November 27, 2018

Mr. Joshua Barsis
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501

Sent via email: *joshua.barsis@alaska.gov*

Re: 2018 Block 303 Tank Farm Surface Water Monitoring Activities

Dear Mr. Barsis:

On behalf of NANA Development Corporation and Northern Oilfield Services, Inc. (NOSI), SLR International Corporation (SLR) is submitting the results of annual monitoring activities that were conducted in July of 2018 at the NOSI Block 303 Tank Farm in Prudhoe Bay, Alaska. The site is registered under Alaska Department of Environmental Conservation (ADEC) File Number 300.38.296. The monitoring was performed by SLR and included a site inspection, surface water sampling, and shovel sheen testing. Activities were part of ongoing monitoring at this site, and were performed at the request of and in cooperation with the ADEC. The objectives of the work conducted in 2018 were to monitor surface water adjacent to the Block 303 gravel pad for hydrocarbon impacts and inspect the pad edge and barrier liner for signs of settling, sloughing or erosion, ponding water, exposed liner, or thermokarsting.

BACKGROUND

The Block 303 tank farm was formerly operated by NANA Oilfield Services, Inc, a subsidiary of the NANA Development Corporation, and is now operated by NOSI. The tank farm is located on a large gravel pad situated between the Deadhorse Airport and Deadhorse Drive (Figure 1). Several gasoline and diesel fuel tanks are located within a secondary containment on the pad which is surrounded on three sides by ponded surface water bodies created by the construction of the pad (Figure 2). Two distinct surface water bodies border the pad, a north/east pond and south pond (Figure 2).

Previous site investigation, corrective action, and monitoring activities have been conducted at the Block 303 Tank Farm since 2011. These activities included a site investigation to characterize and delineate contaminated soil in the gravel pad in April 2011, a supplemental site investigation to characterize contaminants in sediments and surface water at the edge of the gravel pad in August 2011, a corrective action in April of 2012, and annual surface water monitoring August 2012 through 2018. Historical site activities are discussed briefly below.

April 2011 Site Investigation

A site investigation performed by SLR in April 2011 included the drilling of 17 soil borings to evaluate the nature and extent of contaminants in the subsurface soil of the pad. The site investigation findings are detailed in the site investigation report (SLR, 2011a). The analytical results of the subsurface investigation suggested that the site was impacted by spills of both gasoline and diesel.

August 2011 Supplemental Site Investigation

Potential hydrocarbon impacts to surface water and sediment from fuel releases to the pad were assessed during a supplemental site investigation in August 2011. The summer 2011 investigation findings are detailed in the 2011 report (SLR, 2011b). Three surface water samples were collected, one from each pond adjacent to the Block 303 pad, and shovel sheen tests were performed at approximate 10-foot spacing around the perimeter of the pad. Three sediment samples were also collected, in shallow water from each of the three ponds, at the locations of the heaviest sheening.

Surface water samples, sediment samples, and visual observations indicated that historical spills of petroleum products had migrated to the former pad edge and were impacting surface water and sediment surrounding the site.

April 2012 Corrective Action

In April 2012, 505 feet of vertical barrier liner was installed surrounding the pad on three sides where there was evidence of contaminant migration occurring. Additionally, surface water sampling and sheen testing was implemented in August 2012 to begin assessing the effectiveness of the corrective action. The 2012 correction action and subsequent monitoring activities are detailed in the corrective action report (SLR, 2013).

Surface water samples results for locations along the pad perimeter indicated a reduction in total aromatic hydrocarbon (TAH) and total aqueous hydrocarbon (TAqH) concentrations compared to August 2011 results from prior to installation of the vertical barrier liner.

Shovel sheen testing was conducted at 59 locations along the new pad perimeter following surface water sampling. Overall, lighter sheening was observed in 2012 compared to 2011, especially along the north and east pad edge were a single occurrence of heavy sheen was noted in comparison to four in 2011. With the exception of the eastern liner gap discussed below, sheening was not observed in new gravel.

Sheening from disturbed sediments was most notable along the eastern side of the gravel pad where an 11 foot gap in the liner was left to accommodate utilities during liner installation. In this area, heavy sheening was observed along the north side of the liner gap when the pad edge was disturbed. Subsequent analysis of water levels within the pad and surrounding ponds indicates that a slight water level gradient may exist at the gap location, and residual product within the pad gravel may be migrating to the pad edge through the gap. Following inspection and sampling activities, NOSI placed a sorbent boom in the pond adjacent to the gap location to intercept possible sheening.

In September 2012, pad maintenance activities were performed by Alaska Frontier Constructors Inc. (AFC) under the direction of NOSI to increase the stability of the new pad shoulder. The section of liner along the northwest edge of the pad that had been sloughing slightly was hand excavated, pulled upright, and stabilized with additional gravel. Although the original liner installation was containing pad pore water, an additional 2 feet of liner material was added to the existing liner to increase the stability of the entire northern edge. The pad was expanded laterally an additional 1 to 2 feet along the northern edge to anchor

the liner. Along pad edges, additional gravel was added where sloughing and settling had occurred. Exposed liner material was trimmed to the ground surface, and the liner trench was topped off with clean gravel. The entire trench and shoulder area was hand-compacted with a portable vibratory compactor.

2013-2018 Monitoring Activities

Monitoring activities from 2013 through 2018 were conducted consistent with the *2013 Proposed Activities, NANA Oilfield Services, Inc. Block 303 Tank Farm* letter to ADEC dated March 29, 2013, and the surface water monitoring plan (Monitoring Plan) last updated in February 2016 (SLR, 2016). Activities conducted by NOSI have included monitoring and boom placement and monitoring and site maintenance as needed. Activities from 2013 through 2017 are summarized in the 2017 report (SLR, 2018). Activities completed in 2018 are presented in the following section.

2018 ANNUAL MONITORING

Surface water sampling and shovel sheen testing were conducted on July 29. The intent of sampling and sheen testing was to assess hydrocarbon impacts resulting from historical fuel releases to the gravel pad. Sampling and fieldwork was led by ADEC-qualified samplers consistent with the 2016 Monitoring Plan and ADEC's 2017 monitoring report approval letter (ADEC, 2017a). No deviations to planned activities were noted. Activities were documented in the Field Notebook, Surface Water Sampling Forms, and Photograph Log included as attachments to this report.

Three surface water samples were collected from the same general locations as samples collected in previous years (one at each surface water body at the pad perimeter), as shown on Figure 2. Analytical samples were collected for laboratory analysis of benzene, toluene, ethylbenzene, and xylene (BTEX) and polynuclear aromatic hydrocarbons (PAH), for determination of TAH and TAqH.

Shovel sheen-testing of sediments along the pad perimeter occurred after surface water sampling. A shovel was used to disturb sediments every 10 feet along the edge of the pad at approximately the same test locations as 2015 through 2017. The locations and results of sheen-testing were recorded on sheen-testing field forms. Petroleum hydrocarbon sheens were first classified as being "organic" (i.e., a platey sheen of natural origin) or as "petroleum hydrocarbon" sheen. Petroleum hydrocarbon sheens were assigned a subjective rating of heavy, moderate, or light based on the sheen color and intensity. Heavy sheen was rainbow-colored and covering or nearly covering the water's surface, moderate sheening included sheens that were wispy, streaked, or discontinuous, and light sheen consisted of individual droplets of product visible on the surface.

Site Observations

The site inspection and sheen testing were conducted on July 29. The water level in each of the north, east and south ponds appeared to be representative of typical summer levels as observed in 2015 and 2017, with a slight flow gradient from the east pond towards the culvert at the west end of the north pond. The perimeter of the gravel pad was initially inspected for sheen (biogenic or petroleum-derived) in undisturbed surface water and for liner damage or sloughing. No sheen associated with petroleum

hydrocarbons was observed; small amounts of biogenic (platey) sheen were observed along the pad edge. Surface water in the north, east and south ponds was clear. Sample locations and sheen test results are shown on Figure 2 and photographs of the exposed pad liner and select sample locations representing the types of sheen observed are included in the Photograph Log.

SLR conducted a visual inspection of the condition of the gravel pad and liner. The gravel pad appeared to be in good condition with no standing water observed. The pad shoulders appeared stable, with no cracking, erosion, or sloughing. The exposed liner edge above ground looked new with no visual evidence of fraying or weathering.

Data Quality Assessment

Surface water samples, including one duplicate, were submitted to SGS North America in Anchorage, Alaska under standard chain of custody procedures. Analytical data was reviewed for consistency with the ADEC Technical Memorandum, Environmental Laboratory Data and Quality Assurance Requirements. The Attachments accompanying this letter contain the Quality Assurance Review (QAR), ADEC Laboratory Data Review Checklist, and the laboratory analytical data package. The data were found to be of good quality. No data were rejected, and data flags were limited to samples affected by a field duplicate relative percent difference exceedance, as discussed in the attached QAR. All data was considered usable for the intended purpose.

Surface Water Criteria

Surface water sample results were evaluated against Alaska Water Quality Standards (AWQS) presented in Chapter 18, Alaska Administrative Code (AAC) Section 70 as the primary screening criteria, and secondarily against Table C Groundwater Cleanup Levels of 18 AAC 75 (ADEC, 2018). Surface water sample results are presented on Table 1, and sample locations and cleanup level exceedances are shown on Figure 2. The results of BTEX and PAH analyses were used to calculate TAH and TAqH values using the following methodology:

- The TAH value for each surface water sample was calculated by summing concentrations of BTEX constituents. For compounds that were not detected (ND), the Limit of Detection (LOD) was used in the summation. If no BTEX compound were detected, the TAH value was presented as ND with the sum of the LODs for BTEX compounds showed. The summed TAH value for each sample was compared against the AWQS of AWQS of 10 micrograms per liter (µg/L).
- The TAqH value for each surface water sample was calculated by summing the TAH value calculated above and the concentrations of PAH constituents. For PAH compounds that were ND, the LOD was used in the summation (ADEC, 2017b). If neither BTEX nor PAH compounds were detected, the TAqH value was presented as ND with the sum of the LODs for BTEX and PAH compounds showed. The summed TAqH value for each sample was compared against the AWQS of AWQS of 15 µg/L.
- Total xylenes were calculated similarly to TAH and TAqH, using the sum of p- and m-xylenes and o-xylene concentrations. LOD values were used in the summation to represent ND values.

Non-detect values in TAH and TAqH calculates were treated in accordance with ADEC's *Guidelines for Treatment of Non-Detect Values, Data Reduction for Multiple Detections and Comparison of Quantitation Limits to Cleanup Values* (ADEC, 2017b

Surface Water Sample Results

Analytical results and calculated TAH and TAqH for the period of 2011 to 2018 for each surface water sample are presented in Table 1 and concentration trends for SW-1 and SW-2 are shown on Figure 3 and 4, respectively. The sampling results are summarized as follows:

- **SW-1:** Detections of individual BTEX and PAH compounds were below their respective cleanup levels; however, TAH and TAqH concentrations of 32.2 micrograms per liter [µg/L] and 33.5 µg/L exceeded their respective AWQS. The TAqH exceedance and historical TAqH concentrations are primarily due to BTEX constituents and the resulting TAH values, as shown on Figure 3. As shown on the data plot, the TAqH value has increased steadily from a low of 3.63 µg/L in 2013 to the current value of to 33.5 µg/L. The current value remains below the historic maximum of 55.9 µg/L in 2011, sampled prior to installation of the impermeable pad liner.
- **SW-2:** Exceedances of AWQS were detected for benzene, TAH, and TAqH, while ethylbenzene exceeded groundwater cleanup levels applied as a secondary standard. The reported benzene concentration of 53.6 µg/L marks a historic high for any surface water sample result. As shown on Figure 4, the TAH and TAqH values of 259.8 µg/L and 266.1 µg/L show a steady increase from August 2013 lows of 17.9 and 18.5 µg/L respectively. The current values are near the historic 2011 highs of 286 and 287 µg/L, respectively.
- **SW-3:** No AWQS standards were exceeded for analytes or calculated TAH and TAqH values. No BTEX or PAH constituents were detected. These results are consistent with historical data.

Overall, analyte concentrations for SW-1 and SW-2 show a steady increase from low concentrations in 2013. The results with the exception of benzene at sampling location SW-2 were the most similar to reported values from 2011, prior to installation of the impermeable liner. Constituents of BTEX continue to be the main contributors to exceedances of AWQS for TAH and TAqH.

Shovel Sheen Test Observations

Shovel sheen testing was conducted at 57 of the 59 historical screening locations along the pad perimeter. Sheen tests were conducted every 10 feet as near to previous testing locations as possible; two locations had no ponded water, or the water line had receded sufficiently that the locations could not be screened. Testing included photographing and recording the type of sheen (petroleum hydrocarbon or biogenic) and assigning a subjective rating (heavy, moderate, or light) for each hydrocarbon sheen location as shown on Figure 2. Sheen that broke up into plates (i.e., "platey") when disturbed was considered to be of biogenic origin and was not assigned a rating. The consistent scheme for rating sheen was developed in 2014 to minimize subjectivity. The distribution of sheen ratings are summarized as follows:

- **No Sheen**: 47 locations exhibited no sheen, including 21 of the 23 south pond testing locations. Twenty-six of the 30 north/east pond screening locations had no sheen, representing the greatest number of "no sheen" observances since the beginning of sheen testing.
- **Light Sheen**: Five north/east pond screening locations exhibited light sheen. The locations of light sheen were consistent with prior observations of light to heavy sheen.
- **Moderate Sheen**: Two ratings were assigned, one at each of the ponds. The north/east pond rating at screening Location 50 was consistent with previous moderate or heavy sheen ratings from prior years in the vicinity of the sorbent booms. Sheen at screening location 1 along the south pond was rated as moderate in 2018 and prior sheen at this location in 2014 was rated as "light."
- **Heavy Sheen**: A single heavy sheen ratings was assigned to north/east pond Location 51, situated between the sorbent booms and near the liner gap. Heavy sheen is historically the most common in the vicinity of this area near the liner gap and was observed at the adjacent Location 52 in 2017.

Overall, sheen testing results indicated the lowest levels of observed sheen since monitoring began in 2012.

Temporary Piezometer Installation and Water Level Elevations

Piezometers were not installed in 2017 and 2018 to measure water level elevations. The evaluation of water level elevations is considered optional, consistent with the 2016 Work Plan. As in 2017, it was noted that ponded water to the east of the pad was observed to be slowly flowing towards a drainage culvert at the northwest pad corner.

Boom Placement and Monitoring at the Eastern Liner Gap

Sorbent booms were installed by NOSI to mitigate the possible spreading of sheen within the east pond. At least two sorbent booms have been installed in parallel within the pond adjacent to the gap location each year since 2013. The sorbent booms are deployed in early summer once the pond is ice-free and are anchored in place using stakes. The ponds are periodically monitored throughout the summer season by NOSI for sheening, and saturation or breakthrough of the sorbent booms, as documented in the attached inspection reports.

Two inspections were conducted in 2018 including an initial inspection and boom installation on June 25 and a final inspection and boom removal on September 30. The sorbent booms were found to be in good condition and not saturated upon removal. No immediate need for additional corrective actions was identified as a result of the inspections. Booms will be re-installed in 2019 following thawing of pond ice as a precautionary measure.

Site Maintenance

The exposed liner edge appeared to be in good condition and the pad shoulder stable and well-maintained. The exposed liner edge was generally in good condition with some minor cracking above the pad surface. The pad material remains built-up around the pad perimeter along the liner edge. No liner maintenance is recommended based on these observations.

CONCLUSIONS AND RECOMMENDATIONS

Seven annual surface water sampling events have been conducted at the NOSI Block 303 Tank Farm since the pad liner was installed in 2012. The sample results from July 2018 indicate increasing petroleum hydrocarbon impacts at surface water sampling locations SW-1 and SW-2 while sample location SW-3 remains unaffected by hydrocarbons. Constituents of BTEX continue to be the main contributors to exceedances of AWQS for TAH and TAqH. Concentrations of TAH and TAqH at SW-1 and SW-2 are approaching historic highs from prior to the corrective action completed in 2011, suggesting the diminished effectiveness of the liner.

The subjective sheen testing results suggest the reduced presence of petroleum hydrocarbons in the new gravel along the perimeter of the site, particularly along the northern and eastern sides of the pad. Sheen observed in 2018 was generally less pronounced than in the prior three years with moderate and heavy sheen observed at two locations near the liner gap area. In contrast, surface water sample results show increasing hydrocarbon concentrations in these areas. It is recommended that surface water monitoring activities continue at this site as long as it remains a contaminated site with the ADEC, or until further corrective action is taken.

Future sampling events should evaluate overall contaminant concentration trends and propose additional corrective actions as warranted. Shovel sheen testing should continue in 2019 to further assess the condition of the gravel on the perimeter of the pad and continue to evaluate the correlation between sheen testing and concentrations of TAH and TAqH in the surface water. Visual inspection of the above ground liner will continue to be conducted by SLR during annual site monitoring. Additionally, NOSI will continue to conduct pad and liner maintenance including snow removal during the winter months and maintain the surface grade of the pad to limit ponding.

If you have questions or would like additional information, please do not hesitate to call Julie Hoffman at 541-360-1639 or e-mail at jhoffman@slrconsulting.com. Kevin Steglich, Northern Oilfield Services, Inc. Health, Safety, Environmental and Training Manager, may be contacted at (907) 980-3080 or Kevin.Steglich@nosi.com.

Sincerely,
SLR International Corporation

Christophe Venot
Senior Scientist

Julie Hoffman, P.E.
Project Manager

cc Kevin Steglich, Northern Oilfield Services, Inc.
Eric Billingsley, NANA Development Corporation

Attachments:

Figure 1. Site Location Map
Figure 2. Surface Water Sample and Sheen Test Locations and Results
Figure 3 SW-1 Analyte Concentration Plot
Figure 4 SW-2 Analyte Concentration Plot
Table 1 Surface Water Sample Results (2011- 2017)
Photograph Log
Field Documentation
2018 Boom Monitoring Reports
Laboratory Data Quality Assessment Review, including ADEC Laboratory Data Review Checklists and SGS Laboratory Data Report

References:

Alaska Department of Environmental Conservation (ADEC), 2017a. Report approval letter entitled: Re: 2016 Activities at NANA Oilfield Services, Inc. Block 303 Tank Farm. Joshua Barsis, ADEC, to Kevin Steglich, NOSI. January 24.

ADEC, 2017b. *Guidelines for Treatment of Non-Detect Values, Data Reduction for Multiple Detections and Comparison of Quantitation Limits to Cleanup Values.* Technical Memorandum, April.

ADEC, 2018. Alaska Administrative Code (18 AAC 70), Water Quality Standards. Amended as of April 6.

SLR International Corporation (SLR). 2011a. Site Investigation, NANA Oilfield Services, Inc. Block 303. April 29.

SLR. 2011b. Work Plan for Supplemental Site Investigation at NANA Oilfield Services, Inc. Block 303 Tank Farm, Prudhoe Bay, Alaska. August 3.

SLR, 2013. Block 303 Tank Farm Corrective Action Report. February.

SLR, 2016. NANA Oilfield Services, Inc., Block 303 Tank Farm Surface Water Monitoring Plan. February.

SLR, 2018. 2017 Block 303 Tank Farm Surface Water Monitoring Activities. Letter to Joshua Barsis, ADEC. January 19.

NANA NOSI BLOCK 303
DEADHORSE, ALASKA

Report

BLOCK 303 TANK FARM
2018 MONITORING REPORT

Drawing

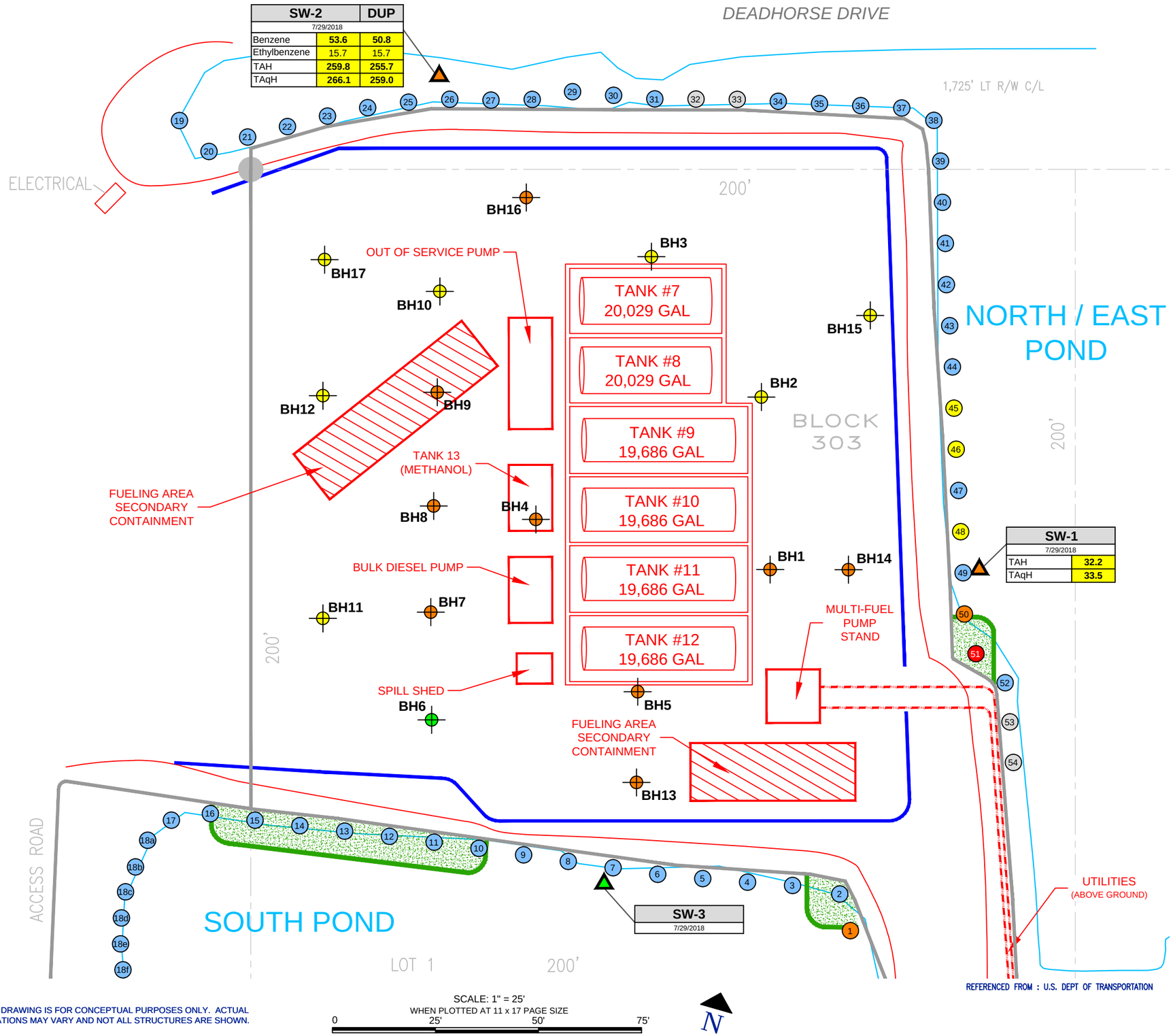
SITE LOCATION MAP

N

800 400 0 800 Feet

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

Date	November 2018	Scale	1 in = 800 feet	Fig. No. 1
File Name	F1 Block 303 SW_NOSI RPT_18.mxd	Project No.	105.01619.17001	



THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

LEGEND

- JULY 2018 SURFACE WATER SAMPLE LOCATION EXCEEDING ALASKA WATER QUALITY STANDARDS
- JULY 2018 SURFACE WATER SAMPLE LOCATION NOT EXCEEDING ALASKA WATER QUALITY STANDARDS
- APRIL 2011 SOIL BORING LOCATION EXCEEDING ADEC METHOD TWO SOIL CLEANUP LEVEL FOR ARCTIC ZONE
- APRIL 2011 SOIL BORING LOCATION EXCEEDING ADEC METHOD ONE SOIL CLEANUP LEVEL FOR ARCTIC ZONE
- APRIL 2011 SOIL BORING LOCATION NOT EXCEEDING ADEC METHOD ONE SOIL CLEANUP LEVEL FOR ARCTIC ZONE
- APRIL 2012 SUBSURFACE SOIL SAMPLE LOCATION EXCEEDING ADEC METHOD TWO SOIL CLEANUP LEVEL FOR ARCTIC ZONE
- APRIL 2012 SUBSURFACE SOIL SAMPLE LOCATION EXCEEDING ADEC METHOD ONE SOIL CLEANUP LEVEL FOR ARCTIC ZONE
- VERTICAL BARRIER LINER
- GRAVEL PAD SHOULDER
- GRAVEL PAD TOE
- SURFACE WATER (2016 EXTENT)
- APPROXIMATE LOCATION OF ORGANIC SOIL COVER
- PROPERTY BOUNDARY
- FUEL PIPELINE

AAC	ALASKA ADMINISTRATIVE CODE
ADEC	ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DUP	DUPLICATE SAMPLE
--	DATA NOT AVAILABLE
J	ESTIMATED CONCENTRATION
ND	NOT DETECTED
NS	NOT SCREENED
TAH	TOTAL AROMATIC HYDROCARBONS
TAqH	TOTAL AQUEOUS HYDROCARBONS

55.9 BOLD AND SHADED VALUES EXCEED THE PRIMARY SCREENING CRITERIA, 18 AAC 70.020B (FEBRUARY 19, 2016) ALASKA WATER QUALITY STANDARDS.
1.68 SHADED VALUES EXCEED THE 2015 OR 2017 18 AAC 75.345 TABLE C GROUNDWATER CLEANUP LEVEL.

SHEEN TEST KEY - JULY 2018 RESULTS

- 51 HEAVY SHEEN, COVERS WATER SURFACE
- 28 MODERATE SHEEN, WISPY
- 14 LIGHT SHEEN, INDIVIDUAL DROPLETS
- 8 NO SHEEN
- 35 SHEEN TEST NOT PERFORMED; NO WATER PRESENT

NOTES

1. SUBSURFACE SOIL INVESTIGATION ACTIVITIES AND ANALYTICAL RESULTS ARE DETAILED IN THE REPORT *SITE INVESTIGATION, NANA OILFIELD SERVICES, INC. BLOCK 303* (SLR, APRIL 29, 2011).
2. GRAVEL PAD AND SHOULDER LOCATION SURVEYED BY F.R. BELL AND ASSOCIATES, MAY 10, 2012.
3. SURFACE WATER SAMPLE RESULTS ARE GIVEN IN µg/L.

Site
NANA NOSI BLOCK 303
DEADHORSE, ALASKA

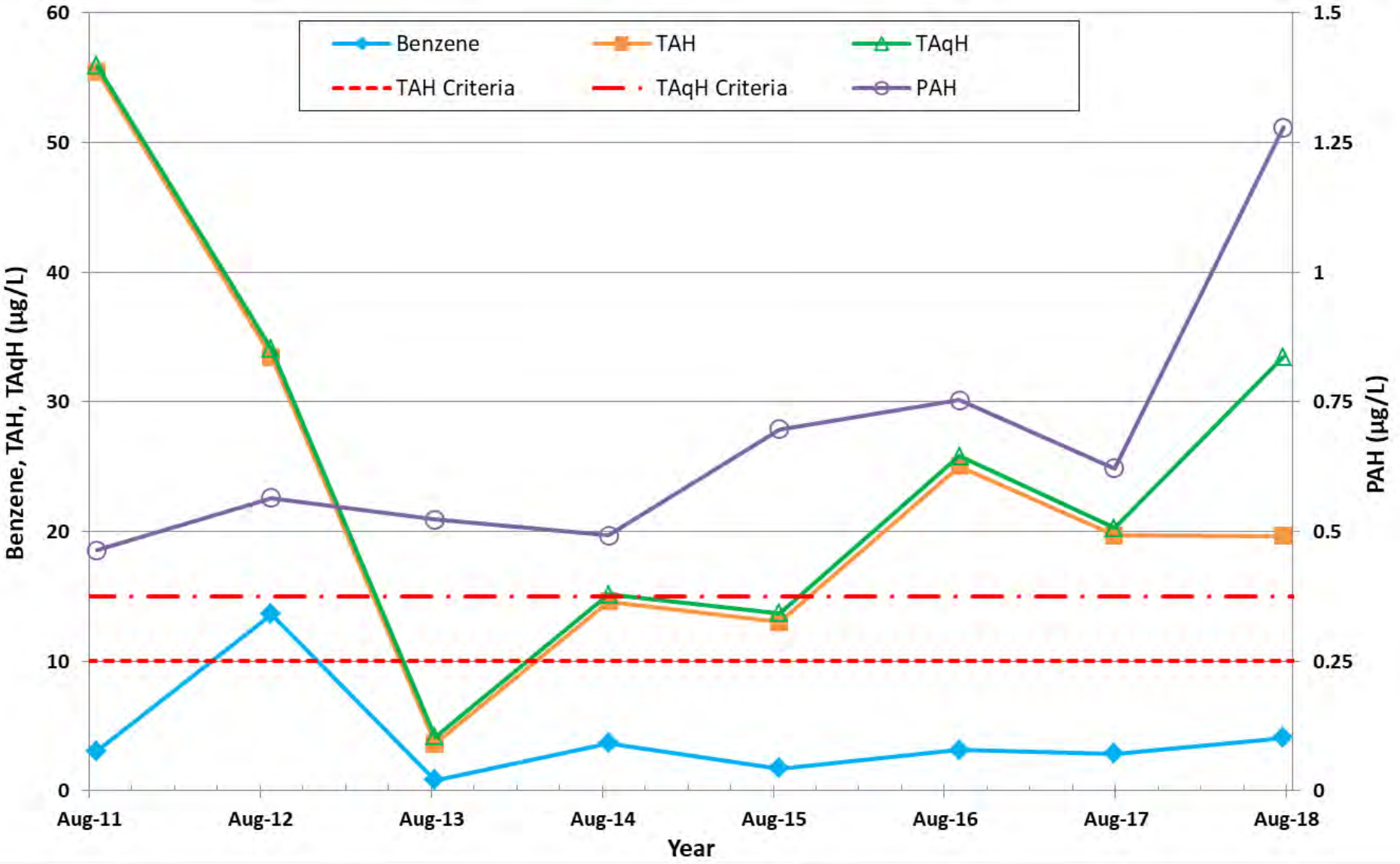
Report
BLOCK 303 TANK FARM
2018 MONITORING REPORT

Drawing
SURFACE WATER SAMPLE AND SHEEN TEST LOCATIONS AND RESULTS

Date	November 2018	Scale	1" = 25 Feet
File Name	F2 Block 303 SW_NOSI RPT_18	Project No.	105.01619.17001

Fig. No. 2

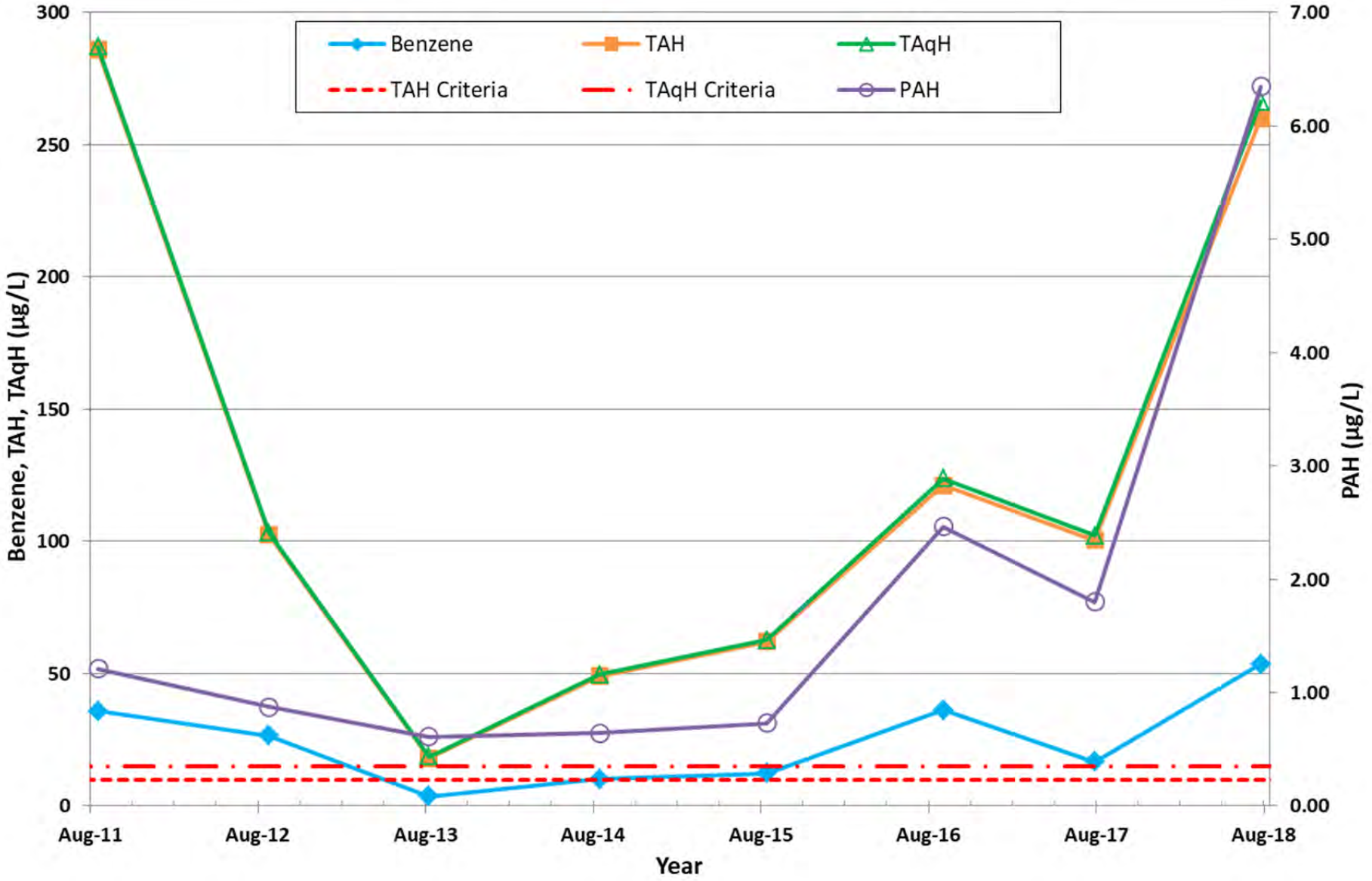
SLR



NOTES: TAH and TAqH criteria referenced from 18 AAC 70.020b, Alaska Water Quality Standards (April 6, 2018). The higher of parent/duplicate sample pairs were plotted for a given analyte.

Abbreviations
PAH - polynuclear aromatic hydrocarbon TAH - total aromatic hydrocarbons TAqH – total aqueous hydrocarbons

SLR	**2018 Block 303 Tank Farm Surface Water Monitoring Activities**
Figure 3 SW-1 Analyte Concentration Plot	Project No.: 105.01619.17001



NOTES: TAH and TAqH criteria referenced from 18 AAC 70.020b, Alaska Water Quality Standards (April 6, 2018). The higher of parent/duplicate sample pairs were plotted for a given analyte.

Abbreviations
PAH - polynuclear aromatic hydrocarbon TAH - total aromatic hydrocarbons TAqH – total aqueous hydrocarbons

SLR	**2018 Block 303 Tank Farm Surface Water Monitoring Activities**
Figure 4 SW-2 Analyte Concentration Plot	Project No.: 105.01619.17001

Table 1. Surface Water Sample Results (2011-2018)
NANA Oilfield Services, Block 303 Tank Farm Monitoring

Analyte	Screening Criteria				Sample Location SW-1[F]																					
					2011				2012				2013		2014		2015		2016		2017				2018	
	Primary: 18 AAC 70 Alaska Water Quality Standard Freshwater[A]	Secondary: 18 AAC 75 Table C Groundwater Cleanup Levels[B]			Primary SW-1 22-Aug-11 1113996001		Duplicate SW-91 22-Aug-11 1113996002		Primary SW-1 28-Aug-12 1124027001		Duplicate SW-91 28-Aug-12 1124027004		SW-1 12-Aug-13 1133792001		SW-01 19-Aug-14 1143927001		SW-1 18-Aug-15 1154613001		SW-1 06-Sep-16 1165321001		Primary SW-1 02-Aug-17 1175185001		Duplicate SW-99 02-Aug-17 1175185004		SW-1 29-Jul-18 1184077001	
		2015[C]	2017[D]	2018[E]	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag
Fuels (AK101 and AK102, mg/L)																										
Gasoline Range Organics	--	2.2	2.2	2.2	0.157	=	0.155	=	0.0981	J	0.0996	J	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diesel Range Organics	--	1.5	1.5	1.5	0.285	J	0.316	J	1.5	=	1.68	=	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX (SW8021B, µg/L)																										
Benzene	5	5	4.6	4.6	3.05	=	2.95	=	**13.6**	=	**13.6**	=	0.83	=	3.66	=	1.71	=	3.15	=	2.86	=	2.84	=	4.07	=
Ethylbenzene	700	700	15	15	2.54	=	2.48	=	1.94	=	1.91	=	0.49	J	1.33	=	2.09	=	1.85	=	2.69	=	2.68	=	2.01	=
Toluene	1,000	1,000	1,100	1,100	27.1	=	26.4	=	8.68	=	8.7	=	0.48	J	2.85	=	1.2	=	5.15	=	0.94	J	0.97	J	8.4	=
o-Xylene	--	--	--	--	6.58	=	6.40	=	2.68	=	2.68	=	0.62	J	2.32	=	2.82	=	5.6	=	3.75	=	3.77	=	6.72	=
P & M -Xylene	--	--	--	--	16.2	=	15.8	=	6.6	=	6.57	=	1.21	J	4.41	=	5.16	=	9.29	=	9.43	=	9.4	=	11	=
Total Xylenes[G]	10,000	10,000	190	190	22.8	=	22.2	=	9.28	=	9.25	=	1.83	J	6.73	=	7.98	=	14.89	=	13.18	=	13.17	=	17.7	=
TAH (Total BTEX)[G]	10	--	--	--	**55.5**	=	**54.0**	=	**33.5**	=	**33.5**	=	3.63	J	**14.6**	=	**13.0**	=	**25.0**	=	**19.67**	=	**19.7**	=	**32.2**	=
Polycyclic Aromatic Hydrocarbons (SW8270 SIM, µg/L)																										
1-Methylnaphthalene	--	150	11	11	0.152	=	0.200	=	0.0659	=	0.0682	=	0.0282	J	0.0485	J	0.178	=	0.255	=	0.172	=	0.185	=	0.725	=, Q
2-Methylnaphthalene	--	150	36	36	0.188	=	0.242	=	0.0528	=	0.0615	=	0.0229	J	0.0379	J	0.105	=	0.287	=	0.168	=	0.165	=	0.699	=, Q
Acenaphthene	1,200	2,200	530	530	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	0.02	J	[0.0232]	U	[0.0236]	U	[0.0245]	U
Acenaphthylene	--	2,200	260	260	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Anthracene	9,600	11,000	43	43	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	UJ	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Benzo(a)anthracene	--	1.2	0.12	0.30	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Benzo[a]pyrene	0.2	0.2	0.034	0.25	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.00925]	U	[0.00925]	U	[0.00945]	U	[0.0098]	U
Benzo[b]fluoranthene	--	1.2	0.34	2.5	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Benzo[g,h,i]perylene	--	1,100	0.26	0.26	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	UJ	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Benzo[k]fluoranthene	--	12	0.80	0.80	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Chrysene	--	120	2.0	2.0	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Dibenzo[a,h]anthracene	--	0.12	0.034	0.25	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	UJ	[0.0256]	U	[0.00925]	U	[0.00925]	U	[0.00945]	U	[0.0098]	U
Fluoranthene	300	1,500	260	260	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Fluorene	1,300	1,500	290	290	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	0.0183	J	[0.0232]	U	[0.0236]	U	0.0325	J
Indeno[1,2,3-c,d] pyrene	--	1.2	0.19	0.19	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	UJ	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
Naphthalene	--	730	1.7	1.7	0.239	=	0.314	=	0.103	=	0.114	=	[0.0425]	U	0.0978	J	0.313	=	0.441	=	0.285	=	0.296	=	0.942	=, Q
Phenanthrene	--	11,000	170	170	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	0.0153	J
Pyrene	960	1,100	120	120	[0.015]	U	[0.0155]	U	[0.03]	U	[0.03]	U	[0.032]	U	[0.0263]	U	[0.0256]	U	[0.0232]	U	[0.0232]	U	[0.0236]	U	[0.0245]	U
PAH[G]	15	--	--	--	0.464	=	0.547	=	0.553	=	0.564	=	0.523	J	0.492	UJ, J, Q	0.697	=	0.753	=	0.6051	=	0.6217	=	1.279	J, Q
TAqH (TAH + PAH)[G]	15	--	--	--	**55.9**	=	**54.6**	=	**34.1**	=	**34.0**	=	4.15	J	**15.1**	UJ, J, Q	13.7	=	**25.8**	=	**20.28**	=	**20.3**	=	**33.5**	J, Q

Notes:

55.9 Bold and shaded values exceed the primary screening criteria, 18 AAC 70.020b (February 19, 2016) Alaska Water Quality Standards.

1.68 Shaded values exceed the 2015 or 2017 18 AAC 75.345 Table C groundwater cleanup level; see Notes [C] and [D] below.

A Screening values from 18 AAC 70.020b (February 5, 2017) are adapted by reference from Alaska Water Quality Criteria Manual for Toxic and other Deleterious Organic and Inorganic Substances (December 12, 2008).

B Groundwater cleanup levels are not directly applicable and are provided for reference only.

C Sample results prior to 2015 were compared with ADEC 2015 cleanup levels (18 AAC 75), as revised on June 17, 2015

D Sample results for 2016 and 2017 were compared with ADEC 2017 cleanup levels (18 AAC 75), as revised on November 6, 2016

E Sample results for 2018 were compared with ADEC 2018 cleanup levels (18 AAC 75), as revised on September 29, 2018.

F The field sample identification number, date collected and laboratory sample identification number are provided.

G Total values are the summation of reported values and LODs for non detects. PAH compounds included in the summation per 18 AAC 70, included all reported PAHs except 1-methylnaphthalene and 2-methylnaphthalene.

Data Flags:

U	The analyte was analyzed for but was not detected above the limit of detection (LOD).
J	The analyte was positively identified, but the result was between the LOQ and DL; the quantitation was an estimate.
Q	The quantitation was an estimate due to a quality control failure. Where applicable, a "+" or "-" was appended to indicate a high or low bias, respectively.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
=	A detected compound [concentration listed in column to the left]

Abbreviations:

--	Not applicable or screening criteria does not exist for this compound	BTEX	benzene, toluene, ethylbenzene, and xylene	LOD	Limit of Detection
µg/L	micrograms per liter	DL	Detection Limit	LOQ	Limit of Quantitation
AAC	Alaska Administrative Code	DRO	Diesel Range Organics	mg/L	milligrams per liter
ADEC	Alaska Department of Environmental Conservation	GRO	Gasoline Range Organics	PAH	Polynuclear Aromatic Hydrocarbons
SIM	Selective Ion Monitoring				
TAH	Total Aromatic Hydrocarbons				
TAqH	Total Aqueous Hydrocarbons				

Table 1. Surface Water Sample Results (2011-2018)
NANA Oilfield Services, Block 303 Tank Farm Monitoring

Analyte	Screening Criteria				Sample Location SW-2[F]																							
					2011		2012		2013				2014				2015				2016				2017				2018			
	Primary: 18 AAC 70 Alaska Water Quality Standard Freshwater[A]	Secondary: 18 AAC 75 Table C Groundwater Cleanup Levels[B]			SW-2 22-Aug-11 1113996003		SW-2 28-Aug-12 1124027002		Primary SW-2 12-Aug-13 1133792002		Duplicate SW-5 12-Aug-13 1133792004		Primary: SW-02 19-Aug-14 1143927002		Duplicate: SW-92 19-Aug-14 1143927004		Primary: SW-2 18-Aug-15 1154613002		Duplicate: SW-29 18-Aug-15 1154613003		Primary: SW-2 06-Sep-16 1165321002		Duplicate: SW-99 06-Sep-16 1165321004		SW-2 02-Aug-17 1175185002		SW-2 14-Aug-17 1175667001		Primary: SW-2 29-Jul-18 1184077002		Duplicate: SW-99 29-Jul-18 1184077004	
		2015[C]	2017[D]	2018[E]	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag
Fuels (AK101 and AK102, mg/L)																																
Gasoline Range Organics	--	2.2	2.2	2.2	0.523	=	0.209	=	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diesel Range Organics	--	1.5	1.5	1.5	0.568	J	1.35	=	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX (SW8021B, µg/L)																																
Benzene	5	5	4.6	4.6	**35.8**	=	**26.5**	=	3.60	=	3.62	=	**9.93**	=	**10.2**	=	**12.2**	=	**12.3**	=	**25.1**	=, Q	**36.3**	=, Q	--	--	**16.7**	=	**53.6**	=	**50.8**	=
Ethylbenzene	700	700	15	15	14	=	5.77	=	1.37	=	1.36	=	2.66	=	2.74	=	17.8	=	17.9	=	4.98	=	6.2	=	--	--	7.48	=	15.7	=	15.7	=
Toluene	1,000	1,000	1,100	1,100	126	=	33.2	=	4.86	=	4.83	=	14.8	=	15.3	=	4.42	=	4.47	=	25.2	=	30.9	=	--	--	34.3	=	89.3	=	88.6	=
o-Xylene	--	--	--	--	38.5	=	13	=	3.01	=	3.09	=	7.88	=	8.07	=	9.74	=	9.9	=	14	=	18.2	=	--	--	15.1	=	34.9	=	34.8	=
P & M -Xylene	--	--	--	--	71.4	=	23.9	=	5.1	=	5.11	=	12.5	=	12.8	=	17.3	=	17.5	=	22.4	=	29.6	=	--	--	26.8	=	66.3	=	65.8	=
Total Xylenes[G]	10,000	10,000	190	190	110	=	36.9	=	8.11	=	8.20	=	20.4	=	20.9	=	27.0	=	27.4	=	36.4	=	47.8	=	--	--	41.9	=	101	=	101	=
TAH (Total BTEX)[G]	10	--	--	--	**286**	=	**102**	=	**17.9**	=	**18.0**	=	**47.8**	=	**49.1**	=	**61.5**	=	**62.1**	=	**91.7**	=, Q	**121**	=, Q	--	--	**100.38**	=	**259.8**	=	**255.7**	=
Polycyclic Aromatic Hydrocarbons (SW8270 SIM, µg/L)																																
1-Methylnaphthalene	--	150	11	11	0.169	=	0.109	=	0.0428	J	0.032	J	0.0498	J	0.0643	=	0.0493	J	0.0637	=	0.498	=	0.531	=	0.342	=	--	--	1.39	=, Q	0.666	=, Q
2-Methylnaphthalene	--	150	36	36	0.237	=	0.0863	=	0.0329	J	0.0283	J	0.0358	J	0.05	J	0.0555	=	0.0518	=	0.522	=	0.556	=	0.29	=	--	--	1.34	=, Q	0.629	=, Q
Acenaphthene	1,200	2,200	530	530	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Acenaphthylene	--	2,200	260	260	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Anthracene	9,600	11,000	43	43	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	UJ	[0.0261]	UJ	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Benzo(a)anthracene	--	1.2	0.12	0.30	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Benzo[a]pyrene	0.2	0.2	0.034	0.25	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0098]	U	[0.01]	U	[0.00925]	U	--	--	[0.0113]	U	[0.0114]	U
Benzo[b]fluoranthene	--	1.2	0.34	2.5	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Benzo[g,h,i]perylene	--	1,100	0.26	0.26	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	UJ	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Benzo[k]fluoranthene	--	12	0.80	0.80	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Chrysene	--	120	2.0	2.0	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Dibenzo[a,h]anthracene	--	0.12	0.034	0.25	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	UJ	[0.025]	U	[0.025]	U	[0.0098]	U	[0.01]	U	[0.00925]	U	--	--	[0.0113]	U	[0.0114]	U
Fluoranthene	300	1,500	260	260	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Fluorene	1,300	1,500	290	290	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	0.017	J	[0.025]	U	[0.0232]	U	--	--	0.0382	J	0.0194	J
Indeno[1,2,3-c,d] pyrene	--	1.2	0.19	0.19	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	UJ	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	[0.0282]	U	[0.0284]	U
Naphthalene	--	730	1.7	1.7	0.973	=	0.425	=	0.106	J	0.114	=	0.173	J, Q	0.249	J, Q	0.357	=	0.279	=	2.08	=	2.12	=	1.48	=	--	--	5.94	=, Q	2.96	=, Q
Phenanthrene	--	11,000	170	170	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	0.0412	J	[0.0284]	U
Pyrene	960	1,100	120	120	[0.0155]	U	[0.03]	U	[0.0334]	U	[0.033]	U	[0.0255]	U	[0.0261]	U	[0.025]	U	[0.025]	U	[0.0245]	U	[0.025]	U	[0.0232]	U	--	--	0.0194	J	[0.0284]	U
PAH[G]	15	--	--	--	1.21	=	0.875	=	0.607	J	0.609	J	0.556	UJ, J, Q	0.641	UJ, J, Q	0.732	=	0.654	=	2.41	=	2.47	=	1.80	=	--	--	6.343	J, Q	3.343	=, Q
TAqH (TAH + PAH)[G]	15	--	--	--	**287**	=	**103**	=	**18.5**	J	**18.6**	J	**48.4**	UJ, J, Q	**49.7**	UJ, J, Q	**62.2**	=	**62.8**	=	**94.1**	=, Q	**124**	=, Q	**102.18**		**=**		**266.1**	J, Q	**259.0**	=, Q

Notes:

55.9	Bold and shaded values exceed the primary screening criteria, 18 AAC 70.020b (February 19, 2016) Alaska Water Quality Standards.
1.68	Shaded values exceed the 2015 or 2017 18 AAC 75.345 Table C groundwater cleanup level; see Notes [C] and [D] below.
A	Screening values from 18 AAC 70.020b (February 5, 2017) are adapted by reference from Alaska Water Quality Criteria Manual for Toxic and other Deleterious Organic and Inorganic Substances (December 12, 2008).
B	Groundwater cleanup levels are not directly applicable and are provided for reference only.
C	Sample results prior to 2015 were compared with ADEC 2015 cleanup levels (18 AAC 75), as revised on June 17, 2015
D	Sample results for 2016 and 2017 were compared with ADEC 2017 cleanup levels (18 AAC 75), as revised on November 6, 2016
E	Sample results for 2018 were compared with ADEC 2018 cleanup levels (18 AAC 75), as revised on September 29, 2018.
F	The field sample identification number, date collected and laboratory sample identification number are provided.
G	Total values are the summation of reported values and LODs for non detects. PAH compounds included in the summation per 18 AAC 70, included all reported PAHs except 1-methylnaphthalene and 2-methylnaphthalene.

Data Flags:

U	The analyte was analyzed for but was not detected above the limit of detection (LOD).
J	The analyte was positively identified, but the result was between the LOQ and DL; the quantitation was an estimate.
Q	The quantitation was an estimate due to a quality control failure. Where applicable, a "+" or "-" was appended to indicate a high or low bias, respectively.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
=	A detected compound [concentration listed in column to the left]

Abbreviations:

--	Not applicable or screening criteria does not exist for this compound	BTEX	benzene, toluene, ethylbenzene, and xylene	LOD	Limit of Detection
µg/L	micrograms per liter	DL	Detection Limit	LOQ	Limit of Quantitation
AAC	Alaska Administrative Code	DRO	Diesel Range Organics	mg/L	milligrams per liter
ADEC	Alaska Department of Environmental Conservation	GRO	Gasoline Range Organics	PAH	Polynuclear Aromatic Hydrocarbons
SIM	Selective Ion Monitoring				
TAH	Total Aromatic Hydrocarbons				
TAqH	Total Aqueous Hydrocarbons				

Table 1. Surface Water Sample Results (2011-2018)
NANA Oilfield Services, Block 303 Tank Farm Monitoring

Analyte	Screening Criteria				Sample Location SW-3[F]															
					2011		2012		2013		2014		2015		2016		2017		2018	
	Primary: 18 AAC 70 Alaska Water Quality Standard Freshwater[A]	Secondary: 18 AAC 75 Table C Groundwater Cleanup Levels[B]			SW-3 22-Aug-11 1113996004		SW-3 28-Aug-12 1124027003		SW-3 12-Aug-13 1133792003		SW-03 19-Aug-14 1143927003		SW-3 18-Aug-15 1154613004		SW-3 06-Sep-16 1165321003		SW-3 02-Aug-17 1175185003		SW-3 29-Jul-18 1184077003	
		2015[C]	2017[D]	2018[E]	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag	Conc	Flag
Fuels (AK101 and AK102, mg/L)																				
Gasoline Range Organics	--	2.2	2.2	2.2	[0.03]	U	[0.062]	U	--	--	--	--	--	--	--	--	--	--	--	--
Diesel Range Organics	--	1.5	1.5	1.5	[0.18]	U	0.393	J	--	--	--	--	--	--	--	--	--	--	--	--
BTEX (SW8021B, µg/L)																				
Benzene	5	5	4.6	4.6	[0.15]	U	[0.3]	U	[0.3]	U	[0.25]	U	[0.25]	U	[0.25]	U	[0.25]	U	[0.25]	U
Ethylbenzene	700	700	15	15	[0.31]	U	[0.62]	U	[0.62]	U	0.32	J	[0.5]	U	[0.5]	U	[0.5]	U	[0.5]	U
Toluene	1,000	1,000	1,100	1,100	[0.31]	U	[0.62]	U	[0.62]	U	[0.5]	U	[0.5]	U	[0.5]	U	[0.5]	U	[0.5]	U
o-Xylene	--	--	--	--	[0.31]	U	[0.62]	U	[0.62]	U	[0.5]	U	[0.5]	U	[0.5]	U	[0.5]	U	[0.5]	U
P & M -Xylene	--	--	--	--	[0.62]	U	[1.24]	U	[1.24]	U	[1]	U	[1]	U	[1]	U	[1]	U	[1]	U
Total Xylenes[G]	10,000	10,000	190	190	[0.62]	U	[1.24]	U	[1.24]	U	[1]	U	[1]	U	[1.5]	U	[1.5]	U	[1.5]	U
TAH (Total BTEX)[G]	10	--	--	--	[1.7]	U	[3.4]	U	[3.4]	U	2.57	J	[2.75]	U	[2.75]	U	[2.75]	U	[2.75]	U
Polycyclic Aromatic Hydrocarbons (SW8270 SIM, µg/L)																				
1-Methylnaphthalene	--	150	11	11	[0.015]	U	0.017	J	[0.04]	U	[0.0259]	U	0.0402	J	0.0152	J	[0.0232]	U	[0.0252]	UJ
2-Methylnaphthalene	--	150	36	36	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	0.0294	J	0.0234	J	0.0141	J	[0.0252]	UJ
Acenaphthene	1,200	2,200	530	530	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	0.0156	J	[0.0232]	U	[0.0252]	U
Acenaphthylene	--	2,200	260	260	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Anthracene	9,600	11,000	43	43	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	UJ	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Benzo(a)anthracene	--	1.2	0.12	0.30	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Benzo[a]pyrene	0.2	0.2	0.034	0.25	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	[0.00945]	U	[0.00925]	U	[0.0101]	U
Benzo[b]fluoranthene	--	1.2	0.34	2.5	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Benzo[g,h,i]perylene	--	1,100	0.26	0.26	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	UJ	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Benzo[k]fluoranthene	--	12	0.80	0.80	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Chrysene	--	120	2.0	2.0	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Dibenzo[a,h]anthracene	--	0.12	0.034	0.25	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	UJ	[0.025]	U	[0.00945]	U	[0.00925]	U	[0.0101]	U
Fluoranthene	300	1,500	260	260	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Fluorene	1,300	1,500	290	290	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	0.0193	J	[0.0232]	U	[0.0252]	U
Indeno[1,2,3-c,d] pyrene	--	1.2	0.19	0.19	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	UJ	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
Naphthalene	--	730	1.7	1.7	[0.031]	U	[0.062]	U	[0.0826]	U	[0.052]	U	[0.05]	U	[0.0471]	U	[0.0463]	U	[0.0505]	UJ
Phenanthrene	--	11,000	170	170	0.0178	J	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	0.0269	J	0.0143	J	[0.0252]	U
Pyrene	960	1,100	120	120	[0.015]	U	[0.03]	U	[0.04]	U	[0.0259]	U	[0.025]	U	[0.0236]	U	[0.0232]	U	[0.0252]	U
PAH[G]	15	--	--	--	0.259	J	0.512	U	0.683	U	[0.440]	U	[0.425]	U	0.364	J	0.358	J	[0.3983]	UJ
TAqH (TAH + PAH)[G]	15	--	--	--	1.96	J	3.82	J	[4.15]	U	3.07	UJ, Q	[3.18]	U	3.11	J	3.11	J	[3.148]	UJ

Notes:

55.9 Bold and shaded values exceed the primary screening criteria, 18 AAC 70.020b (February 19, 2016) Alaska Water Quality Standards.

1.68 Shaded values exceed the 2015 or 2017 18 AAC 75.345 Table C groundwater cleanup level; see Notes [C] and [D] below.

A Screening values from 18 AAC 70.020b (February 5, 2017) are adapted by reference from Alaska Water Quality Criteria Manual for Toxic and other Deleterious Organic and Inorganic Substances (December 12, 2008).

B Groundwater cleanup levels are not directly applicable and are provided for reference only.

C Sample results prior to 2015 were compared with ADEC 2015 cleanup levels (18 AAC 75), as revised on June 17, 2015

D Sample results for 2016 and 2017 were compared with ADEC 2017 cleanup levels (18 AAC 75), as revised on November 6, 2016

E Sample results for 2018 were compared with ADEC 2018 cleanup levels (18 AAC 75), as revised on September 29, 2018.

F The field sample identification number, date collected and laboratory sample identification number are provided.

G Total values are the summation of reported values and LODs for non detects. PAH compounds included in the summation per 18 AAC 70, included all reported PAHs except 1-methylnaphthalene and 2-methylnaphthalene.

Data Flags:

U	The analyte was analyzed for but was not detected above the limit of detection (LOD).
J	The analyte was positively identified, but the result was between the LOQ and DL; the quantitation was an estimate.
Q	The quantitation was an estimate due to a quality control failure. Where applicable, a "+" or "-" was appended to indicate a high or low bias, respectively.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
=	A detected compound [concentration listed in column to the left]

Abbreviations:

--	Not applicable or screening criteria does not exist for this compound	BTEX	benzene, toluene, ethylbenzene, and xylene	LOD	Limit of Detection
µg/L	micrograms per liter	DL	Detection Limit	LOQ	Limit of Quantitation
AAC	Alaska Administrative Code	DRO	Diesel Range Organics	mg/L	milligrams per liter
ADEC	Alaska Department of Environmental Conservation	GRO	Gasoline Range Organics	PAH	Polynuclear Aromatic Hydrocarbons
SIM	Selective Ion Monitoring				
TAH	Total Aromatic Hydrocarbons				
TAqH	Total Aqueous Hydrocarbons				

Photo 1: Intact pad liner along the northwest edge of the north pond. Photograph faces northwest.

Photo 2: Northeast edge of the north pond. Photograph shows well-formed berm along pad edge. Photograph faces east.

Photo 3: Sorbent booms at the liner gap. Photograph faces north-northwest.

Photo 4: SW-1 surface water sample collection. Sorbent booms at the liner gap are visible on in the background. Photograph faces east.

Photo 5: North corner of the south pond near screening Location 2. Photograph faces southeast.

Photo 6: North corner of the south pond. Photograph faces west.

Photo 7: Light sheen (4.5 out of 9) observed at south pond screening Location 1. Photograph faces south.

Photo 8: Typical “no sheen” response at south pond screening Location 6.

Photo 9: Typical dry, vegetated location at north pond screening Location 32.

Photo 10: Light (1 out of 9) sheen observed (red circle) at test Location 46.

Photo 11: Heavy (7 out of 9) sheen observed (red circle) at test location 51 near liner gap sorbent booms.

~60°F, Sunny NOSI BLOCK 303 C.VENOT / S.OLIVER 7/29/18

1600- Check in with Kevin Steylich at NOSI office. Kevin reports only minor gravel berming completed in last year at Block 303 tank farm; no changes to liners. Tailgate Safety Meeting.
1615 - Collect Surface water sample SW-1
1625 - Collect SW sample SW-2 and dup SW-99 at "1810"
1640 - Collect SW sample SW-3
1650 - Commence Shovel Sheen testing (See forms).
1758 - End sheen test/liner inspection (See forms.
1820 - End for day.

Additional notes: Liner/berm appears to be in good condition. Liner edge is visible along North

7/30/18

0620-0720 - Ice & check samples, prepare for shipment.

0830-1030 - Pack equipment/ship samples to ANC via Goldstreak.

End of Project

C VENOT 7/30/18

Scale: 1 square = _____

NANA NOSI Block 303 Tank Farm Surface Water Sheen Test Log

Date: 7/29/18 Personnel: C.VENOT / S.OLIVER

Location	Surface Description[a]	Sheen Rating[b]	Photo ID	ft*	Comments (e.g., color, drops/swirls/biogenic, water not present)
1	gravel	4.5	5:04	10	Swirls, Chirpy, Continues after test.
2		0	5:05	20	—
3		0	5:06	30	—
4		0	5:06	40	no sheen
5		0	5:07	50	
6		0	5:08	60	
7		0	5:08	70	
8		0	5:09	80	
9		0	5:09	90	
10		0	5:10	100	
11		0	5:10	110	
12		0	5:11	120	
13		0	5:11	130	
14		0	5:12	140	
15		0	5:13	150	
16		0	5:13	160	
17		0	5:14	170	
18a		0	5:14	180	
18b		0	5:15	190	
18c		0	5:15	200	
18d		0	5:16	210	
18e		0	5:17	220	
18f		0	5:17	230	
19	grassy	0	5:27	0 - 5:28	Picture of Platy Sheen
20	gravel	0	5:29	10 - 5:29	Picture of Platy Sheen
21		0	5:30	20 -	
22		0	5:30	30 -	
23		0	5:31	40 -	
24		0	5:31	50 -	
25		0	5:32	60 -	
26		0	5:32	70 -	
27	gravel	0	5:33	80 -	

Notes:

a Examples: gravel, mix, grass, new old

b 1-3 a few drops, light, 4-6 moderate, whispy, 7-9 heavy/covers surface

* Feet distance along shoreline used to identify screening locations

NANA NOSI Block 303 Tank Farm Surface Water Sheen Test Log

Location	Surface Description[a]	Sheen Rating[b]	Photo ID	Comments (e.g., color, drops/swirls/biogenic, water not present)	Ex
28	gravel	0	5:33		-90
29		0	5:34		-100
30	gravel Grassy	0	5:34	Not much water Biogenic Sheen	-110
31	grassy	0	5:35	Biogenic Sheen	-120
32	grassy	~~0~~	5:35	Dry	-130
33	grassy	~~0~~	5:36	Dry	-140
34	grassy	0	5:36	Minimal water; Biogenic Sheen	-150
35	grassy/soil	0	5:37	Biogenic Sheen	-160
36	grassy/soil	0	5:37	Biogenic Sheen	-170
37	gravel	0	5:38		-180
38	|	0	5:39	light biogenic Sheen	-190
39	|	0	5:40	|	|
40	|	0	5:40	|	|
41	|	0	5:41	|	|
42	|	0	5:41	|	|
43	|	1.5	5:42	|	|
44	|	1	5:43	|	↓
45	|	~~0~~ 1	5:44	|	-260
46	|	1	5:45	|	-270
47	|	0	5:46	Between booms	280
48	|	1	5:47	Heavy Biogenic Sheen	|
49	|	0	5:48	Light biogenic	|
50	gravel	4	5:49	|	|
51	grassy gravel	7	5:50	Above the booms	↓
52	grass/plants gravel	0	5:52		330
53					
54					
55					
56					
57					
58					
59					

end

Notes:

[a] Examples: gravel, mix, grass, new old

[b] 1-3 a few drops, light, 4-6 moderate, whispy, 7-9 heavy/covers surface

SLR

Surface Water Sampling Form

Client / Site Name:	NOSI Block 303	**Location ID:**	SW-1
Project # :	105-01619.17001	Sample ID:	SW-1
Sampled By:	CVENOT / S. OLIVER	Sample Time:	1610 Sample Date: 7/29/18
Weather Conditions:	Sunny ~60°F	Duplicate ID:	—
		MS/MSD ☐ Yes ☒ No	Trip Blank Required: ☒ Yes ☐ No

Location Information

Distance from Bank (ft): 1.5	Depth of Water (ft): 0.75	Flowing Water: ☐ Rapid	☒ Slow ☐ Stagnant Pool
Co-Located Sediment Sample: ☐ Yes ☒ No	GPS Coordinates: Northing		Easting

Sheen Test

☒ No Sheen ☐ Sheen Observed: POL-fluid rainbow / Biogenic-platy / other

Water Quality Parameters

Temp (°C)	Specific Conductance (µS/cm^c)	DO (mg/L)	ORP (mV)	pH	Turbidity (NTU)	Color	Odor
11.34	497	<9.44	129.9	~~5.24~~	—	Light brown haze	none

Analytical Sampling

Analyses	Number/Type of Bottle	Preservative/ Comments	Analyses	Number/Type of Bottle	Preservative/ Comments
GRO/BTEX			PAHs		
DRO			Total Metals		
RRO			Dis. Metals		
VOCs					
SVOCs					

Notes (indicate collection method): Dip bottle

Equipment Used: Pump Type — Tubing (Type/Length) — Transfer Bottle glass

Multi-Parameter Meter (Make/SN#) YSI 556 07L100513 Turbidity Meter (Make/SN#) —

GPS (Type/Unit Number) — Filter Lot # —

Site/Client Name:	NOSI Block 303	**Location ID:**	SW-2
Project # :	105-01619.17001	Sample ID:	SW-2 ~~at 1800~~
Sampled By:	CVENOT / S. OLIVER	Sample Time:	1625 Sample Date: 7/29/18
Weather Conditions:	Sunny ~60°F	Duplicate ID:	SW-99 at "1800"
		MS/MSD ☐ Yes ☒ No	Trip Blank Required: ☒ Yes ☐ No

Location Information

Distance from Bank (ft): 1	Depth of Water (ft): 0.5	Flowing Water: ☐ Rapid	☒ Slow ☐ Stagnant Pool
Co-Located Sediment Sample: ☐ Yes ☒ No	GPS Coordinates: Northing —		Easting —

Sheen Test

☒ No Sheen ☐ Sheen Observed: POL-fluid rainbow / Biogenic-platy / other

Water Quality Parameters

Temp (°C)	Specific Conductance (µS/cm^c)	DO (mg/L)	ORP (mV)	pH	Turbidity (NTU)	Color	Odor
15.23	443	7.47	71.4	7.18	Low	Light yellow	none

Analytical Sampling

Analyses	Number/Type of Bottle	Preservative/ Comments	Analyses	Number/Type of Bottle	Preservative/ Comments
GRO/BTEX			PAHs		
DRO			Total Metals		
RRO			Dis. Metals		
VOCs					
SVOCs					

Notes (indicate collection method):

Equipment Used: Pump Type — Tubing (Type/Length) — Transfer Bottle glass

Multi-Parameter Meter (Make/SN#) YSI 556 (Same) Turbidity Meter (Make/SN#) —

GPS (Type/Unit Number) — Filter Lot # —

SLR

Surface Water Sampling Form

Client / Site Name:	NDSI BLOCK 303	**Location ID:**	SW-3
Project # :	105.01614.17001	Sample ID:	SW-3
Sampled By:	CUENOT / S. CLEVER	Sample Time:	1640 Sample Date: 7/29/18
Weather Conditions:	Sunny, 60°F	Duplicate ID:	—
		MS/MSD ☐ Yes ☒ No	Trip Blank Required: ☒ Yes ☐ No

Location Information

Distance from Bank (ft):	1	Depth of Water (ft):	1
Flowing Water: ☐ Rapid ☐ Slow ☒ Stagnant Pool			
Co-Located Sediment Sample: ☐ Yes ☒ No	GPS Coordinates: Northing —	Easting —	

Sheen Test

☐ No Sheen ☐ Sheen Observed: POL-fluid rainbow / Biogenic-platy / other

Water Quality Parameters

Temp (°C)	Specific Conductance (µS/cm^c)	DO (mg/L)	ORP (mV)	pH	Turbidity (NTU)	Color	Odor
13.49	378	8.94	32.5	7.70	—	Clear	none

Analytical Sampling

Analyses	Number/Type of Bottle	Preservative/ Comments	Analyses	Number/Type of Bottle	Preservative/ Comments
GRO/BTEX			PAHs		
DRO			Total Metals		
RRO			Dis. Metals		
VOCs					
SVOCs					

Notes (indicate collection method): Dip bottle

Equipment Used: Pump Type — Tubing (Type/Length) — Transfer Bottle glass

Multi-Parameter Meter (Make/SN#) YSI 556 (Sume) Turbidity Meter (Make/SN#) —

GPS (Type/Unit Number) Filter Lot #

Site/Client Name:		**Location ID:**	
Project # :		Sample ID:	
Sampled By:		Sample Time:	Sample Date:
Weather Conditions:		Duplicate ID:	
		MS/MSD ☐ Yes ☐ No	Trip Blank Required: ☐ Yes ☐ No

Location Information

Distance from Bank (ft):	Depth of Water (ft):	Flowing Water: ☐ Rapid ☐ Slow ☐ Stagnant Pool	
Co-Located Sediment Sample: ☐ Yes ☐ No	GPS Coordinates: Northing	Easting	

Sheen Test

☐ No Sheen ☐ Sheen Observed: POL-fluid rainbow / Biogenic-platy / other

Water Quality Parameters

Temp (°C)	Specific Conductance (µS/cm^c)	DO (mg/L)	ORP (mV)	pH	Turbidity (NTU)	Color	Odor

Analytical Sampling

Analyses	Number/Type of Bottle	Preservative/ Comments	Analyses	Number/Type of Bottle	Preservative/ Comments
GRO/BTEX			PAHs		
DRO			Total Metals		
RRO			Dis. Metals		
VOCs					
SVOCs					

Notes (indicate collection method):

Equipment Used: Pump Type Tubing (Type/Length) Transfer Bottle

Multi-Parameter Meter (Make/SN#) Turbidity Meter (Make/SN#)

GPS (Type/Unit Number) Filter Lot #

NOSI Block 303 Eastern Liner Gap Monitoring Inspection Form

Date: 6-25-2018

INSPECTOR (print) Kevin Steglich

General Weather Conditions:
Partly cloudy light wind 38 degrees

(sign) 

Observation	yes/no	comments
Inside Sorbent Boom Intact	Yes	
Inside Sorbent Boom Saturated	No	
Outside Sorbent Boom Intact	Yes	
Outside Sorbent Boom Saturated	No	
Standing Water between Pad Edge and Inside Sorbent Boom	Yes	
Oil Sheen present between Pad Edge and Inside Sorbent Boom	Yes	
Standing Water between Inside and Outside Sorbent Booms	Yes	
Oil Sheen present between Inside and Outside Sorbent Booms	No	
Oil Sheen present outside of the Outside Sorbent Boom	No	
Inside Sorbent Boom Replaced	No	

ANY ACTIONS TAKEN DOCUMENT HERE (add additional page if needed):
Booms Placed for the Summer.

PHOTOS (copy and paste, use additional page to document photos if needed):

LABORATORY DATA
QUALITY ASSURANCE REVIEW
NANA OILFIELD SERVICES, INC.

TANK FARM MONITORING
NOSI BLOCK 303
(DEADHORSE, AK)

NOVEMBER 2018

Prepared by: Nicholas Wells
Reviewed by: Jennifer McLean

SLR Project Number: 105.01619.17001
ADEC Number: 300.38.296

SLR International Corporation
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Anchorage, AK 99503

ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
AK	Alaska
ADEC	Alaska Department of Environmental Conservation
BTEX	benzene, toluene, ethylbenzene, xylenes
°C	degrees Celsius
CCV	continuing calibration verification
COC	chain of custody
DL	detection limit
EDD	electronic data deliverable
LCL	lower control limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
LV	low volume
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NFG	National Functional Guidelines
NOSI	Northern Oilfield Services, Inc.
PAH	polynuclear aromatic hydrocarbons
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
QA	quality assurance
QAR	quality assurance review
QC	quality control
RPD	relative percent difference
SDG	sample delivery group
SIM	selective ion monitoring
SLR	SLR International Corporation
SGS	SGS North America, Inc.
SW	surface water
UCL	upper control limit
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency

This report summarizes a review of analytical data for samples collected on July 29, 2018 in support of the NANA Northern Oilfield Services, Inc. (NOSI) Block 303 Tank Farm monitoring. Samples were collected by SLR International Corporation (SLR). SGS North America, Inc (SGS) provided analytical support to the project. SGS maintains a current Alaska Department of Environmental Conservation (ADEC) Contaminated Sites approval number (UST-005) for analytical methods of interest, as applicable. Table 1 provides a summary of the work order, sample receipt, analytical methods, and analytes.

Table 1 Sample Summary

SDG	Date Collected	Date Received by Laboratory	Temp. Blank	Matrix	Analytical Method	Analyte	Trip Blank[1]
1184077	7/29/2018	7/31/2018	4.9°C	SW	SW8021B SW8270D LV	BTEX PAH SIM	Required NA

Notes:
1 – This type of sample requires a trip blank to be included in the cooler, with the trip blank noted on the chain of custody.
Acronyms:
°C – degrees Celsius
BTEX – benzene, toluene, ethylbenzene, and total xylenes
LV – low volume
NA – not applicable
PAH – polynuclear aromatic hydrocarbons
SDG – sample delivery group
SIM – selective ion monitoring
SW – surface water

The laboratory final report was presented as a Level II deliverable and included documentation of the delivery group chain-of-custody (COC) and sample receipt condition. A Microsoft Access compatible electronic data deliverable (EDD) was also provided. The PDF laboratory report is provided electronically as Attachment 1 to this QAR.

Quality Assurance Program

A quality assurance (QA) program was followed for this project that addressed project administration, sampling, quality control (QC), and data review. SLR adhered to required and established sampling and COC protocols. The selected laboratory maintains an internal quality assurance program and standard operating procedures.

The analytical data was reviewed for consistency with any project-specific requirements in the Work Plan (SLR 2016), ADEC Technical Memorandum *Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling* (ADEC 2017), National Functional Guidelines (NFG, United States Environmental Protection Agency [USEPA] 2014), analytical method criteria, and laboratory criteria. An ADEC Laboratory Data Review Checklist was completed for the SDG and is included as Attachment 2. A review for any anomalies to the project requirements for precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS) are noted in this Quality Assurance review (QAR), and any data qualifications discussed.

The data review included the following, as applicable:

- Reviewing COC records for completeness, signatures, and dates;
- Identifying any sample receipt or preservation anomalies that could impact data quality;
- Verifying that QC blanks (e.g., field blanks, equipment blanks, trip blanks, etc.) were properly prepared, identified, and analyzed;
- Evaluating whether laboratory reporting limits met project goals; Reviewing calibration verification recoveries, to include confirming that the laboratory did not identify that any Calibration Verification (CCV) recoveries or other calibration related criteria were outside applicable acceptance limits;
- Verifying that surrogate analyses were within recovery acceptance limits;
- Verifying that Laboratory Control Samples (LCS) and Laboratory Control Sample Duplicates (LCSD) were within recovery acceptance limits;
- Evaluating the result relative percent difference (RPD) between primary and duplicate field samples and LCS/LCSD; and
- Providing an overall assessment of laboratory data quality and qualifying sample results if necessary.

Data Qualifications

As part of this QAR, qualifiers were applied to datum as determined necessary based on specified criteria or professional judgement. In all cases, the basis for qualification and the applied data flag are discussed in this QAR. Table 2 provides a list of potential qualifiers (i.e., flags). These data flags were appended to the data as appropriate.

Table 2 Data Qualifiers

Lab Qualifier (Flag)	NFG Qualifier (Flag)	Equivalent Project Qualifier (Flag)[1,2]	Definition
U	U	**U**	The analyte was analyzed for but was not detected above the limit of detection (LOD).
J	NJ	**J**	The analyte has been "tentatively" or "presumptively" identified as present and the associated numerical value is the estimated concentration in the sample between the limit of quantitation (LOQ) and the Detection Limit (DL). This qualifier is appended by the laboratory.
--	J	**Q**	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample, due to one or more laboratory quality control criteria failures (e.g., LCS recovery, surrogate spike recovery) or a matrix effect. Where applicable, a "+" or "-" was appended to indicate a high or low bias, respectively.
--	UJ	**UJ**	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
--	R	R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
--	--	B	Blank contamination: The analyte was positively identified in the blank (e.g., trip blank and/or method blank) associated with the sample and the concentration reported for the sample was less than five times that of the blank (ten times for metals and common laboratory contaminants methylene chloride and acetone). Where applicable, "U" was appended prior to the "B" to indicate the blank detection is greater than the sample detection and the result is likely a false positive.

Notes:
1 – Flags were appended to the data where applicable. The table presents laboratory, NFG and project equivalent qualifiers.
2 – Only flags in **bold** were applicable and appended to data for this project.

A discussion of the project data quality relative to PARCCS goals and summary of any anomalies or failures requiring data qualifiers follows.

Data Validation

Data Packages
The data package was checked for transcription errors, omissions, or other anomalies. No issues were noted with regards to the data package.

Sample Receipt
The sample receipt documentation was checked for anomalies. Issues regarding the receipt of the samples were limited to the one noted below.

- The COC noted that samples were, “Relinquished By” SLR on July 31, 2018, but were “Received By” the laboratory on July 30, 2018. This was due to human error on the part of laboratory personnel. Both the PDF and EDD laboratory reports note the correct sample receipt date of July 31, 2018. Samples remained in custody of SLR personnel from the time of collection until delivery to the laboratory. Sample integrity was not compromised.

Holding Times and Preservation
Samples were appropriately preserved and were submitted to SGS. Sample analyses were conducted within holding time criteria. Only one minor issue was noted with regards to sample preservation.

- For Method SW8270D, one of two PAH SIM bottles for sample SW-99 arrived at the laboratory preserved with hydrochloric acid, while the second was correctly unpreserved. Method SW8270D requires extraction of an unpreserved aliquot. Presumably the container with unpreserved sample was used for analysis. Data was not impacted.

Laboratory Method Blanks
Analytes were not detected at or above the limit of detection (LOD) in any method blanks. Laboratory method blanks were analyzed at the appropriate frequencies.

Trip Blanks
Analytes were not detected at or above the LOD in any of the trip blanks. One trip blank was analyzed for BTEX by Method SW8021B.

Reporting Limits
For non-detectable results, LODs were compared to applicable regulatory criteria for the site. LODs were compared with 18 Alaska Administrative Code (AAC) 70, *Water Quality Standards* (ADEC, 2018). 18 AAC 70 references *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (December 12, 2008). All analytes with results of non-detect had LODs at or below applicable levels.

Calibration Verifications
CCV data was included only in the EDD, not in the case narrative. All CCV recoveries were within acceptable limits as reviewed in the EDD. CCVs were analyzed at the appropriate frequencies.

Internal Standards
No internal standards were noted in the case narrative as being outside of acceptance limits. Internal standard performance was not otherwise presented in the report or in the electronic data deliverable. Internal standards criteria were considered met.

Surrogate Recovery Results
All surrogate recoveries were within analytical method and SGS percent recovery acceptance limits. Surrogate analysis was performed at the required frequencies.

Laboratory Control Samples and Laboratory Control Duplicate Samples
All LCS and LCSD recoveries and RPDs were within acceptable limits. LCS and LCSDs were analyzed at the appropriate frequencies.

Matrix Spike and Matrix Spike Duplicate Samples
No matrix spike or matrix spike duplicate samples were analyzed for this SDG. Analysis of LCS and LCSDs established both accuracy and precision.

Field Duplicates
For all methods and analytes, the duplicate frequency satisfied the requirement of one per 10 samples or less per matrix and analyte. Field duplicates were submitted blind to the laboratory. The field duplicate sample frequency is presented in Table 3. Parent sample and field duplicates are presented in Table 4.

All parent sample/field duplicate RPDs were within the ADEC required 30% for waters, except as noted in Table 5. All samples for this SDG are chronologically associated to this parent sample/duplicate pair. Parent sample/duplicate results were qualified as shown in the table. To err on the conservative, impacted analytes for all chronologically associated field samples were also qualified. Detected results were qualified "Q" and non-detect results were qualified "UJ."

Regarding field associated samples, in all instances laboratory precision was established by an LCS/LCSD pair with RPDs within acceptable limits, thus the impact to data was considered minimal.

Because ADEC surface water cleanup levels for these compounds do not exist, data usability was not impacted. In all cases, the higher of the two results should be used for reporting purposes.

Parent sample/field duplicate pairs with both results below the LOQ were considered acceptable without qualification.

Table 3 Field Duplicate Count

Matrix	Number of Primary	Number of Field	Method	Analytes
Surface Water	3	1	SW8021B	BTEX
	3	1	SW8270D LV	PAH SIM

Table 4 Parent Samples and Field Duplicates

Matrix	Parent Sample	Field Duplicate	Method	Analytes
Surface Water	SW-2	SW-99	SW8021B SW8270D LV	BTEX PAH SIM

Table 5 Field Duplicate RPD Exceedances

Primary Sample ID	Duplicate Sample ID	Method	Analyte	Result (µg/L)	Result (µg/L)	RPD (%)	Flag	ADEC Cleanup Level[1] (µg/L)
SW-2	SW-99	SW8270D LV	1-Methylnaphthalene	1.39	0.666	70	Q, UJ	--
SW-2	SW-99	SW8270D LV	2-Methylnaphthalene	1.34	0.629	72	Q, UJ	--
SW-2	SW-99	SW8270D LV	Naphthalene	5.94	2.96	67	Q, UJ	--

-- - The cleanup level does not exist.

Notes:

1 – Cleanup Levels referenced are 18 AAC 70 (ADEC, 2018).

Laboratory Duplicate Samples

No laboratory duplicates were analyzed in association with these samples.

Overall Assessment

This data were considered of good quality acceptable for use with the noted qualifications. No data were rejected.

Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity Summary

- Precision: Precision goals were met, except as noted in the Field Duplicates section.
- Accuracy: Accuracy goals were met.
- Representativeness: Representativeness goals were met. The samples were collected from usual locations.
- Comparability: Comparability goals were met. The same laboratory and methods were used.
- Completeness: Completeness goals were met. The data were 100% complete with respect to analysis.
- Sensitivity: Sensitivity goals were met.

References

Alaska Department of Environmental Conservation (ADEC), 2008. *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances*. December 12.

ADEC. 2017. ADEC Technical Memorandum *Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling.* March.

ADEC, 2018. Alaska Administrative Code (18 AAC 70), *Water Quality Standards*. Ammended as of April 6.

SLR International Corporation (SLR), 2016. *Block 303 Tank Farm Surface Water Monitoring Plan, Deadhorse, Alaska.* February.

U.S. Environmental Protection Agency (USEPA). 2014. *National Functional Guidelines for Superfund Organic Methods Data Review.* August.

Attachments

Attachment 1 – ADEC Laboratory Data Review Checklists

Attachment 2 – Laboratory Deliverables

Attachment 1

ADEC Laboratory Data Review Checklists

Laboratory Data Review Checklist

Completed by:

Nicholas Wells

Title:

Staff Engineer

Date:

October 29, 2018

CS Report Name:

Tank Farm Monitoring NOSI Block 303

Report Date:

October 1, 2018

Consultant Firm:

SLR International Corporation

Laboratory Name:

SGS North America, Inc.

Laboratory Report Number:

1184077

ADEC File Number:

300.38.296

Hazard Identification Number:

NA

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

   (●) Yes ( ) No Comments:

   SGS North America, Inc. (SGS) maintains a current Alaska Department of Environmental Conservation Contaminated Sites approval (number UST-005) for analytical methods of interest.

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

   (●) Yes ( ) No Comments:

   Not applicable.

2. Chain of Custody (COC)

   a. COC information completed, signed, and dated (including released/received by)?

   (●) Yes ( ) No Comments:

   The COC noted that samples were, "Relinquished By" SLR on July 31, 2018, but were "Received By" the laboratory on July 30, 2018. This was due to human error on the part of laboratory personnel. Both the PDF and EDD laboratory reports note the correct sample receipt date of July 31, 2018. Samples remained in custody of SLR personnel from the time of collection until delivery to SGS laboratory. Sample integrity was not compromised.

   b. Correct analyses requested?

   (●) Yes ( ) No Comments:

3. Laboratory Sample Receipt Documentation

   a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

   (●) Yes ( ) No Comments:

   b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

   (●) Yes ( ) No Comments:

   For Method SW8270D, one of two PAH SIM bottles for sample SW-99 arrived at the laboratory preserved with hydrochloric acid, while the second was correctly unpreserved. Method SW8270D requires extraction of an unpreserved aliquot.

   c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

   (●) Yes ( ) No Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

(●) Yes ( ) No Comments:

Preservation discrepancy was noted.

e. Data quality or usability affected?

Comments:

For PAH SIM, presumably the container with unpreserved sample was used for analysis. Data was not impacted.

4. Case Narrative

a. Present and understandable?

(●) Yes ( ) No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

(●) Yes ( ) No Comments:

No discrepancies were noted.

c. Were all corrective actions documented?

(●) Yes ( ) No Comments:

No corrective actions were necessary.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

No impact.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(●) Yes ( ) No Comments:

b. All applicable holding times met?

(●) Yes ( ) No Comments:

c. All soils reported on a dry weight basis?

(●) Yes ( ) No Comments:

No soils were analyzed for this SDG.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

(●) Yes ( ) No Comments:

LODs were compared with 18 Alaska Administrative Code (AAC) 70, *Water Quality Standards* (ADEC, 2018). 18 AAC 70 references *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (December 12, 2008). All analytes with results of non-detect had LODs at or below applicable levels.

e. Data quality or usability affected?

Comments:

No impact.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

(●) Yes ( ) No Comments:

ii. All method blank results less than limit of quantitation (LOQ)?

(●) Yes ( ) No Comments:

iii. If above LOQ, what samples are affected?

Comments:

Not applicable.

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

(●) Yes ( ) No Comments:

v. Data quality or usability affected?

Comments:

No impact.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

(●) Yes ( ) No Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

(•) Yes ( ) No Comments:

No inorganics were analyzed.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

(•) Yes ( ) No Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

All recoveries and RPDs were within acceptable limits.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

(•) Yes ( ) No Comments:

Not applicable.

vii. Data quality or usability affected?

Comments:

No impact.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

(•) Yes ( ) No Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

(•) Yes ( ) No Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

(•) Yes ( ) No Comments:

Not applicable.

iv. Data quality or usability affected?

Comments:

No impact.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

(•) Yes ( ) No Comments:

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

(•) Yes ( ) No Comments:

iii. All results less than LOQ?

( ) Yes ( ) No Comments:

Yes

iv. If above LOQ, what samples are affected?

Comments:

Not applicable.

v. Data quality or usability affected?

Comments:

No impact.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

(•) Yes ( ) No Comments:

ii. Submitted blind to lab?

(•) Yes ( ) No Comments:

Parent sample SW-2 corresponds to duplicate sample SW-99.

iii. Precision – All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

RPD (%) = Absolute value of: $\frac{(R_1-R_2)}{((R_1+R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

○ Yes ◉ No Comments:

The RPDs for 1-Methylnaphthalene, 2-Methynaphthalene, and Naphthalene exceeded limits with 70%, 72%, and 67%, respectively. All samples for this SDG are chronologically associated to this parent sample/duplicate pair. To err on the conservative, impacted analytes for all chronologically associated field samples were also qualified. Detected results were qualified "Q" and non-detect results were qualified "UJ."

iv. Data quality or usability affected?

Comments:

Regarding field associated samples, in all instances laboratory precision was established by an LCS/LCSD pair with RPDs within acceptable limits, thus the impact to data was considered minimal.
For the parent/duplicate pair, in all cases, the higher of the two results should be used for reporting purposes.
Since ADEC surface water cleanup levels for the affected analytes do not exist, data usability was not impacted.

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below.)

○ Yes ○ No ◉ Not Applicable

i. All results less than LOQ?

◉ Yes ○ No Comments:

Not applicable.

ii. If above LOQ, what samples are affected?

Comments:

Not applicable.

iii. Data quality or usability affected?

Comments:

No impact.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

   a. Defined and appropriate?

      (•) Yes ( ) No Comments:

Attachment 2

Laboratory Deliverables

(Data packages and electronic files)

Laboratory Report of Analysis

To: SLR Alaska-Anchorage
2700 Gamble St. Ste 200
Anchorage, AK 99502
222-1112

Report Number: **1184077**

Client Project: **105.01619.17001 NOSI Block 303**

Dear Julie Hoffman,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Justin at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

SGS North America Inc.
Environmental Services – Alaska Division
Project Manager

Justin Nelson
2018.10.01
15:14:47 -08'00'

Justin Nelson Date
Project Manager
Justin.Nelson@sgs.com

Revised Report - This report has been reissued to report 1 and 2-Methylnaphthalene, per client request.

SGS North America Inc. 200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Case Narrative

SGS Client: **SLR Alaska-Anchorage**
SGS Project: **1184077**
Project Name/Site: **105.01619.17001 NOSI Block 303**
Project Contact: **Julie Hoffman**

Refer to sample receipt form for information on sample condition.

*QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

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Report of Manual Integrations

Laboratory ID	Client Sample ID	Analytical Batch	Analyte	Reason
8270D SIM LV (PAH)				
1184077001	SW-1	XMS10946	Fluorene	BLC
1184077002	SW-2	XMS10946	Fluorene	BLC
1184077004	SW-99	XMS10946	Fluorene	BLC

Manual Integration Reason Code Descriptions

Code	Description
O	Original Chromatogram
M	Modified Chromatogram
SS	Skimmed surrogate
BLG	Closed baseline gap
RP	Reassign peak name
PIR	Pattern integration required
IT	Included tail
SP	Split peak
RSP	Removed split peak
FPS	Forced peak start/stop
BLC	Baseline correction
PNF	Peak not found by software

All DRO/RRO analysis are integrated per SOP.

Print Date: 10/01/2018 2:30:13PM

Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indenmification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content. All DRO/RRO analyses are integrated per SOP.

SGS North America Inc. 200 West Potter Drive, Anchorage, AK 99518
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Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
SW-1	1184077001	07/29/2018	07/31/2018	Water (Surface, Eff., Ground)
SW-2	1184077002	07/29/2018	07/31/2018	Water (Surface, Eff., Ground)
SW-3	1184077003	07/29/2018	07/31/2018	Water (Surface, Eff., Ground)
SW-99	1184077004	07/29/2018	07/31/2018	Water (Surface, Eff., Ground)
Trip Blank	1184077005	07/29/2018	07/31/2018	Water (Surface, Eff., Ground)

Method	Method Description
8270D SIM LV (PAH)	8270 PAH SIM GC/MS Liq/Liq ext. LV
SW8021B	BTEX 8021

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Detectable Results Summary

Client Sample ID: **SW-1**
Lab Sample ID: 1184077001

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	0.725	ug/L
	2-Methylnaphthalene	0.699	ug/L
	Fluorene	0.0325J	ug/L
	Naphthalene	0.942	ug/L
	Phenanthrene	0.0153J	ug/L
Volatile Fuels	Benzene	4.07	ug/L
	Ethylbenzene	2.01	ug/L
	o-Xylene	6.72	ug/L
	P & M -Xylene	11.0	ug/L
	Toluene	8.40	ug/L
	Xylenes (total)	17.7	ug/L

Client Sample ID: **SW-2**
Lab Sample ID: 1184077002

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	1.39	ug/L
	2-Methylnaphthalene	1.34	ug/L
	Fluorene	0.0382J	ug/L
	Naphthalene	5.94	ug/L
	Phenanthrene	0.0412J	ug/L
	Pyrene	0.0194J	ug/L
Volatile Fuels	Benzene	53.6	ug/L
	Ethylbenzene	15.7	ug/L
	o-Xylene	34.9	ug/L
	P & M -Xylene	66.3	ug/L
	Toluene	89.3	ug/L
	Xylenes (total)	101	ug/L

Client Sample ID: **SW-99**
Lab Sample ID: 1184077004

	Parameter	Result	Units
Polynuclear Aromatics GC/MS	1-Methylnaphthalene	0.666	ug/L
	2-Methylnaphthalene	0.629	ug/L
	Fluorene	0.0194J	ug/L
	Naphthalene	2.96	ug/L
Volatile Fuels	Benzene	50.8	ug/L
	Ethylbenzene	15.7	ug/L
	o-Xylene	34.8	ug/L
	P & M -Xylene	65.8	ug/L
	Toluene	88.6	ug/L
	Xylenes (total)	101	ug/L

SGS North America Inc.
200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Results of **SW-1**

Client Sample ID: **SW-1**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077001
Lab Project ID: 1184077

Collection Date: 07/29/18 16:15
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.725		0.0490	0.0147	ug/L	1		08/06/18 15:50
2-Methylnaphthalene	0.699		0.0490	0.0147	ug/L	1		08/06/18 15:50
Acenaphthene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Acenaphthylene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Anthracene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Benzo(a)Anthracene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Benzo[a]pyrene	0.00980	U	0.0196	0.00608	ug/L	1		08/06/18 15:50
Benzo[b]Fluoranthene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Benzo[g,h,i]perylene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Benzo[k]fluoranthene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Chrysene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Dibenzo[a,h]anthracene	0.00980	U	0.0196	0.00608	ug/L	1		08/06/18 15:50
Fluoranthene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Fluorene	0.0325	J	0.0490	0.0147	ug/L	1		08/06/18 15:50
Indeno[1,2,3-c,d] pyrene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Naphthalene	0.942		0.0980	0.0304	ug/L	1		08/06/18 15:50
Phenanthrene	0.0153	J	0.0490	0.0147	ug/L	1		08/06/18 15:50
Pyrene	0.0245	U	0.0490	0.0147	ug/L	1		08/06/18 15:50
Surrogates								
2-Methylnaphthalene-d10 (surr)	75.2		47-106		%	1		08/06/18 15:50
Fluoranthene-d10 (surr)	77.4		24-116		%	1		08/06/18 15:50

Batch Information

Analytical Batch: XMS10946
Analytical Method: 8270D SIM LV (PAH)
Analyst: BMZ
Analytical Date/Time: 08/06/18 15:50
Container ID: 1184077001-D

Prep Batch: XXX40058
Prep Method: SW3520C
Prep Date/Time: 08/01/18 11:06
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

Results of **SW-1**

Client Sample ID: **SW-1**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077001
Lab Project ID: 1184077

Collection Date: 07/29/18 16:15
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	4.07		0.500	0.150	ug/L	1		08/04/18 04:38
Ethylbenzene	2.01		1.00	0.310	ug/L	1		08/04/18 04:38
o-Xylene	6.72		1.00	0.310	ug/L	1		08/04/18 04:38
P & M -Xylene	11.0		2.00	0.620	ug/L	1		08/04/18 04:38
Toluene	8.40		1.00	0.310	ug/L	1		08/04/18 04:38
Xylenes (total)	17.7		3.00	0.930	ug/L	1		08/04/18 04:38
Surrogates								
1,4-Difluorobenzene (surr)	95.1		77-115		%	1		08/04/18 04:38

Batch Information

Analytical Batch: VFC14323
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 08/04/18 04:38
Container ID: 1184077001-A

Prep Batch: VXX32794
Prep Method: SW5030B
Prep Date/Time: 08/03/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/01/2018 2:30:19PM

J flagging is activated

Results of **SW-2**

Client Sample ID: **SW-2**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077002
Lab Project ID: 1184077

Collection Date: 07/29/18 16:25
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	1.39		0.0563	0.0169	ug/L	1		08/06/18 16:11
2-Methylnaphthalene	1.34		0.0563	0.0169	ug/L	1		08/06/18 16:11
Acenaphthene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Acenaphthylene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Anthracene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Benzo(a)Anthracene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Benzo[a]pyrene	0.0113	U	0.0225	0.00698	ug/L	1		08/06/18 16:11
Benzo[b]Fluoranthene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Benzo[g,h,i]perylene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Benzo[k]fluoranthene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Chrysene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Dibenzo[a,h]anthracene	0.0113	U	0.0225	0.00698	ug/L	1		08/06/18 16:11
Fluoranthene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Fluorene	0.0382	J	0.0563	0.0169	ug/L	1		08/06/18 16:11
Indeno[1,2,3-c,d] pyrene	0.0282	U	0.0563	0.0169	ug/L	1		08/06/18 16:11
Naphthalene	5.94		0.113	0.0349	ug/L	1		08/06/18 16:11
Phenanthrene	0.0412	J	0.0563	0.0169	ug/L	1		08/06/18 16:11
Pyrene	0.0194	J	0.0563	0.0169	ug/L	1		08/06/18 16:11
Surrogates								
2-Methylnaphthalene-d10 (surr)	66.9		47-106		%	1		08/06/18 16:11
Fluoranthene-d10 (surr)	69.5		24-116		%	1		08/06/18 16:11

Batch Information

Analytical Batch: XMS10946
Analytical Method: 8270D SIM LV (PAH)
Analyst: BMZ
Analytical Date/Time: 08/06/18 16:11
Container ID: 1184077002-D

Prep Batch: XXX40058
Prep Method: SW3520C
Prep Date/Time: 08/01/18 11:06
Prep Initial Wt./Vol.: 222 mL
Prep Extract Vol: 1 mL

Print Date: 10/01/2018 2:30:19PM

J flagging is activated

Results of **SW-2**

Client Sample ID: **SW-2**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077002
Lab Project ID: 1184077

Collection Date: 07/29/18 16:25
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	53.6		0.500	0.150	ug/L	1		08/04/18 04:56
Ethylbenzene	15.7		1.00	0.310	ug/L	1		08/04/18 04:56
o-Xylene	34.9		1.00	0.310	ug/L	1		08/04/18 04:56
P & M -Xylene	66.3		2.00	0.620	ug/L	1		08/04/18 04:56
Toluene	89.3		1.00	0.310	ug/L	1		08/04/18 04:56
Xylenes (total)	101		3.00	0.930	ug/L	1		08/04/18 04:56
Surrogates								
1,4-Difluorobenzene (surr)	101		77-115		%	1		08/04/18 04:56

Batch Information

Analytical Batch: VFC14323
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 08/04/18 04:56
Container ID: 1184077002-A

Prep Batch: VXX32794
Prep Method: SW5030B
Prep Date/Time: 08/03/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/01/2018 2:30:19PM

J flagging is activated

Results of **SW-3**

Client Sample ID: **SW-3**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077003
Lab Project ID: 1184077

Collection Date: 07/29/18 16:40
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
2-Methylnaphthalene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Acenaphthene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Acenaphthylene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Anthracene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Benzo(a)Anthracene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Benzo[a]pyrene	0.0101	U	0.0202	0.00625	ug/L	1		08/06/18 16:31
Benzo[b]Fluoranthene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Benzo[g,h,i]perylene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Benzo[k]fluoranthene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Chrysene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Dibenzo[a,h]anthracene	0.0101	U	0.0202	0.00625	ug/L	1		08/06/18 16:31
Fluoranthene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Fluorene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Indeno[1,2,3-c,d] pyrene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Naphthalene	0.0505	U	0.101	0.0313	ug/L	1		08/06/18 16:31
Phenanthrene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Pyrene	0.0252	U	0.0504	0.0151	ug/L	1		08/06/18 16:31
Surrogates								
2-Methylnaphthalene-d10 (surr)	77.6		47-106		%	1		08/06/18 16:31
Fluoranthene-d10 (surr)	79.9		24-116		%	1		08/06/18 16:31

Batch Information

Analytical Batch: XMS10946
Analytical Method: 8270D SIM LV (PAH)
Analyst: BMZ
Analytical Date/Time: 08/06/18 16:31
Container ID: 1184077003-D

Prep Batch: XXX40058
Prep Method: SW3520C
Prep Date/Time: 08/01/18 11:06
Prep Initial Wt./Vol.: 248 mL
Prep Extract Vol: 1 mL

Results of **SW-3**

Client Sample ID: **SW-3**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077003
Lab Project ID: 1184077

Collection Date: 07/29/18 16:40
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		08/04/18 05:14
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		08/04/18 05:14
o-Xylene	0.500	U	1.00	0.310	ug/L	1		08/04/18 05:14
P & M -Xylene	1.00	U	2.00	0.620	ug/L	1		08/04/18 05:14
Toluene	0.500	U	1.00	0.310	ug/L	1		08/04/18 05:14
Xylenes (total)	1.50	U	3.00	0.930	ug/L	1		08/04/18 05:14
Surrogates								
1,4-Difluorobenzene (surr)	91.4		77-115		%	1		08/04/18 05:14

Batch Information

Analytical Batch: VFC14323
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 08/04/18 05:14
Container ID: 1184077003-A

Prep Batch: VXX32794
Prep Method: SW5030B
Prep Date/Time: 08/03/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/01/2018 2:30:19PM

J flagging is activated

Results of **SW-99**

Client Sample ID: **SW-99**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077004
Lab Project ID: 1184077

Collection Date: 07/29/18 18:00
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.666		0.0568	0.0170	ug/L	1		08/06/18 16:52
2-Methylnaphthalene	0.629		0.0568	0.0170	ug/L	1		08/06/18 16:52
Acenaphthene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Acenaphthylene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Anthracene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Benzo(a)Anthracene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Benzo[a]pyrene	0.0114 U		0.0227	0.00705	ug/L	1		08/06/18 16:52
Benzo[b]Fluoranthene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Benzo[g,h,i]perylene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Benzo[k]fluoranthene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Chrysene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Dibenzo[a,h]anthracene	0.0114 U		0.0227	0.00705	ug/L	1		08/06/18 16:52
Fluoranthene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Fluorene	0.0194 J		0.0568	0.0170	ug/L	1		08/06/18 16:52
Indeno[1,2,3-c,d] pyrene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Naphthalene	2.96		0.114	0.0352	ug/L	1		08/06/18 16:52
Phenanthrene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Pyrene	0.0284 U		0.0568	0.0170	ug/L	1		08/06/18 16:52
Surrogates								
2-Methylnaphthalene-d10 (surr)	75		47-106		%	1		08/06/18 16:52
Fluoranthene-d10 (surr)	79.5		24-116		%	1		08/06/18 16:52

Batch Information

Analytical Batch: XMS10946
Analytical Method: 8270D SIM LV (PAH)
Analyst: BMZ
Analytical Date/Time: 08/06/18 16:52
Container ID: 1184077004-D

Prep Batch: XXX40058
Prep Method: SW3520C
Prep Date/Time: 08/01/18 11:06
Prep Initial Wt./Vol.: 220 mL
Prep Extract Vol: 1 mL

Results of **SW-99**

Client Sample ID: **SW-99**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077004
Lab Project ID: 1184077

Collection Date: 07/29/18 18:00
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	50.8		0.500	0.150	ug/L	1		08/04/18 05:32
Ethylbenzene	15.7		1.00	0.310	ug/L	1		08/04/18 05:32
o-Xylene	34.8		1.00	0.310	ug/L	1		08/04/18 05:32
P & M -Xylene	65.8		2.00	0.620	ug/L	1		08/04/18 05:32
Toluene	88.6		1.00	0.310	ug/L	1		08/04/18 05:32
Xylenes (total)	101		3.00	0.930	ug/L	1		08/04/18 05:32
Surrogates								
1,4-Difluorobenzene (surr)	94.1		77-115		%	1		08/04/18 05:32

Batch Information

Analytical Batch: VFC14323
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 08/04/18 05:32
Container ID: 1184077004-A

Prep Batch: VXX32794
Prep Method: SW5030B
Prep Date/Time: 08/03/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/01/2018 2:30:19PM

J flagging is activated

Results of **Trip Blank**

Client Sample ID: **Trip Blank**
Client Project ID: **105.01619.17001 NOSI Block 303**
Lab Sample ID: 1184077005
Lab Project ID: 1184077

Collection Date: 07/29/18 16:15
Received Date: 07/31/18 09:56
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.250	U	0.500	0.150	ug/L	1		08/03/18 04:12
Ethylbenzene	0.500	U	1.00	0.310	ug/L	1		08/03/18 04:12
o-Xylene	0.500	U	1.00	0.310	ug/L	1		08/03/18 04:12
P & M -Xylene	1.00	U	2.00	0.620	ug/L	1		08/03/18 04:12
Toluene	0.500	U	1.00	0.310	ug/L	1		08/03/18 04:12
Xylenes (total)	1.50	U	3.00	0.930	ug/L	1		08/03/18 04:12
Surrogates								
1,4-Difluorobenzene (surr)	90.8		77-115		%	1		08/03/18 04:12

Batch Information

Analytical Batch: VFC14320
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 08/03/18 04:12
Container ID: 1184077005-A

Prep Batch: VXX32783
Prep Method: SW5030B
Prep Date/Time: 08/02/18 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Method Blank

Blank ID: MB for HBN 1783609 [VXX/32783]
Blank Lab ID: 1464320

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1184077005

Results by **SW8021B**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	0.930	ug/L
Surrogates				
1,4-Difluorobenzene (surr)	92.6	77-115		%

Batch Information

Analytical Batch: VFC14320
Analytical Method: SW8021B
Instrument: Agilent 7890A PID/FID
Analyst: ST
Analytical Date/Time: 8/2/2018 9:52:00AM

Prep Batch: VXX32783
Prep Method: SW5030B
Prep Date/Time: 8/2/2018 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/01/2018 2:30:21PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1184077 [VXX32783]
Blank Spike Lab ID: 1464321
Date Analyzed: 08/02/2018 23:05

Spike Duplicate ID: LCSD for HBN 1184077 [VXX32783]
Spike Duplicate Lab ID: 1464322
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1184077005

Results by **SW8021B**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	100	101	101	100	104	104	(80-120)	3.30	(< 20)
Ethylbenzene	100	95.6	96	100	98.3	98	(75-125)	2.90	(< 20)
o-Xylene	100	98.3	98	100	96.9	97	(80-120)	1.40	(< 20)
P & M -Xylene	200	193	96	200	192	96	(75-130)	0.12	(< 20)
Toluene	100	98.4	98	100	100	100	(75-120)	1.80	(< 20)
Xylenes (total)	300	291	97	300	289	96	(79-121)	0.57	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	50	101	101	50	101	101	(77-115)	0.02	

Batch Information

Analytical Batch: **VFC14320**
Analytical Method: **SW8021B**
Instrument: **Agilent 7890A PID/FID**
Analyst: **ST**

Prep Batch: **VXX32783**
Prep Method: **SW5030B**
Prep Date/Time: **08/02/2018 08:00**
Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

Print Date: 10/01/2018 2:30:23PM

Method Blank

Blank ID: MB for HBN 1783665 [VXX/32794]
Blank Lab ID: 1464600

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1184077001, 1184077002, 1184077003, 1184077004

Results by **SW8021B**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	0.930	ug/L
Surrogates				
1,4-Difluorobenzene (surr)	95.5	77-115		%

Batch Information

Analytical Batch: VFC14323
Analytical Method: SW8021B
Instrument: Agilent 7890A PID/FID
Analyst: ST
Analytical Date/Time: 8/3/2018 10:17:00AM

Prep Batch: VXX32794
Prep Method: SW5030B
Prep Date/Time: 8/3/2018 8:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 10/01/2018 2:30:25PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1184077 [VXX32794]
Blank Spike Lab ID: 1464601
Date Analyzed: 08/04/2018 02:32

Spike Duplicate ID: LCSD for HBN 1184077 [VXX32794]
Spike Duplicate Lab ID: 1464602
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1184077001, 1184077002, 1184077003, 1184077004

Results by **SW8021B**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	100	106	106	100	102	102	(80-120)	3.70	(< 20)
Ethylbenzene	100	100	100	100	98.4	98	(75-125)	1.90	(< 20)
o-Xylene	100	99.4	99	100	95.4	95	(80-120)	4.10	(< 20)
P & M -Xylene	200	198	99	200	192	96	(75-130)	3.10	(< 20)
Toluene	100	101	101	100	99.4	99	(75-120)	1.50	(< 20)
Xylenes (total)	300	298	99	300	288	96	(79-121)	3.50	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	50	102	102	50	101	101	(77-115)	1.40	

Batch Information

Analytical Batch: **VFC14323**
Analytical Method: **SW8021B**
Instrument: **Agilent 7890A PID/FID**
Analyst: **ST**

Prep Batch: **VXX32794**
Prep Method: **SW5030B**
Prep Date/Time: **08/03/2018 08:00**
Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

Print Date: 10/01/2018 2:30:26PM

Method Blank

Blank ID: MB for HBN 1783421 [XXX/40058]
Blank Lab ID: 1463503

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1184077001, 1184077002, 1184077003, 1184077004

Results by **8270D SIM LV (PAH)**

Parameter	Results	LOQ/CL	DL	Units
1-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
2-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
Acenaphthene	0.0250U	0.0500	0.0150	ug/L
Acenaphthylene	0.0250U	0.0500	0.0150	ug/L
Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo(a)Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo[a]pyrene	0.0100U	0.0200	0.00620	ug/L
Benzo[b]Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Benzo[g,h,i]perylene	0.0250U	0.0500	0.0150	ug/L
Benzo[k]fluoranthene	0.0250U	0.0500	0.0150	ug/L
Chrysene	0.0250U	0.0500	0.0150	ug/L
Dibenzo[a,h]anthracene	0.0100U	0.0200	0.00620	ug/L
Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Fluorene	0.0250U	0.0500	0.0150	ug/L
Indeno[1,2,3-c,d] pyrene	0.0250U	0.0500	0.0150	ug/L
Naphthalene	0.0500U	0.100	0.0310	ug/L
Phenanthrene	0.0250U	0.0500	0.0150	ug/L
Pyrene	0.0250U	0.0500	0.0150	ug/L
Surrogates				
2-Methylnaphthalene-d10 (surr)	81.1	47-106		%
Fluoranthene-d10 (surr)	88.3	24-116		%

Batch Information

Analytical Batch: XMS10946
Analytical Method: 8270D SIM LV (PAH)
Instrument: Agilent GC 7890B/5977A SWA
Analyst: BMZ
Analytical Date/Time: 8/6/2018 11:23:00AM

Prep Batch: XXX40058
Prep Method: SW3520C
Prep Date/Time: 8/1/2018 11:06:59AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Blank Spike Summary

Blank Spike ID: LCS for HBN 1184077 [XXX40058]
Blank Spike Lab ID: 1463504
Date Analyzed: 08/06/2018 11:44

Spike Duplicate ID: LCSD for HBN 1184077 [XXX40058]
Spike Duplicate Lab ID: 1463505
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1184077001, 1184077002, 1184077003, 1184077004

Results by **8270D SIM LV (PAH)**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
1-Methylnaphthalene	2	1.81	91	2	1.75	88	(41-115)	3.60	(< 20)
2-Methylnaphthalene	2	1.69	85	2	1.63	81	(39-114)	3.90	(< 20)
Acenaphthene	2	1.87	94	2	1.81	91	(48-114)	3.40	(< 20)
Acenaphthylene	2	1.76	88	2	1.69	85	(35-121)	4.00	(< 20)
Anthracene	2	1.57	79	2	1.53	77	(53-119)	2.70	(< 20)
Benzo(a)Anthracene	2	1.70	85	2	1.64	82	(59-120)	3.50	(< 20)
Benzo[a]pyrene	2	1.61	80	2	1.56	78	(53-120)	2.70	(< 20)
Benzo[b]Fluoranthene	2	1.74	87	2	1.62	81	(53-126)	7.20	(< 20)
Benzo[g,h,i]perylene	2	1.60	80	2	1.55	78	(44-128)	2.90	(< 20)
Benzo[k]fluoranthene	2	1.71	85	2	1.71	86	(54-125)	0.20	(< 20)
Chrysene	2	1.83	91	2	1.76	88	(57-120)	3.80	(< 20)
Dibenzo[a,h]anthracene	2	1.52	76	2	1.46	73	(44-131)	4.30	(< 20)
Fluoranthene	2	1.92	96	2	1.87	93	(58-120)	3.10	(< 20)
Fluorene	2	1.65	83	2	1.60	80	(50-118)	3.50	(< 20)
Indeno[1,2,3-c,d] pyrene	2	1.61	81	2	1.57	78	(48-130)	2.90	(< 20)
Naphthalene	2	1.89	95	2	1.83	92	(43-114)	3.10	(< 20)
Phenanthrene	2	1.56	78	2	1.51	76	(53-115)	3.00	(< 20)
Pyrene	2	1.99	100	2	1.93	96	(53-121)	3.40	(< 20)
Surrogates									
2-Methylnaphthalene-d10 (surr)	2	84.6	85	2	78.8	79	(47-106)	7.20	
Fluoranthene-d10 (surr)	2	93.2	93	2	90	90	(24-116)	3.50	

Batch Information

Analytical Batch: **XMS10946**
Analytical Method: **8270D SIM LV (PAH)**
Instrument: **Agilent GC 7890B/5977A SWA**
Analyst: **BMZ**

Prep Batch: **XXX40058**
Prep Method: **SW3520C**
Prep Date/Time: **08/01/2018 11:06**
Spike Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL
Dupe Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL

Print Date: 10/01/2018 2:30:31PM

SGS REVIEWED NIC

SGS North America Inc.
CHAIN OF CUSTODY RECORD

1184077
Revised Report - Revision 1

Instructions: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.

Page 1 of 4

Section 1

CLIENT: SLR
CONTACT: Julie Hoffman / Christophe Venet
PHONE NO: 907-222-1112
PROJECT NAME: NOSI Block 303
PROJECT/ PWSID/ PERMIT#: 105.01619.17001
REPORTS TO: Julie Hoffman, Christophe Venet
E-MAIL: JHoffman@SLRconsulting.com, CVenet@SLRconsulting.com
INVOICE TO: SLR
QUOTE #:
P.O. #:

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Type C = COMP G = GRAB MI = Multi Incremental Soils	Preservative: HCL	Preservative: 1	REMARKS/ LOC ID
(1) A-E	SW-1	7/29/18	1615	W	5	G	X	X	
(2) A-E	SW-2	7/29/18	1625	W	5	G	X	X	
(3) A-E	SW-3	7/29/18	1640	W	5	G	X	X	
(4) A-E	SW-99	7/29/18	1800	W	5	G	X	X	
(5) A-C	TRIP BLANK	7/29/18	1615	W	3	—	X		

Preservative: BTEX (EPA 8021B); PAH (EPA 8270D SIM in PAHs_8270D)

Section 5

	Date	Time	
Relinquished By: (1)	7/30/18	0800	Received By: Christophe Venet 7/31 0900
Relinquished By: (2)			Received By:
Relinquished By: (3)			Received By:
Relinquished By: (4) 7/31 9:55	7/30/18	9:56	Received For Laboratory By: KGT

Section 4

DOD Project? Yes (No)

Cooler ID: 1

Data Deliverable Requirements: LEVEL II

Requested Turnaround Time and/or Special Instructions: STANDARD

Temp Blank °C: 4.9 D25
or Ambient [ ]
(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT
(See attached Sample Receipt Form)

[ ] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

e-Sample Receipt Form

Revised Report - Revision 1

SGS Workorder #: **1184077**

1 1 8 4 0 7 7

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
Chain of Custody / Temperature Requirements		yes — Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	yes	1f 1b
COC accompanied samples?	yes	
n/a — **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	yes	Cooler ID: 1 @ 4.9 °C Therm. ID: D25
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
	n/a	Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	n/a	
If <0°C, were sample containers ice free?	n/a	
If samples received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP**" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled".		
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
Holding Time / Documentation / Sample Condition Requirements		Note: Refer to form F-083 "Sample Guide" for specific holding times.
Were samples received within holding time?	yes	
Do samples **match COC**** (i.e.,sample IDs,dates/times collected)?	yes	
**Note: If times differ <1hr, record details & login per COC.		
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)	yes	
	n/a	***Exemption permitted for metals (e.g,200.8/6020A).
Were proper containers (type/mass/volume/preservative***)used?	yes	see below
Volatile / LL-Hg Requirements		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	yes	
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	yes	
Were all soil VOAs field extracted with MeOH+BFB?	n/a	

Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.

Additional notes (if applicable):

1 container, 4-E fpr PAH is preserved with HCL.

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1184077001-A	HCL to pH < 2	OK			
1184077001-B	HCL to pH < 2	OK			
1184077001-C	HCL to pH < 2	OK			
1184077001-D	No Preservative Required	OK			
1184077001-E	No Preservative Required	OK			
1184077002-A	HCL to pH < 2	OK			
1184077002-B	HCL to pH < 2	OK			
1184077002-C	HCL to pH < 2	OK			
1184077002-D	No Preservative Required	OK			
1184077002-E	No Preservative Required	OK			
1184077003-A	HCL to pH < 2	OK			
1184077003-B	HCL to pH < 2	OK			
1184077003-C	HCL to pH < 2	OK			
1184077003-D	No Preservative Required	OK			
1184077003-E	No Preservative Required	OK			
1184077004-A	HCL to pH < 2	OK			
1184077004-B	HCL to pH < 2	OK			
1184077004-C	HCL to pH < 2	OK			
1184077004-D	No Preservative Required	OK			
1184077004-E	No Preservative Required	OK			
1184077005-A	HCL to pH < 2	OK			
1184077005-B	HCL to pH < 2	OK			
1184077005-C	HCL to pH < 2	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.
BU - The container was received with headspace greater than 6mm.
DM - The container was received damaged.
FR - The container was received frozen and not usable for Bacteria or BOD analyses.
IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.
PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.