BIOSPARGE PILOT STUDY

1987 HOT OIL PIPELINE RELEASE

WORK PLAN

REVISION 2

February 17, 2022

Project #: 39B-003-008

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List of Abbreviations and Acronyms

ADEC	Alaska Department of Environmental Conservation
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylenes
CO_2	carbon dioxide
Conoco	Conoco Philips
DO	dissolved oxygen
DRO	diesel range organics
GRO	gasoline range organics
HASP	Health and Safety Plan
IDW	investigation derived waste
JSA	job safety assessments
KLNG	Kenai LNG LLC's Liquified Natural Gas Plant
ORP	oxidation-reduction potential
mL/min	milliliters per minute
NSZD	natural source-zone depletion
PID	photoionization detector
ppm	parts per million
PRM	Phillips remedial measure
PVC	polyvinyl chloride
Tesoro	Tesoro Alaska Company
Trihydro	Trihydro Corporation
USCS	Unified Soil Classification System

1.0 INTRODUCTION

On behalf of Tesoro Alaska Company, LLC (Tesoro), a subsidiary of Marathon Petroleum, Trihydro has prepared this work plan for a biosparge pilot study (pilot study) to enhance natural source-zone depletion (NSZD) of the 1987 Hot Oil Pipeline Release (release), and subsequent light, non-aqueous phase liquids (LNAPL) sheen occurring at the beach bluff along Cook Inlet (Beach Seep). The work plan details biosparge well installation, startup, and operation details; outlines the plan for pilot study effectiveness monitoring; and presents the plan for evaluating NSZD in impacted groundwater.

The pilot study goal is to evaluate the feasibility of using biosparge technology to reduce the risk of beach sheen. The proposed biosparge well will be utilized to increase oxygen content in groundwater to enhance biodegradation and reduce contaminant flux towards the beach.

2.0 BACKGROUND

The 1987 release location is near the western border of the Kenai LNG LLC's Liquified Natural Gas (KLNG) Plant (formerly owned by Conoco Phillips), along the bluff adjacent to the Cook Inlet beach. The Beach Seep is located slightly north of the release point (Figure 1). The pilot study will be completed as part of the site corrective measures (RCRA Post-Closure Permit No. AKD 04867 9682) and as recommended in the Updated Conceptual Site Model and Remedial Alternatives Evaluation for the 1987 Hot Oil Pipeline Release revision 2.

For the purpose of the pilot test, one biosparge well will be located north-west of the containment dike, along the bluff at the Kenai LNG Facility, previously Conoco Philips (Conoco) LNG Facility. Figures 1 and 2 show the proposed biosparge well location and design details. This work is tentatively scheduled for September/October 2021.
The pilot study will include drilling and construction of one biosparge well (BSB-01) and connection to an air compressor for pilot testing, installation a ground temperature thermistor string near the biosparge well, `and use of adjacent wells to monitor air and water gas changes, including oxygen and carbon dioxide (CO_2). Collection of groundwater samples for geo-chemistry will also be used to assess system effectiveness.

2.1 WELL INSTALLATION LOCATION

Planned biosparge well location is shown in Figure 1. Additional well summary information includes the following:

- BSB-01 will be located near the release area, adjacent to monitoring wells E-257A and E-257B. Bluff stability safety concerns limit installation of a well closer to the bluff face.
- BSB-01 will be screened above the clay layer, varying between 50 and 60 feet below ground surface (bgs).
- BSB-01 will be installed with the possibility of a second nested well in deeper water level if lithology suggests two potential areas that bio-sparging could be effective (Figure 2). An upper perched zone was found in E-257A but not in B-1, so field assessment will be made during drilling efforts to complete final well design. Figure 2 shows anticipated design.
- Vapor monitoring points BSV-01 through BSV-03 will be installed in locations shown on Figure 1 to help detect any vapor migration through the vadose zone and possible negative impact to ambient air from biosparge well operation. If it is determined vapor migration is causing impacts to ambient air, the remedial design will need to account for mitigating adverse impacts such as coupling biosparge with soil vapor extraction. Vapor point design is shown on Figure 2.

2.1.1 SURVEY

Horizontal coordinates (latitude and longitude / ASP North and ASP East), Tesoro plant coordinates (Northing and Easting), ground surface elevation, top of casing elevation, and polyvinyl chloride (PVC) casing elevation of the new biosparge well and vapor monitoring point locations will be surveyed in Spring of 2022.

2.2 BIOSPARGE OPERATION AND EFFECTIVENESS MONITORING

The proposed pilot test will consist of injection air into BSB-01 for a 24- to 48-hour period using a portable air compressor to provide low flow injection. Pressures needed to establish flow will likely be low (5 to 10 pounds per square inch [psi]), but variations in pressures and flows will be recorded and adjusted as needed during the test. If the pilot test is successful, full scale implementation would include connecting BSB-01 to the PRM air sparge system located to the west (Figure 2) for long term operation.

The proposed Pilot Study will assess short term biosparge effectiveness by comparing background data to data collected after system startup. Comparison information will then be used to assess impact of biosparge on NSZD rates and overall effectiveness.

Pilot study data will include collecting: 1) soil temperatures (biodegradation is an exothermic reaction resulting in the release of heat), 2) soil gas parameters (oxygen, carbon dioxide, and methane all provide an indication of microbial respiration and level of biodegradation), 3) groundwater field parameters (changes to temperature, dissolved oxygen, pH, oxygen reducing potential (ORP), and specific conductivity help assess any changed conditions when bio-sparging is introduced, 4) groundwater analytical data that compares impact of short term bio-sparging on hydrocarbon concentrations, and 5) PID levels from vapor monitoring points to assess possible ambient air impacts from bio-sparging. Detailed effectiveness monitoring detailed below and in Table 1.

Background monitoring will include the following steps prior to biosparge operation:

- Soil gas screening with multi-gas meter to measure oxygen, carbon dioxide, and methane in BSB-01, E-257A, E-257B, and B-1
- Soil vapor screening with a photoionization detector (PID) in BSV-01, BSV-02, and BSV-03. If any PID readings are measured over 10 parts per million (ppm), an analytical sample will be collected in a summa canister and analyzed for benzene, toluene, ethyl-benzene, xylenes (BTEX)
- Groundwater field screening parameters from E-257A, E-257B, BSB-01, and B-1 for temperature, pH, dissolved oxygen, ORP, and specific conductivity

- Analytical groundwater sampling from E-257A, E-257B, BSB-01, and B-1 for BTEX, gasoline-range organics (GRO), diesel range organics (DRO), and NSZD parameters (nitrate, sulfate, ferrous iron, manganese, methane, and dissolved oxygen)
- Temperature monitoring in BSB-01 and E-257-B using an array of sensors spaced every 5 feet up from the bottom of the well
- DO and dissolved CO2 monitoring using downhole probe or titration kits in B-1, BSB-01, E-257A, and E-257B

During operation of the biosparge well for 24 to 48 hours, monitoring will include the following:

- Soil gas screening with multi-gas meter to measure oxygen, carbon dioxide, and methane in E-257A, and E-257B
- Soil vapor screening with a photoionization detector (PID) in BSV-01, BSV-02, and BSV-03, and if PID readings are measured over 10 ppm, collection of analytical sample for BTEX

Immediately following operation of the biosparge well for 24 to 48 hours, monitoring will include the following:

- Soil gas screening with multi-gas meter to measure oxygen, carbon dioxide, and methane in E-257A, E-257B, and B-1
- Soil vapor screeding with a photoionization detector (PID) in BSV-01, BSV-02, and BSV-03, and if PID readings are measured over 10 ppm, collection of analytical sample for BTEX
- Groundwater field screening parameters from E-257A, E-257B, BSB-01, and B-1 for temperature, pH, dissolved ORP, and specific conductivity
- Analytical groundwater sampling from E-257A, E-257B, BSB-01, and B-1 for BTEX, gasoline-range organics (GRO), diesel range organics (DRO), and NSZD parameters (nitrate, sulfate, ferrous iron, manganese, methane, and dissolved oxygen)
- Temperature monitoring in BSB-01 and E-257-B using an array of sensors spaced every 5 feet up from the bottom of the well
- DO and dissolved CO2 monitoring using downhole probe or titration kits in BSB-01, E-257A, E-257B, E-258, and B-1

All data collected will be utilized to consider biosparge effectiveness, but the baseline evaluation will be the increase in saturated zone dissolved oxygen, and potentially a change in ORP from negative towards positive, indicating a shift to an aerobic environment compared to pretest conditions.

3.0 FIELD METHODOLOGY

3.1 WELL INSTALLATION ACTIVITIES

The installation of biosparge well BSB-01, BSV-01, BSV-02, and BSV-03 will be performed by Trihydro, accompanied by an applicable subcontracted drilling contractor.

3.1.1 PERMITTING / UTILITY CLEARANCE

Facility permits, subsurface utility locates, and site reconnaissance will be performed to identify any indications of subsurface-utilities and verify overhead utility clearance. The drilling location will be pre-cleared from 5- to 10-feet bgs using vacuum truck once utility locates and Refinery utility clearing measures are complete. Trihydro will utilize the existing site-specific Health and Safety Plan (HASP), available during onsite field activities. Additionally, job safety assessments (JSAs) for applicable tasks including hollow-stem auger drilling, direct push drilling, well installation and development, and equipment decontamination will be utilized for each task. JSAs will also be attached to daily permitting forms.

3.1.2 BIOSPARGE WELL AND VAPOR MONITORING POINT CONSTRUCTION

Figure 2 documents the well construction, vapor monitoring point construction, and connection details for BSB-01.

BSB-01, BSV-01, -02, and -03 will be constructed using 2-inch schedule 40 PVC casing, 2-inch schedule 40 PVC 0.010 slotted well screen, and a threaded PVC end cap. BSV-01, -02, and -03 will be installed directly in vacuum truck precleared holes, and BSB-01 will be installed with a drill rig according to details shown in Figure 2.

BSV vapor points will be installed with one-foot screens at a depth of 5 to 6 feet bgs. Vapor points will not be shallower than 5 feet bgs. The borehole will be filled with 10/20 silica sand from the bottom to approximately 0.5-feet above the top of the screen interval. Above the sand filter pack the annulus will be sealed with hydrated bentonite chips.

Biosparge well BSB-01 screen depth and length is dependent upon subsurface soils encountered during borehole soil logging and will be determined during well installation. The biosparge well is anticipated to be constructed using a five-foot screen set at a depth interval between approximately 60 and 70 feet bgs based on lithology of adjacent borings. Following installation, the borehole annulus will be filled with 10/20 Colorado silica sand from the bottom of the borehole to approximately 2-feet above the screened interval. A pel-plug seal will be created directly above the silica sand pack using ¼-inch TR30 bentonite pellets or bentonite grout slurry to the top of the water table, approximately 30 feet bgs. The remainder of the borehole annulus was sealed with mixture of bentonite chips and native soil cuttings.

The top of well casings will be completed above grade with compacted backfill, mounded to drain. The well construction diagram (Figure 2) includes borehole and well diameters, screen length, sand pack, screen slop, bentonite seal (pellets or chips) bentonite/cement grout, end plug, well completion details, and other important features of the well. If double screen section is used, alternating sand and bentonite pellets/grout and sand will be used.

3.1.3 DRILLING METHODS

BSB-01 will be installed by a subcontracted drilling contractor using a track mounted GeoProbe drilling rig and direct push drilling methods, hollow stem auger rig or approved equivalent. Soil classifications be completed throughout drill and will include lithologic descriptions of soil types using the Unified Soil Classification System (USCS). Particular attention will be paid to clay layers and any perched water layers. Borehole logging will be performed by a Trihydro geologist on relatively undisturbed soil samples. Samples will be collected in 5-foot intervals, using macro core sampling and/or split-spoon samplers. Heated headspace measurements will be collected using a PID. Analytical soil samples will be collected to confirm previous soil characterization completed at adjacent borings is similar to subsurface conditions at the biosparge well location. Soil samples will be collected at the capillary fringe of the perched water table and from the saturated zone of the underlying water table. Soil samples will be analyzed for GRO using Alaska Method AK101, DRO using Alaska Method AK102, and BTEX using EPA Method 8260C. In addition, excess soil from the cores collected from the screen interval will be submitted for grain size analysis using ASTM method D422/D4464M.

BSV-01, -02, and -03 will be installed using vacuum truck clearing methods and completed as shown on Figure 2.

3.1.4 WELL DEVELOPMENT

Following BSB-01 installation, the well will be developed using surging and pumping techniques in accordance with Alaska Department of Environmental Conservation (ADEC) Field Sampling Guidance (March 2016), to remove fine sediments from the filter pack and well interior. The well will be purged of at least three casing volumes. Following each purge step, the well will be surged with a suspended surge block. The well development will be completed when sediments are no longer observed in the extracted purge water. Purged water produced during development will be collected and disposed at the Refinery wastewater treatment system. Well development field logs will be provided along with groundwater field parameters including temperature, pH, ORP, and conductivity measurements recorded during well development.

3.1.5 DECONTAMINATION

Soil boring sample barrels and drill tooling will be decontaminated after each use. Hot (dry) or wet decontamination methods may be utilized.

3.2 WASTE MANAGEMENT

Soil investigation derived waste generated during well installation will be containerized (55-gallon drums) as directed by Trihydro staff based on field screening. Soil will be screened in accordance with the ADEC Field Sampling Guidance using a PID. Soil with heated head space PID readings above 15 parts per million (ppm) will be collected in 55-gallon drums, labeled, sealed, and stored on site. Soil screened below 15 ppm with the PID will be staged onsite to be used for backfilling and regrading.

3.3 WELL CONNECTIONS AND PILOT TEST DETAILS

Following BSB-01 well installation, appropriate fittings shall be installed to connect to test compressor (Figure 2). A compressor capable of at least 15 psi pressure and 1 cubic feet per minute flow will be staged on site with power from adjacent air sparge system. The pilot test will be started following the completion well installation and surface connection activities, and baseline monitoring. Biosparging will start in BSB-01 controlling flow with a ball valve on piping details and flows/pressures will be recorded for the duration of the test as changes occur or a minimum of every 3 hours during daylight hours. During this pilot test, air may be injected at higher pressures (5-10 PSI) than what would be typical for biosparging in order to more quickly evaluate increases in DO over a shorter time period. The test will be conducted for 24 to 48 hours depending on evaluation of data quality and trends during testing.

3.4 PILOT STUDY EFFECTIVENESS MONITORING

Following installation and development of BSB-01, baseline parameters shown in Table 1 will be collected from:

- Biosparge well BSB-01.
- Monitoring wells E-257A, E-257B, E-258, and B-1.
- Vapor monitoring points BSV-01, BSV-02, and BSV-03.

3.4.1 GROUNDWATER MONITORING PROCEDURES

Biosparge well BSB-01 and groundwater monitoring wells E-257A, E-257B, E-258, and B-1 will be monitoring as part of the pilot test event as outlined in Table 1. Monitoring wells will be gauged, and field measurements will be recorded. Field measurements will include temperature, specific conductance, DO, ORP, and pH. In addition, the field measurements will include dissolved CO_2 measurements before system startup and following pilot test. Field measurements will be collected using a flow-through cell to align with groundwater sampling procedures described below.

A tentative schedule of events is presented in Table 1. Monitoring wells will be gauged and sampled according to the Table 1 schedule. Prior to collecting samples, water levels will be gauged with an oil-interface probe. If product is measured during gauging, samples will not be collected from associated wells. Monitoring well samples will be collected in accordance with EPA Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers (EPA 2002).

Low-flow sampling techniques will be employed using a variable speed submersible pump, with the goal of maintaining drawdown of less than 0.3 feet and target purge rates between 50 and 500 milliliters per minute (mL/min). Wells will be purged until groundwater quality parameters stabilize or a minimum of three well volumes has been purged and samples will then be collected. Water quality parameters will be considered stable when three successive readings, collected 3-5 minutes apart are within:

- ± 3% for temperature (minimum of ± 0.2ºC)
- ± 0.1 for pH
- ± 3% for specific conductance
- ± 10 mv for redox potential
- ± 10% for dissolved oxygen
- ± 10% for turbidity (or less than or equal to 10 NTU)

Water quality parameters will be monitored and recorded until a minimum of three (minimum of four if using temperature as an indicator) of these parameters stabilize, indicating overall groundwater stability. The submersible pump will be set at the midpoint of the submersed screen interval. Groundwater samples will be submitted to SGS Environmental Services (SGS) laboratory for analyses of groundwater constituents provided in Table 1, with detailed analytical information provided in Table 2.

Purge water generated during sampling will be collected into 55-gallon drums, labeled, sealed, and stored on site. After containers reach capacity, Marathon will properly dispose of waste material.

3.4.2 TEMPERATURE PROFILE PROCEDURES

Temperature profile from wells shown in Table 1 will be collected and recorded monthly from September 2021 to December of 2022 in BSB-01 and E-257B. A single thermistor bead or a thermistor string (or approved equivalent) will be used to collect temperature profile readings by dropping thermistor(s) into selected wells to appropriate depth, wait for temperatures to equilibrate, and record information. Temperature intervals will be from approximately surface level and every 5-feet to the bottom of the well.

3.4.3 DISSOLVED OXYGEN AND CARBON DIOXIDE COLLECTION PROCEDURES

DO and CO_2 will be monitored using titration kits (CO_2), downhole data collection device, or handheld monitors. Probes will be lowered in wells outlined in Table 1 to approximately the sample depth of the pump for groundwater sampling and the data will be recorded. If collected from pump, data will be collected from flow through cell or a titration sampler.

3.4.4 VADOZE ZONE VAPOR MONITORING

Pre-, during, and post-pilot test, volatile organic compounds will be screened in vapor monitoring points BSV-01, -02, and -03 per Table 1 using a PID. As noted in Section 2.2, PID readings collected above 10 ppm from BSV wells will trigger collection of analytical air samples for BTEX analysis (summa cannisters).

3.5 SCHEDULE

The proposed schedule for 2021 well installation is:

- November 2021 – Schedule with Tesoro, KLNG, and subcontractors, complete safety and permitting requirements for drilling.
- November 2021 – Installation, development, and completion of biosparge pilot test.
- March 2022 – Submit well install report as part of Q22-1 Quarterly Report.
- February 2022 – Submit results of biosparge pilot test as part of Q22-1 Quarterly Report and make recommendations on full scale system.
- Spring 2022 – Implement full scale biosparge system if pilot test results suggest appropriate.

TABLES

TABLE 1. BEACH SEEP BIOSPARGE WELL PILOT STUDY EFFECTIVENESS MONITORING
TESORO ALASKA COMPANY
KENAI, ALASKA

Well ID	**Groundwater Field Screening** (temp., pH, DO, ORP, specific conductance) **and Analytical** (BTEX, GRO, DRO, NSZD)		**Temp Profile** (5 ft intervals length of well)		**Dissolved O_2 and CO_2****		**Soil Gas** (CO_2, O_2, and methane)			**Volitile Organics** (PID and BTEX**)		
	Pre-Pilot Test	**Post-Pilot Test**	**Pre-Pilot Test**	**Post-Pilot Test**	**Pre-Pilot Test**	**Post-Pilot Test**	**Pre-Pilot Test**	**During Pilot Test**	**Post-Pilot Test**	**Pre-Pilot Test**	**During Pilot Test**	**Post-Pilot Test**
BSB-01* Biosparge shallow screen	x	x	x	x	x	x	x	x	x	--	--	--
BSB-01* Biosparge deep screen	x	x	x	x	x	x	x	x	x	--	--	--
E-257A Treatment Zone	x	x	--	--	x	x	x	x	x	--	--	--
E-257B Treatment Zone	x	x	x	x	x	x	x	x	x	--	--	--
E-258 Background	x	--	--	--	x	x	x	x	x	--	--	--
B-1 Comparison	x	x	--	--	x	x	x	x	x	--	--	--
BSV-1 Monitor	--	--	--	--	--	--	x	x	x	x	x	x
BSV-2 Monitor	--	--	--	--	--	--	x	x	x	x	x	x
BSV-3 Monitor	--	--	--	--	--	--	x	x	x	x	x	x

Notes:

BTE benzene, toluene, ethylbenzene, xylene (Method 8260C)

GRO gasoline-range organics

DRO diesel-range organics

PID photoionization detector

NSZD natural source zone depletion parameters-nitrate, sulfate, ferrous iron, manganese, and methane

***** well not yet installed but could include shallow and deeper screened intervals; schedule assumes October 2021 Install/development

****** In addition to routine groundwater sample screening, pilot testing include DO and dissolved CO_2 monitoring using downhole probes or titration kits

ft feet

bgs below ground surface

Baseline prior to pilot test

TABLE 2. SUMMARY OF ANALYTICAL METHODS AND PARAMETERS
SAMPLING AND ANALYSIS PLAN

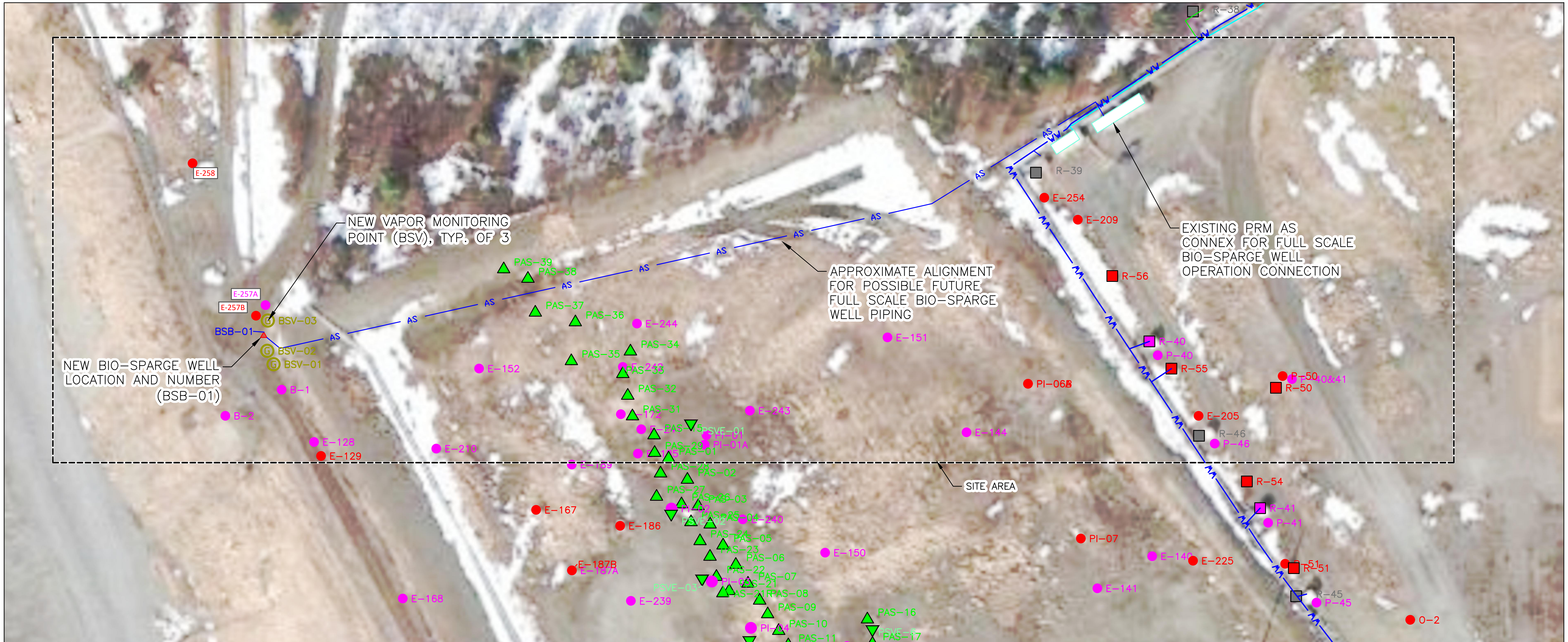
Parameter	Sample Medium	Analyte	CAS Number	ADEC Cleanup Level[1] (µg/L) - water (mg/kg) - soil	Analytical Method	Sample Container	Preservation	Holding Time	Other Notes
VOCs	Water	Benzene		4.6	SW 8260C	3x40 mL amber VOA vials w/ septa	HCl; 0-6° C	14 days	Allow no headspace; TB required
		Toluene	108-88-3	1,100					
		Ethylbenzene	100-41-4	15					
		P & M-Xylene	106-42-3 & 108-38-3	NA					
		o-Xylene	95-47-6	NA					
		Total Xylenes	1330-20-7	190					
Geochemical	Water	Dissolved Iron	NA	NA	SW 6020A	1x250 mL HDPE	HNO_3; 0-6° C	180 days	Field Filtered
		Dissolved Manganese	NA	NA	SW 6020A	1x250 mL HDPE	HNO_3; 0-6° C	180 days	Field Filtered Combine with Dissolved Iron
		Sulfate	NA	NA	EPA 300.0	1x60 mL Nalgene	0-6° C	28 days	
		Nitrate	NA	NA	SM 4500NO3-F	1x60 mL Nalgene	H_2SO_4;2-6°C	14 days	
		Methane	NA	NA	RSK 175 (Reference Lab)	3x40 mL amber VOA vials w/ septa	HCl; 0-6° C	14 days	Allow no headspace; TB required; separate voa set required
Gasoline Range Organics (GRO)	Water	GRO	NA	2,200 µg/L	AK 101	3x40 mL amber VOA vials w/ septa	HCl; 0-6° C	14 days	Allow no headspace; TB required; separate voa set required
Diesel Range Organics (DRO)	Water	DRO	NA	1,500 µg/L	AK 102	2 x 250 mL glass amber	HCl; 0-6° C	14 days	
VOCs	Soil	Benzene	71-43-2	0.022	SW 8260C	1x4 oz prewt'd amber (2nd 4 oz unpreserve % solids jar if no other analyses)	MeOH+BFB; 0-6° C	14 days	Field-preservation required; use 50 g soil & 25 ml MeOH; TB required
		Toluene	108-88-3	6.7					
		Ethylbenzene	100-41-4	0.13					
		Total Xylenes	1330-20-7	1.5					
Gasoline Range Organics (GRO)	Soil	GRO	NA	300	AK 101	1x4 oz prewt'd amber (2nd 4 oz unpreserve % solids jar if no other analyses)	MeOH+BFB; chill recommended	28 days	Field-preservation required; use 50 g soil & 25 ml MeOH; TB required, can be run with
Diesel Range Organics (DRO)	Soil	DRO	NA	250	AK 102	1x4 oz amber glass	0-6° C	14 days	
Grain Size	Soil	Grain Size Distribution	NA	NA	ASTM D422/ D4464M	lab dependent	none	--	

Notes:

[1] 18 AAC 75 Oil and Hazardous Substances Pollution Control Revised as of October 27, 2018

LOQ Limit of Quantitation
N/A Not Applicable
L Liter
mL milliliter
VOCs Volatile Organic Compounds
°C Degrees Celsius
LNAPL Light non aqueous phase liquid
HCl Hydrochloric acid
µg/L micrograms per liter
mg/kg milligrams per kilogram

FIGURES



2 SITE MAP
SCALE: 1" = 50'

0 50'

1 VICINITY MAP
SCALE: 1" = 1,500'

0 1,500'

Image Citation: ©2012 TerraMetrics; ©2012 Google

EXPLANATION

- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- UC-AQUIFER MONITORING WELL
- A-AQUIFER RECOVERY WELL
- B-AQUIFER RECOVERY WELL
- UNUSED RECOVERY WELL
- AIR SPARGE WELL
- UNUSED AIR SPARGE WELL
- VAPOR EXTRACTION WELL

REV.	DATE	DESCRIPTION	BY	CHK'D

REVISIONS

DRAWN BY: PAC
CHECKED BY: JM
DATE: 8/1/19
SCALE: AS SHOWN
FILE: 39B-BEACHSEEP_BIO-AS_SITEPLAN

Trihydro CORPORATION
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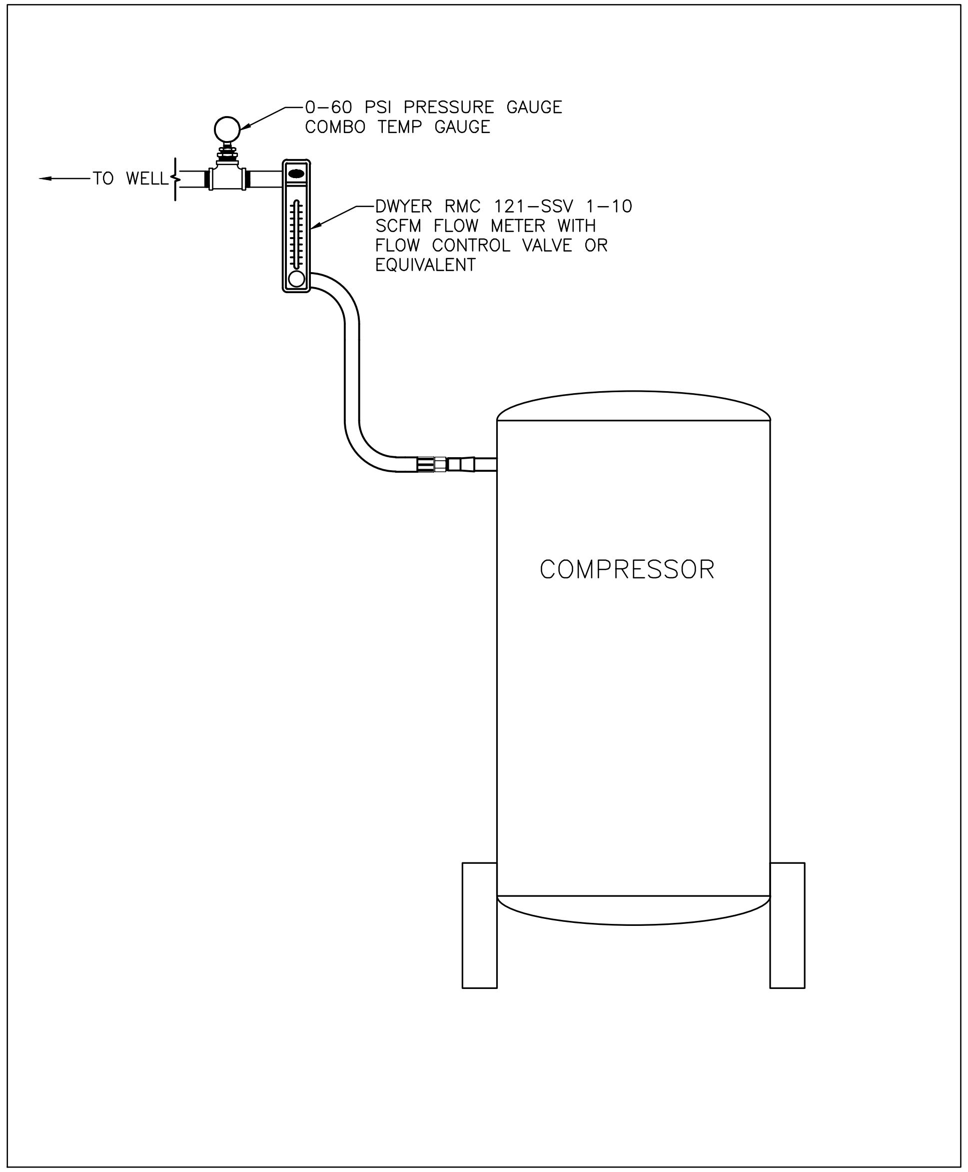
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

SITE PLAN

KENAI MARATHON REFINERY BEACH SEEP BIO-SPARGE INSTALLATION KENAI, ALASKA

SHEET 1
1 OF 2
REV:

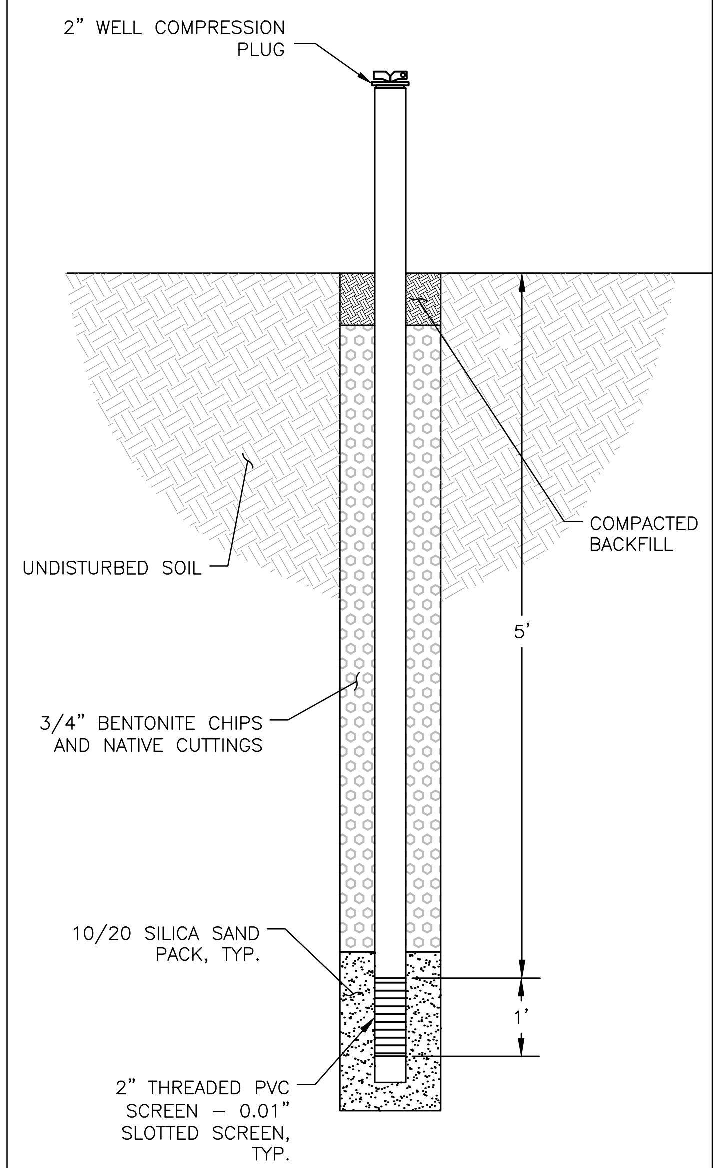
M:\STOV\TESORO\CADD\KENAIREFINERY\RCRA_PERMIT\CORRECTIVEACTIONS\PM_PRM\BEACHSEEP\39B-BEACHSEEP_BIO-AS_SITEPLAN



NOTES:

1. FITTINGS TO BE CONFIGURED TO PROVIDE LEAK FREE AIR TESTING TO BSB-01
2. FITTINGS AND TUBING SELECTED TO BE RATED TO 100PSI AND COMPRESSOR TO BE REGULATED TO MAXIMUM PRESSURE OF 50 PSI PRIOR TO TESTING.
3. COMBINATION PRESSURE/TEMPERATURE GAUGE, DWYER TRI-100-25E OR APPROVED EQUIVALENT
4. COMPRESSOR TO BE CAPABLE OF A MINIMUM 10 PSI AND 2 CFMS FLOW RATE

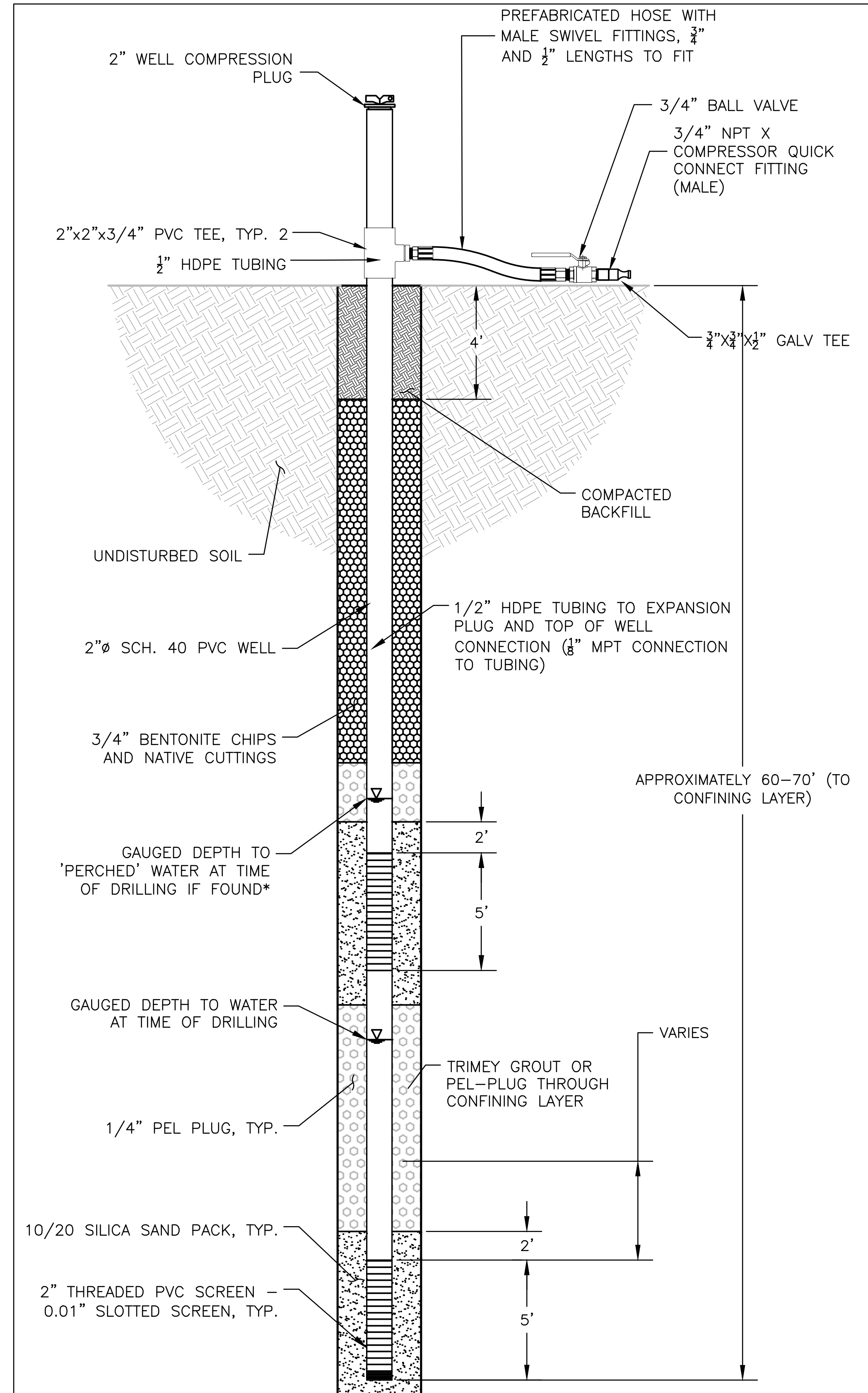
1 BIOSPARGE PILOT TEST CONFIGURATION DETAIL
SCALE: NONE



NOTES:

1. VAPOR POINT TO BE INSTALLED USING VACUUM TRUCK USED

2 BSV-01 COMPLETION DETAIL
SCALE: NONE



NOTES:

1. BEFORE SETTING WELL, VERIFY WATER LEVEL DEPTH AND CONFINING LAYER DEPTH TO ADJUST SCREEN LENGTH AS NEEDED.
2. * NESTED UPPER SCREEN WELL TO BE PLACED IN BORE HOLE IF UPPER PERCHED WATER ZONE FOUND ABOVE 50' BGS. SEPARATE ADJACENT UPPER WELL TO BE DRILLED IF DIRECT PUSH TECHNIQUES USED (ACCOMMODATED DURING PRE-CLEARING).
3. SECOND WELL CASING NOT SHOWN FOR CLARITY

3 BSB-01 WELL COMPLETION DETAIL
SCALE: NONE

NOT FOR CONSTRUCTION

REV.	DATE	DESCRIPTION	BY	CHK'D

REVISIONS

DRAWN BY: PAC
CHECKED BY: JM
DATE: 7/30/2021
SCALE: AS SHOWN
FILE: 39B-BEACHSEEP_BIO-AS_DETAIL

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DETAILS

KENAI MARATHON REFINERY
BEACH SEEP BIOSPARGE INSTALLATION
KENAI, ALASKA

SHEET **2** 2 OF 2

REV: