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June 15, 2021

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 Unit, P&S Yard –** 2021 Work Plan
**Swanson River Unit**
**Sterling, Alaska**
**ADEC File Number: 2334.38.017**
**ADEC Hazard Identification Number: 452**

Dear Mr. Campbell:

Please find enclosed for your files a copy of the *Work Plan for 2021 Activities at Swanson River Field Pipe and Supply Yard,* Swanson River Unit, Sterling, Alaska. 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 Tom Madsen (801 743-4924) with Stantec or myself at 925-493-9858/SLathrop@chevron.com should you have any questions

Respectfully,

**Chevron Environmental Management Company**
**on behalf of**
**Chevron U.S.A. Inc.**

Shelby Lathrop
Operations Lead W

# 2021 Work Plan

Work Plan for 2021 Activities at Swanson River Field Pipe and Supply Yard

June 8, 2021

Prepared for:

Chevron Environmental Management Company

Prepared by:

Stantec Consulting Services, Inc.
725 East Fireweed Lane, Suite 200
Anchorage, AK  99503-2245

ADEC File Number: 2334.38.017
ADEC Hazard ID Number: 452

| Revision | Description | Author | | Quality Check | | Independent Review | |
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| 0 | Draft | CHW | 6/4/2021 | THM | 6/8/2021 | BL | 6/9/2021 |
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Prepared by ______________________________________
(signature)

**Craig Wilson**

Reviewed by ______________________________________
(signature)

**Brent Lucyk**

Approved 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 | Alaska Statutes |
| 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 |
| EM | electromagnetic |
| Fe | iron |
| FOC | fractional organic carbon |
| GPR | Ground penetrating radar |
| GPS | Global Positioning System |
| GTS | groundwater treatment system |
| HASP | Health and Safety Plan |
| HHS | heated head space |
| Hilcorp | Hilcorp Alaska, LLC |
| LOQ | limit of quantitation |
| mg/kg | milligram per kilogram |
| mg/L | milligram per liter |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| NA | not applicable |
| ND | non-detect |
| 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 |
| PVC | polyvinyl chloride |
| QAPP | Quality Assurance Program Plan |
| QC | quality control |
| SRF | Swanson River Field |
| Stantec | Stantec Consulting Services Inc. |
| SW | Solid Waste |
| TAH | total aromatic hydrocarbons |
| TAqH | total aqueous hydrocarbons |
| UOCC | Union Oil Company of California |
| USEPA | United States Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |
| µg/L | micrograms per liter |

# 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 2020a) 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* (ADEC 2019) and relevant industry standards.

## 1.1 PROJECT OBJECTIVES

The 2021 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 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. Conduct additional soil sampling in the wetlands area to determine the concentration of contaminants in the peat layer and to inform decisions involving future remediation of the wetlands area.
3. Continue operations and maintenance activities on the air sparge system located on site.
4. Remove surplus equipment and debris from the project site.
5. 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 |
|---|---|
| Tom Madsen, PE<br>Project Manager | Manages and oversees project scope, schedule, and budget. Supports project technical lead in project design, sample collection, and scientific approach. |
| Michael Zidek<br>Managing Principal | Manages resources and supports project technical lead in review of deliverables, project design, sample collection, and scientific approach, and coordinates field team members to ensure that field goals are being met. |
| Craig Wilson<br>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. |
| Roxanne Russell, PE<br>Project Engineering Lead | 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. |
| Austin Badger, EIT<br>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. |
| John Marshall<br>Project Staff and Site Safety Officer | 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 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. |

### 1.2.2 Project Schedule

**Table 2** presents the proposed project schedule for 2021 activities.

**Table 2 Proposed 2021 Project Schedule**

| Month | Activity |
|---|---|
| March – November | Monthly O&M of air sparge system and sampling of monitoring wells TW-1, TW-2, and TW-3 |
| July | OBC groundwater monitoring and sampling |
| September | OBC groundwater monitoring and sampling<br>Soil sampling in the wetlands area east of the project site (hand boring) |
| November | OBC groundwater sampling<br>Soil sampling in the wetlands area east of the project site (direct push) |

# 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).

## 2.3 SUMMARY OF PAST FIELD EFFORTS

A xylene release was discovered in 1988 at the P&S Yard, originating from an aboveground 1,000-barrel storage tank located 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). The OBC amendment 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).

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Site Description and Background

Several remedial technologies utilized in the 1990s are summarized in the 1998 Site Summary Report compiled by GeoEngineers for UOCC (GeoEngineers 1998). Soil remediation consisting of excavation, soil screening, landfarming and backfilling began in 2010 and concluded in 2016. These remediation activities are 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). Concurrent with remediation activities, subsurface soil and groundwater investigations filled data gaps and guided remediation efforts. Details regarding subsurface investigation results are summarized in three reports (AECOM 2013; AECOM 2014b; and AECOM 2017). In addition, a complete 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).

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.

To contain the contaminant plume and control groundwater inflow, a soil-bentonite slurry wall was installed around the perimeter of the P&S Yard site in 2002, and a second slurry and sheet pile wall located adjacent to and just east of Swanson River Road was installed in 2005 (**Figure 2**).

Groundwater analytical results from direct-push temporary well points installed in Swanson River Road during the 2013 subsurface investigation activities indicated that total xylene concentrations ranged from 0.026 milligrams per liter (mg/L) to 99.7 mg/L and ethylbenzene from 0.008 mg/L to 32.9 mg/L. Benzene was not detected above the laboratory reporting limits in the groundwater samples collected during the assessment (AECOM 2013).

In 2014, three soil borings were drilled and completed as temporary wells between Swanson River Road and the 2005 slurry/sheet pile wall to more accurately delineate xylene-impacted soil and groundwater encountered in that area, as reported in the *2013 Subsurface Investigation Report* (AECOM 2013). The 2014 investigation and total xylene analytical results from the soil borings drilled immediately east of Swanson River Road indicated that soil between 4.5 and 8.5 feet bgs (at SB 5 completed as TW-2 and SB-6 completed as TW-3) exceeded the interim soil cleanup level for total xylene (AECOM 2014b). Groundwater was encountered between 3 and 4 feet bgs in this area, and analytical results in 2014 from temporary monitoring wells (TW-1, TW-2, and TW-3), located immediately east of the Swanson River Road, indicated that total dissolved-phase xylene concentrations ranged from 20.3 mg/L to 45.5 mg/L.

A multiyear remedial effort consisting of excavation, soil screening, landfarming, and backfilling of xylene-impacted soil from within the 2002 slurry wall (i.e., previously remediated area) was conducted from 2010 through 2016. Landfarming technology was accomplished via excavating xylene-impacted soil down to the aquitard. Soil was stockpiled and mechanically screened utilizing a screening plant to remove rocks larger than ¾ inches in diameter. Rocks exceeding ¾ inches in diameter were later used as backfill at the bottom of the excavation above the aquitard. The screened material less than ¾ inches was stockpiled and staged for landfarming. Landfarming operations were conducted daily in the summer months with weather permitting, utilizing a spader deployed from a farm tractor. After soil screening and laboratory sample analytical results indicated that landfarm soil did not exceed soil screening levels, remediated soil was backfilled into the excavation moving west to east. Active soil remediation consisting of excavating, excavation dewatering, soil screening, and landfarming was completed at the conclusion of the 2015 field season. The landfarm excavation backfilling and final landfarm surface grading were completed in 2016.

The results of the 2005, 2013, and 2014 assessment activities indicated that xylene-impacted soil and groundwater existed along the eastern portion of Swanson River Road. Due to various health and safety risks, logistical challenges of closing Swanson River Road, and engineering limitations, excavation was eliminated as a potential remedial alternative for this area. In-situ air sparging was selected as a viable remedial technology. Data collected from a 1996 air sparge pilot test conducted at the site, along with the boring logs from the 2013 and 2014 subsurface investigations, indicated lithological conditions conducive to successful remediation of soil and groundwater by in-situ air sparging (GeoEngineers 1996; AECOM 2014a and 2014b). Regulatory approval for air sparging was obtained in 2014.

An air sparge 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). The air sparge network was operated from November 2015 to November 2016. It was restarted in 2018 and operated until it had a compressor failure in 2019.

In 2016, AECOM installed a total of 12 temporary wells to enhance the post-remediation groundwater monitoring well network. Six temporary wells (TW-11 through TW-16) on the eastern end of the site and in the wetlands were installed during February 2016 when the wetland was frozen and could support a drill rig without causing damage to the wetland surface. The remaining six temporary wells within and around the previously remediated area (TW-4R, TW-6 through TW-10) were installed in June 2016. Four additional wells were drilled and completed as air sparge replacement wells in June 2016 (AS-2R, AS-6R, AS-10R, and AS-11R) with ADEC approval to replace four air sparge wells that had lost their seals (AS-2, AS-6, AS-10, and AS-11, respectively). **Figure 2** shows site features, slurry walls, remediation components and historic sample locations.

Twice yearly groundwater and wetland monitoring has been performed at the site since June 2016. Analytical results 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).

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 to facilitate monitoring of potentially petroleum hydrocarbon-impacted groundwater immediately downgradient of the AS system. 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 deeper well of the nested pairs were constructed so they could be potentially converted to AS wells, if needed. The temporary piezometers provided data regarding the lateral extent of xylene in groundwater in the area outside and to the east of the 2002 slurry wall between TW-13 and W-1P.

The air sparging system was reactivated in 2018 with modified programming to vary the on-off cycles of each air sparge well to optimize xylene attenuation. Past analytical results from TW-1, TW-2 and TW-3 indicated that the air sparge system was effectively reducing xylene concentrations between the slurry walls. In early 2019, equipment issues with the system compressor forced a shutdown of the system. A new air compressor was installed in August 2019 and the air sparge system was restarted in October 2019, using the same pulsed operation schedule that was used from September 2018 until March 2019 when the system went offline for repair. The air sparge system continued operation until May 21, 2020 when it was turned off to measure contaminant rebound. The system was restarted on September 9, 2020 and operated until December 9, 2020 when it was turned off for the winter season.

Nine additional monitoring wells were installed within the 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.

## 2.4 CONTAMINANTS OF POTENTIAL CONCERN

**Table 3** lists the known site contaminants addressed in this work plan and the cleanup levels specified in the OBC. Groundwater and soil cleanup levels for the site are specified in the OBC, except that the wetland area must meet ADEC water quality standards (ADEC 2020b).

### 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 |

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

The OBC (USFWS 1991) requires sampling for benzene but does not list a groundwater cleanup level. Benzene monitoring levels will be compared to ADEC groundwater cleanup levels (ADEC 2018) for reference purposes only.

## 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 in with in the slurry wall boundaries east of the AS system.

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. Future activities, determined by the results of the wetlands soil sampling, are anticipated to include remediation of xylene impacted peats in the wetland area.

### 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 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 July 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 in July and September using the procedures described in Section 6.3. 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) or wetlands soil sampling (Section 5).

### Table 4 Groundwater Sampling Locations and Schedule

| Sample Identification | Location | Sampling Frequency | Analysis |
|---|---|---|---|
| MW-1 | Western side of previously remediated area (PRA), outside of slurry wall, western side of Swanson River Road | Annual (July) | BTEX<br>Direct read dissolved oxygen (DO)<br>Geochemical parameters |
| TW-4R | Eastern side of PRA, inside of slurry wall | Semi-annual | BTEX<br>Direct read DO (July, September)<br>Geochemical parameters (September) |
| TW-5 | Eastern side of PRA, inside of slurry wall | Semi-annual | BTEX<br>Direct read DO |
| TW-6 | PRA area, inside of slurry wall | Semi-annual | BTEX<br>Direct read DO |
| TW-6D | PRA area, inside of slurry wall near TW-6 | Semi-annual | BTEX<br>Direct read DO |
| TW-7 | PRA area, inside of slurry wall, within excavation area, 160 feet east of sheet pile wall | Semi-annual | BTEX<br>Direct read DO |
| TW-7D | PRA area, inside of slurry wall near TW-7 | Semi-annual | BTEX<br>Direct read DO |
| TW-8 | PRA area, inside of slurry wall, within excavation area, 375 feet east of sheet pile wall | Semi-annual | BTEX<br>Direct read DO |
| TW-12 | Spruce forest outside of 2002 slurry wall on eastern side and downgradient of PRA area | NA | Well found damaged in October 2020 and abandoned in November 2020. |
| TW-13 | Spruce forest outside of 2002 slurry wall on eastern side and downgradient of PRA area | Semi-annual | BTEX[a]<br>Direct read DO (July, September)<br>Geochemical parameters (September) |
| TW-15 | Wetland area, southeast of TW-13 | Semi-annual | BTEX[a] |
| TW-16 | Wetland area, southeast of TW-15 | Semi-annual | BTEX[a] |

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Groundwater Sampling

| Sample Identification | Location | Sampling Frequency | Analysis |
|---|---|---|---|
| TW-17D | East of 2005 slurry wall, in PRA area, immediately downgradient of TW-1 | Semi-annual | BTEX<br>Direct read DO |
| TW-17S | East of 2005 slurry wall, in PRA area, immediately downgradient of TW-1 | Semi-annual | BTEX<br>Direct read DO |
| TW-18D | East of 2005 slurry wall, in PRA area, immediately downgradient of TW-2 | Semi-annual | BTEX<br>Direct read DO |
| TW-18S | East of 2005 slurry wall, in PRA area, immediately downgradient of TW-2 | Semi-annual | BTEX<br>Direct read DO |
| TW-19D | East of 2005 slurry wall, in PRA area, immediately downgradient of TW-3 | Semi-annual | BTEX<br>Direct read DO |
| TW-19S | East of 2005 slurry wall, in PRA area, immediately downgradient of TW-3 | Semi-annual | BTEX<br>Direct read DO |
| TW-20 | Equidistant between TW-6, TW-7, & TW-9 | Semi-annual | BTEX<br>Direct read DO |
| TW-21 | Approximately 100 feet northeast of GTS trailer | Semi-annual | BTEX<br>Direct read DO |
| TW-22 | Equidistant between TW-7, TW-8, & TW-9 | Semi-annual | BTEX<br>Direct read DO |
| TW-23 | Approximately 160 feet north of TW-10 | Semi-annual | BTEX<br>Direct read DO |
| TW-24 | Midway between TW-8 and TW-9 at limit of excavation | Semi-annual | BTEX<br>Direct read DO |
| TW-25 | Approximately 100 feet south of TW-8 | Semi-annual | BTEX<br>Direct read DO |
| TW-26 | In line with TW-8 & TW-4R, just east of 1992 interception trench | Semi-annual | BTEX<br>Direct read DO |
| W-1P | Wetland OBC compliance point | Semi-annual | BTEX (July, September)<br>Direct read DO (July, September)<br>Geochemical parameters (September)<br>TAH, TAqH (July, September) |
| 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 Identification | 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 2** 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 |

## 3.1 JULY 2021 GROUNDWATER MONITORING

The July 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 2021 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.

## 3.3 PIEZOMETER REMOVAL

The temporary piezometers installed in the wetlands to the east of the site in 2018 (PZ-1 through PZ-19) have been problematic for sampling in accordance with ADEC protocols due to low recharge rates and will be removed in 2021.

# 4.0 AIR SPARGE SYSTEM OPERATION & MAINTENANCE

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 on December 9, 2020. The system will be restarted for the 2021 season once the ground thaws sufficiently for system operation and will be operated until the ground freezes sufficiently to affect vaporization and diffusion of the sparged xylene.

## 4.1 MONTHLY MONITORING

Sampling of TW-1, TW-2, and TW-3 will occur during months when environmental conditions allow (**Table 5**). It is anticipated that sampling will occur March through December.

### Table 5 Air Sparge System Monitoring

| Sample Identification | Location | Sampling Frequency | Analysis |
|---|---|---|---|
| TW-1 | Western side of PRA, outside and immediately west of 2005 slurry wall, source area well | Monthly | 8260-BTEX |
| 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 2021 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. It is anticipated that the north end of the system will be run in a pulsed mode at low air flow volume to prevent groundwater mounding, while the south end will be pulsed at a greater frequency to maximize volatilization of contaminants. A remote monitoring system will be installed to allow remote auditing of system operation between monthly sampling events.

# 5.0 WETLANDS SOIL SAMPLING

Additional soil samples will be collected from the seep/wetlands area to the east of the slurry wall, in the vicinity of W-1 and W-1P, to further confirm the horizontal extent and evaluate the vertical delineation of the xylene impacted peats in the seep/wetlands area. This will be a continuation of the November 2020 sampling and will consist of hand borings in September and direct push borings in November (**Table 6**). Pending site freeze up, the direct push sampling will occur in November 2021 to take advantage of the low winter water table and frozen ground for access by a tracked drill rig. Proposed sampling locations for the November event are shown on **Figure 3**. The results of the sampling will be used to inform future decisions regarding remediation in that area.

Based on the previous extent of investigation in the seep/wetlands area and knowledge of past use of the area, site clearance of the upper 5 feet of the borings will not be required prior to direct push activities. Utility clearance procedures will be limited to a State-required one-call. A USFWS special use permit and a notice of intent to be covered under an Army Corps of Engineers national general permit will be required before field work begins.

**Table 6 Wetlands Soil Sampling**

| Sample Identification | Location | Sampling Frequency | Analysis |
|---|---|---|---|
| Wetlands | Soil samples from seep/wetlands area (6 locations) | Once (September) | 8260-BTEX |
| Wetlands | Soil samples from seep/wetlands area (14 locations) | Once (November) | 8260-BTEX<br>9060-FOC |

## 5.1 HAND BORINGS

If practicable, up to 6 locations will be sampled by hand during the September site visit to determine if contaminant levels in the wetlands during non-freezing conditions. Two samples, one mid-depth and one at the peat/silt interface, will be collected from each location where practical.

## 5.2 SOIL BORINGS

It is anticipated that up to 14 soil borings will be advanced by direct push during the November site visit, with the actual number being determined by field conditions (**Figure 3**). The borings will be advanced through the peat layer to the underlying sediment, anticipated to be 8 feet or less bgs, based upon 2005 probing of the area and the results from the November 2020 borings. Ten of the borings will be located to delineate the southern extents of the contamination and four borings will be in known uncontaminated locations. The borings in the uncontaminated locations will be analyzed for fractional organic carbon (FOC), the other locations will be analyzed for BTEX.

Borings will be advanced using a small GeoProbe® direct push rig, utilizing a Macro-Core® MC5 soil system for sample collection, or equivalent system. The MC5 system uses 2.25 inch outside diameter tooling. Two samples, one mid-depth and one at the peat/silt interface, will be collected from each location where practical. Any thawed peat is expected to collapse on itself after sampling. If boring holes do not collapse after sampling, they will be filled with local organic material mixed with sand and bentonite chips.

Section 6 of this work plan provides details of the soil sample collection and analytical methods associated with this activity.

# 6.0 SAMPLING PLAN

The 2021 sampling plan is designed to meet the following data quality objectives:

1. Monthly monitoring of wells TW-1, TW-2, and TW-3 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).
4. Soil sampling of the wetlands to the east of the site to evaluate xylene impacts in soil/peat (see Section 5 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. Four locations (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 July and September timeframes, and monthly sampling of the monitoring wells in the AS area (TW-1, TW-2, and TW-3) will be reduced during the winter season when environmental conditions preclude effective sampling.

Soil sampling in the wetlands area will be conducted in September and November. Up to six locations will be sampled for BTEX (EPA Method 8260D) in September. The November event will sample up to ten locations for BTEX (EPA Method 8260D) and four locations for fractional organic carbon (EPA Method 9060).

## 6.1 TARGET ANALYTES

**Table 7** provides a summary listing of the target analytes for the sampling events in this work plan.

## Table 7 Target Analytes by Location

| Location | Parameter / Method | Field Samples | Field Duplicates | Matrix Spike | Matrix Spike Duplicate | Trip Blanks |
|---|---|---|---|---|---|---|
| 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 | BTEX EPA 8260D | 57 | 6 | 4 | 4 | 2 |
| TW-1, TW-2, TW-3 | BTEX EPA 8260D | 30 | — | — | — | 10 |
| MW-1, TW-4R, TW-13, W-1P | Alkalinity SM21 2320B | 4 | — | — | — | — |
| MW-1, TW-4R, TW-13, W-1P | Direct Read Conductivity | 4 | — | — | — | — |
| MW-1, TW-4R, TW-13, W-1P | Direct Read pH | 4 | — | -- | -- | — |
| MW-1, TW-4R, TW-13, W-1P | Nitrate / Nitrite SM 21 4500NO3-F | 4 | — | — | --— | — |
| MW-1, TW-4R, TW-13, W-1P | Sulfate EPA Method SW9056A | 4 | — | --— | -- | — |
| MW-1, TW-4R, TW-13, W-1P | Methane EPA Method RSK 175 | 4 | — | — | — | — |
| MW-1, TW-4R, TW-13, W-1P | Dissolved Iron EPA Method 200.8, field filtered | 4 | — | — | — | — |
| MW-1, TW-1, TW-2, TW-3, 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 | Direct Read DO | 45 | — | — | — | — |
| Wetlands soil sampling (hand-core) | BTEX EPA 8260D | 12 | — | 1 | 1 | 1 |
| Wetlands soil sampling (direct push) | BTEX EPA 8260D | 24 | 3 | 2 | 2 | 2 |
| Wetlands soil sampling (direct push) | FOC (EPA 9060) | 8 | 1 | — | — | — |
| W-1P, W-1, W-1E, W-3, W-5, W-6, W-7, wetlands groundwater sampling | TAH EPA 624 | 14 | 2 | — | — | — |
| W-1P, W-1, W-1E, W-3, W-5, W-6, W-7, wetlands groundwater sampling | TAqH EPA 625M | 14 | 2 | — | — | — |

**Table 7** Notes:

BTEX benzene, toluene, ethylbenzene, and xylenes
DO dissolved oxygen
EPA U. S. Environmental Protection Agency
FSS Forest Seep Sample
PRA Previously Remediated Area
PSW Ponded Surface Water
TAH Total Aromatic Hydrocarbons
TAqH Total Aqueous Hydrocarbons
SM Standard Method
— not applicable

## 6.2 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.

## 6.3 SAMPLE COLLECTION METHODS

### 6.3.1 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.

### 6.3.2 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.

### 6.3.3 Soil

Field screened soil samples will be collected from direct push cores. Field screening will be conducted by partially filling (one-third to one-half) a re-sealable plastic bag with the soil and warming the sample soil to a minimum of 40 degrees Fahrenheit. Soils will be warmed for at least 10 minutes but no longer than 1 hour. The bag will be agitated for 15 seconds at the beginning and end of the headspace development period to assist volatilization. After headspace development, a PID will be used to measure relative organic vapors, and the result will be recorded on the soil boring logs.

Samples for laboratory analyses will be collected from the direct push cores. For each volatile soil sample, approximately 50 grams of soil was placed in a pre-tared, 4-ounce, amber-glass jar using a dedicated stainless-steel spoon and field-preserved in 25 milliliters of methanol. An additional unpreserved volume of soil will be collected with each volatile soil sample for percent-solid analysis. Sample containers will be immediately labeled and placed in a cooler with ice.

# 7.0 QUALITY ASSURANCE AND QUALITY CONTROL

## 7.1 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 8** on the following page 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.

## Table 8 Quality Control Requirements

| Sampling Event | Parameter | Primary Samples | QA/QC Samples | Total Number of Samples |
|---|---|---|---|---|
| Monthly AS System Monitoring (March-December) | BTEX | 3 | 1 Trip Blank | 4 per month, 40 total |
| July OBC Monitoring | BTEX | 29 | 3 Field Duplicates<br>1 Trip Blank<br>2 MS/MSD | 35 |
| | Nitrate / Nitrite | 2 | NA | 2 |
| | Dissolved (ferrous) Fe | 2 | NA | 2 |
| | Total Fe | 2 | NA | 2 |
| | Sulfate | 2 | NA | 2 |
| | Alkalinity | 2 | NA | 2 |
| | pH | 2 | NA | 2 |
| | Conductivity | 2 | NA | 2 |
| | Methane | 2 | NA | 2 |
| | Dissolved Oxygen | 13 | NA | 13 |
| | TAH | 7 | 1 Field Duplicate | 8 |
| | TAqH | 7 | 1 Field Duplicate | 8 |
| September OBC Monitoring | BTEX | 28 | 3 Field Duplicates<br>1 Trip Blank<br>2 MS/MSD | 34 |
| | Nitrate / Nitrite | 2 | NA | 2 |
| | Dissolved (ferrous) Fe | 2 | NA | 2 |
| | Total Fe | 2 | NA | 2 |
| | Sulfate | 2 | NA | 2 |
| | Alkalinity | 2 | NA | 2 |
| | pH | 2 | NA | 2 |
| | Conductivity | 2 | NA | 2 |
| | Methane | 2 | NA | 2 |
| | Dissolved Oxygen | 13 | NA | 2 |
| | TAH | 7 | 1 Field Duplicate | 8 |
| | TAqH | 7 | 1 Field Duplicate | 8 |
| September Soil Sampling | BTEX | 12 | 1 Trip Blank<br>1 MS/MSD | 14 |
| November Soil Sampling | BTEX | 24 | 3 Field Duplicates<br>1 Trip Blank<br>2 MS/MSD | 30 |
| | FOC | 8 | 1 Field Duplicate | 9 |

**Table 8** Notes: BTEX: Benzene, Toluene, Ethylbenzene, Xylene
Fe: Iron
MS/MSD: Matrix Spike / Matrix Spike Duplicate
NA: Not Applicable

## 7.2 SAMPLE CONTAINERS, HOLD TIMES, AND PRESERVATION

**Table 9** summarizes the sample containers, preservation, and holding times required for each analytical method by which samples will be collected.

### Table 9 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 |
| BTEX (soil) | EPA 8260D | 14 | 2x 250 mL amber glass | Methanol; 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 |
| FOC | EPA 9060 | 14 | 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 |

## 7.3 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.

## 7.4 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).

## 7.5 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.

## 7.6 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 Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling, Technical Memorandum* (ADEC 2017a).

# 8.0 INVESTIGATION DERIVED WASTE MANAGEMENT

Investigation-derived waste may include soil cuttings, 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.

## 8.1 SOIL CUTTINGS

Soil boring can potentially generate soil investigation-derived waste. Soil cuttings generated from the soil borings will be field screened as specified in ADEC guidance (ADEC 2019). Soil cuttings will be considered clean unless heated head space (HHS) screening exceeds the ADEC interim cleanup goal of 9.3 ppm. If HHS screening does not exceed 9.3 ppm, the soils will be placed back in the borehole from which they were generated. If soils are encountered that exhibit by elevated HHS results exceeding the 9.3 ppm HHS screening level, soil cuttings will be drummed in open-topped 55-gallon drums for off-site disposal at an ADEC approved waste disposal facility.

## 8.2 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.

## 8.3 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.

# 9.0 REMOVAL OF SURPLUS EQUIPMENT AND SUPPLIES

Over the course of the project surplus equipment and supplies have accumulated at the project site. Removal and disposal of the accumulated equipment and supplies that are no longer useful to the project has been an ongoing activity that will continue through 2021.

# 10.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2017a. *Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling, Technical Memorandum.* March.

ADEC. 2017b. *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites*. March 7, 2017.

ADEC. 2018. *18 AAC 75, Oil and Other Hazardous Substances Pollution Control*. As amended through October 27, 2018.

ADEC. 2019. Division of Spill Prevention and Response, Contaminated Sites Program, *Field Sampling Guidance.* October.

ADEC. 2020a. Title 18, Alaska Administrative Code Chapter 70 (18 AAC 70), Water Quality Standards. As amended through March 5.

ADEC. 2020b. *18 AAC 75, Oil and Other Hazardous Substances Pollution Control*. As amended through November 7, 2020.

AECOM. 2013. *2013 Subsurface Investigation Report, Pipe and Supply Yard, Swanson River Field, Alaska*. December.

AECOM. 2014a. *2013 Remediation Report, Pipe and Supply Yard, Swanson River Field, Sterling, Alaska*. February.

AECOM. 2014b. *2014 Subsurface Investigation Report, Pipe and Supply Yard, Swanson River Field, Alaska*. August.

AECOM. 2015a. *2014 Final Remediation Report, Pipe and Supply Yard, Swanson River Field, Sterling, Alaska*. March.

AECOM. 2015b. *2015 Remediation Work Plan, Pipe and Supply Yard, Swanson River Field, Sterling, Alaska*. March.

AECOM. 2015c. *Air Sparge Well Installation Report, Pipe and Supply Yard, Swanson River Field, Sterling, Alaska*. October.

AECOM. 2015d. *Groundwater Monitoring Program, Pipe and Supply Yard, Swanson River Field, Sterling, Alaska*. December 15.

AECOM. 2016. *2015 Remediation Report, Pipe and Supply Yard, Swanson River Field, Sterling, Alaska*. June.

References

AECOM. 2017. *Addendum to the 2017 Groundwater and Wetland Monitoring Work Plan, Pipe and Supply Yard, Swanson River Field, Sterling, Alaska*. November 29.

GeoEngineers. 1996. *Air Sparge Pilot and Respiration Testing, Unocal P&S Yard, Swanson River Oilfield, Alaska*. August 5.

GeoEngineers. 1998. *Site Summary Report, Pipe and Supply Yard, Swanson River Oilfield, Alaska*. June 9.

OilRisk Consultants (OilRisk). 1999. *1999 Annual Report: P&S Yard Soil Remediation*. December.

OilRisk Consultants (OilRisk). 2008. *2007 Groundwater Monitoring Report, P&S Yard, Swanson River Field*. June.

OilRisk Consultants (OilRisk). 2010*. Interim Soil Cleanup Level Analysis, P&S Yard, Swanson River Field*. March.

Stantec. 2021. *2020 Annual Report: Swanson River P&S Yard.* June

United States Environmental Protection Agency (USEPA). 1996. *Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures*. April.

USEPA. 2008. *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 540/R-94/012).

U. S. Fish & Wildlife Service (USFWS). 1991. *Addendum to Amendment Number Five to the Order by Consent Mitigation Plan – Swanson River Oil Field, Kenai National Wildlife Refuge.* March 22.

Weston Solutions, Coffman Engineers and OilRisk Consultants. 2011a. *2010 Remediation Report, P&S Yard, Swanson River Field*. March.

Weston Solutions, Coffman Engineers and OilRisk Consultants. 2011b. *2011 Remediation Report, P&S Yard Xylene Site, Swanson River Field*. December.

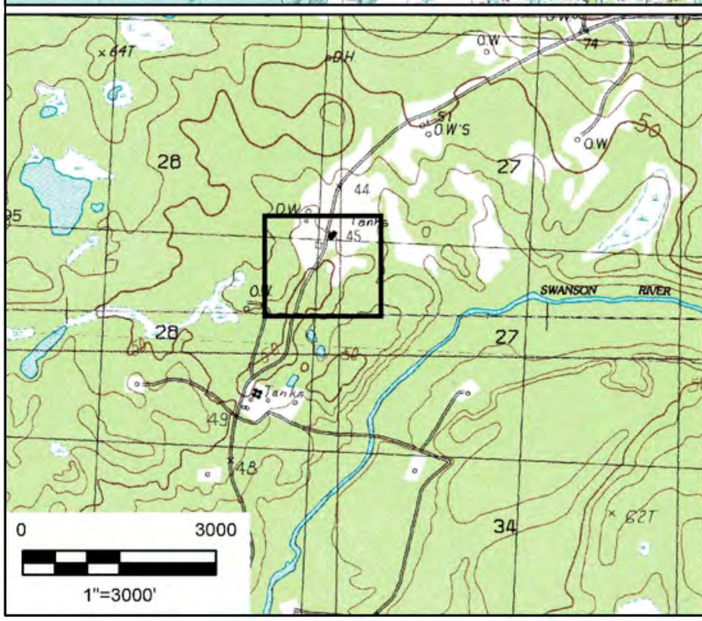
Weston Solutions and Coffman Engineers. 2013. *2012 Remediation Report, P&S Yard Xylene Site, Swanson River Field*. January.

# FIGURES

**Figure 1 Site Location Map**

**Figure 2 Site Features & Groundwater Sample Locations**

**Figure 3 Wetland Soil Sampling**



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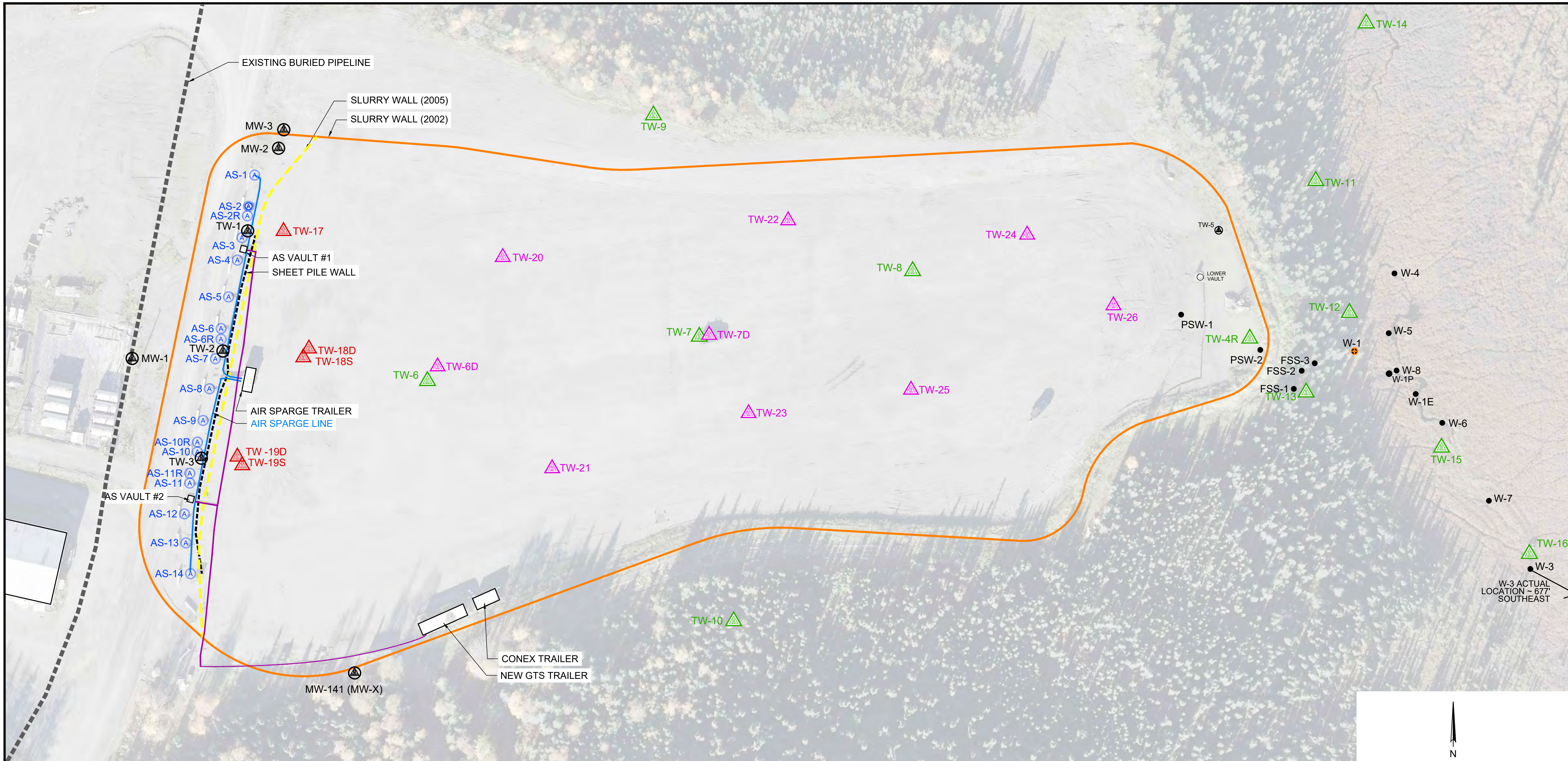
FOR:
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
P&S YARD, SWANSON RIVER FIELD
STERLING, ALASKA

SITE LOCATION MAP

FIGURE: 1

| JOB NUMBER: | DRAWN BY: | CHECKED BY: | APPROVED BY: | DATE: |
|---|---|---|---|---|
| 203721236 | JRO | AS | TM | 07/23/19 |

FILEPATH:V:\1826\resource\AutoCAD\other_offices\salt_lake_ut\203721236_swanson\figures\dwg_203721236_swanson_2019.dwg | JOpalekOpsahl | Jul 23, 2019 at 10:20 | Layout: fig1_slm




## 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) |
| W-4 | SURFACE WATER SAMPLE LOCATION |
| W-1P | GROUNDWATER SEEP SAMPLE LOCATION |
| W-1 | HISTORIC SURFACE WATER SAMPLE LOCATION |
| AS-13 | AIR SPARGE WELL |

| | |
|---|---|
| orange solid line | SLURRY WALL (2002) |
| yellow dashed line | SLURRY WALL (2005) |
| black dashed line | SHEET PILE WALL |
| blue line | AIR SPARGE LINE |
| purple line | AIR SPARGE TRENCH WATER RETURN LINE |
| grey dashed line | EXISTING BURIED PIPELINE |



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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 | EF | TM | 02/19/2021 |

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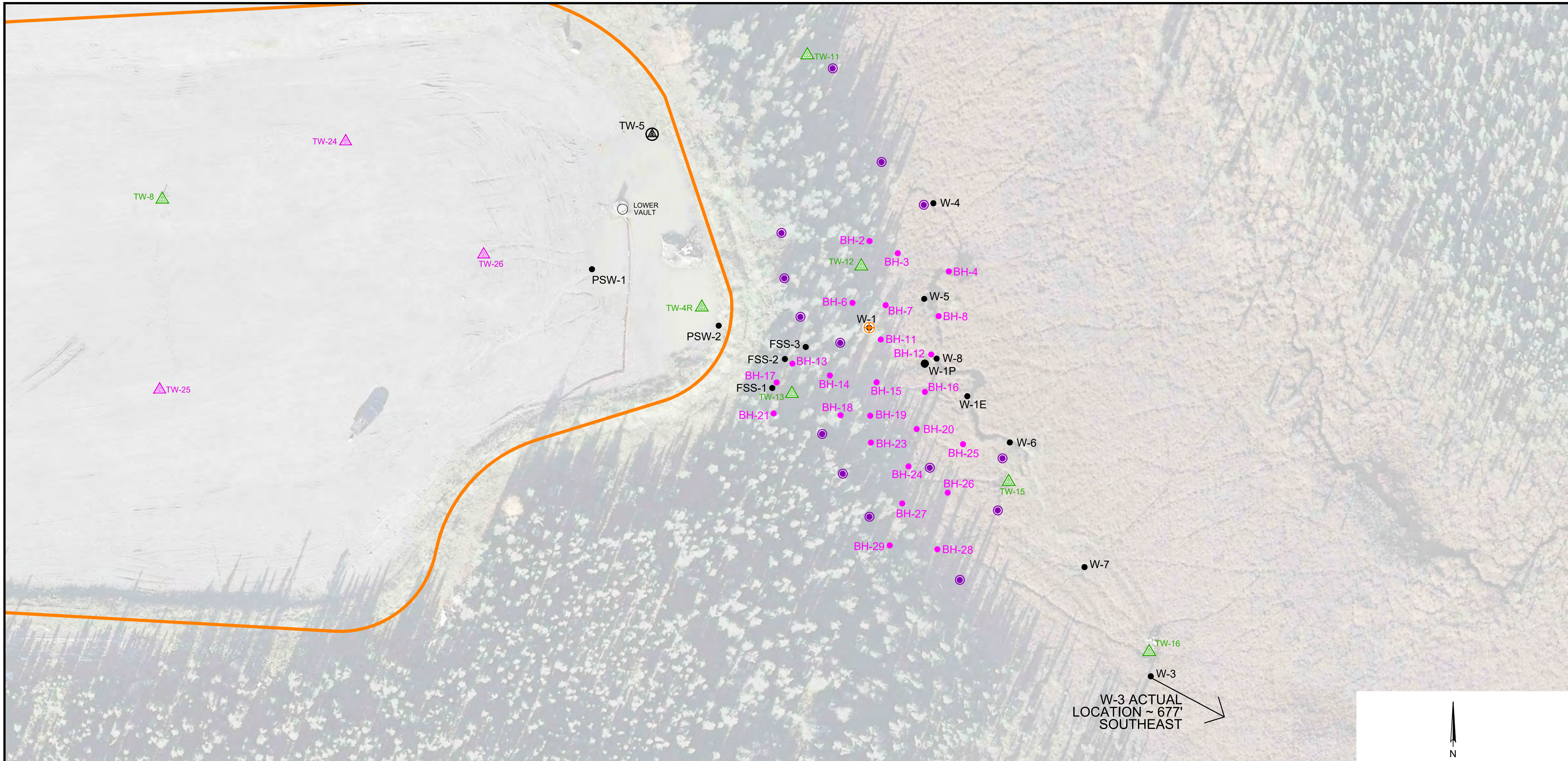


0 50 100

APPROXIMATE SCALE IN FEET

## 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)
- W-4 SURFACE WATER SAMPLE LOCATION
- BH-2 WETLAND SOIL SAMPLE LOCATION (2020)
- PROPOSED WETLAND SOIL SAMPLE LOCATION (2021)
- W-1P GROUNDWATER SEEP SAMPLE LOCATION
- W-1 HISTORIC SURFACE WATER SAMPLE LOCATION
- AS-13 AIR SPARGE WELL



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P&S YARD, SWANSON RIVER FIELD
STERLING, ALASKA

WETLAND SOIL SAMPLING

FIGURE: 3

| JOB NUMBER: | DRAWN BY: | CHECKED BY: | APPROVED BY: | DATE: |
|---|---|---|---|---|
| 203721236 | JO | EF | TM | 02/19/2021 |

FILEPATH:\\US0395-PPFSS01\Shared_Projects\203721236\03_data\gis_cad\AutoCAD\dwg_203721236_annual_2020.dwg|JOpalekOpsahl|Jun 07, 2021 at 13:43|Layout: fig3_wetland-soil