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July 25, 2024

Mr. Peter Campbell, Project Manager
Alaska Department of Environmental Conservation / SPAR / CSP
43335 Kalifornsky Beach Road, Suite 11
Soldotna, AK 99669-8250

Re: Swanson River Field Pipe & Supply Yard
2024 Work Plan
ADEC File Number: 2337.38.017
ADEC Hazard ID Number: 452

Dear Pete,

Please find enclosed the Swanson River Field Pipe and Supply Yard 2024 Work Plan for your review and files. The submittal was prepared by Stantec on behalf of Chevron Environmental Management Company (CEMC).

Please do not hesitate to contact Craig Wilson (907 266-1128) and/or Michael Stauthamer (307 231-7660) with Stantec or myself at 832-854-5601 should you have any questions.

Respectfully,

Jason Michelson

Jason Michelson

Encl.

2024 Work Plan

Work Plan for 2024 Activities at Swanson River Field Pipe and Supply Yard

June 14, 2024

Prepared for:

Chevron Environmental Management Company

Prepared by:

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ADEC File Number: 2334.38.017
ADEC Hazard ID Number: 452

Revision	Description	Author		Quality Check		Independent Review	
0	Draft	CHW	5/14/24	MHS	6/14/24	THM	6/25/24

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Prepared by 
(signature)

Craig Wilson

Reviewed by 
(signature)

Michael Stauthamer

Reviewed by 
(signature)

Tom Madsen

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Acronyms

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AECOM	AECOM Technical Services, Inc.
AS	air sparge
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CEMC	Chevron Environmental Management Company
CoC	chain-of-custody
Coffman	Coffman Engineers
DO	dissolved oxygen
FOC	fractional organic carbon
GTS	groundwater treatment system
HHS	heated head space
Hilcorp	Hilcorp Alaska, LLC
mg/kg	milligram per kilogram
mg/L	milligram per liter
MS	matrix spike
MSD	matrix spike duplicate
OBC	Order by Consent
O&M	Operation and Maintenance
OilRisk	OilRisk Consultants
P&S	Pipe and Supply
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
PRA	Previously Remediated Area
QC	quality control
SRF	Swanson River Field
Stantec	Stantec Consulting Services Inc.
TAH	total aromatic hydrocarbons
TAqH	total aqueous hydrocarbons
UOCC	Union Oil Company of California
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this work plan on behalf of Chevron Environmental Management Company (CEMC) in support of investigation and remedial efforts at a xylene remediation project site located at the Pipe and Supply (P&S) Yard, Swanson River Field (SRF), Sterling, Alaska (**Figure 1**). The groundwater and surface water exhibiting xylene and ethylbenzene impacts are presumed to be the result of a xylene and ethylbenzene release associated with an aboveground 1,000-barrel storage tank in 1988.

This work plan was prepared in compliance with Title 18 of the Alaska Administrative Code (AAC), Chapter 75, Section 355 (18 AAC 75.355; ADEC 2023) and the *ADEC Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites* (ADEC 2017b). The sampling procedures described in this work plan were developed in accordance with ADEC's *Field Sampling Guidance for Contaminated Sites and Leaking Underground Storage Tank Sites* (ADEC 2022a) and relevant industry standards.

1.1 PROJECT OBJECTIVES

The 2024 project objectives for the P&S Yard described in this work plan are:

1. Conduct groundwater and surface water sampling and monitoring in accordance with Alaska Department of Environmental Conservation (ADEC) requirements, in support of Amendment 5, dated 25 March 1991, to the Order by Consent (OBC) for the Swanson River Oil Field issued by the U. S. Fish and Wildlife Service (USFWS) on 06 August 1985 (USFWS 1991).
2. Continue operations and maintenance activities on the air sparge system located on site.
3. Evaluate data collected to date, identify remaining data gaps, and develop remedial alternatives and a recommended approach to progress the site to closure.

1.2 PROJECT TEAM AND SCHEDULE

1.2.1 Project Team

The Stantec team member roles and responsibilities are listed in **Table 1**. Additional personnel and subcontractors will be utilized as needed to achieve the work plan goals.

Table 1 Project Team

Name / Position	Role
Michael Stauthamer Project Manager	Manages and oversees project scope, schedule, and budget. Supports project technical lead in project design, sample collection, and scientific approach.
Craig Wilson Project Technical Lead	Manages development of deliverables and completion of field work to ensure that field goals are being met; relays information to CEMC Project Manager; ensures that project requirements are being met; assists in design questions; coordinates job safety briefings and tailgate safety meetings; and oversees general project status.
Sydney Souza Project Field Lead and Site Safety Officer	Leads field operations and collection of samples. Supports all activities required for project completion, including sample preparation, decontamination, sample collection, packing and transport, as well as quality assurance/quality control (QA/QC) related tasks; informs Project Manager of project status; organizes and oversees tailgate safety meetings and job safety briefings; and ensures QA/QC goals are met.
Jeremiah Malenfant Project Staff	Assist in field operations and collection of samples. Supports all activities required for project completion, including sample preparation, decontamination, sample collection, packing and transport, as well as QA/QC related tasks; informs Project Manager of project status.

1.2.2 Project Schedule

Table 2 presents the proposed project schedule for 2024 activities.

Table 2 Proposed 2024 Project Schedule

Month	Activity
March – November	Quarterly operation and maintenance (O&M) of air sparge system and sampling of monitoring wells TW-2 and TW-3
May	OBC groundwater monitoring and sampling
September	OBC groundwater monitoring and sampling

2.0 SITE DESCRIPTION AND BACKGROUND

2.1 SITE LOCATION AND OWNERSHIP

The P&S Yard site is located within the SRF, an oil and gas production facility within the boundaries of the Kenai National Wildlife Refuge, located approximately 50 miles southwest of Anchorage and 15 miles northeast of Kenai, Alaska. The site is located within the western half of the west half of Section 27 and the eastern half of the east half of Section 28, Township 8 North, Range 9 West, Seward Meridian. See **Figure 1** for additional location details. Current site features are shown on **Figure 2**.

Union Oil Company of California (UOCC), an indirect wholly owned subsidiary of Chevron Corporation, is the former leaseholder and operator of the SRF (including the P&S Yard). UOCC sold the SRF assets, along with other Cook Inlet assets, to Hilcorp Alaska, LLC (Hilcorp) in 2011 but retained the contractual obligation to remediate xylene-impacted soils and groundwater at the P&S Yard site to the extent that the agencies grant closure, or a statement of no further corrective action necessary is issued. This remediation effort is being managed by CEMC on behalf of UOCC.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Numerous investigations and remediation activities have been implemented at the site since 1988 and soil and hydrogeologic conditions have been interpreted from these investigations and activities. In general, the soils at the P&S Yard consist of 2 to 3 feet of silty sand, or silt overlaying a predominantly sand-and-gravel water-bearing zone. An aquitard consisting of silt, silty clay, and silty sand is present throughout the area, underlying the sand and gravel water-bearing zone. The aquitard depth ranges from approximately 2 feet below ground surface (bgs) in the vicinity of the wetlands east of the site to 15 feet bgs at the western end of the site. The water-bearing zone soils are interpreted to be primarily of glacio-fluvial origin, and the aquitard is composed of ground moraine or glaciolacustrine sediments (CH2M Hill 2008). The sand-and-gravel water-bearing zone contains scattered cobbles and boulders, thin lenses of coarse sand and/or pea gravel (that may act as preferential flow pathways), and some fine-grained silt layers (CH2M Hill 2008). During the historical landfarm and backfilling activities described below, coarser materials consisting of gravel larger than ¾ inches were used as backfill at the bottom of the excavation above the aquitard within the installed slurry wall (i.e., previous remediated area, PRA).

2.3 SUMMARY OF PAST FIELD EFFORTS

A xylene release was discovered at the site in 1988, originating from an aboveground 1,000-barrel storage tank located at the P&S Yard on the eastern side of Swanson River Road, since removed. The contaminant groundwater plume extended from the tank to downgradient seeps located approximately 750 feet east of the tank. Cleanup levels for the site were established in Amendment 5 of the 1991 USFWS OBC (USFWS 1991) which established soil and groundwater cleanup goals for benzene, toluene, ethylbenzene, and xylenes (BTEX) at the P&S Yard site (as discussed in Section 2.4). Remedial activities in the 1990s are summarized in the 1998 Site Summary Report compiled by GeoEngineers for UOCC (GeoEngineers 1998).

A soil-bentonite slurry wall was installed around the perimeter of the site in 2002 to contain the contaminant plume and control groundwater inflow and a second slurry and sheet pile wall was installed in 2005 (**Figure 2**). Soil remediation consisting of excavation, soil screening, landfarming and backfilling of xylene-impacted soil from within the 2002 slurry wall was conducted from 2010 through 2016 and is summarized in numerous remediation reports (Weston Solutions [Weston], Coffman Engineers [Coffman] and OilRisk Consultants [OilRisk] 2011a; Weston, Coffman and OilRisk 2011b; Weston and Coffman 2013; AECOM 2014a; AECOM 2015d; and AECOM 2016).

A groundwater interception trench system and groundwater treatment system (GTS) were installed in 1991 to intercept and treat impacted groundwater. The GTS system aeration trailer and leach field were upgraded in 2009 and then systematically decommissioned and removed from west to east as landfarm soil excavation activities progressed between 2012 and 2015.

Subsurface soil and groundwater investigations were conducted concurrent with remediation activities and are summarized in three reports (AECOM 2013; AECOM 2014b; and AECOM 2017). A description of the project background and the approach and methodology for developing the interim cleanup level for the site is provided in UOCC's *Interim Soil Cleanup Level Analysis* (OilRisk 2010), the *2015 Remediation Work Plan* (AECOM 2015c), and the *Final Groundwater Monitoring Program Work Plan* (AECOM 2015a).

2005, 2013, and 2014 assessment activities indicated that xylene-impacted soil and groundwater existed along the eastern portion of Swanson River Road. In-situ air sparging was selected as a viable remedial technology to address this contamination (GeoEngineers 1996; AECOM 2014a and 2014b). An air sparge (AS) well network consisting of 14 air sparge wells (AS-1 through AS-14) was installed on the eastern shoulder of Swanson River Road in 2015 to address xylene-impacted soil and groundwater remaining in an isolated pocket between the 2002 and 2005 slurry walls beneath Swanson River Road on the western end of the site (AECOM 2015b). Equipment issues forced a shutdown of the system in 2019 until a new air compressor was installed in August 2019. The system is currently operated spring through fall and turned off during the winter months when the ground is frozen (See Section 4 of this work plan).

AECOM Technical Services, Inc (AECOM) installed 12 temporary wells in 2016 to enhance the post-remediation groundwater monitoring well network; six wells (TW-11 through TW-16) on the eastern end of the site and in the wetlands and the remaining six wells within and around the previously remediated area (TW-4R, TW-6 through TW-10). Four additional wells were drilled and completed as air sparge replacement wells in 2016 (AS-2R, AS-6R, AS-10R, and AS-11R) to replace four air sparge wells that had lost their seals (AS-2, AS-6, AS-10, and AS-11, respectively).

Additional wells and temporary piezometers were installed in 2018. Five wells (TW-17, TW-18D, TW-18S, TW-19D, and TW-19S) were added in the previously remediated area. Wells TW-18S/D and TW-19S/D were installed as nested pairs to collect additional BTEX concentration data at the top of the aquitard (deep wells) and at the top of the water table (shallow wells). The temporary piezometers provided groundwater data in the area outside and to the east of the 2002 slurry wall between TW-13 and W-1P.

Nine additional monitoring wells were installed within the previously remediated area (PRA) in July 2020 to assess the contaminant level in the PRA and soil sampling was conducted in the wetlands area east of the site in November 2020 to assess and delineate the extent of xylene contamination in that area.

Activities since 2021 have consisted of soil and groundwater sampling of the wetlands to further delineate the xylene-contaminated area and sampling of the monitoring wells within the PRA. **Figure 2** shows site features, slurry walls, remediation components and historic sample locations.

Analytical results from groundwater and wetland monitoring at the site since June 2016 indicate that:

- Xylene and ethylbenzene-impacted groundwater in exceedance of cleanup standards is present between the 2002 slurry wall and the 2005 slurry/sheet pile walls in temporary wells TW-2 and TW-3 installed immediately east of Swanson River Road, but not TW-1.
- Ethylbenzene-impacted groundwater in exceedance of ethylbenzene cleanup standards is present in the previously remediated area temporary wells TW-6, TW-7 and TW-8 and xylene-impacted groundwater in exceedance of xylene cleanup standard is present in TW-6 and TW-7.
- Xylene-impacted groundwater in exceedance of xylene cleanup standard of 0.019 mg/L is present immediately downgradient of the eastern portion of the 2002 slurry wall in temporary well TW-13.
- W-1P has surface water quality exceedances for total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH).

2.4 CONTAMINANTS OF POTENTIAL CONCERN

Table 3 lists the known site contaminants and cleanup levels specified in the OBC and addressed in this work plan. The OBC specifies groundwater and soil cleanup levels, except that the wetland area must meet ADEC water quality standards (ADEC 2020b). The OBC requires sampling for benzene but does not list a groundwater cleanup level; ADEC groundwater cleanup levels (ADEC 2023) are shown for reference purposes.

Table 3 Site Contaminants and Cleanup Levels

Contaminant of Potential Concern	Soil			Groundwater		
	OBC Cleanup Level (mg/kg)[a]	Interim Soil Cleanup Level (mg/kg)[b]	2015 & 2018 Interim Soil Cleanup Level (mg/kg)[c]	OBC Cleanup Level (mg/L)[a]	18 AAC 75.345 Table C (mg/L)	18 AAC 70 (mg/L)
Benzene	2.0	-	-	N/S	0.0046	-
Ethylbenzene	15.0	-	-	0.48	0.015	-
Toluene	4.5	-	-	0.50	1.1	-
Xylenes, Total	1.5	24.7	9.3	0.20	0.19	-
TAH	-	-	-	-	-	0.01
TAqH	-	-	-	-	-	0.015

Table 3 Notes:

[a] Per OBC (USFWS 1991), OBC cleanup levels applied to all areas of the P&S Yard and the east drainage.
[b] Interim soil cleanup level of 24.7 mg/kg was applied to soils treated by landfarming (OilRisk 2010a) from 2010 to 2014 (Weston Solutions, Coffman Engineers and OilRisk Consultants 2011a and 2011b; Weston Solutions and Coffman Engineers 2013; CEMC 2014a; and CEMC 2015).
[c] Interim soil cleanup level of 9.3 mg/kg is applied to soils treated by landfarming from 2015 onwards (AECOM 2016a).

AAC Alaska Administrative Code
mg/kg milligrams per kilogram
mg/L milligrams per liter
N/S not specified
OBC Order by Consent
ppm parts per million
TAH total aromatic hydrocarbons
TAqH total aqueous hydrocarbons
- not applicable

2.5 REMEDIAL APPROACH SELECTION

To achieve the soil and water cleanup goals established in the OBC (USFWS 1991), several remedial technologies were attempted in the 1990s through early 2000s, including soil venting, air sparging, and aboveground bio-piles. Landfarming with an agricultural disk was found to be most effective at reducing xylene concentrations in the soil. Considerable remediation has been completed within the slurry wall boundaries east of the AS system and current remediation activities are centered on reducing the xylene levels along the roadside in the vicinity of wells TW-2 and TW-3, utilizing the air sparge system.

2.5.1 Interim Soil Cleanup Level

Because of the desired expedited timeline for treating the soil, landfarming was not considered practical for achieving the OBC soil cleanup level of 1.5 (milligram per kilogram) mg/kg for total xylenes. Long-term monitoring results indicated that higher soil concentrations would be protective of groundwater (OilRisk 2008). Since previous work at the site indicated that soil concentrations below 30 mg/kg could be achieved via landfarming (OilRisk 1999), UOCC proposed development of an interim soil cleanup level that would result in leachate concentrations of xylenes below the established OBC groundwater cleanup level of 0.2 mg/L. A complete description of the approach and methodology for developing the interim cleanup level is provided in UOCC's *Interim Soil Cleanup Level Analysis* (OilRisk 2010). Samples were analyzed for xylenes in both soil and liquid leachate, and the pairs of results were fitted to a log-log regression relationship. The lower 90-percent confidence interval of the mean, 24.7 mg/kg, was proposed as the interim soil cleanup level for xylenes in 2010. All ADEC and stakeholder approved P&S Yard Remedial Work Plans developed between 2010 and 2014 identified a total xylene concentration of 24.7 mg/kg as the interim cleanup goal for soil. In 2015, after soil excavation activities began, it was determined by ADEC and the stakeholders that a more conservative interim cleanup goal of 9.3 mg/kg would be used when screening soils.

3.0 GROUNDWATER SAMPLING

Two sampling events, in May and September, will be conducted in support of the groundwater monitoring requirements of the OBC (USFWS 1991). Groundwater samples from monitoring wells in the previously remediated area and the wetlands area to the east will be collected using the procedures described in Section 6.3 and the samples will be submitted for analysis of BTEX using EPA Method 8260D. **Table 4** provides a summary of groundwater sampling locations and analysis. The sampling locations are also located on **Figure 2**. Note that **Table 4** does not include air sparge system monitoring (Section 4).

3.1 MAY 2024 GROUNDWATER MONITORING

The May event will include the groundwater sampling listed in Table 4, including MW-1, and measurement of groundwater levels of all the project monitoring wells. MW-1 is only sampled annually to provide an upgradient background reference for remediation analysis.

3.2 SEPTEMBER 2024 GROUNDWATER MONITORING

The September event will include the groundwater sampling listed in Table 4, excluding MW-1, and measurement of groundwater levels of all the project monitoring wells.

Table 4 Groundwater Sampling Locations and Schedule

Sample Location	Location	Sampling Frequency	Analysis
MW-1	Western side of previously remediated area (PRA), outside of slurry wall, western side of Swanson River Road	Annual (May)	BTEX Direct read dissolved oxygen (DO) Geochemical parameters
TW-4R	Eastern side of PRA, inside of slurry wall	Semi-annual	BTEX Direct read DO Geochemical parameters (annual)
TW-5	Eastern side of PRA, inside of slurry wall	Semi-annual	BTEX Direct read DO
TW-6	PRA area, inside of slurry wall	Semi-annual	BTEX Direct read DO
TW-6D	PRA area, inside of slurry wall near TW-6	Semi-annual	BTEX Direct read DO
TW-7	PRA area, inside of slurry wall, within excavation area, 160 feet east of sheet pile wall	Semi-annual	BTEX Direct read DO
TW-7D	PRA area, inside of slurry wall near TW-7	Semi-annual	BTEX Direct read DO
TW-8	PRA area, inside of slurry wall, within excavation area, 375 feet east of sheet pile wall	Semi-annual	BTEX Direct read DO
TW-13	Spruce forest outside of 2002 slurry wall on eastern side and downgradient of PRA area	Semi-annual	BTEX[a] Direct read DO Geochemical parameters (annual)

2024 WORK PLAN

Groundwater Sampling

Sample Location	Location	Sampling Frequency	Analysis
TW-15	Wetland area, southeast of TW-13	Semi-annual	BTEX[a]
TW-16	Wetland area, southeast of TW-15	Semi-annual	BTEX[a]
TW-17D	East of 2005 slurry wall, in PRA area, immediately downgradient of TW-1	Semi-annual	BTEX Direct read DO
TW-17S	East of 2005 slurry wall, in PRA area, immediately downgradient of TW-1	Semi-annual	BTEX Direct read DO
TW-18D	East of 2005 slurry wall, in PRA area, immediately downgradient of TW-2	Semi-annual	BTEX Direct read DO
TW-18S	East of 2005 slurry wall, in PRA area, immediately downgradient of TW-2	Semi-annual	BTEX Direct read DO
TW-19D	East of 2005 slurry wall, in PRA area, immediately downgradient of TW-3	Semi-annual	BTEX Direct read DO
TW-19S	East of 2005 slurry wall, in PRA area, immediately downgradient of TW-3	Semi-annual	BTEX Direct read DO
TW-20	Equidistant between TW-6, TW-7, & TW-9	Semi-annual	BTEX Direct read DO
TW-21	Approximately 100 feet northeast of GTS trailer	Semi-annual	BTEX Direct read DO
TW-22	Equidistant between TW-7, TW-8, & TW-9	Semi-annual	BTEX Direct read DO
TW-23	Approximately 160 feet north of TW-10	Semi-annual	BTEX Direct read DO
TW-24	Midway between TW-8 and TW-9 at limit of excavation	Semi-annual	BTEX Direct read DO
TW-25	Approximately 100 feet south of TW-8	Semi-annual	BTEX Direct read DO
TW-26	In line with TW-8 & TW-4R, just east of 1992 interception trench	Semi-annual	BTEX Direct read DO
W-1P	Wetland OBC compliance point	Semi-annual	BTEX Direct read DO Geochemical parameters (annual) TAH, TAqH
FSS-1	Seasonal seep located downgradient and east of the eastern edge of the slurry wall berm, at toe of slurry wall between the berm and the forest near TW-13	Semi-annual	BTEX
FSS-2	Seasonal seep located immediately downgradient and east of the 2002 slurry wall berm at toe of 2002 slurry wall between the berm and the forest near TW-13	Semi-annual	BTEX
PSW-1	Ponded surface water at the east end of the remediated PRA area, at the interface between the remediated PRA and ponded water surface	Semi-annual	BTEX [b]

Groundwater Sampling

Sample Location	Location	Sampling Frequency	Analysis
PSW-2	Ponded surface water at the east end of the remediated PRA area, at the interface between the ponded water and the eastern berm	Semi-annual	BTEX [b]
Wetlands	Surface water samples from seep/wetlands area (W-1, W-1E, W-3, W-5, W-6, W-7)	Semi-annual	TAH, TAqH

Table 4 Notes:

Geochemical parameters are nitrate / nitrite, dissolved Fe (ferrous Fe), sulfate, alkalinity, pH, conductivity, and methane.

[a] Per ADEC letter (2017a), Sampling for hydrocarbons should be included for the downgradient wetland monitoring wells and creek samples, at least on an interim basis, in order to determine if they are present at concentrations exceeding 15 micrograms per liter.

[b] Per ADEC letter (2017a), If no ponded water is present at both of these locations at the time of sampling, and the dewatering system is not in operation, then one static water sample will be collected from the lower vault for analyses of BTEX.

BTEX: Benzene, toluene, ethylbenzene, and xylenes

PRA: Previously remediated area

DO: Dissolved oxygen

SIM PAH: Single ion monitoring / polyaromatic hydrocarbon

4.0 AIR SPARGE SYSTEM

The air sparge system was installed in 2015 to address xylene-impacted soil and groundwater remaining in an isolated pocket between the 2002 and 2005 slurry walls. Pulsed operation of the air sparge system has been shown to be effective in attenuating xylene concentrations during previous operation of the system.

The air sparge system was turned off for the winter season in December 2023 and restarted in May 2024. The system will be operated until the ground freezes sufficiently to inhibit vaporization and diffusion of the sparged xylene and then turned off for the winter season.

4.1 MONTHLY MONITORING

Sampling of TW-2 and TW-3 will occur on a monthly basis during months when environmental conditions allow (**Table 5**). It is anticipated that sampling will occur May through November.

Table 5 Air Sparge System Monitoring

Sample Identification	Location	Sampling Frequency	Analysis
TW-2	West side of PRA, outside and immediately west of 2005 slurry wall, source area well	Monthly	8260-BTEX
TW-3	Western side of PRA, outside and immediately west of 2005 slurry wall, source area well	Monthly	8260-BTEX

4.2 SYSTEM MONITORING & ADJUSTMENT

Monitoring and adjustment of the system will continue in 2024 to target xylene attenuation at the south end of the air sparge line where xylene concentrations continue to exceed cleanup standards without incurring groundwater mounding or movement to the north end of the system.

5.0 SAMPLING PLAN

The 2024 sampling plan is designed to meet the following data quality objectives:

1. Monthly sampling of wells TW-2 and TW-3 from March through December to ascertain the effectiveness of the air sparge system (see Section 4 of this plan).
2. Semi-annual monitoring of xylene concentrations within the site for compliance with OBC requirements for groundwater (see Section 3 of this plan).
3. Semi-annual groundwater sampling of the wetlands area to the east of the site for compliance with Alaska water quality standards (see Section 3 of this plan).

Groundwater sampling within the project site will include BTEX sampling (EPA Method 8260D), along with direct read measurements of conductivity, pH, and dissolved oxygen. Groundwater sampling within the wetlands area will include TAH (EPA Method 624) and TAqH (EPA Method 625M) for surface water quality, and BTEX (EPA Method 8260D) for soil and groundwater analysis. Five locations (TW-3, MW-1, TW-4R, TW-13, and W-1P) will also be analyzed for geochemical parameters for comparison with previous analysis.

Semi-annual groundwater monitoring will be conducted in the May and September timeframes, and quarterly sampling of the monitoring wells in the AS area (TW-2, and TW-3) may be reduced during the winter season if environmental conditions preclude effective sampling.

5.1 TARGET ANALYTES

Table 6 provides a summary listing of the target analytes for the sampling events in this work plan.

Table 6 Sampling and Analysis Plan

Sampling Event	Parameter	Location	Primary Samples	QA/QC Samples	Total Number of Samples
AS System Monitoring (March-December)	BTEX	TW-2, TW-3	2	1 Trip Blank	3 per quarter
AS System Monitoring (May)	Sulfate	TW-3	1	NA	1
	Alkalinity	TW-3	1	NA	1
	pH	TW-3	1	NA	1
	Dissolved Oxygen	TW-3	1	NA	1
	Sulfides	TW-3	1	NA	1

Sampling Plan

Sampling Event	Parameter	Location	Primary Samples	QA/QC Samples	Total Number of Samples
May OBC Monitoring	BTEX	MW-1, TW-4R, TW-5, TW-6, TW-6D, TW-7, TW-7D, TW-8, TW-13, TW-15, TW-16, TW-17D, TW-17S, TW-18D, TW-18S, TW-19D, TW-19S, TW-20, TW-21, TW-22, TW-23, TW-24, TW-25, TW-26, W-1P, SS-1, FSS-2, PSW-1, PSW-2	29	3 Field Duplicates 1 Trip Blank 2 MS/MSD	35
	Nitrate / Nitrite	MW-1	1	NA	1
	Dissolved (ferrous) Fe	MW-1	1	NA	1
	Total Fe	MW-1	1	NA	1
	Sulfate	MW-1	1	NA	1
	Alkalinity	MW-1	1	NA	1
	pH	MW-1	1	NA	1
	Conductivity	MW-1	1	NA	1
	Methane	MW-1	1	NA	1
	Dissolved Oxygen	MW-1, TW-4R, TW-5, TW-6, TW-6D, TW-7, TW-7D, TW-8, TW-13, TW-17D, TW-17S, TW-18D, TW-18S, TW-19D, TW-19S, TW-20, TW-21, TW-22, TW-23, TW-24, TW-25, TW-26, W-1P	23	NA	23
	TAH	W-1P, W-1, W-1E, W-3, W-5, W-6, W-7	7	1 Field Duplicate	8
	TAqH	W-1P, W-1, W-1E, W-3, W-5, W-6, W-7	7	1 Field Duplicate	8
September OBC Monitoring	BTEX	TW-4R, TW-5, TW-6, TW-6D, TW-7, TW-7D, TW-8, TW-13, TW-15, TW-16, TW-17D, TW-17S, TW-18D, TW-18S, TW-19D, TW-19S, TW-20, TW-21, TW-22, TW-23, TW-24, TW-25, TW-26, W-1P, SS-1, FSS-2, PSW-1, PSW-2	28	3 Field Duplicates 1 Trip Blank 2 MS/MSD	34
	Nitrate / Nitrite	TW-4R, TW-13, W-1P	3	NA	3
	Dissolved (ferrous) Fe	TW-4R, TW-13, W-1P	3	NA	3
	Total Fe	TW-4R, TW-13, W-1P	3	NA	3

Sampling Event	Parameter	Location	Primary Samples	QA/QC Samples	Total Number of Samples
	Sulfate	TW-4R, TW-13, W-1P	3	NA	3
	Alkalinity	TW-4R, TW-13, W-1P	3	NA	3
	pH	TW-4R, TW-13, W-1P	3	NA	3
	Conductivity	TW-4R, TW-13, W-1P	3	NA	3
	Methane	TW-4R, TW-13, W-1P	3	NA	3
	Dissolved Oxygen	TW-4R, TW-5, TW-6, TW-6D, TW-7, TW-7D, TW-8, TW-13, TW-17D, TW-17S, TW-18D, TW-18S, TW-19D, TW-19S, TW-20, TW-21, TW-22, TW-23, TW-24, TW-25, TW-26, W-1P	22	NA	22
	TAH	W-1P, W-1, W-1E, W-3, W-5, W-6, W-7	7	1 Field Duplicate	8
	TAqH	W-1P, W-1, W-1E, W-3, W-5, W-6, W-7	7	1 Field Duplicate	8

Table 7 Notes: BTEX: Benzene, Toluene, Ethylbenzene, Xylene
Fe: Iron
MS/MSD: Matrix Spike / Matrix Spike Duplicate
NA: Not Applicable

5.2 SITE CONTROL

SRF is a Hilcorp-controlled facility with limited access. Any person entering the field is required to sign in and sign out at the Hilcorp main office. Any contractor new to the site will be required to attend a Hilcorp site-specific field orientation, which takes approximately one hour to complete.

Access to the P&S Yard xylene site will be controlled during remedial efforts. The site is surrounded on three sides by woods, and on the fourth side Jersey barriers prohibit vehicle access except where absent at the P&S Yard access road (driveway). Traffic cones are present across the P&S Yard driveway to further limit access. During remedial efforts access is restricted to remediation personnel and support personnel only. All visitors are required to check in at the P&S Yard GTS trailer. On-site personnel will monitor access during daily activities so that all visitors to the site are briefed about daily site activities prior to entering the area.

The GTS trailer will be used for safety meetings, office space, break room capacity, tool and material storage, and general site supervision use. Restrooms are located at Hilcorp's main office and at Plant 10.

Any heavy equipment or drilling equipment exposed to impacted soil will be staged inside the slurry wall containment and will be decontaminated prior to removal from the site. A specific equipment decontamination area may be constructed on site as needed. Decontamination fluids will be collected and disposed of in the skim pit at the 1-33 transfer station.

5.3 SAMPLE COLLECTION METHODS

5.3.1 Groundwater

Groundwater samples will be conducted using a peristaltic pump and approved low flow sampling techniques. A direct read down-hole optical dissolved oxygen (DO) meter will be used prior and post purging and sampling at locations identified in **Table 4**. Water samples will be collected directly from the end of the peristaltic tubing into sample containers supplied by the laboratory. Water quality parameters will be collected during purging and recorded on field forms. Wells will be sampled after water quality parameters stabilize for three successive readings. If water quality parameters do not stabilize, a minimum of four well casing volumes will be removed, and then the well will be immediately sampled.

5.3.2 Surface Water

Surface water samples will be collected by submerging a dedicated vial into the surface water, and the water will be decanted into sample containers supplied by the laboratory. Water quality measurements will be collected after the collection of the laboratory sample by submerging the water quality probe into the surface water after sample collection.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

6.1 QUALITY CONTROL SAMPLES

Quality control (QC) samples will be collected to assess potential errors introduced during sample collection, handling, and analyses. As part of the field Quality Assurance / Quality Control (QA/QC) program, field duplicate samples, trip blanks, and extra sample volume for matrix spike/matrix spike duplicate (MS/MSD) procedures will be collected. QC sampling control requirements are summarized in **Table 7** and will be collected to assess potential errors introduced during sample collection, handling, and analyses.

QC samples will include:

1. One trip blank for each cooler containing BTEX samples,
2. One duplicate field sample for every 10 samples collected per laboratory analysis,
3. Additional sample volumes for MS/MSD analysis for water samples at a rate of one per 20 samples collected per requested laboratory analysis.

6.2 SAMPLE CONTAINERS, HOLD TIMES, AND PRESERVATION

Table 7 summarizes the sample containers, preservation, and holding times required for each analytical method by which samples will be collected.

Table 7 Sample Containers, Preservation, and Hold Times

Analytical Parameter	Analytical Method	Holding Time (days)	Containers	Preservation
BTEX (water)	EPA 8260D	14	3 x 40 mL VOA vials	pH<2, HCl; Cool to 0-6˚C
TAH	EPA 624 / 602	14	3 x 40 mL VOA vials	pH 4-5, HCl; Cool to 0-6˚C
TAqH	EPA 625	7	2x 250 mL amber glass	Cool to 0-6˚C
Alkalinity	SM 21 2320B	14	1 x 125 mL HDPE	Cool to 0-6˚C
Sulfate	EPA Method SW9056A	28		Cool to 0-6˚C
Nitrate / Nitrite	SM 21 4500NO3-F	28	1 x 60 mL mL HDPE	pH<2, H2SO4; Cool to 0-6˚C
Methane	EPA Method RSK 175	14	3 x 40 mL VOA vials	pH<2, HCl; Cool to 0-6˚C
Dissolved Iron	EPA Method 200.8	180	1 x 125 mL HDPE	Field filtered; pH<2, HNO3; Cool to 0-6˚C

6.3 FIELD DOCUMENTATION

Field documentation will include sample identification labels, photographs, laboratory analysis requests, and permanently bound field logs. A field logbook will be maintained by the field team lead to record a detailed description of all field activities and samples collected.

6.4 SAMPLE LABELING

Each sample container will be sealed and labeled immediately after collection. Sample labels will be completed using waterproof ink and will be affixed firmly to the sample containers. A sample code will be assigned to each sample as an identification number to track collected samples. The sample label will provide the following information: sample identification number; date and time of collection; analysis required; and preservation method used. Field duplicate samples will be submitted as blind duplicates – that is they will be consecutively numbered and will not be identified on the chain-of-custody (CoC) as being duplicates (but the fact that they are duplicates will be recorded in the field logbook).

6.5 CHAIN-OF-CUSTODY AND SAMPLE PACKAGING

A CoC record will be completed and shipped with the samples. Proper sample custody is maintained through adherence to the procedures listed below:

1. If the samples are not hand delivered, a minimum of one custody seal will be placed over the lid/cooler edge and secured with clear packaging tape.
2. A CoC record must accompany the coolers in which the samples are packed. When transferring samples, the individuals relinquishing and receiving the coolers must sign, date, and note the time on the CoC record. This record documents sample custody transfer.

Samples must be packaged carefully to avoid breakage or contamination and must be shipped to the laboratory at proper temperatures. Adherence to the following sample package requirements is essential:

1. Sample container lids must never be mixed. All lids must remain with their original container.
2. Environmental samples must be cooled to 0 to 6 ˚C and packed to maintain this temperate to preserve many chemical constituents. All coolers will contain a temperature blank that the laboratory will use to document sample temperatures.
3. Any remaining space in the cooler should be filled with inert packing material.

6.6 DATA REDUCTION, VALIDATION AND REPORTING

Validation and review of all analytical data will be performed by a qualified professional experienced in data validation and review procedures. All data will be validated and reviewed in accordance with appropriate EPA procedural guidance documents and ADEC regulatory guidance documents. The reference documents include *EPA Functional Guidelines for Organic Data Review* (EPA 2008), and ADEC *Guidelines for Data Reporting* (ADEC 2022c).

7.0 INVESTIGATION DERIVED WASTE MANAGEMENT

Investigation-derived waste may include well purge water from water sampling, personal protective equipment (PPE) such as nitrile gloves, and dedicated sampling equipment including polyethylene bailers, peristaltic pump tubing, and paper towels.

7.1 WELL PURGE WATER

All well purge water will be collected in 5-gallon buckets that will be transported, labeled, and stored inside of the P&S Yard groundwater treatment system trailer until laboratory analytical results are received. If analytical results indicate that concentrations of BTEX is below ADEC cleanup levels the water will be disposed of as non-regulated water. If BTEX concentrations exceed ADEC cleanup levels, then the water will be transported and disposed of in the skim pit at the 1-33 transfer station.

7.2 PERSONAL PROTECTIVE EQUIPMENT & DEDICATED SAMPLING EQUIPMENT

Personal protective equipment such as nitrile gloves and dedicated sampling equipment, including tubing and paper towels used to decontaminate the oil-water interface probe, will be disposed with general solid waste at Plant 10 for disposal at the Kenai Peninsula Borough Landfill.

8.0 REFERENCES

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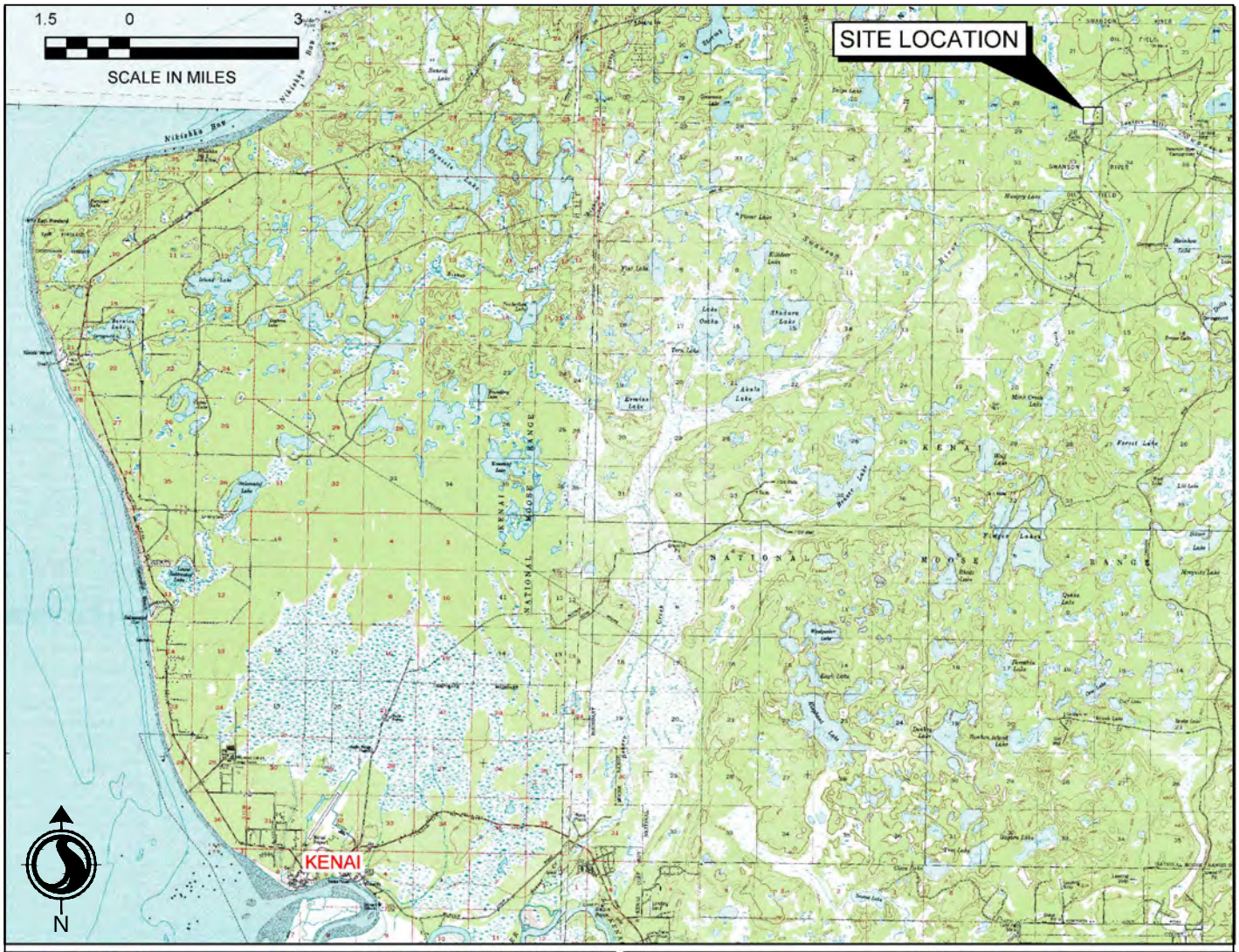
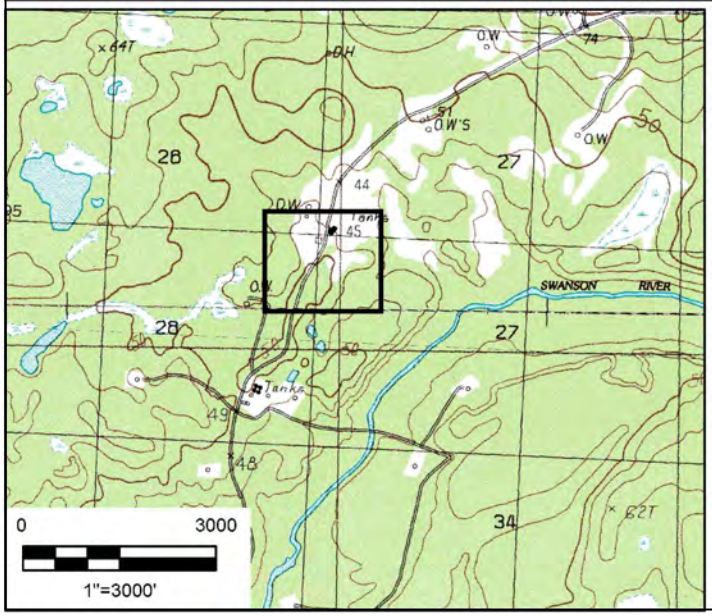
FIGURES

Figures

Figure 1 Site Location Map

Figure 2 Site Features & Groundwater Sample Locations





Stantec

FOR:
CHEVRON ENVIRONMENTAL MANAGEMENT AND REAL ESTATE COMPANY
P&S YARD, SWANSON RIVER FIELD
STERLING, ALASKA

SITE LOCATION MAP

FIGURE: 1

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
203721236	JO			

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EXISTING BURIED PIPELINE
SLURRY WALL (2005)
SLURRY WALL (2002)
MW-3
MW-2
AS-1
AS-2
AS-2R
TW-1
AS-3
AS-4
TW-17
AS VAULT #1
SHEET PILE WALL
AS-5
AS-6
AS-6R
TW-2
AS-7
MW-1
TW-18D
TW-18S
TW-6D
TW-6
AS-8
AS-9
AIR SPARGE TRAILER
AIR SPARGE LINE
AS-10R
AS-10
TW-3
AS-11R
AS-11
TW -19D
TW-19S
AS VAULT #2
AS-12
AS-13
AS-14
TW-9
TW-22
TW-20
TW-24
TW-8
TW-7
TW-7D
TW-21
TW-23
TW-25
TW-26
TW-5
LOWER VAULT
PSW-1
TW-4R
PSW-2
TW-11
TW-12
W-4
W-5
W-1
FSS-3
FSS-2
W-8
W-1P
FSS-1
TW-13
W-1E
W-6
TW-15
W-7
TW-14
TW-16
W-3A
LOCATION OF W-3 ~677' TO THE SOUTHEAST
TW-10
CONEX TRAILER
NEW GTS TRAILER
MW-141 (MW-X)

LEGEND

- MW1 — EXISTING MONITORING WELL
- TW-3 — TEMPORARY WELL (2014)
- TW-7 — TEMPORARY WELL (2016)
- TW-17 — TEMPORARY WELL (2018)
- TW-6D — TEMPORARY WELL (2020)
- TW-12 — ABANDONED TEMPORARY WELL
- W-4 — SURFACE WATER SAMPLE LOCATION
- W-1P — GROUNDWATER WELL COMPLIANCE POINT
- W-1 — HISTORIC SURFACE WATER SAMPLE LOCATION
- AS-13 — AIR SPARGE WELL

- SLURRY WALL (2002)
- SLURRY WALL (2005)
- SHEET PILE WALL
- AIR SPARGE LINE
- AIR SPARGE TRENCH WATER RETURN LINE
- EXISTING BURIED PIPELINE

N

0 80 160

APPROXIMATE SCALE IN FEET

IMAGERY REFERENCE:
GOOGLE EARTH IMAGE, JULY 2018

Stantec

FOR:
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
P&S YARD, SWANSON RIVER FIELD
STERLING, ALASKA

SITE FEATURES & GROUNDWATER SAMPLE LOCATIONS

FIGURE: 2

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
203721236	JO			

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