/28/2016	<5.10
O-28	Onsite	Water Table	02/22/2012	72.5
O-29	Onsite	Water Table	02/22/2012	<6.66
O-30	Onsite	Water Table	08/28/2012	<6.74
O-31	Onsite	Water Table	10/01/2013	R*
O-31	Onsite	Water Table	03/17/2014	16.9
O-31	Onsite	Water Table	04/16/2014	15.0
O-31	Onsite	Water Table	08/20/2014	<5.00
O-31	Onsite	Water Table	10/30/2014	<5.70
O-31	Onsite	Water Table	02/24/2015	3.45J
O-31	Onsite	Water Table	04/21/2015	6.94J
O-31	Onsite	Water Table	08/07/2015	<5.00J*
O-31	Onsite	Water Table	02/26/2016	5.02J
O-31	Onsite	Water Table	08/17/2016	<5.05
O-31	Onsite	Water Table	02/24/2017	3.71J
O-31	Onsite	Water Table	07/13/2017	<5.20
O-31	Onsite	Water Table	10/18/2017	<10.5
O-31	Onsite	Water Table	01/19/2018	5.51
O-31	Onsite	Water Table	04/03/2018	7.69JL*
O-32	Onsite	Water Table	10/01/2013	376
O-32	Onsite	Water Table	03/14/2014	416
O-32	Onsite	Water Table	04/16/2014	396
O-32	Onsite	Water Table	08/19/2014	112

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-32	Onsite	Water Table	10/22/2014	387
O-32	Onsite	Water Table	02/19/2015	481
O-32	Onsite	Water Table	04/21/2015	418
O-32	Onsite	Water Table	08/04/2015	15.7
O-32	Onsite	Water Table	10/26/2015	306
O-32	Onsite	Water Table	02/22/2016	430
O-32	Onsite	Water Table	08/18/2016	<5.00
O-32	Onsite	Water Table	02/23/2017	374
O-33	Onsite	Water Table	10/07/2013	61.3
O-33	Onsite	Water Table	03/17/2014	36.1
O-33	Onsite	Water Table	04/16/2014	35.6
O-33	Onsite	Water Table	08/20/2014	31.7
O-33	Onsite	Water Table	10/29/2014	44.2
O-33	Onsite	Water Table	02/19/2015	23.1
O-33	Onsite	Water Table	04/20/2015	15.0
O-33	Onsite	Water Table	08/05/2015	23.5
O-33	Onsite	Water Table	10/27/2015	40.5
O-33	Onsite	Water Table	02/26/2016	27.0
O-33	Onsite	Water Table	08/16/2016	29.2
O-33	Onsite	Water Table	02/23/2017	11.2
O-34	Onsite	Water Table	10/10/2013	1700JL*
O-34	Onsite	Water Table	03/15/2014	1210
O-34	Onsite	Water Table	04/21/2014	1300
O-34	Onsite	Water Table	09/02/2014	896
O-34	Onsite	Water Table	10/29/2014	976
O-34	Onsite	Water Table	02/19/2015	927
O-34	Onsite	Water Table	04/20/2015	930
O-34	Onsite	Water Table	08/07/2015	833
O-34	Onsite	Water Table	10/27/2015	954
O-34	Onsite	Water Table	02/22/2016	963
O-34	Onsite	Water Table	08/16/2016	813
O-34	Onsite	Water Table	03/10/2017	620
O-34	Onsite	Water Table	07/13/2017	511
O-34	Onsite	Water Table	01/19/2018	497
O-34	Onsite	Water Table	07/17/2018	421
O-35	Onsite	Water Table	10/10/2013	11.3
O-35	Onsite	Water Table	03/14/2014	<5.15
O-35	Onsite	Water Table	04/21/2014	<5.20
O-35	Onsite	Water Table	09/02/2014	6.99J
O-35	Onsite	Water Table	10/29/2014	8.32J
O-35	Onsite	Water Table	02/19/2015	<5.00
O-35	Onsite	Water Table	08/07/2015	<5.00
O-35	Onsite	Water Table	08/16/2016	<5.10
O-36	Onsite	Water Table	10/07/2013	<6.20J*
O-36	Onsite	Water Table	03/12/2014	<5.15
O-36	Onsite	Water Table	04/16/2014	<5.50
O-36	Onsite	Water Table	08/21/2014	<5.00
O-36	Onsite	Water Table	10/29/2014	<5.15
O-36	Onsite	Water Table	08/06/2015	<5.15
O-36	Onsite	Water Table	08/18/2016	<5.00J*
O-37	Onsite	Water Table	10/07/2013	7.71JL*
O-37	Onsite	Water Table	03/12/2014	<5.00

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
O-37	Onsite	Water Table	04/21/2014	<5.40
O-37	Onsite	Water Table	08/25/2014	5.25J
O-37	Onsite	Water Table	10/29/2014	9.05J
O-37	Onsite	Water Table	02/19/2015	3.95J
O-37	Onsite	Water Table	08/06/2015	<5.40
O-37	Onsite	Water Table	02/26/2016	<5.20
O-37	Onsite	Water Table	08/18/2016	<5.05
O-38	Onsite	Water Table	10/08/2013	260
O-38	Onsite	Water Table	03/15/2014	109
O-38	Onsite	Water Table	04/21/2014	39.7
O-38	Onsite	Water Table	08/25/2014	<5.00
O-38	Onsite	Water Table	10/29/2014	<5.15
O-38	Onsite	Water Table	02/19/2015	<5.45
O-38	Onsite	Water Table	04/20/2015	<5.15J*
O-38	Onsite	Water Table	08/06/2015	<5.20
O-38	Onsite	Water Table	08/18/2016	<5.05
R-14	Onsite	Water Table	09/24/2001	3000
R-14	Onsite	Water Table	10/01/2001	3000
R-14A	Onsite	Water Table	01/09/2002	4000
R-14A	Onsite	Water Table	01/14/2002	5000
R-14A	Onsite	Water Table	01/21/2002	4000
R-14A	Onsite	Water Table	01/28/2002	3000
R-14A	Onsite	Water Table	02/11/2002	6000
R-14A	Onsite	Water Table	02/18/2002	5000
R-14A	Onsite	Water Table	03/04/2002	6000
R-14A	Onsite	Water Table	03/11/2002	6000
R-14A	Onsite	Water Table	03/18/2002	6000
R-14A	Onsite	Water Table	03/25/2002	6000
R-14A	Onsite	Water Table	04/03/2002	6000
R-14A	Onsite	Water Table	04/08/2002	6000
R-14A	Onsite	Water Table	04/16/2002	6000
R-14A	Onsite	Water Table	04/23/2002	6000
R-14A	Onsite	Water Table	05/07/2002	5000
R-14A	Onsite	Water Table	07/15/2002	5100
R-21	Onsite	Water Table	05/16/2006	710
R-21	Onsite	Water Table	06/21/2006	770
R-21	Onsite	Water Table	07/19/2006	750
R-21	Onsite	Water Table	01/15/2007	1200
R-21	Onsite	Water Table	04/18/2007	960
R-21	Onsite	Water Table	07/17/2007	843
R-21	Onsite	Water Table	10/18/2007	1270
R-21	Onsite	Water Table	01/03/2008	879
R-21	Onsite	Water Table	04/03/2008	1180
R-21	Onsite	Water Table	07/14/2008	945
R-21	Onsite	Water Table	10/01/2008	1370
R-21	Onsite	Water Table	01/12/2009	729
R-21	Onsite	Water Table	04/09/2009	931
R-21	Onsite	Water Table	07/07/2009	666
R-21	Onsite	Water Table	10/01/2009	466
R-21	Onsite	Water Table	01/19/2010	758
R-21	Onsite	Water Table	04/05/2010	574
R-21	Onsite	Water Table	07/26/2010	492

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Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-21	Onsite	Water Table	04/06/2011	274
R-21	Onsite	Water Table	01/17/2012	355
R-21	Onsite	Water Table	02/15/2012	413
R-21	Onsite	Water Table	03/19/2012	304
R-21	Onsite	Water Table	04/18/2012	315
R-21	Onsite	Water Table	05/16/2012	302
R-21	Onsite	Water Table	06/18/2012	268
R-21	Onsite	Water Table	07/17/2012	399
R-21	Onsite	Water Table	08/09/2012	441
R-21	Onsite	Water Table	09/13/2012	356
R-21	Onsite	Water Table	10/16/2012	344
R-21	Onsite	Water Table	11/13/2012	336
R-21	Onsite	Water Table	12/11/2012	314
R-21	Onsite	Water Table	01/15/2013	303
R-21	Onsite	Water Table	02/18/2013	279
R-21	Onsite	Water Table	03/12/2013	369
R-21	Onsite	Water Table	04/10/2013	236
R-21	Onsite	Water Table	05/13/2013	277JL*
R-21	Onsite	Water Table	06/03/2013	410JL*
R-21	Onsite	Water Table	06/03/2013	337
R-21	Onsite	Water Table	06/04/2013	297
R-21	Onsite	Water Table	06/04/2013	309
R-21	Onsite	Water Table	06/05/2013	307
R-21	Onsite	Water Table	06/06/2013	284
R-21	Onsite	Water Table	06/11/2013	273
R-21	Onsite	Water Table	07/24/2013	309
R-21	Onsite	Water Table	08/14/2013	307
R-21	Onsite	Water Table	09/17/2013	288
R-21	Onsite	Water Table	10/18/2013	269
R-21	Onsite	Water Table	11/14/2013	251
R-21	Onsite	Water Table	12/19/2013	328
R-21	Onsite	Water Table	01/16/2014	269
R-21	Onsite	Water Table	02/13/2014	241
R-21	Onsite	Water Table	03/13/2014	243
R-21	Onsite	Water Table	04/17/2014	257
R-21	Onsite	Water Table	05/15/2014	262
R-21	Onsite	Water Table	06/23/2014	244
R-21	Onsite	Water Table	07/23/2014	262
R-21	Onsite	Water Table	08/27/2014	250
R-21	Onsite	Water Table	09/18/2014	289
R-21	Onsite	Water Table	10/16/2014	265
R-21	Onsite	Water Table	11/12/2014	267
R-21	Onsite	Water Table	12/10/2014	279
R-21	Onsite	Water Table	01/12/2015	220
R-21	Onsite	Water Table	02/11/2015	226
R-21	Onsite	Water Table	03/11/2015	219
R-21	Onsite	Water Table	04/06/2015	223
R-21	Onsite	Water Table	05/13/2015	212
R-21	Onsite	Water Table	06/08/2015	264
R-21	Onsite	Water Table	07/08/2015	286
R-21	Onsite	Water Table	10/06/2015	270
R-21	Onsite	Water Table	01/06/2016	217

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-21	Onsite	Water Table	02/04/2016	242
R-21	Onsite	Water Table	03/02/2016	230
R-21	Onsite	Water Table	04/14/2016	214
R-21	Onsite	Water Table	05/05/2016	233
R-21	Onsite	Water Table	06/01/2016	452JL*
R-21	Onsite	Water Table	07/06/2016	272
R-21	Onsite	Water Table	08/05/2016	245
R-21	Onsite	Water Table	09/06/2016	256
R-21	Onsite	Water Table	10/03/2016	247
R-21	Onsite	Water Table	11/03/2016	256
R-21	Onsite	Water Table	12/01/2016	239
R-21	Onsite	Water Table	01/05/2017	235J*
R-21	Onsite	Water Table	02/01/2017	223
R-21	Onsite	Water Table	03/01/2017	211JL*
R-21	Onsite	Water Table	04/05/2017	211
R-21	Onsite	Water Table	05/03/2017	194
R-21	Onsite	Water Table	06/06/2017	184J*
R-21	Onsite	Water Table	07/26/2017	328
R-21	Onsite	Water Table	07/06/2017	189
R-21	Onsite	Water Table	08/29/2017	236
R-21	Onsite	Water Table	09/19/2017	328
R-21	Onsite	Water Table	10/26/2017	279
R-21	Onsite	Water Table	02/13/18	307
R-21	Onsite	Water Table	04/04/18	337JL*
R-32	Onsite	Water Table	12/03/2010	<12900
R-32	Onsite	Water Table	04/01/2013	<62.0
R-32R	Onsite	Water Table	10/08/2013	1100
R-32R	Onsite	Water Table	03/17/2014	1090
R-32R	Onsite	Water Table	04/21/2014	976
R-32R	Onsite	Water Table	09/02/2014	818
R-32R	Onsite	Water Table	10/29/2014	841
R-32R	Onsite	Water Table	02/19/2015	854
R-32R	Onsite	Water Table	04/20/2015	891
R-32R	Onsite	Water Table	08/06/2015	697JL*
R-32R	Onsite	Water Table	10/27/2015	770
R-32R	Onsite	Water Table	02/22/2016	743
R-32R	Onsite	Water Table	08/16/2016	344
R-32R	Onsite	Water Table	02/23/2017	570
R-33	Onsite	Water Table	12/06/2010	<13100
R-35R	Onsite	Water Table	01/17/2012	123
R-35R	Onsite	Water Table	02/15/2012	127
R-35R	Onsite	Water Table	03/19/2012	118
R-35R	Onsite	Water Table	04/18/2012	110
R-35R	Onsite	Water Table	05/16/2012	113
R-35R	Onsite	Water Table	06/18/2012	112
R-35R	Onsite	Water Table	07/17/2012	131
R-35R	Onsite	Water Table	08/09/2012	131
R-35R	Onsite	Water Table	09/13/2012	147
R-35R	Onsite	Water Table	10/16/2012	121
R-35R	Onsite	Water Table	11/13/2012	139
R-35R	Onsite	Water Table	12/11/2012	125
R-35R	Onsite	Water Table	01/15/2013	124

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-35R	Onsite	Water Table	02/18/2013	124
R-35R	Onsite	Water Table	03/12/2013	124
R-35R	Onsite	Water Table	04/10/2013	111
R-35R	Onsite	Water Table	05/13/2013	100
R-35R	Onsite	Water Table	06/03/2013	106
R-35R	Onsite	Water Table	06/03/2013	104
R-35R	Onsite	Water Table	06/04/2013	116
R-35R	Onsite	Water Table	06/04/2013	118
R-35R	Onsite	Water Table	06/05/2013	118
R-35R	Onsite	Water Table	06/06/2013	112
R-35R	Onsite	Water Table	06/11/2013	107
R-35R	Onsite	Water Table	07/24/2013	114
R-35R	Onsite	Water Table	08/14/2013	126
R-35R	Onsite	Water Table	09/17/2013	119
R-35R	Onsite	Water Table	10/18/2013	106
R-35R	Onsite	Water Table	11/14/2013	94.9
R-35R	Onsite	Water Table	12/19/2013	91.9
R-35R	Onsite	Water Table	01/16/2014	82.9
R-35R	Onsite	Water Table	02/13/2014	78.8
R-35R	Onsite	Water Table	03/13/2014	72.8
R-35R	Onsite	Water Table	04/17/2014	84.2
R-35R	Onsite	Water Table	05/15/2014	73.3
R-35R	Onsite	Water Table	06/23/2014	62.2
R-35R	Onsite	Water Table	07/23/2014	77.9
R-35R	Onsite	Water Table	08/27/2014	57.3
R-35R	Onsite	Water Table	09/18/2014	53.6
R-35R	Onsite	Water Table	10/16/2014	39.1
R-35R	Onsite	Water Table	11/12/2014	41.8
R-35R	Onsite	Water Table	12/10/2014	38.0
R-35R	Onsite	Water Table	01/12/2015	37.9
R-35R	Onsite	Water Table	02/11/2015	39.4
R-35R	Onsite	Water Table	03/11/2015	42.8
R-35R	Onsite	Water Table	04/06/2015	41.9
R-35R	Onsite	Water Table	05/13/2015	45.2
R-35R	Onsite	Water Table	06/08/2015	51.6
R-35R	Onsite	Water Table	07/08/2015	56.0
R-35R	Onsite	Water Table	10/06/2015	39.3
R-35R	Onsite	Water Table	01/06/2016	52.3
R-35R	Onsite	Water Table	02/04/2016	45.8
R-35R	Onsite	Water Table	03/02/2016	53.2
R-35R	Onsite	Water Table	04/14/2016	41.7
R-35R	Onsite	Water Table	05/05/2016	49.2
R-35R	Onsite	Water Table	06/01/2016	51.1
R-35R	Onsite	Water Table	07/06/2016	56.2
R-35R	Onsite	Water Table	08/05/2016	52.5
R-35R	Onsite	Water Table	09/06/2016	53.3
R-35R	Onsite	Water Table	10/03/2016	46.9
R-35R	Onsite	Water Table	11/03/2016	50.7
R-35R	Onsite	Water Table	12/01/2016	42.0
R-35R	Onsite	Water Table	01/05/2017	36.1
R-35R	Onsite	Water Table	02/01/2017	35.0
R-35R	Onsite	Water Table	03/01/2017	33.7

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Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-35R	Onsite	Water Table	04/05/2017	32.0
R-35R	Onsite	Water Table	05/03/2017	30.2
R-35R	Onsite	Water Table	06/06/2017	23.1
R-35R	Onsite	Water Table	07/27/2017	28.9
R-35R	Onsite	Water Table	07/06/2017	25.9
R-35R	Onsite	Water Table	08/30/2017	9.71J
R-35R	Onsite	Water Table	09/20/2017	13.5
R-35R	Onsite	Water Table	10/25/2017	9.14J
R-35R	Onsite	Water Table	02/13/18	9.63J
R-35R	Onsite	Water Table	04/04/18	12.1JL *
R-39	Onsite	Water Table	01/17/2012	<6.20
R-39	Onsite	Water Table	02/15/2012	<6.52
R-39	Onsite	Water Table	03/19/2012	<6.20
R-39	Onsite	Water Table	04/18/2012	<6.20
R-39	Onsite	Water Table	05/16/2012	<6.20
R-39	Onsite	Water Table	06/18/2012	<6.20
R-39	Onsite	Water Table	07/17/2012	<6.46
R-39	Onsite	Water Table	08/09/2012	<6.20
R-39	Onsite	Water Table	09/13/2012	<6.60
R-39	Onsite	Water Table	10/16/2012	<6.20
R-39	Onsite	Water Table	11/13/2012	<6.20
R-39	Onsite	Water Table	12/11/2012	<6.40
R-39	Onsite	Water Table	01/15/2013	<6.52
R-39	Onsite	Water Table	02/18/2013	<6.40
R-39	Onsite	Water Table	03/12/2013	<6.52
R-39	Onsite	Water Table	04/10/2013	<6.20
R-40	Onsite	Water Table	01/17/2012	68.4
R-40	Onsite	Water Table	02/15/2012	69.2
R-40	Onsite	Water Table	03/19/2012	54.9
R-40	Onsite	Water Table	04/18/2012	48.0
R-40	Onsite	Water Table	05/16/2012	38.7
R-40	Onsite	Water Table	06/18/2012	39.4
R-40	Onsite	Water Table	07/17/2012	49.8
R-40	Onsite	Water Table	08/09/2012	47.8
R-40	Onsite	Water Table	09/13/2012	48.3
R-40	Onsite	Water Table	10/16/2012	50.9
R-40	Onsite	Water Table	11/13/2012	44.2
R-40	Onsite	Water Table	12/11/2012	40.7
R-40	Onsite	Water Table	01/15/2013	41.6
R-40	Onsite	Water Table	02/18/2013	39.1
R-40	Onsite	Water Table	03/12/2013	39.5
R-40	Onsite	Water Table	04/10/2013	36.3
R-40	Onsite	Water Table	12/29/2014	21.5
R-40	Onsite	Water Table	01/05/2015	32.3
R-40	Onsite	Water Table	01/07/2015	33.5
R-40	Onsite	Water Table	01/12/2015	28.7
R-40	Onsite	Water Table	01/14/2015	34.6
R-40	Onsite	Water Table	01/19/2015	36.5
R-40	Onsite	Water Table	01/21/2015	30.6
R-40	Onsite	Water Table	02/02/2015	28.8
R-40	Onsite	Water Table	02/04/2015	33.1
R-40	Onsite	Water Table	02/09/2015	32.9

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-40	Onsite	Water Table	02/11/2015	33.5
R-40	Onsite	Water Table	02/18/2015	32.4
R-40	Onsite	Water Table	02/25/2015	32.3
R-40	Onsite	Water Table	03/02/2015	31.1
R-40	Onsite	Water Table	03/04/2015	34.1
R-40	Onsite	Water Table	03/09/2015	31.8
R-40	Onsite	Water Table	03/11/2015	30.9
R-40	Onsite	Water Table	04/06/2015	32.1
R-40	Onsite	Water Table	05/13/2015	29.4
R-40	Onsite	Water Table	06/08/2015	29.4
R-40	Onsite	Water Table	07/08/2015	31.6
R-40	Onsite	Water Table	10/06/2015	34.3
R-40	Onsite	Water Table	01/06/2016	27.6
R-40	Onsite	Water Table	02/04/2016	22.4
R-40	Onsite	Water Table	03/16/2016	18.2
R-40	Onsite	Water Table	04/27/2016	21.7
R-40	Onsite	Water Table	05/05/2016	24.8
R-40	Onsite	Water Table	06/01/2016	22.7
R-40	Onsite	Water Table	07/06/2016	20.9
R-40	Onsite	Water Table	08/05/2016	27.0
R-40	Onsite	Water Table	09/06/2016	27.3
R-40	Onsite	Water Table	10/03/2016	29.1
R-40	Onsite	Water Table	11/03/2016	23.9
R-40	Onsite	Water Table	12/01/2016	26.2
R-40	Onsite	Water Table	01/05/2017	23.0
R-40	Onsite	Water Table	02/01/2017	20.2
R-40	Onsite	Water Table	03/01/2017	22.6
R-40	Onsite	Water Table	04/05/2017	21.0
R-40	Onsite	Water Table	05/03/2017	20.3
R-40	Onsite	Water Table	06/06/2017	17.6JL *
R-40	Onsite	Water Table	08/15/2017	52.9
R-40	Onsite	Water Table	07/06/2017	15.2
R-40	Onsite	Water Table	10/20/2017	86.4
R-40	Onsite	Water Table	1/19/2018	125
R-40	Onsite	Water Table	4/4/2018	124JL *
R-42	Onsite	Water Table	01/17/2012	59.1
R-42	Onsite	Water Table	02/15/2012	69.8
R-42	Onsite	Water Table	03/19/2012	60.4
R-42	Onsite	Water Table	04/18/2012	65.6
R-42	Onsite	Water Table	05/16/2012	70.8
R-42	Onsite	Water Table	06/18/2012	61.8
R-42	Onsite	Water Table	07/17/2012	50.2
R-42	Onsite	Water Table	08/09/2012	57.4J*
R-42	Onsite	Water Table	09/13/2012	54.2
R-42	Onsite	Water Table	10/16/2012	52.6
R-42	Onsite	Water Table	11/13/2012	52.5
R-42	Onsite	Water Table	12/11/2012	50.4
R-42	Onsite	Water Table	01/15/2013	47.0
R-42	Onsite	Water Table	02/18/2013	39.7
R-42	Onsite	Water Table	03/12/2013	43.5
R-42	Onsite	Water Table	04/10/2013	38.2
R-42	Onsite	Water Table	05/13/2013	29.4

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-42	Onsite	Water Table	05/31/2013	14.5
R-42	Onsite	Water Table	05/31/2013	19.5
R-42	Onsite	Water Table	05/31/2013	19.7
R-42	Onsite	Water Table	05/31/2013	24.4
R-42	Onsite	Water Table	05/31/2013	27.5
R-42	Onsite	Water Table	05/31/2013	28.3
R-42	Onsite	Water Table	06/03/2013	19.9
R-42	Onsite	Water Table	06/03/2013	25.7
R-42	Onsite	Water Table	06/04/2013	24.4
R-42	Onsite	Water Table	06/04/2013	26.5
R-42	Onsite	Water Table	06/05/2013	27.7
R-42	Onsite	Water Table	06/06/2013	28.1
R-42	Onsite	Water Table	06/11/2013	27.6
R-42	Onsite	Water Table	07/24/2013	21.9
R-42	Onsite	Water Table	08/14/2013	20.0
R-42	Onsite	Water Table	09/17/2013	19.2
R-42	Onsite	Water Table	10/18/2013	20.3
R-42	Onsite	Water Table	11/14/2013	21.6
R-42	Onsite	Water Table	12/19/2013	25.3
R-42	Onsite	Water Table	01/16/2014	23.0
R-42	Onsite	Water Table	02/13/2014	20.7
R-42	Onsite	Water Table	03/13/2014	22.0
R-42	Onsite	Water Table	04/17/2014	21.3
R-42	Onsite	Water Table	05/15/2014	18.9
R-42	Onsite	Water Table	06/23/2014	21.2
R-42	Onsite	Water Table	06/27/2014	18.9
R-42	Onsite	Water Table	07/21/2014	20.1
R-42	Onsite	Water Table	08/18/2014	23.4
R-42	Onsite	Water Table	09/17/2014	28.0
R-42	Onsite	Water Table	10/16/2014	30.3
R-42	Onsite	Water Table	11/11/2014	31.7
R-42	Onsite	Water Table	12/02/2014	30.5
R-42	Onsite	Water Table	12/10/2014	29.6
R-42	Onsite	Water Table	01/13/2015	28.9
R-42	Onsite	Water Table	02/10/2015	29.4
R-42	Onsite	Water Table	03/10/2015	31.2
R-42	Onsite	Water Table	04/07/2015	32.2
R-42	Onsite	Water Table	05/13/2015	26.3
R-42	Onsite	Water Table	06/10/2015	26.2
R-42	Onsite	Water Table	07/06/2015	21.0JL*
R-42	Onsite	Water Table	10/07/2015	26.0
R-42	Onsite	Water Table	01/05/2016	23.4
R-42	Onsite	Water Table	02/02/2016	24.2
R-42	Onsite	Water Table	03/01/2016	23.2
R-42	Onsite	Water Table	04/06/2016	25.0
R-42	Onsite	Water Table	05/04/2016	27.9
R-42	Onsite	Water Table	06/03/2016	23.2
R-42	Onsite	Water Table	07/07/2016	18.2
R-42	Onsite	Water Table	08/04/2016	17.1
R-42	Onsite	Water Table	09/06/2016	17.8
R-42	Onsite	Water Table	10/03/2016	20.8
R-42	Onsite	Water Table	11/03/2016	19.2

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-42	Onsite	Water Table	12/01/2016	16.5
R-42	Onsite	Water Table	01/05/2017	14.6J*
R-42	Onsite	Water Table	02/01/2017	16.9
R-42	Onsite	Water Table	03/01/2017	16.0
R-42	Onsite	Water Table	04/05/2017	16.5
R-42	Onsite	Water Table	05/03/2017	16.1
R-42	Onsite	Water Table	06/06/2017	15.4
R-42	Onsite	Water Table	07/06/2017	15.6
R-43	Onsite	Water Table	05/13/2013	118
R-43	Onsite	Water Table	05/29/2013	119
R-43	Onsite	Water Table	05/29/2013	117
R-43	Onsite	Water Table	05/29/2013	121
R-43	Onsite	Water Table	05/29/2013	121
R-43	Onsite	Water Table	05/29/2013	118
R-43	Onsite	Water Table	05/29/2013	125
R-43	Onsite	Water Table	06/03/2013	150
R-43	Onsite	Water Table	06/03/2013	140
R-43	Onsite	Water Table	06/04/2013	140
R-43	Onsite	Water Table	06/04/2013	145
R-43	Onsite	Water Table	06/04/2013	139
R-43	Onsite	Water Table	06/05/2013	128
R-43	Onsite	Water Table	06/06/2013	127
R-43	Onsite	Water Table	06/11/2013	109
R-43	Onsite	Water Table	07/24/2013	81.3
R-43	Onsite	Water Table	08/14/2013	69.1
R-43	Onsite	Water Table	09/17/2013	65.9
R-43	Onsite	Water Table	10/18/2013	66.6
R-43	Onsite	Water Table	11/14/2013	71.5
R-43	Onsite	Water Table	12/19/2013	124
R-43	Onsite	Water Table	01/16/2014	88.3
R-43	Onsite	Water Table	02/13/2014	78.2
R-43	Onsite	Water Table	03/13/2014	70.1
R-43	Onsite	Water Table	04/17/2014	73.0
R-43	Onsite	Water Table	05/15/2014	73.5
R-43	Onsite	Water Table	06/23/2014	79.1
R-43	Onsite	Water Table	08/27/2014	94.2
R-43	Onsite	Water Table	09/18/2014	94.8
R-43	Onsite	Water Table	10/16/2014	88.2
R-43	Onsite	Water Table	11/12/2014	97.8
R-43	Onsite	Water Table	12/10/2014	97.4
R-43	Onsite	Water Table	01/12/2015	99.2
R-43	Onsite	Water Table	02/11/2015	89.9
R-43	Onsite	Water Table	03/11/2015	101
R-43	Onsite	Water Table	04/06/2015	106
R-43	Onsite	Water Table	05/13/2015	99.9
R-43	Onsite	Water Table	06/08/2015	92.1
R-43	Onsite	Water Table	07/08/2015	92.3
R-43	Onsite	Water Table	10/06/2015	99.7
R-43	Onsite	Water Table	01/06/2016	81.3
R-43	Onsite	Water Table	02/04/2016	86.7
R-43	Onsite	Water Table	03/02/2016	83.7
R-43	Onsite	Water Table	04/14/2016	104

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-43	Onsite	Water Table	05/05/2016	97.4
R-43	Onsite	Water Table	06/01/2016	123
R-43	Onsite	Water Table	07/06/2016	85.6
R-43	Onsite	Water Table	08/05/2016	77.2
R-43	Onsite	Water Table	09/06/2016	91.7
R-43	Onsite	Water Table	10/03/2016	110
R-43	Onsite	Water Table	11/03/2016	99.7
R-43	Onsite	Water Table	12/01/2016	89.5
R-43	Onsite	Water Table	01/05/2017	87.6J*
R-43	Onsite	Water Table	02/01/2017	86.1
R-43	Onsite	Water Table	03/01/2017	77.9
R-43	Onsite	Water Table	04/05/2017	85.4
R-43	Onsite	Water Table	05/03/2017	79.2
R-43	Onsite	Water Table	06/06/2017	76.1
R-43	Onsite	Water Table	07/06/2017	73.6
R-44	Onsite	Water Table	05/13/2013	63.1
R-44	Onsite	Water Table	06/01/2013	46.7
R-44	Onsite	Water Table	06/01/2013	62.5
R-44	Onsite	Water Table	06/01/2013	64.7
R-44	Onsite	Water Table	06/01/2013	64.5
R-44	Onsite	Water Table	06/01/2013	69.9
R-44	Onsite	Water Table	06/01/2013	74.1
R-44	Onsite	Water Table	06/03/2013	82.6
R-44	Onsite	Water Table	06/03/2013	80.1
R-44	Onsite	Water Table	06/04/2013	80.2
R-44	Onsite	Water Table	06/04/2013	76.4
R-44	Onsite	Water Table	06/04/2013	78.7
R-44	Onsite	Water Table	06/05/2013	71.1
R-44	Onsite	Water Table	06/06/2013	70.4
R-44	Onsite	Water Table	06/11/2013	58.6
R-44	Onsite	Water Table	07/24/2013	47.9
R-44	Onsite	Water Table	08/14/2013	45.7
R-44	Onsite	Water Table	09/17/2013	40.9
R-44	Onsite	Water Table	10/18/2013	37.7
R-44	Onsite	Water Table	11/14/2013	37.7
R-44	Onsite	Water Table	12/19/2013	55.1
R-44	Onsite	Water Table	01/16/2014	43.4
R-44	Onsite	Water Table	02/13/2014	42.7
R-44	Onsite	Water Table	03/13/2014	45.3
R-44	Onsite	Water Table	04/17/2014	49.1
R-44	Onsite	Water Table	05/15/2014	45.7
R-44	Onsite	Water Table	06/23/2014	51.5
R-44	Onsite	Water Table	07/23/2014	61.2JL*
R-44	Onsite	Water Table	08/27/2014	53.0
R-44	Onsite	Water Table	09/18/2014	45.5
R-44	Onsite	Water Table	10/16/2014	40.6
R-44	Onsite	Water Table	11/12/2014	40.0
R-44	Onsite	Water Table	12/10/2014	42.3
R-44	Onsite	Water Table	01/12/2015	42.8
R-44	Onsite	Water Table	02/11/2015	44.6
R-44	Onsite	Water Table	03/11/2015	47.1
R-44	Onsite	Water Table	04/06/2015	49.2

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-44	Onsite	Water Table	05/13/2015	49.8
R-44	Onsite	Water Table	06/08/2015	41.2
R-44	Onsite	Water Table	07/08/2015	43.8
R-44	Onsite	Water Table	10/06/2015	52.2
R-44	Onsite	Water Table	01/06/2016	38.2J*
R-44	Onsite	Water Table	02/04/2016	35.4
R-44	Onsite	Water Table	03/02/2016	33.8
R-44	Onsite	Water Table	04/14/2016	41.8
R-44	Onsite	Water Table	05/05/2016	37.0
R-44	Onsite	Water Table	06/01/2016	34.1
R-44	Onsite	Water Table	07/06/2016	36.2
R-44	Onsite	Water Table	08/10/2016	51.1
R-44	Onsite	Water Table	09/06/2016	46.7
R-44	Onsite	Water Table	10/03/2016	57.3
R-44	Onsite	Water Table	11/03/2016	44.2
R-44	Onsite	Water Table	12/01/2016	41.9
R-44	Onsite	Water Table	01/05/2017	39.3
R-44	Onsite	Water Table	02/01/2017	38.9
R-44	Onsite	Water Table	03/01/2017	34.4
R-44	Onsite	Water Table	04/05/2017	33.7
R-44	Onsite	Water Table	05/03/2017	32.0J*
R-44	Onsite	Water Table	06/06/2017	29.2JL*
R-44	Onsite	Water Table	07/06/2017	27.4
R-45	Onsite	Water Table	05/13/2013	37.9
R-45	Onsite	Water Table	05/30/2013	44.0
R-45	Onsite	Water Table	05/30/2013	42.7
R-45	Onsite	Water Table	05/30/2013	45.6
R-45	Onsite	Water Table	05/30/2013	43.9
R-45	Onsite	Water Table	05/30/2013	43.7
R-45	Onsite	Water Table	05/30/2013	39.3
R-45	Onsite	Water Table	06/03/2013	47.3
R-45	Onsite	Water Table	06/03/2013	46.8
R-45	Onsite	Water Table	06/04/2013	45.3
R-45	Onsite	Water Table	06/04/2013	42.8
R-45	Onsite	Water Table	06/05/2013	42.5
R-45	Onsite	Water Table	06/06/2013	41.9
R-45	Onsite	Water Table	06/11/2013	45.8
R-45	Onsite	Water Table	07/24/2013	44.6
R-45	Onsite	Water Table	08/14/2013	45.3
R-45	Onsite	Water Table	09/17/2013	42.9
R-45	Onsite	Water Table	10/18/2013	42.6
R-45	Onsite	Water Table	11/14/2013	40.4
R-45	Onsite	Water Table	12/19/2013	70.8
R-45	Onsite	Water Table	01/16/2014	52.3
R-45	Onsite	Water Table	02/13/2014	50.3
R-45	Onsite	Water Table	03/13/2014	46.7
R-45	Onsite	Water Table	04/17/2014	60.1
R-45	Onsite	Water Table	05/15/2014	60.5
R-45	Onsite	Water Table	06/23/2014	57.0
R-45	Onsite	Water Table	07/23/2014	71.1
R-45	Onsite	Water Table	08/27/2014	64.5
R-45	Onsite	Water Table	09/18/2014	57.4

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Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-45	Onsite	Water Table	10/16/2014	50.0
R-45	Onsite	Water Table	11/12/2014	52.4
R-45	Onsite	Water Table	12/10/2014	49.2
R-45	Onsite	Water Table	01/12/2015	43.5
R-45	Onsite	Water Table	03/11/2015	41.1
R-45	Onsite	Water Table	04/06/2015	41.9
R-45	Onsite	Water Table	05/13/2015	39.7
R-45	Onsite	Water Table	06/08/2015	42.3
R-45	Onsite	Water Table	07/08/2015	45.3
R-45	Onsite	Water Table	10/06/2015	61.9
R-45	Onsite	Water Table	01/06/2016	43.1
R-45	Onsite	Water Table	02/04/2016	37.7
R-45	Onsite	Water Table	03/02/2016	34.8
R-45	Onsite	Water Table	04/14/2016	43.0
R-45	Onsite	Water Table	05/05/2016	37.6
R-45	Onsite	Water Table	06/01/2016	36.8JL*
R-45	Onsite	Water Table	07/06/2016	34.7
R-45	Onsite	Water Table	08/05/2016	38.3
R-45	Onsite	Water Table	09/06/2016	48.8
R-45	Onsite	Water Table	10/03/2016	54.6
R-45	Onsite	Water Table	11/03/2016	46.7
R-45	Onsite	Water Table	12/01/2016	41.0
R-45	Onsite	Water Table	01/05/2017	37.4
R-45	Onsite	Water Table	02/01/2017	36.7
R-45	Onsite	Water Table	03/01/2017	30.7JL*
R-45	Onsite	Water Table	04/05/2017	34.2
R-45	Onsite	Water Table	05/03/2017	32.1
R-45	Onsite	Water Table	06/06/2017	26.7J*
R-45	Onsite	Water Table	07/06/2017	29.3
R-46	Onsite	Water Table	05/13/2013	6.20JL*
R-46	Onsite	Water Table	06/03/2013	<6.60
R-46	Onsite	Water Table	06/03/2013	<6.66
R-46	Onsite	Water Table	06/04/2013	<6.20
R-46	Onsite	Water Table	06/04/2013	<6.20
R-46	Onsite	Water Table	06/04/2013	<6.20
R-46	Onsite	Water Table	06/05/2013	<6.20
R-46	Onsite	Water Table	06/06/2013	<6.20
R-46	Onsite	Water Table	06/11/2013	<6.20
R-46	Onsite	Water Table	07/24/2013	<6.20
R-46	Onsite	Water Table	08/14/2013	<6.32
R-46	Onsite	Water Table	09/17/2013	<6.32
R-46	Onsite	Water Table	10/18/2013	<6.36
R-46	Onsite	Water Table	11/14/2013	<5.20
R-46	Onsite	Water Table	12/19/2013	<5.00
R-46	Onsite	Water Table	01/16/2014	<5.30
R-46	Onsite	Water Table	02/13/2014	<5.00
R-46	Onsite	Water Table	03/13/2014	<5.20
R-46	Onsite	Water Table	04/17/2014	<5.00
R-46	Onsite	Water Table	05/15/2014	<5.00
R-46	Onsite	Water Table	06/23/2014	<5.60
R-46	Onsite	Water Table	07/23/2014	<5.25
R-46	Onsite	Water Table	08/27/2014	<5.45

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-46	Onsite	Water Table	09/18/2014	<5.20
R-46	Onsite	Water Table	10/16/2014	<5.00
R-46	Onsite	Water Table	11/12/2014	<5.00
R-46	Onsite	Water Table	12/10/2014	<5.10
R-46	Onsite	Water Table	01/12/2015	<5.00
R-46	Onsite	Water Table	02/11/2015	<5.00
R-46	Onsite	Water Table	03/11/2015	<5.00
R-46	Onsite	Water Table	04/06/2015	<5.00
R-46	Onsite	Water Table	05/13/2015	<5.00
R-46	Onsite	Water Table	06/08/2015	<5.15
R-46	Onsite	Water Table	07/08/2015	<5.00
R-46	Onsite	Water Table	10/06/2015	<5.05
R-46	Onsite	Water Table	01/06/2016	<5.05
R-46	Onsite	Water Table	02/04/2016	<5.15
R-46	Onsite	Water Table	03/02/2016	<5.15
R-46	Onsite	Water Table	04/14/2016	<5.30
R-46	Onsite	Water Table	05/05/2016	<5.05
R-46	Onsite	Water Table	06/01/2016	<5.00
R-46	Onsite	Water Table	07/06/2016	<5.05
R-46	Onsite	Water Table	08/05/2016	<5.20
R-46	Onsite	Water Table	09/06/2016	<5.05
R-46	Onsite	Water Table	10/03/2016	<5.05
R-46	Onsite	Water Table	11/03/2016	<5.10
R-46	Onsite	Water Table	12/01/2016	<5.10
R-46	Onsite	Water Table	01/05/2017	<5.05
R-46	Onsite	Water Table	02/01/2017	<5.05
R-46	Onsite	Water Table	03/01/2017	<5.20
R-46	Onsite	Water Table	04/05/2017	<5.00
R-46	Onsite	Water Table	05/03/2017	<5.20
R-46	Onsite	Water Table	06/06/2017	<5.25
R-46	Onsite	Water Table	07/06/2017	<5.20
R-47	Onsite	10-55	06/26/2014	21.7
R-47	Onsite	10-55	06/27/2014	20.2
R-47	Onsite	10-55	07/03/2014	18.9
R-47	Onsite	10-55	07/21/2014	14.4
R-47	Onsite	10-55	08/18/2014	12.0
R-47	Onsite	10-55	09/17/2014	12.8
R-47	Onsite	10-55	10/15/2014	11.8
R-47	Onsite	10-55	11/11/2014	11.9
R-47	Onsite	10-55	12/02/2014	12.0
R-47	Onsite	10-55	01/13/2015	12.6
R-47	Onsite	10-55	02/10/2015	10.8
R-47	Onsite	10-55	03/10/2015	9.67J
R-47	Onsite	10-55	04/07/2015	8.66J
R-47	Onsite	10-55	05/13/2015	7.29J
R-47	Onsite	10-55	06/10/2015	5.07J
R-47	Onsite	10-55	07/06/2015	22.9
R-47	Onsite	10-55	08/04/2015	6.70J
R-47	Onsite	10-55	10/07/2015	8.81J
R-47	Onsite	10-55	01/05/2016	8.27J
R-47	Onsite	10-55	02/02/2016	8.13J
R-47	Onsite	10-55	03/01/2016	7.85J*

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
R-47	Onsite	10-55	04/06/2016	<5.15
R-47	Onsite	10-55	05/04/2016	8.01J
R-47	Onsite	10-55	06/03/2016	7.20J
R-47	Onsite	10-55	07/07/2016	7.96J
R-47	Onsite	10-55	08/04/2016	6.82J
R-48	Onsite	10-55	06/26/2014	31.6
R-48	Onsite	10-55	06/27/2014	33.6
R-48	Onsite	10-55	07/07/2016	16.4
R-48	Onsite	10-55	08/04/2016	17.5
S-9	Onsite	Water Table	09/03/2008	262
S-19	Onsite	Water Table	09/03/2008	<10.4
S-20	Onsite	Water Table	04/18/2007	5570
S-20	Onsite	Water Table	10/17/2007	<515
S-20	Onsite	Water Table	04/03/2008	9400
S-20	Onsite	Water Table	10/01/2008	6320
S-20	Onsite	Water Table	04/10/2009	3750
S-20	Onsite	Water Table	10/02/2009	<16700
S-20	Onsite	Water Table	04/06/2010	<6600
S-21	Onsite	Water Table	04/19/2006	870
S-21	Onsite	Water Table	05/17/2006	<21.0
S-21	Onsite	Water Table	06/21/2006	<100
S-21	Onsite	Water Table	07/19/2006	<59.0
S-21	Onsite	Water Table	01/15/2007	760
S-21	Onsite	Water Table	07/18/2007	<113
S-21	Onsite	Water Table	10/18/2007	<419
S-21	Onsite	Water Table	01/03/2008	<119
S-21	Onsite	Water Table	04/03/2008	3160
S-21	Onsite	Water Table	07/01/2008	<100
S-21	Onsite	Water Table	10/01/2008	<10.2
S-21	Onsite	Water Table	01/12/2009	<5640
S-21	Onsite	Water Table	04/08/2009	<699
S-21	Onsite	Water Table	07/07/2009	<10.5
S-21	Onsite	Water Table	10/02/2009	<258
S-21	Onsite	Water Table	01/20/2010	<206
S-21	Onsite	Water Table	04/06/2010	<16800
S-21	Onsite	Water Table	05/22/2012	<7.04
S-21	Onsite	Water Table	05/02/2013	<6.40
S-21	Onsite	Water Table	11/04/2013	4.45J
S-21	Onsite	Water Table	03/27/2014	4.25J
S-21	Onsite	Water Table	08/25/2014	5.44J
S-21	Onsite	Water Table	02/19/2015	4.14J
S-21	Onsite	Water Table	08/06/2015	4.02JL *
S-21	Onsite	Water Table	02/26/2016	6.00J
S-21	Onsite	Water Table	08/18/2016	6.75JL *
S-21	Onsite	Water Table	02/28/2017	5.42JL *
S-39	Onsite	Water Table	08/20/2013	7.14JL *
S-39	Onsite	Water Table	04/16/2014	5.73J
S-39	Onsite	Water Table	10/22/2014	7.64J
S-39	Onsite	Water Table	08/18/2016	R*
S-39	Onsite	Water Table	04/13/2017	5.23J
S-41R	Onsite	Water Table	05/17/2006	150
S-41R	Onsite	Water Table	06/21/2006	140

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North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
S-41R	Onsite	Water Table	07/19/2006	<110
S-41R	Onsite	Water Table	10/17/2007	222
S-41R	Onsite	Water Table	04/04/2008	97.2
S-41R	Onsite	Water Table	10/03/2008	370
S-41R	Onsite	Water Table	04/10/2009	112
S-41R	Onsite	Water Table	10/02/2009	122
S-41R	Onsite	Water Table	04/03/2010	138
S-41R	Onsite	Water Table	10/14/2010	366
S-41R	Onsite	Water Table	04/14/2011	1090
S-41R	Onsite	Water Table	01/30/2014	134
S-41R	Onsite	Water Table	04/24/2014	111
S-41R	Onsite	Water Table	09/04/2014	111
S-41R	Onsite	Water Table	10/29/2014	74.3
S-41R	Onsite	Water Table	02/25/2015	31.7
S-41R	Onsite	Water Table	04/22/2015	38.3
S-41R	Onsite	Water Table	08/10/2015	94.6
S-41R	Onsite	Water Table	10/22/2015	111
S-41R	Onsite	Water Table	02/29/2016	76.3JL *
S-41R	Onsite	Water Table	08/16/2016	83.4
S-41R	Onsite	Water Table	02/23/2017	64.6
S-43	Onsite	Water Table	02/12/2013	<6.66
S-43	Onsite	Water Table	06/12/2013	3.98J
S-43	Onsite	Water Table	08/20/2013	7.55J
S-43	Onsite	Water Table	11/04/2013	4.94J
S-43	Onsite	Water Table	03/11/2014	8.00JN*
S-43	Onsite	Water Table	04/21/2014	8.33J
S-43	Onsite	Water Table	09/02/2014	35.2
S-43	Onsite	Water Table	10/29/2014	10.9
S-43	Onsite	Water Table	02/20/2015	6.97J
S-43	Onsite	Water Table	04/20/2015	5.18J
S-43	Onsite	Water Table	08/05/2015	5.86J
S-43	Onsite	Water Table	10/27/2015	4.14J
S-43	Onsite	Water Table	02/26/2016	6.50J
S-43	Onsite	Water Table	06/16/2016	6.00J
S-43	Onsite	Water Table	08/18/2016	8.23J
S-43	Onsite	Water Table	10/25/2016	6.99J
S-43	Onsite	Water Table	02/27/2017	5.26J
S-43	Onsite	Water Table	04/12/2017	5.11J
S-44	Onsite	Water Table	11/04/2013	<7.30
S-44	Onsite	Water Table	02/21/2015	8.56J
S-50	Onsite	Water Table	04/19/2006	3000
S-50	Onsite	Water Table	06/21/2006	4400
S-50	Onsite	Water Table	07/19/2006	12000
S-50	Onsite	Water Table	11/15/2006	2600
S-50	Onsite	Water Table	12/08/2006	4900
S-50	Onsite	Water Table	01/15/2007	3700
S-50	Onsite	Water Table	02/13/2007	3600
S-50	Onsite	Water Table	03/19/2007	4100
S-50	Onsite	Water Table	06/20/2007	3450
S-50	Onsite	Water Table	07/17/2007	3600
S-50	Onsite	Water Table	08/21/2007	2920
S-50	Onsite	Water Table	09/20/2007	2680

Appendix A-3
Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
S-50	Onsite	Water Table	10/18/2007	3650
S-50	Onsite	Water Table	11/12/2007	2380
S-50	Onsite	Water Table	12/07/2007	2340
S-50	Onsite	Water Table	01/03/2008	2710
S-50	Onsite	Water Table	02/12/2008	2380
S-50	Onsite	Water Table	03/05/2008	2890
S-50	Onsite	Water Table	04/03/2008	2900
S-50	Onsite	Water Table	05/07/2008	2680
S-50	Onsite	Water Table	06/10/2008	3120
S-50	Onsite	Water Table	07/01/2008	1720
S-50	Onsite	Water Table	08/07/2008	694
S-50	Onsite	Water Table	09/02/2008	1990
S-50	Onsite	Water Table	10/01/2008	1960
S-50	Onsite	Water Table	11/06/2008	2020
S-50	Onsite	Water Table	12/04/2008	2190
S-50	Onsite	Water Table	01/12/2009	914
S-50	Onsite	Water Table	02/10/2009	2500
S-50	Onsite	Water Table	03/03/2009	1190
S-50	Onsite	Water Table	04/08/2009	1770
S-50	Onsite	Water Table	05/06/2009	1350
S-50	Onsite	Water Table	06/05/2009	1210
S-50	Onsite	Water Table	07/07/2009	1690
S-50	Onsite	Water Table	08/03/2009	1190
S-50	Onsite	Water Table	09/03/2009	1260
S-50	Onsite	Water Table	10/01/2009	1230
S-50	Onsite	Water Table	11/06/2009	1730
S-50	Onsite	Water Table	12/22/2009	1070
S-50	Onsite	Water Table	01/20/2010	1590
S-50	Onsite	Water Table	02/17/2010	1520
S-50	Onsite	Water Table	03/04/2010	1210
S-50	Onsite	Water Table	04/05/2010	884
S-50	Onsite	Water Table	06/14/2010	1240
S-50	Onsite	Water Table	05/02/2013	817
S-50	Onsite	Water Table	03/17/2014	902
S-50	Onsite	Water Table	08/21/2014	458
S-50	Onsite	Water Table	02/20/2015	588
S-50	Onsite	Water Table	05/15/2015	579
S-50	Onsite	Water Table	08/11/2015	558
S-50	Onsite	Water Table	10/23/2015	254
S-50	Onsite	Water Table	02/25/2016	560
S-50	Onsite	Water Table	08/18/2016	151JL*
S-50	Onsite	Water Table	02/27/2017	309
S-51	Onsite	Water Table	05/22/2012	1010
S-51	Onsite	Water Table	08/01/2012	1180
S-51	Onsite	Water Table	02/12/2013	847
S-51	Onsite	Water Table	04/01/2013	862JL*
S-51	Onsite	Water Table	08/29/2013	589JL*
S-51	Onsite	Water Table	11/06/2013	770
S-51	Onsite	Water Table	03/15/2014	816
S-51	Onsite	Water Table	04/16/2014	811
S-51	Onsite	Water Table	08/19/2014	638
S-51	Onsite	Water Table	10/29/2014	456

Appendix A-3
Historical Sulfolane Summary

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Sulfolane (µg/L)
S-51	Onsite	Water Table	02/20/2015	599
S-51	Onsite	Water Table	04/20/2015	606
S-51	Onsite	Water Table	08/05/2015	555
S-51	Onsite	Water Table	10/26/2015	387
S-51	Onsite	Water Table	02/22/2016	571
S-51	Onsite	Water Table	06/16/2016	527
S-51	Onsite	Water Table	08/18/2016	491
S-51	Onsite	Water Table	10/26/2016	335
S-51	Onsite	Water Table	02/27/2017	333
S-51	Onsite	Water Table	04/12/2017	482
S-51	Onsite	Water Table	07/13/2017	460
S-51	Onsite	Water Table	10/18/2017	299
S-51	Onsite	Water Table	01/19/2018	372
S-51	Onsite	Water Table	04/03/2018	320JL*
S-51	Onsite	Water Table	07/17/2018	271JL*
S-54	Onsite	Water Table	09/03/2008	<10.0

General Notes:

Higher result of a field-duplicate pair is reported.

Date listed is the sample date for recent samples. Prior to 2006, however, the date listed is likely the event date as sample dates were not always available.

MW-148-80/100/A-15/B-30/C-55/D-150 are offsite wells, but are reported along with the Onsite data

Acronyms and Abbreviations:

< = not detected; limit of detection (LOD) or limit of quantitation (LOQ; for older data) listed

J = estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ)

J* = result is considered estimated (no direction of bias), due to QC failures or sample-handling anomalies; flag applied by Shannon & Wilson, Inc.

JH* = result is considered estimated, biased high. Flag applied by Shannon & Wilson, Inc.

JL* = result is considered estimated, biased low. Flag applied by Shannon & Wilson, Inc.

JN* = result is considered estimated and analyte was tentatively identified. Flag applied by Shannon & Wilson, Inc.

R* = result is rejected due to significant QC failures or interference. Flag applied by Shannon & Wilson, Inc.

µg/L = micrograms per liter

UJ* = analyte was not detected; listed limit of detection (LOD) is approximate and may be inaccurate or imprecise; displayed as <...J*. Flag applied by Shannon & Wilson, Inc.

Appendix A-4
Historical COC Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)
MW-101A-25	Onsite	10-55	05/10/2001	<0.0900	1.20
MW-101A-25	Onsite	10-55	07/26/2001	--	1.43
MW-101A-25	Onsite	10-55	07/31/2015	<0.0500	<0.300
MW-101A-25	Onsite	10-55	12/18/2015	<0.0500	<0.283
MW-101A-25	Onsite	10-55	07/19/2016	<0.0500	<0.288
MW-101A-25	Onsite	10-55	08/07/2017	<0.0500	<0.288
MW-101A-25	Onsite	10-55	11/15/2017	<0.0500	<0.283
MW-101A-25	Onsite	10-55	02/15/2018	<0.0500	<0.300
MW-101A-25	Onsite	10-55	04/10/2018	<0.0500	0.180J
MW-101A-25	Onsite	10-55	08/02/2018	<0.0500	<0.288
MW-101-60	Onsite	10-55	05/10/2001	<0.0900	0.818
MW-101-60	Onsite	10-55	07/26/2001	--	0.946
MW-105A-25	Onsite	10-55	05/10/2001	<0.0900	<0.495
MW-105A-25	Onsite	10-55	06/13/2001	<0.0900	--
MW-105A-25	Onsite	10-55	08/04/2015	<0.0500	<0.300
MW-105A-25	Onsite	10-55	10/02/2015	<0.0500	<0.545B*
MW-105A-25	Onsite	10-55	12/18/2015	<0.0500	<0.588B*
MW-105A-25	Onsite	10-55	07/26/2016	<0.0500	<0.278
MW-105-65	Onsite	10-55	05/10/2001	0.153	<0.495
MW-105-65	Onsite	10-55	06/13/2001	<0.0900	--
MW-106-25	Onsite	10-55	05/10/2001	<0.0900	<0.495
MW-106-25	Onsite	10-55	07/31/2015	<0.0500	<0.344
MW-106-25	Onsite	10-55	02/16/2016	<0.100B*	<0.273
MW-106-25	Onsite	10-55	07/27/2016	<0.0500	<0.283
MW-106-25	Onsite	10-55	03/01/2017	<0.0500	<0.313
MW-109-15	Onsite	Water Table	07/31/2015	<0.0500	<0.300
MW-109-15	Onsite	Water Table	07/20/2016	<0.0500	<0.278
MW-110-20	Onsite	Water Table	06/13/2001	8.69	2.87
MW-110-20	Onsite	Water Table	08/23/2011	0.867	2.15
MW-110-20	Onsite	Water Table	10/18/2011	0.408	1.41
MW-110-20	Onsite	Water Table	02/21/2012	0.111	0.458J
MW-110-20	Onsite	Water Table	06/15/2012	0.799	2.49
MW-110-20	Onsite	Water Table	09/03/2014	0.438	1.33
MW-110-20	Onsite	Water Table	02/20/2015	0.0548J	0.504J
MW-110-20	Onsite	Water Table	07/31/2015	0.359	0.985
MW-110-20	Onsite	Water Table	08/09/2016	0.451	0.961J*
MW-113-15	Onsite	Water Table	08/17/2011	<0.0620	<0.372
MW-113-15	Onsite	Water Table	10/14/2011	<0.0620	0.285J
MW-113-15	Onsite	Water Table	02/14/2012	0.0686J	0.295J
MW-113-15	Onsite	Water Table	05/17/2012	0.0461J	0.438J
MW-113-15	Onsite	Water Table	05/20/2013	<0.100B*	0.372JL*
MW-113-15	Onsite	Water Table	07/31/2014	<0.100B*	<0.600B*
MW-113-15	Onsite	Water Table	04/23/2015	<0.0500	0.389J
MW-113-15	Onsite	Water Table	07/28/2015	<0.0500	0.189J
MW-113-15	Onsite	Water Table	02/04/2016	<0.0500	0.356J
MW-113-15	Onsite	Water Table	08/08/2016	<0.0500	<0.283
MW-115-15	Onsite	Water Table	05/10/2001	5.62	2.44
MW-116-15	Onsite	Water Table	05/10/2001	36.8	4.57
MW-116-15	Onsite	Water Table	08/10/2015	27.9	8.06J*
MW-116-15	Onsite	Water Table	12/18/2015	24.8JH*	14.3

Appendix A-4
Historical COC Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)
MW-116-15	Onsite	Water Table	02/29/2016	27.2	9.12
MW-116-15	Onsite	Water Table	08/16/2016	28.5	7.99
MW-116-15	Onsite	Water Table	08/31/2017	28.8	8.77
MW-116-15	Onsite	Water Table	11/15/2017	24.0	5.00
MW-116-15	Onsite	Water Table	02/14/2018	20.1	5.77
MW-116-15	Onsite	Water Table	04/10/2018	17.3	6.51
MW-116-15	Onsite	Water Table	08/08/2018	28.9	10.2
MW-124-25	Onsite	10-55	08/07/2015	0.0317J	<0.268
MW-124-25	Onsite	10-55	08/15/2016	0.0710J	<0.278
MW-125-25	Onsite	10-55	05/10/2001	0.214	<0.495
MW-125-25	Onsite	10-55	08/17/2011	5.12	0.537J
MW-125-25	Onsite	10-55	10/18/2011	2.85	<0.600B*
MW-125-25	Onsite	10-55	02/17/2012	0.431	<0.376
MW-125-25	Onsite	10-55	05/22/2012	0.0681J	<0.417B*
MW-125-25	Onsite	10-55	04/16/2013	0.123	<0.625B*
MW-125-25	Onsite	10-55	08/12/2014	0.0348J	0.283J
MW-125-25	Onsite	10-55	02/20/2015	0.0400J	0.399J
MW-125-25	Onsite	10-55	08/04/2015	0.0512J	<0.300
MW-125-25	Onsite	10-55	12/18/2015	0.0355J	<0.566B*
MW-125-25	Onsite	10-55	02/25/2016	<0.0500	0.313J
MW-125-25	Onsite	10-55	08/18/2016	0.0323J	0.227J
MW-125-25	Onsite	10-55	02/24/2017	<0.0500	<0.566B*
MW-125-25	Onsite	10-55	08/15/2017	<0.0500	0.179J
MW-125-25	Onsite	10-55	11/16/2017	4.84	<0.923B*
MW-125-25	Onsite	10-55	02/14/2018	7.78	0.774
MW-125-25	Onsite	10-55	04/05/2018	8.06JH*	0.845
MW-125-25	Onsite	10-55	08/07/2018	10.8	0.936
MW-126-25	Onsite	10-55	08/10/2015	<0.0500	<0.278
MW-126-25	Onsite	10-55	08/10/2016	<0.0500	<0.273
MW-127-25	Onsite	10-55	05/10/2001	1.01	<0.495
MW-127-25	Onsite	10-55	08/18/2011	<0.0620	<0.392
MW-127-25	Onsite	10-55	10/20/2011	<0.0620	<0.360
MW-127-25	Onsite	10-55	02/21/2012	<0.0620	<0.360
MW-127-25	Onsite	10-55	05/18/2012	<0.0620	<0.360
MW-127-25	Onsite	10-55	04/16/2013	<0.0620	<0.360
MW-127-25	Onsite	10-55	08/14/2014	<0.0500	0.315J
MW-127-25	Onsite	10-55	02/21/2015	<0.0500	0.221J
MW-127-25	Onsite	10-55	08/07/2015	<0.0500	<0.278
MW-127-25	Onsite	10-55	08/15/2016	<0.0500	<0.283
MW-129-40	Onsite	10-55	02/24/2015	<0.0500	<0.300
MW-129-40	Onsite	10-55	08/07/2015	0.0315J	<0.268
MW-129-40	Onsite	10-55	08/10/2016	<0.0500	<0.278
MW-130-25	Onsite	10-55	05/10/2001	0.678	1.66
MW-130-25	Onsite	10-55	02/20/2015	3.24JH*	7.29
MW-130-25	Onsite	10-55	08/07/2015	4.63	6.10
MW-130-25	Onsite	10-55	12/18/2015	2.36JH*	4.10
MW-130-25	Onsite	10-55	03/07/2016	2.05JH*	5.09
MW-130-25	Onsite	10-55	08/18/2016	7.76	15.6
MW-130-25	Onsite	10-55	02/24/2017	1.52JH*	4.09
MW-130-25	Onsite	10-55	08/03/2017	4.17	4.41

Appendix A-4
Historical COC Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)
MW-130-25	Onsite	10-55	10/20/2017	5.80	5.13
MW-130-25	Onsite	10-55	11/15/2017	3.91JH*	2.89
MW-130-25	Onsite	10-55	02/14/2018	2.79JH*	1.51
MW-130-25	Onsite	10-55	04/10/2018	1.76JH*	1.61
MW-130-25	Onsite	10-55	08/08/2018	3.68	2.37
MW-131-25	Onsite	10-55	07/27/2015	<0.0500	<0.300
MW-131-25	Onsite	10-55	07/28/2016	<0.0500	<0.283
MW-131-25	Onsite	10-55	07/14/2017	<0.0500	<0.278
MW-131-25	Onsite	10-55	07/19/2018	<0.0500	<0.588B*
MW-132-20	Onsite	Water Table	08/06/2015	0.284	<0.288
MW-132-20	Onsite	Water Table	08/15/2016	0.0568J	<0.300
MW-133-20	Onsite	Water Table	05/10/2001	<0.0900	<0.495
MW-133-20	Onsite	Water Table	08/17/2011	<0.0620	<0.360
MW-133-20	Onsite	Water Table	10/18/2011	<0.0620	<0.360
MW-133-20	Onsite	Water Table	02/17/2012	<0.0620	<0.376
MW-133-20	Onsite	Water Table	05/19/2012	<0.0620	<0.360
MW-133-20	Onsite	Water Table	04/26/2013	<0.0620	<0.372
MW-133-20	Onsite	Water Table	08/11/2014	<0.100B*	<0.300
MW-133-20	Onsite	Water Table	08/06/2015	<0.0500	<0.288
MW-133-20	Onsite	Water Table	08/15/2016	<0.0500	<0.283
MW-134-20	Onsite	Water Table	08/07/2015	0.0339J	<0.278
MW-134-20	Onsite	Water Table	08/17/2016	<0.0527B*	<0.278
MW-135-20	Onsite	Water Table	07/19/2001	32.9	3.38
MW-135-20	Onsite	Water Table	10/14/2011	20.8	1.52
MW-135-20	Onsite	Water Table	02/20/2015	23.2	1.72
MW-135-20	Onsite	Water Table	08/05/2015	51.6	2.91
MW-135-20	Onsite	Water Table	02/24/2017	23.0	2.47
MW-135-20	Onsite	Water Table	07/24/2017	42.4	4.28
MW-135-20	Onsite	Water Table	11/16/2017	50.1	4.09
MW-135-20	Onsite	Water Table	02/13/2018	45.3	4.69
MW-135-20	Onsite	Water Table	04/04/2018	70.3	3.64
MW-135-20	Onsite	Water Table	08/08/2018	43.1	2.56
MW-136-20	Onsite	Water Table	02/20/2015	8.98	1.22
MW-136-20	Onsite	Water Table	02/24/2017	6.47	<0.734B*
MW-137-20	Onsite	Water Table	02/24/2015	0.0510J	0.347J
MW-137-20	Onsite	Water Table	08/10/2015	0.126	0.224J
MW-137-20	Onsite	Water Table	08/15/2016	0.152JH*	0.219J
MW-137-20	Onsite	Water Table	08/02/2017	2.14JH*	1.00
MW-137-20	Onsite	Water Table	07/19/2018	22.7	2.49
MW-138-20	Onsite	Water Table	02/23/2012	80.7	22.1
MW-138-20	Onsite	Water Table	05/31/2012	128	29.8
MW-138-20	Onsite	Water Table	04/02/2013	72.4	50.1
MW-138-20	Onsite	Water Table	04/11/2016	115	5.68
MW-139-25	Onsite	10-55	07/19/2001	2.98	1.59
MW-139-25	Onsite	10-55	08/17/2011	2.11	1.97
MW-139-25	Onsite	10-55	10/12/2011	1.93JH*	1.86
MW-139-25	Onsite	10-55	02/14/2012	1.52JH*	1.08
MW-139-25	Onsite	10-55	05/21/2012	1.29JH*	1.39
MW-139-25	Onsite	10-55	05/13/2013	0.432	0.617
MW-139-25	Onsite	10-55	07/30/2014	0.466JH*	<1.13B*

Appendix A-4
Historical COC Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)
MW-139-25	Onsite	10-55	02/26/2015	0.191	0.695
MW-139-25	Onsite	10-55	07/31/2015	0.205JH*	1.09
MW-139-25	Onsite	10-55	10/02/2015	0.202JH*	0.953JH*
MW-139-25	Onsite	10-55	02/04/2016	0.107JH*	0.489J
MW-139-25	Onsite	10-55	07/21/2016	0.0537J	0.323J
MW-139-25	Onsite	10-55	02/28/2017	0.118JH*	0.509J
MW-139-25	Onsite	10-55	07/14/2017	0.125JH*	0.561J
MW-139-25	Onsite	10-55	10/20/2017	1.10JH*	1.69
MW-139-25	Onsite	10-55	01/19/2018	1.40JH*	1.02
MW-139-25	Onsite	10-55	04/04/2018	1.61JH*	1.00
MW-139-25	Onsite	10-55	08/08/2018	1.02JH*	1.29
MW-140-25	Onsite	10-55	07/19/2001	<0.0900	<0.505
MW-140-25	Onsite	10-55	07/30/2015	<0.0500	<0.300
MW-140-25	Onsite	10-55	07/21/2016	<0.0500	<0.278
MW-140-25	Onsite	10-55	07/24/2017	0.0722J	<0.273
MW-140-25	Onsite	10-55	01/19/2018	<0.0500	<0.288
MW-140-25	Onsite	10-55	08/08/2018	<0.0500	<0.288
MW-141-20	Onsite	Water Table	08/17/2011	<0.0620	<0.418
MW-141-20	Onsite	Water Table	10/14/2011	<0.0620	0.227J
MW-141-20	Onsite	Water Table	02/14/2012	<0.0620	<0.376
MW-141-20	Onsite	Water Table	04/27/2012	<0.0620	<0.360
MW-141-20	Onsite	Water Table	05/17/2012	<0.0620	<0.360
MW-141-20	Onsite	Water Table	05/08/2013	<0.100B*	<0.360
MW-141-20	Onsite	Water Table	07/31/2014	<0.100B*	<0.600B*
MW-141-20	Onsite	Water Table	08/03/2015	<0.100B*	<0.300
MW-141-20	Onsite	Water Table	02/23/2016	<0.0500	<0.294
MW-141-20	Onsite	Water Table	08/04/2016	0.0440J	<0.588B*
MW-141-20	Onsite	Water Table	03/01/2017	<0.0500	<0.306
MW-142-20	Onsite	Water Table	08/13/2001	0.0850	0.568
MW-142-20	Onsite	Water Table	02/26/2015	0.0530J	0.326J
MW-142-20	Onsite	Water Table	07/31/2015	<0.100B*	<0.300
MW-142-20	Onsite	Water Table	12/18/2015	0.0413J	<0.566B*
MW-142-20	Onsite	Water Table	08/09/2016	<0.0500	<0.278
MW-142-20	Onsite	Water Table	08/09/2017	<0.0500	<0.283
MW-142-20	Onsite	Water Table	11/16/2017	<0.0500	0.231J
MW-142-20	Onsite	Water Table	02/13/2018	<0.0500	0.335J
MW-142-20	Onsite	Water Table	04/26/2018	<0.0500	0.367J
MW-142-20	Onsite	Water Table	08/03/2018	<0.0500	0.510J
MW-143-20	Onsite	Water Table	07/24/2015	<0.0500	<0.300
MW-143-20	Onsite	Water Table	07/18/2016	<0.0500	<0.288
MW-143-20	Onsite	Water Table	08/01/2017	<0.0500	<0.283
MW-143-20	Onsite	Water Table	08/03/2018	<0.0500	0.330J
MW-144A-25	Onsite	10-55	07/24/2015	<0.0500	<0.300
MW-144A-25	Onsite	10-55	07/21/2016	<0.0500	<0.283
MW-144A-25	Onsite	10-55	07/14/2017	<0.0500	<0.283
MW-145-20	Onsite	Water Table	02/24/2015	<0.0500	<0.300
MW-145-20	Onsite	Water Table	08/10/2015	<0.0500	<0.288
MW-145-20	Onsite	Water Table	12/18/2015	<0.0500	<0.283
MW-145-20	Onsite	Water Table	08/10/2016	<0.0500	<0.288
MW-145-20	Onsite	Water Table	08/10/2017	<0.0500	<0.288

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Well ID	Proximity	Zone	Date	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)
MW-145-20	Onsite	Water Table	11/16/2017	<0.0500	<0.283
MW-145-20	Onsite	Water Table	02/15/2018	<0.0500	<0.288
MW-145-20	Onsite	Water Table	04/05/2018	<0.0500	<0.294
MW-145-20	Onsite	Water Table	08/03/2018	<0.0500	0.247J
MW-146A-15	Onsite	Water Table	10/05/2008	<0.100	--
MW-147A-15	Onsite	Water Table	10/05/2008	<0.100	--
MW-148A-15	Onsite	Water Table	10/04/2008	<0.100	--
MW-148A-15	Onsite	Water Table	08/18/2011	<0.0620	<0.396
MW-148A-15	Onsite	Water Table	10/07/2011	<0.0620	0.313NPS*
MW-148A-15	Onsite	Water Table	02/12/2012	<0.0620	0.276J NPS*
MW-148A-15	Onsite	Water Table	05/06/2013	<0.100B*	0.252J
MW-148A-15	Onsite	Water Table	08/04/2014	<0.0500	<0.300
MW-148A-15	Onsite	Water Table	07/17/2015	<0.0500	<0.625B*
MW-149A-15	Onsite	Water Table	10/04/2008	<0.100	--
MW-149A-15	Onsite	Water Table	08/18/2011	<0.0620	<0.378
MW-149A-15	Onsite	Water Table	10/13/2011	<0.0620	0.247NPS*
MW-149A-15	Onsite	Water Table	02/12/2012	<0.0620	0.226J NPS*
MW-149A-15	Onsite	Water Table	05/17/2012	<0.0620	<0.360
MW-149A-15	Onsite	Water Table	04/10/2013	<0.0620	<0.600B*
MW-149A-15	Onsite	Water Table	07/26/2014	<0.0500	<0.600B*
MW-149A-15	Onsite	Water Table	07/17/2015	<0.0500	<0.600B*
MW-149A-15	Onsite	Water Table	07/10/2017	<0.0500	<0.305
MW-149B-20	Onsite	Water Table	05/17/2012	<0.0620	0.207J
MW-153A-15	Offsite	Water Table	08/18/2011	<0.0620	<0.378
MW-153A-15	Offsite	Water Table	10/12/2011	<0.0620	<0.360
MW-153A-15	Offsite	Water Table	02/13/2012	<0.0620	0.496J NPS*
MW-153A-15	Offsite	Water Table	05/10/2012	0.0313J	<0.600B*
MW-153A-15	Offsite	Water Table	04/09/2013	<0.0620	<0.600B*
MW-153A-15	Offsite	Water Table	08/08/2014	<0.100B*	<0.300
MW-154B-95	Onsite	55-90	08/07/2018	0.0646J	0.622
MW-169C-60	Offsite	10-55	03/22/2013	<0.100B*	<0.372
MW-169C-60	Offsite	10-55	07/26/2014	<0.0500	<0.600B*
MW-173A-15	Onsite	Water Table	04/09/2010	<0.100	<1.60
MW-173B-150	Onsite	90-160	04/09/2010	<0.100	<1.60
MW-174B-90	Onsite	55-90	02/14/2012	<0.0620	<0.376
MW-174B-90	Onsite	55-90	05/01/2013	<0.100B*	<0.360
MW-174B-90	Onsite	55-90	09/03/2014	<0.0500	<0.300
MW-176A-15	Onsite	Water Table	05/22/2012	4.03	3.45
MW-176A-15	Onsite	Water Table	04/02/2013	4.46	5.40
MW-176A-15	Onsite	Water Table	07/13/2017	1.14	4.67
MW-176B-50	Onsite	10-55	08/14/2014	<0.0500	0.274J
MW-179A-15	Onsite	Water Table	08/06/2015	<0.0500	<0.288
MW-179A-15	Onsite	Water Table	08/12/2016	<0.0500	<0.283
MW-180A-15	Onsite	Water Table	08/07/2015	0.136	1.05
MW-180A-15	Onsite	Water Table	12/18/2015	<0.153B*	<0.588B*
MW-180A-15	Onsite	Water Table	08/12/2016	0.304	<0.283
MW-180A-15	Onsite	Water Table	08/16/2017	0.0806J	0.204J
MW-180A-15	Onsite	Water Table	11/15/2017	0.273	0.469J
MW-180A-15	Onsite	Water Table	02/14/2018	<0.0500	<0.300
MW-180A-15	Onsite	Water Table	04/11/2018	0.0904J	0.195J

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MW-180A-15	Onsite	Water Table	08/08/2018	0.0440J	0.341J*
MW-186A-15	Onsite	Water Table	08/05/2015	0.106	0.194J
MW-192A-15	Onsite	Water Table	08/04/2015	<0.0500	<0.300
MW-192A-15	Onsite	Water Table	10/02/2015	<0.0500	<0.273
MW-192A-15	Onsite	Water Table	07/26/2016	<0.0500	<0.294
MW-192A-15	Onsite	Water Table	08/16/2017	<0.0500	<0.288
MW-192A-15	Onsite	Water Table	11/15/2017	<0.0500	<0.283
MW-192A-15	Onsite	Water Table	02/15/2018	<0.0500	<0.278
MW-192A-15	Onsite	Water Table	04/10/2018	<0.0500	<0.318
MW-192A-15	Onsite	Water Table	08/07/2018	<0.0500	<0.288
MW-196-15	Onsite	Water Table	08/04/2015	<0.0500	<0.300
MW-196-15	Onsite	Water Table	12/18/2015	<0.0500	<0.273
MW-196-15	Onsite	Water Table	08/09/2016	<0.0500	<0.288
MW-301-CMT-10	Onsite	Water Table	07/30/2015	<0.0500	<0.300
MW-301-CMT-10	Onsite	Water Table	07/15/2016	<0.0500	<0.273
MW-301-CMT-20	Onsite	Water Table	07/30/2015	<0.0500	<0.300
MW-301-CMT-20	Onsite	Water Table	07/15/2016	<0.0500	<0.273
MW-302-CMT-10	Onsite	Water Table	07/21/2015	<0.0500	<0.300
MW-302-CMT-10	Onsite	Water Table	07/14/2016	<0.0500	<0.283
MW-302-CMT-20	Onsite	Water Table	07/21/2015	<0.0500	<0.300
MW-302-CMT-20	Onsite	Water Table	07/14/2016	<0.0500	<0.273
MW-303-CMT-9	Onsite	Water Table	07/29/2015	<0.0500	<0.300
MW-303-CMT-9	Onsite	Water Table	07/14/2016	<0.0500	<0.273
MW-303-CMT-19	Onsite	Water Table	07/29/2015	<0.0500	<0.300
MW-303-CMT-19	Onsite	Water Table	07/14/2016	<0.0500	<0.283
MW-303-CMT-19	Onsite	Water Table	07/28/2017	<0.0500	<0.294
MW-303-CMT-39	Onsite	10-55	08/02/2018	<0.0500	0.428J
MW-304-CMT-10	Onsite	Water Table	08/01/2015	<0.0500	<0.300
MW-304-CMT-10	Onsite	Water Table	07/21/2016	<0.0500	<0.288
MW-304-15	Onsite	Water Table	07/28/2015	<0.0500	<0.300
MW-304-15	Onsite	Water Table	07/22/2016	<0.0500	<0.283
MW-304-CMT-20	Onsite	Water Table	08/01/2015	<0.0500	<0.300
MW-304-CMT-20	Onsite	Water Table	10/02/2015	<0.0500	<0.577B*
MW-304-CMT-20	Onsite	Water Table	07/21/2016	<0.0500	<0.294
MW-304-CMT-20	Onsite	Water Table	07/28/2017	<0.0500	<0.294
MW-304-CMT-40	Onsite	10-55	10/02/2015	<0.0500	<0.556B*
MW-304-CMT-60	Onsite	10-55	10/02/2015	<0.0500	<0.278
MW-305-CMT-28	Onsite	10-55	07/27/2017	<0.0500	<0.308
MW-309-15	Onsite	Water Table	02/26/2015	<0.0500	0.208J
MW-309-15	Onsite	Water Table	07/29/2015	<0.0500	<0.300
MW-309-15	Onsite	Water Table	07/19/2016	<0.0500	<0.278
MW-321-15	Onsite	Water Table	08/03/2015	<0.219B*	0.212J
MW-321-15	Onsite	Water Table	12/18/2015	0.448	<0.617B*
MW-321-15	Onsite	Water Table	02/17/2016	0.691	0.409J
MW-321-15	Onsite	Water Table	08/11/2016	0.322	<0.283
MW-321-15	Onsite	Water Table	02/28/2017	0.431	0.373J
MW-321-15	Onsite	Water Table	08/08/2017	0.352	0.561J
MW-321-15	Onsite	Water Table	11/15/2017	0.389	0.277J
MW-321-15	Onsite	Water Table	02/15/2018	0.219	0.435J
MW-321-15	Onsite	Water Table	04/10/2018	0.255	0.467J

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MW-321-15	Onsite	Water Table	08/07/2018	0.317	0.374J
MW-334-15	Onsite	Water Table	07/25/2017	13.4	5.01
MW-336-20	Onsite	Water Table	08/11/2015	41.0	13.3J*
MW-336-20	Onsite	Water Table	12/18/2015	76.1	11.7
MW-336-20	Onsite	Water Table	08/15/2016	66.4	9.37
MW-336-20	Onsite	Water Table	08/15/2017	53.1	9.60
MW-336-20	Onsite	Water Table	11/15/2017	43.0	10.8
MW-336-20	Onsite	Water Table	02/15/2018	30.1	7.38
MW-336-20	Onsite	Water Table	04/11/2018	40.0	12.8
MW-336-20	Onsite	Water Table	08/08/2018	70.6	17.9
MW-336-35	Onsite	10-55	08/11/2015	0.0502J	<0.268J*
MW-336-35	Onsite	10-55	10/02/2015	<0.123B*	<0.536B*
MW-336-35	Onsite	10-55	08/15/2016	0.176	<0.288
MW-336-55	Onsite	10-55	08/11/2015	0.0313J	<0.278
MW-336-55	Onsite	10-55	10/02/2015	<0.0500	<0.288
MW-336-55	Onsite	10-55	08/15/2016	0.0354J	<0.294
MW-337-20	Onsite	Water Table	08/11/2015	64.9	10.6J*
MW-337-20	Onsite	Water Table	08/17/2016	83.9	12.5
MW-344-15	Onsite	Water Table	02/19/2015	<0.0500	0.380J
MW-344-15	Onsite	Water Table	07/30/2015	<0.0500	<0.300
MW-344-15	Onsite	Water Table	08/11/2016	<0.0500	<0.283
MW-344-15	Onsite	Water Table	07/24/2017	0.0538J	0.391J
MW-344-15	Onsite	Water Table	01/19/2018	<0.0500	0.291
MW-344-55	Onsite	10-55	02/19/2015	<0.0500	<0.300
MW-344-55	Onsite	10-55	07/30/2015	<0.0500	<0.300
MW-344-55	Onsite	10-55	02/16/2016	<0.100B*	<0.294
MW-344-55	Onsite	10-55	08/11/2016	<0.0500	<0.283
MW-344-55	Onsite	10-55	02/28/2017	<0.0500	<0.294
MW-345-15	Onsite	Water Table	02/25/2015	0.0504J	0.438J
MW-345-15	Onsite	Water Table	07/24/2015	0.0429J	<0.300
MW-345-15	Onsite	Water Table	07/22/2016	<0.0500	<0.288
MW-345-15	Onsite	Water Table	07/24/2017	0.554	0.541J
MW-345-15	Onsite	Water Table	10/24/2017	3.27	1.51
MW-345-15	Onsite	Water Table	02/12/2018	2.50JH*	1.34
MW-345-15	Onsite	Water Table	04/04/2018	3.09JH*	1.56
MW-345-15	Onsite	Water Table	07/19/2018	2.13	1.64JH*
MW-345-55	Onsite	10-55	02/25/2015	<0.0500	0.310J
MW-345-55	Onsite	10-55	07/24/2015	<0.0500	<0.300
MW-345-55	Onsite	10-55	07/22/2016	<0.0500	<0.283
MW-351-15	Onsite	Water Table	02/20/2015	<0.0500	0.233J
MW-351-15	Onsite	Water Table	08/03/2015	<0.0500	<0.300
MW-351-15	Onsite	Water Table	07/19/2016	<0.0500	<0.288
MW-351-15	Onsite	Water Table	08/01/2017	<0.0500	<0.278
MW-351-55	Onsite	10-55	02/20/2015	<0.0500	0.194J
MW-351-55	Onsite	10-55	08/03/2015	<0.0500	<0.300
MW-351-55	Onsite	10-55	07/19/2016	<0.0500	<0.294
MW-358-15	Onsite	Water Table	07/23/2015	<0.0500	<0.300
MW-358-15	Onsite	Water Table	07/18/2016	<0.0500	<0.288
MW-358-15	Onsite	Water Table	08/01/2017	<0.0500	0.224J
MW-358-20	Onsite	Water Table	07/23/2015	<0.0500	<0.300

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MW-358-20	Onsite	Water Table	07/18/2016	<0.0500	<0.273
MW-359-15	Onsite	Water Table	07/20/2015	<0.0500	<0.600B*
MW-359-15	Onsite	Water Table	07/14/2016	<0.0500	<0.300
MW-360-15	Onsite	Water Table	07/20/2015	<0.0500	<0.600B*
MW-360-15	Onsite	Water Table	07/14/2016	<0.0500	<0.278
MW-360-15	Onsite	Water Table	07/11/2017	<0.0500	<0.288
MW-361-15	Onsite	Water Table	08/10/2015	<0.0500	<0.268J*
MW-362-15	Onsite	Water Table	07/18/2016	<0.0500	<0.294
MW-363-15	Onsite	Water Table	07/17/2015	<0.0500	<0.600B*
MW-363-15	Onsite	Water Table	07/25/2016	<0.0500	<0.300
MW-364-15	Onsite	Water Table	07/17/2015	<0.0500	<0.600B*
MW-364-15	Onsite	Water Table	07/25/2016	<0.0500	<0.308
MW-369-16	Onsite	Water Table	02/19/2015	<0.0500	0.210J
MW-369-16	Onsite	Water Table	07/31/2015	<0.0500	<0.321
MW-369-16	Onsite	Water Table	12/18/2015	<0.0500	<0.566B*
MW-369-16	Onsite	Water Table	07/20/2016	<0.0500	<0.300
MW-369-16	Onsite	Water Table	08/16/2017	<0.0500	<0.288
MW-369-16	Onsite	Water Table	11/15/2017	<0.0500	0.191J
MW-369-16	Onsite	Water Table	02/15/2018	<0.0500	0.203J
MW-369-16	Onsite	Water Table	04/11/2018	<0.0500	0.232J
MW-369-16	Onsite	Water Table	08/08/2018	<0.0500	<0.294
MW-370-15	Onsite	Water Table	02/25/2015	<0.0500	0.191J
MW-370-15	Onsite	Water Table	07/29/2015	<0.0500	<0.300
MW-370-15	Onsite	Water Table	07/19/2016	<0.0500	<0.300
MW-371-15	Onsite	Water Table	02/20/2015	<0.0500	0.188J
MW-371-15	Onsite	Water Table	07/24/2015	<0.0500	<0.305
MW-371-15	Onsite	Water Table	07/15/2016	<0.0500	<0.283
MW-371-15	Onsite	Water Table	08/03/2018	<0.0500	0.607
O-2	Onsite	Water Table	07/24/2017	2.40JH*	2.07
O-3	Onsite	Water Table	02/24/2015	<0.0500	0.264J
O-3	Onsite	Water Table	08/10/2015	<0.0500	<0.278
O-3	Onsite	Water Table	03/01/2016	<0.0500	<0.283
O-3	Onsite	Water Table	08/15/2016	<0.0500	<0.300
O-3	Onsite	Water Table	08/02/2017	<0.0500	<0.318
O-3	Onsite	Water Table	08/07/2018	<0.0500	<0.283
O-4	Onsite	Water Table	02/26/2015	0.0661J	0.292J
O-4	Onsite	Water Table	07/31/2015	<0.100B*	<0.300
O-4	Onsite	Water Table	02/17/2016	<0.100B*	<0.273
O-4	Onsite	Water Table	08/04/2016	<0.0500	<0.588B*
O-4	Onsite	Water Table	02/28/2017	<0.0500	<0.294
O-4	Onsite	Water Table	07/14/2017	<0.0500	<0.278
O-4	Onsite	Water Table	07/19/2018	0.168	<0.732B*
O-5	Onsite	Water Table	02/19/2015	0.0444J	0.449J
O-5	Onsite	Water Table	07/31/2015	<0.100B*	0.355J
O-5	Onsite	Water Table	02/17/2016	<0.100B*	0.378J
O-5	Onsite	Water Table	08/04/2016	0.0503J	<0.748B*
O-5	Onsite	Water Table	02/28/2017	0.0418J	0.387J
O-6	Onsite	Water Table	02/19/2015	<0.0500	0.381J
O-6	Onsite	Water Table	07/24/2015	<0.0500	<0.300
O-6	Onsite	Water Table	08/08/2016	<0.0500	<0.278

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O-12	Onsite	Water Table	02/21/2015	0.0670J	0.354J
O-12	Onsite	Water Table	08/10/2015	0.0926J	<0.300
O-12	Onsite	Water Table	10/02/2015	<0.100B*	<0.556B*
O-12	Onsite	Water Table	02/29/2016	<0.100B*	<0.283
O-12	Onsite	Water Table	08/10/2016	<0.0500	0.250J
O-12	Onsite	Water Table	02/25/2017	<0.100B*	<0.588B*
O-14	Onsite	Water Table	08/07/2015	<0.0500	<0.278
O-14	Onsite	Water Table	08/17/2016	<0.0500	<0.300
O-15	Onsite	Water Table	08/16/2017	<0.0500	<0.294
O-15	Onsite	Water Table	11/16/2017	<0.0500	<0.300
O-15	Onsite	Water Table	02/15/2018	<0.0500	<0.283
O-15	Onsite	Water Table	04/11/2018	<0.0500	<0.283
O-15	Onsite	Water Table	08/07/2018	<0.0500	<0.288
O-16	Onsite	Water Table	08/11/2015	1.47J*	0.316J
O-16	Onsite	Water Table	08/16/2016	1.14J*	<0.294
O-17	Onsite	Water Table	08/10/2015	<0.0500	<0.573B*
O-17	Onsite	Water Table	08/17/2016	0.0528J	<0.259
O-18	Onsite	Water Table	08/10/2015	<0.100B*	<0.538B*
O-18	Onsite	Water Table	08/17/2016	<0.0500	0.240J
O-19	Onsite	Water Table	08/04/2015	0.559	0.679
O-19-55	Onsite	10-55	02/20/2015	0.0339J	<0.300
O-19-55	Onsite	10-55	08/04/2015	<0.0500	<0.300
O-19-55	Onsite	10-55	08/15/2016	<0.0500	<0.300
O-24	Onsite	Water Table	02/21/2015	0.0622J	0.333J
O-24	Onsite	Water Table	08/11/2015	0.123	0.248J
O-24	Onsite	Water Table	02/29/2016	<0.104B*	0.335J
O-24	Onsite	Water Table	08/15/2016	0.0944J	0.180J
O-24	Onsite	Water Table	02/25/2017	<0.100B*	<0.615B*
O-24	Onsite	Water Table	07/10/2017	0.0728J	<0.283
O-24	Onsite	Water Table	07/19/2018	<0.0500	<0.577B*
O-25	Onsite	Water Table	10/02/2015	<0.100B*	<0.556B*
O-26	Onsite	Water Table	02/21/2015	0.0478J	0.277J
O-26	Onsite	Water Table	08/11/2015	0.0417J	<0.288
O-26	Onsite	Water Table	08/10/2016	<0.0500	<0.283
R-32	Onsite	Water Table	12/03/2010	22100	---
R-33	Onsite	Water Table	12/06/2010	57000	---
R-35R	Onsite	Water Table	07/27/2017	<1.37B*	0.853
R-35R	Onsite	Water Table	02/13/2018	1.69JH*	3.69
R-39	Onsite	Water Table	02/12/2018	<0.0500B*	0.697
R-39	Onsite	Water Table	04/10/2018	0.0998J	0.757
S-9	Onsite	Water Table	08/11/2015	0.0450J	<0.268
S-9	Onsite	Water Table	10/02/2015	<0.100B*	<0.581B*
S-9	Onsite	Water Table	08/10/2016	<0.0500	<0.278
S-9	Onsite	Water Table	08/02/2017	0.0353J	<0.294
S-9	Onsite	Water Table	02/12/2018	<0.0500	0.194J
S-9	Onsite	Water Table	08/03/2018	<0.0500	0.319J
S-19	Onsite	Water Table	09/03/2008	<0.100	--
S-41R	Onsite	Water Table	09/02/2008	4.90	--
S-43	Onsite	Water Table	02/20/2015	5.13	2.22
S-43	Onsite	Water Table	08/05/2015	2.26JH*	0.694

Appendix A-4
Historical COC Analytical Results

Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Well ID	Proximity	Zone	Date	Gasoline Range Organics (mg/L)	Diesel Range Organics (mg/L)
S-43	Onsite	Water Table	02/27/2017	2.56JH*	0.827
S-50	Onsite	Water Table	09/02/2008	24.1	--
S-51	Onsite	Water Table	08/05/2015	4.11	2.56

General Notes:

Higher result of field-duplicate pair is reported.

Date listed is the sample date for recent samples; prior to 2006 however, the date listed is likely the event date as sample dates were not always available for older samples.

MW-148A-15, MW-153A-15, and MW-169C-60 are offsite wells, but are reported along with the Onsite data

Acronyms and Abbreviations:

--- = information not provided because results were not obtained.

< = not detected; limit of detection (LOD) or limit of quantitation (LOQ; for older data) listed

J = estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ)

J* = result is considered estimated (no direction of bias), due to QC failures or sample-handling anomalies; flag applied by Shannon & Wilson, Inc.

JH* = result is considered estimated, biased high. Flag applied by Shannon & Wilson, Inc.

JL* = result is considered estimated, biased low. Flag applied by Shannon & Wilson, Inc.

mg/L = milligrams per liter

NPS* = no petroleum signature, sample result is likely due to naturally-occurring organics

UB* = result is considered not detected at the limit of quantitation (LOQ) or reported concentration (higher value), due to contamination identified in a blank QC sample. Flag is reported as <...B*. Flag applied by Shannon & Wilson, Inc.

Appendix A-5
Historical Geochemistry Summary
Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Location	Zone	Date	Nitrate (mg/L)	Nitrite (mg/L)	Nitrate+Nitrite (mg/L)	Hardness as CaCO3 (mg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)	Chemical Oxygen Demand (mg/L)	Biological Oxygen Demand (mg/L)	Alkalinity (mg/L)	HCO3 Alkalinity (mg/L)	CO3 Alkalinity (mg/L)	OH Alkalinity (mg/L)	Nitrogen Kjeldahl (mg/L)	Total Phosphorus (mg/L)	Methane (mg/L)
AS-MW-6	Water Table	10/12/2012	---	---	3.86	---	62.1	---	---	---	---	---	---	---	---	---	ND
AS-MW-8	Water Table	05/14/2013	---	---	---	---	---	---	<12.4	<4.00	---	---	---	---	---	---	---
MW-105A-25	10-55	10/11/2011	<0.0620	<0.0620	---	186	38.0	2.05	---	---	144	144	<6.20	<6.20	<1.00B*	<0.0620	0.0796
MW-105A-25	10-55	05/04/2012	---	---	---	184	39.2	1.95	---	---	140	140	<6.20	<6.20	---	---	0.0527
MW-105A-25	10-55	07/19/2012	<0.0620	---	---	---	41.1	---	---	---	---	---	---	---	---	---	0.00705
MW-105A-25	10-55	09/17/2012	---	---	0.0900J	---	39.8	---	---	---	---	---	---	---	---	---	0.0467
MW-105A-25	10-55	11/12/2012	---	---	---	169	39.3	1.93	---	---	142	142	<6.20	<6.20	---	---	0.0352
MW-105A-25	10-55	05/22/2013	---	---	---	175	39.0	1.82	---	---	148	148	<6.20	<6.20	---	---	0.0600
MW-105-65	10-55	10/11/2011	<0.0620	<0.0620	---	156	43.4	1.12	---	---	117	117	<6.20	<6.20	<1.00B*	<0.0620	<0.00656
MW-105-65	10-55	05/04/2012	---	---	---	163	44.3	1.13	---	---	116	116	<6.20	<6.20	---	---	ND
MW-105-65	10-55	11/12/2012	---	---	---	147	44.6	1.16	---	---	123	123	<6.20	<6.20	---	---	ND
MW-105-65	10-55	05/22/2013	---	---	---	153	43.0	1.15	---	---	123	123	<6.20	<6.20	---	---	0.000910J
MW-105-65	10-55	08/29/2014	---	---	---	---	44.1	0.958	---	---	122	122	<5.00	<5.00	---	---	---
MW-109-15	Water Table	10/11/2011	<0.0620	<0.0620	---	172	36.0	1.70	---	---	145	145	<6.20	<6.20	<1.02B*	0.0310J	<0.00656
MW-109-15	Water Table	05/04/2012	---	---	---	167	39.4	1.31	---	---	122	122	<6.20	<6.20	---	---	ND
MW-109-15	Water Table	11/14/2012	---	---	---	166	39.8	1.38	---	---	136	136	<6.20	<6.20	---	---	ND
MW-109-15	Water Table	06/06/2013	---	---	---	149	39.8	1.28	---	---	123	123	<6.20	<6.20	---	---	0.000830J
MW-110-20	Water Table	10/11/2011	<0.0620	<0.0620	---	189	4.56	8.05	---	---	183	183	<6.20	<6.20	2.23	0.0660	2.29
MW-110-20	Water Table	06/15/2012	---	---	---	210	7.01	9.25	---	---	203	203	<6.20	<6.20	---	---	2.80
MW-110-20	Water Table	10/18/2012	---	---	---	178	10.5	10.1	---	---	110	110	<6.20	<6.20	---	---	2.55
MW-116-15	Water Table	10/11/2011	0.0520J	<0.0620	---	179	0.184	22.5	---	---	224	224	<6.20	<6.20	<3.46B*	0.0628	4.88
MW-116-15	Water Table	05/21/2012	---	---	---	201	0.459	24.4	---	---	220	220	<6.20	<6.20	---	---	8.81
MW-116-15	Water Table	06/12/2013	---	---	---	189	1.02	14.9	---	---	237	237	<6.20	<6.20	---	---	11.0
MW-127-25	10-55	03/09/2011	<0.0310	<0.0310	---	157	38.0	2.26	---	---	143	143	<3.10	<3.10	<0.310	<0.00310	---
MW-127-25	10-55	04/13/2011	<0.0310	<0.0310	---	162	36.8	2.32	---	---	142	142	<3.10	<3.10	<0.310	0.0306	---
MW-127-25	10-55	08/18/2011	<0.0620	<0.0620	---	184	34.7	3.17	---	---	156	156	<6.20	<6.20	<0.620	<0.00620	---
MW-127-25	10-55	10/11/2011	<0.0620	<0.0620	---	187	30.3	3.08	---	---	160	160	<6.20	<6.20	<1.00B*	0.0338J	0.225
MW-127-25	10-55	05/18/2012	---	---	---	184	31.7	2.53	---	---	153	153	<6.20	<6.20	---	---	0.145
MW-127-25	10-55	11/12/2012	---	---	---	172	32.9	2.58	---	---	152	152	<6.20	<6.20	---	---	0.169
MW-127-25	10-55	04/16/2013	---	---	---	805J*	38.1	2.13	---	---	141	141	<6.20	<6.20	---	---	0.150
MW-130-25	10-55	05/19/2012	---	---	---	---	10.6	17.7	---	---	192	192	<6.20	<6.20	---	---	ND
MW-130-25	10-55	07/23/2012	<0.0620	---	---	---	18.1	---	---	---	---	---	---	---	---	---	1.17
MW-130-25	10-55	10/22/2012	---	---	<0.143B*	---	15.4	---	---	---	---	---	---	---	---	---	1.26
MW-131-25	10-55	03/09/2011	<0.0310	<0.0310	---	193	37.1	2.08	---	---	168	168	<3.10	<3.10	<0.310	<0.0310	---
MW-131-25	10-55	04/08/2011	<0.0310	<0.0310	---	179	35.9	2.19	---	---	164	164	<3.10	<3.10	<0.310	<0.00310	---
MW-131-25	10-55	08/12/2011	<0.0620	<0.0620	---	202	38.6	2.24	---	---	164	164	<6.20	<6.20	<0.620	<0.00620	---
MW-131-25	10-55	10/11/2011	<0.0620	<0.0620	---	196	37.0	2.21	---	---	167	167	<6.20	<6.20	<1.00B*	0.0446J	0.0253
MW-131-25	10-55	05/05/2012	---	---	---	209	37.6	1.80	---	---	157	157	<6.20	<6.20	---	---	0.0454
MW-131-25	10-55	11/14/2012	---	---	---	195	37.5	1.86	---	---	159	159	<6.20	<6.20	---	---	0.0740
MW-131-25	10-55	06/06/2013	---	---	---	189	37.7	1.79	---	---	153	153	<6.20	<6.20	---	---	0.0540
MW-138-20	Water Table	05/31/2012	---	---	---	---	17.4	103	---	---	213	213	<6.20	<6.20	---	---	---
MW-139-25	10-55	05/13/2013	---	---	---	---	---	---	13.9J	2.72	---	---	---	---	---	---	---
MW-142-20	Water Table	03/09/2011	<0.0310	<0.0310	---	185	18.2	4.17	---	---	193	193	<3.10	<3.10	<0.310	<0.0310	---
MW-142-20	Water Table	04/08/2011	<0.0310	<0.0310	---	190	17.0	4.38	---	---	190	190	<3.10	<3.10	<0.310	0.0627	---
MW-142-20	Water Table	08/12/2011	<0.0620	<0.0620	---	181	21.1	4.04	---	---	173	173	<6.20	<6.20	<0.620	<0.00620	---
MW-142-20	Water Table	10/11/2011	0.0380J	<0.0620	---	193	12.4	4.50	---	---	196	196	<6.20	<6.20	<1.09B*	0.00655J	0.236
MW-142-20	Water Table	05/03/2012	---	---	---	188	18.8	4.00	---	---	182	182	<6.20	<6.20	---	---	---
MW-142-20	Water Table	07/19/2012	<0.0620	---	---	---	24.2	---	---	---	---	---	---	---	---	---	0.106
MW-142-20	Water Table	09/17/2012	---	---	0.0860J	---	20.2	---	---	---	---	---	---	---	---	---	0.404
MW-142-20	Water Table	11/12/2012	---	---	---	173	18.1	3.78	---	---	187	187	<6.20	<6.20	---	---	0.447
MW-142-20	Water Table	06/12/2013	---	---	---	179	23.8	3.21	16.0J	<4.00	177	177	<6.20	<6.20	---	---	0.290
MW-142-20	Water Table	09/03/2014	---	---	---	---	21.3	3.35	---	---	186	186	<5.00	<5.00	---	---	---
MW-143-20	Water Table	03/09/2011	<0.0310	<0.0310	---	186	29.9	3.22	---	---	167	167	<3.10	<3.10	<0.310	<0.0310	---
MW-143-20	Water Table	04/08/2011	<0.0310	<0.0310	---	180	29.2	3.18	---	---	165	165	<3.10	<3.10	<0.310	<0.0310	---
MW-143-20	Water Table	08/12/2011	0.0505J	<0.0620	---	205	29.2	3.14	---	---	167	167	<6.20	<6.20	<0.620	<0.00620	---
MW-143-20	Water Table	10/11/2011	0.0980J	<0.0620	---	211	28.1	3.16	---	---	185	185	<6.20	<6.20	<1.00B*	<0.0620	0.0143
MW-143-20	Water Table	05/03/2012	---	---	---	180	33.3	2.33	---	---	150	150	<6.20	<6.20	---	---	0.0203
MW-143-20	Water Table	11/15/2012	---	---	---	164	36.3	2.37	---	---	147	147	<6.20	<6.20	---	---	0.0890
MW-143-20	Water Table	04/18/2013	---	---	---	158	38.9	2.27	---	---	147	147	<6.20	<6.20	---	---	0.0430
MW-148A-15	Water Table	03/07/2011	<0.0310	<0.0310	---	166	20.9	9.56	---	---	152	152	<3.10	<3.10	<0.310	<0.00310	---
MW-148A-15	Water Table	04/08/2011	<0.0310	<0.0310	---	162	19.4	10.2	---	---	148	148	<3.10	<3.10	<0.310	<0.00310	---
MW-148A-15	Water Table	08/18/2011	<0.0620	<0.0620	---	171	19.9	11.1	---	---	141	141	<6.20	<6.20	0.489J	<0.0124	---
MW-148A-15	Water Table	10/11/2011	<0.0620	<0.0620	---	162	18.1	15.4	---	---	134	134	<6.20	<6.20	<1.00B*	<0.310	0.0384
MW-148A-15	Water Table	05/03/2012	---	---	---	160	19.2	11.4	---	---	133	133	<6.20	<6.20	---	---	---
MW-148A-15	Water Table	07/23/2012	<0.0620	---	---	---	20.4	---	---	---	---	---	---	---	---	---	0.00427
MW-148A-15	Water Table	10/22/2012	---	---	<0.100B*	---	---	---	---	---	---	---	---	---	---	---	---

Appendix A-5
Historical Geochemistry Summary
Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska

Location	Zone	Date	Nitrate (mg/L)	Nitrite (mg/L)	Nitrate+Nitrite (mg/L)	Hardness as CaCO ₃ (mg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)	Chemical Oxygen Demand (mg/L)	Biological Oxygen Demand (mg/L)	Alkalinity (mg/L)	HCO ₃ Alkalinity (mg/L)	CO ₃ Alkalinity (mg/L)	OH Alkalinity (mg/L)	Nitrogen Kjeldahl (mg/L)	Total Phosphorus (mg/L)	Methane (mg/L)
MW-148A-15	Water Table	10/22/2012	---	---	---	144	17.3	15.8	---	---	134	134	<6.20	<6.20	---	---	0.0571
MW-148A-15	Water Table	05/06/2013	---	---	---	147	18.8	12.6	---	---	132	132	<6.20	<6.20	---	---	0.0210
MW-148A-15	Water Table	08/04/2014	---	---	---	---	21.0	9.00	---	---	97.0	97.0	<5.00	<5.00	---	---	---
MW-148B-30	10-55	03/07/2011	<0.0310	<0.0310	---	186	32.2	3.41	---	---	166	166	<3.10	<3.10	<0.310	<0.00310	---
MW-148B-30	10-55	04/08/2011	<0.0310	<0.0310	---	185	30.9	3.44	---	---	164	164	<3.10	<3.10	<0.310	0.0122	---
MW-148B-30	10-55	08/12/2011	0.0730J	<0.0620	---	194	32.4	3.66	---	---	162	162	<6.20	<6.20	0.893J	0.0132	---
MW-148B-30	10-55	10/11/2011	<0.0620	<0.0620	---	193	32.5	3.30	---	---	160	160	<6.20	<6.20	<1.00B*	<0.124	0.00929
MW-148B-30	10-55	05/01/2012	---	---	---	194	32.3	3.12	---	---	160	160	<6.20	<6.20	---	---	0.00625
MW-148B-30	10-55	11/11/2012	---	---	---	189	33.4	3.02	---	---	161	161	<6.20	<6.20	---	---	ND
MW-148B-30	10-55	04/15/2013	---	---	---	894	35.7	2.95	---	---	155	155	<6.20	<6.20	---	---	0.0150
MW-148B-30	10-55	08/04/2014	---	---	---	---	36.3	3.09	---	---	162	162	<5.00	<5.00	---	---	---
MW-154B-95	55-90	05/21/2012	---	---	---	---	42.3	1.42	---	---	117	117	<6.20	<6.20	---	---	---
MW-176A-15	Water Table	05/22/2012	---	---	---	261	2.72	9.85	---	---	226	226	<6.20	<6.20	---	---	2.18
MW-176A-15	Water Table	12/12/2012	---	---	---	286	2.53	11.3	---	---	220	220	<6.20	<6.20	---	---	3.00
MW-176A-15	Water Table	04/02/2013	---	---	---	259	6.16	9.39	---	---	233	233	<6.20	<6.20	---	---	2.30
MW-176B-50	10-55	12/12/2012	---	---	---	152	46.0	1.17	---	---	124	124	<6.20	<6.20	---	---	0.00450
MW-180A-15	Water Table	10/11/2011	<0.0620	<0.0620	---	195	39.1	2.27	---	---	145	145	<6.20	<6.20	<1.80B*	<0.124	<0.00656
MW-180A-15	Water Table	11/12/2012	---	---	---	188	43.2	2.66	---	---	143	143	<6.20	<6.20	---	---	ND
MW-180B-50	10-55	10/11/2011	<0.0620	<0.0620	---	151	44.2	<1.13B*	---	---	119	119	<6.20	<6.20	<1.06B*	0.00479J	<0.00656
MW-180B-50	10-55	11/12/2012	---	---	---	150	45.4	1.11	---	---	117	117	<6.20	<6.20	---	---	ND
MW-304-15	Water Table	06/10/2013	---	---	---	---	---	---	11.7J	<4.00	---	---	---	---	---	---	---
MW-304-CMT-20	Water Table	06/07/2012	---	---	---	---	25.1	4.02	---	---	194	194	<6.20	<6.20	---	---	---
MW-309-15	Water Table	11/25/2013	---	---	---	---	---	3.58	---	---	---	---	---	---	---	---	---
MW-310-15	Water Table	11/25/2013	---	---	---	---	---	6.43	---	---	---	---	---	---	---	---	---
O-1	Water Table	08/01/2012	---	---	---	---	14.1	5.97	---	---	154	154	<6.20	<6.20	---	---	---
O-26	Water Table	05/08/2013	---	---	---	---	---	---	33.2	6.32	---	---	---	---	---	---	---

General Notes:

Higher result of a field-duplicate pair is reported.

MW-148A-15/B-30 are offsite wells, but are reported along with the Onsite data

Acronyms and Abbreviations:

--- = analytical results are not available

< = not detected, LOD or limit of quantitation (LOQ; for older data) listed; flag applied by the laboratory

B* = result is considered not detect due to a detection in a blank quality control sample, the reported value is the LOQ or the detected concentration, whichever values is higher; displayed as <...B*, flag applied by Shannon & Wilson, Inc.

CO₃ = carbonate

HCO₃ = bicarbonate

J = estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ); flag applied by the laboratory

J* = result is considered estimated, no bias; flag applied by Shannon & Wilson, Inc.

mg/L = milligrams per liter

ND = analyte not detected, unknown limit of detection (LOD)

OH = hydroxide

**Appendix A-6
Historical PFC Summary**

**Annual 2018 Onsite Groundwater Monitoring Report
Flint Hills Resources Alaska, LLC
North Pole Terminal, North Pole, Alaska**

Well ID	Proximity	Zone	Date	Perfluorooctane Sulfonate (ng/L)	Perfluorooctanoic Acid (ng/L)
MW-309-15	Onsite	Water Table	08/08/2017	112	147
MW-309-15	Onsite	Water Table	08/07/2018	80.6	106
MW-321-15	Onsite	Water Table	08/08/2017	610	2540
MW-321-15	Onsite	Water Table	08/07/2018	647	2040
MW-358-20	Onsite	Water Table	08/08/2017	24.8	26.3
MW-358-20	Onsite	Water Table	08/07/2018	52.7	47.3
MW-359-15	Onsite	Water Table	08/08/2017	7.50J	10.4J
MW-359-15	Onsite	Water Table	08/07/2018	19.5	17.9
MW-359-35	Onsite	10-55	08/08/2017	10.0J	20.8
MW-359-35	Onsite	10-55	08/07/2018	21.3	22.2
MW-362-15	Onsite	Water Table	08/08/2017	30.8	34.6
MW-362-15	Onsite	Water Table	08/07/2018	31.8	37.1
MW-362-25	Onsite	10-55	08/09/2017	33.6	36
MW-362-25	Onsite	10-55	08/07/2018	34.9	35.7
MW-364-15	Onsite	Water Table	08/08/2017	<6.20	<6.20
MW-364-15	Onsite	Water Table	08/07/2018	2.27JH*	1.45
MW-364-30	Onsite	10-55	08/08/2017	<6.20	4.90J
MW-364-30	Onsite	10-55	08/07/2018	6.03	5.38

General Notes:

Higher result of a field-duplicate pair is reported.

Acronyms and Abbreviations:

< = not detected, LOD or limit of quantitation (LOQ; for older data) listed; flag applied by the laboratory

J = estimated concentration, detected above the detection limit (DL) and below the limit of quantitation (LOQ); flag applied by the laboratory

JH* = Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.

ng/L = nanograms per liter