DSHW-2023-001282

Big West Oil LLC

February 13, 2023

RECEIVED
By Division of Waste Management and Radiation Control at 10:12 am, Feb 13, 2023

Karen Wallner
Waste Management Radiation Control
195 North 1950 West
PO Box 144880
Salt Lake City, Utah 84114-4880

RE: Big West Oil LLC RCRA Facility Investigation
Site Management Plan Response to Comments
North Salt Lake Refinery, EPA ID UTD045267127

Dear Karen Wallner:

Big West Oil, LLC (BWO) entered into a Stipulation and Consent Order (Order) issued by the Director of the Division of Waste Management and Radiation Control (WMRC) pursuant the Utah Solid and Hazardous Waste Act, Utah Code Annotated 19-6-101, *et seq.,* dated August 5, 2015. BWO is submitting the attached Site Management Plan for the Refinery. As we discussed, all reference to SWMU 38 (Lab) has been removed from the Site Management Plan because analytical results from the 2022 lab investigation are being tabulated for inclusion into an updated SWMU 38 (Lab) investigation report and risk assessment.

BWO appreciates the efforts and cooperation of WMRC in developing the BWO SMP. Please let us know if you have questions or require additional information by contacting Beau Stander at (801) 296-7828, email at Beau.stander@bigwestoil.com.

Sincerely,

Alec Klinghoffer
Refinery General Manager
Big West Oil LLC
333 West Center Street
North Salt Lake, Utah 84054

cc: Ian Muller
Beau Stander

Attachments: BWO Site Management Plan BWO North Salt Lake Refinery, EPA ID UTD045267127 (electronic submittal)

DRAFT BWO RFI Site Management Plan for SWMUs/AOC1
Big West Oil North Salt Lake Refinery

EPA ID: UTDO45267127

Prepared for:

Big West Oil LLC
333 West Center Street
North Salt Lake, UT 84054

Prepared by:

Johnston Leigh Inc.
1820 S Palomar Ln
Kanab, UT 84741

February 9, 2023

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FIGURES

TABLES

APPENDICES

Acronyms and Abbreviations

BGS	Below Ground Surface
BW	Body Weight
BWO	Big West Oil LLC
CDI	Chronic Daily Intake
ELCR	Excessive Lifetime Cancer Risk
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
GOF	Goodness of Fit
HI	Hazard Index
Husky	Husky Oil Corporation
IR	Intake Rate
IUR	Inhalation Unit Risk
LTA	Land Treatment Area
PRO UCL	PRO UCL - Statistical Software
QAPP	Quality Assurance Project Plan
RAGS	Risk Assessment Guidance for Superfund
RAIS	Risk Assessment Information System
RfC	Reference Concentration
RSL	Regional Screening Level
SAP	Sampling and Analyses Plan
SCR	Site Characterization Report
SF	Slope Factor
SVOC	Semi Volatile Organic Compounds
THQ	Target Hazard Quotient
TR	Target Risk 1E-6
UCL	Upper 95% Confidence Interval
US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds
VISL	Vapor Intrusion Screening Level
WMRC	Waste Management Radiation Control

1.0 Introduction

Big West Oil LLC (BWO) entered into a STIPULATION AND CONSENT ORDER issued by the Director of the Division of Waste Management and Radiation Control (WMRC) (former DSHW) pursuant the Utah Solid and Hazardous Waste Act, Utah Code Annotated 19-6-101, *et seq*., dated August 5, 2015, for the purpose of conducting a Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI). The terms of this Order required that BWO undertake the investigation and corrective action (if necessary) for the Solid Waste Management Units (SWMUs) and Areas of Concern (AOC) identified at the BWO Refinery (Refinery) located at 333 West Center Street, North Salt Lake, UT (**Figure 1-1**). A SWMU is any discernible unit at the Refinery at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. An AOC includes any area having a probable release of a hazardous waste or hazardous constituent which is not from a SWMU and is determined by the Director to pose a current or potential threat to human health or the environment.

The BWO RFI is being conducted under the RCRA process, which consists of the following general phases:

- Current Conditions (review of current and past site use, to be utilized in determining potential contaminant sources and their locations)
- RCRA Facility Investigation (RFI) (determines nature and extent of contamination;
- Risk Assessment (determines ecological and human health risks associated with contamination)
- Site Management Plan (long-term in-place management of remaining contamination, current phase of the process)
- Corrective Action (implementation of selected remedial technologies)

The Refinery has been the site of petroleum refining activities by several operators since mid-1949 when operations began with a processing capacity of 500 barrels of crude oil per day. A predecessor in interest to BWO, purchased the Refinery from a subsidiary of Husky Oil Corporation (Husky), RMT Properties, Inc., (RMT) in 1985. The Refinery currently employs about 220 people and supplies fuel products to many customers in seven western states. The Refinery processing units include crude fractionation, catalytic cracking, alkylation, pentane/hexane isomerization, distillate hydrodesulfurization, distillate dewaxing, butane isomerization, sulfur recovery and catalytic reforming. The Refinery refines up to approximately 33,000 barrels a day of Utah, Wyoming and Canadian crude oils into motor fuels.

1.1 Purpose and Objective

The purpose of this draft Site Management Plan (SMP) is to describe appropriate site management activities for the 13 SWMUs and one AOC that present a risk for carcinogens that are in the range of 1E-06 and 1E-4 as documented in the BWO RFI Risk Assessment Report (JLI, 2021). The SWMUs and one AOC (AOC1) at the BWO Refinery (Refinery) are listed in **Table 1-1** and locations are shown on **Figure 1-2**.

Table 1-1 BWO SWMU/AOC List

SWMU Number	SWMU Name
SWMU 1	API Separator 1
SWMU 2	API Separator 2
SWMU 5	Process Tank 1-A
SWMU 17	Tank 7
SWMU 20	Tank Farm, Draw Disposal Area
SWMU 22	Heat Exchanger Bundle Cleaning Pad
SWMU 23	Refinery Process Sewer Water
SWMU 24	North End Rail Loading/Unloading Area
SWMU 26	Spent Caustic Tank
SWMU 29	90-day Hazardous Waste Storage Area
SWMU 34	Open Ditch between API 2 and API 3
SWMU 39	Flare-Stained Soil Area
SWMU 41	Former Ponds at Current Location Tank 17
AOC 1	Former Administration Building

SWMU 38 (Lab) is temporarily excluded from this SMP until the additional Lab investigation results completed in fall of 2022 can be reported. SWMU 38 (Lab) will be included into this SMP after the Risk Assessment is updated with SWMU 38 (Lab) additional investigation results.

1.2 Geographic Location

The BWO Refinery is in North Salt Lake, Utah on the east limb of a north-south trending incised valley, with the limbs of the valley defined by the Jordan River (**Figure 1-1**). The center of the Refinery has coordinates of approximately -111.921638 longitude and 40.838424 latitude (decimal degree) and covers an area of approximately 110 acres of developed refinery property and approximately 40 acres of undeveloped property to the west as shown on the SWMU location map (**Figure 1-2**). The topography gently slopes from east to west with an approximate gradient of 0.016 feet/foot (ft/ft) and elevation difference of approximately 32 feet.

1.3 Previous Work

Detailed descriptions of the Refinery soil lithology and groundwater hydrogeology are presented in the RFI Phase I (JLI, 2018) and Phase II (JLI, 2020) reports. The results of Phase I and II investigations are summarized below.

1.3.1 Soil Lithology

The soil lithology at the Refinery was investigated to a depth of approximately 15 feet below ground surface (BGS) over most of the Refinery. The deepest boring was 20 feet BGS at SWMU 26 on the east side of the refinery which is topographically higher. Four geologic cross sections were constructed and include two south to north, and two west to east sections. South to north geologic cross sections A-A' and B-B' are presented on **Figures 1-3** and **1-4**. West to east geologic cross sections C-C' and D-D' are presented on **Figure 1-5** and **Figure 1-6**. On each cross section, the approximate groundwater saturated zone encountered during drilling is shown by the blue columns.

Generally, the upper five feet of soil at the Refinery consists of clayey silt (ML) and silty gravel (GM). The ML is native soil and the GM is backfill. Below about five feet, coarser native sediments are encountered and include clayey sand (CS), silty sand (SM), well graded sand (SW) and poorly graded sand (SP). These four units are collectively referred to as the sandy sediments. Underlying the sandy interval is silty clay (CL) that is typically plastic to very plastic and moist. Interbedded in the CL are thin sand lenses typically one-inch or less thick and these sand lenses are saturated with water under pressure.

1.3.2 Hydraulic Gradient

The hydraulic gradient is generally west on the northern half of the Refinery and west-southwest on the southern half of the Refinery (**Figure 1-7**). The average hydraulic gradient during Phase I and 11 investigations was approximately 0.010 feet/foot. First encountered groundwater is under hydraulic

pressure and will rise up in wells constructed in the upper 15 feet of sediments in addition to those constructed deeper. The vertical potential gradient is approximately 0.08 feet/feet up as measured in well pairs S-4 and D-1 (south and east part of Refinery) and wells S-85-9 (shallow) and S-85-10 (deep) located near SWMU 6. Well S-85-10 was destroyed during closure activities on the surface impoundments from September 1988 through September 1989.

1.3.3 Laser Induced Fluorescence

Laser induced fluorescence (LIF) is used for highly detailed, qualitative to semi-quantitative evaluation on the distribution of subsurface contamination of petroleum products containing polycyclic aromatic hydrocarbons (PAH). Electrons in the aromatic molecules adsorb light energy at given wavelengths and fluoresces back at lower energy level. Fuels, oils and creosotes are mixtures and create overlapping spectra. Using LIF Response Factors (%RE), it's possible to determine the relative concentrations and the type of product present.

LIF %RE was observed on most logs and was predominantly located between 4 and 10 feet BGS. The deepest LIF %RE was recorded in SB24-9 (upper east side of Refinery) at a depth of 18 feet BGS. During Phase II, the soil analytical results are all compared to industrial Regional Screening Levels (RSL) values for the purpose of risk assessment activities. The distribution of soil with LIF %RE value of 40 is very similar to the distribution of benzene in soil above industrial RSL value of 5.1 mg/kg as shown on **Figure 1-8** and **1-9**. This correlation demonstrates that LIF %RE values greater than 40 can be used as a screening tool to identify soil with benzene concentrations potentially above industrial RSL values.

1.3.4 Soil Analytical Results

The soil samples were analyzed for the following compounds of potential concern (COPCs) by Pace National (formally ESC Laboratory) of Mt Juliet, Tennessee using the EPA Methods identified below:

- Volatile Organic Compounds (VOC) using EPA Methods 8260B and 8260B SIM
- Semi Volatile Organic Compounds (SVOC), using EPA Method 8270C and 8270C SIM
- RCRA metals using EPA Methods 7471A (mercury), 6010B
- Hexavalent Chromium using EPA Method 3060A/7196A.

VOC compounds including benzene, ethylbenzene and naphthalene are the predominant COPC detected in soil above RSL values and summarized on **Table 1-2**. Naphthalene was detected as a VOC and SVOC. 1-methynaphthalene was a rare detection in soil, and only found in three soil samples at three separate locations. Benzo(a)pyrene and dibenz(a,h)anthracene were both detected once at the same location.

Table 1-2 VOCs and SVOCs in Soil above Industrial RSL

SWMU	Benzene	Ethylbenzene	Naphthalene VOC	Benzo(a)pyrene	Dibenz(a,h)anthracene	Naphthalene SVOC	1 Methylnaphthalene
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
1			25.1				
2	5.8, 7.08, 15.7		10.9, 36.4, 36.4, 40.4			15.4, 30.3, 46, 48.3, 107	95.7
5			20.4, 35.9				
17			30.9				
20	8.3, 9.68, 12, 12.6, 18.3, 23.7, 31.6, 45.3	121, 150, 185	9.38, 14.3, 15.7, 20.2, 26.1, 26.3, 26.8, 32.5, 40.9, 54.4, 61.4	5.2	2.26	15.2, 26.5, 45, 56, 61.3	80.7
22							
23							
24							
26	13.5		9.48, 15.6, 45.2				
29	7.01, 11.8		49.2, 50.9			10.6, 34.1	83.2
34			9.16, 9.29, 10.2			14.7	
39	17.6	25.1, 58.1	15.4, 40.1				
41			40.1				
AOC1	5.5		9.91, 15.9, 35.2, 62.6			8.72, 34.4	
Industrial RSL	5.1	25	8.6	2.1	2.1	8.6	73
Total							
Detected	16	5	34	1	1	15	3

A total of 10 background locations were drilled and 27 soil samples collected during Phase II for the purpose of calculating Background Threshold Value (BTV) of 33 milligrams per kilogram (mg/kg) for arsenic. Arsenic was detected in four samples at four separate locations at concentrations above the BTV of 33 milligrams per kilogram (mg/kg). These three samples include:

- SWMU 5 - 60.1 mg/kg depth of 4-5 feet below ground surface (BGS)
- SWMU 24 - 38.9 mg/kg depth of 14-15 feet BGS
- SWMU 26 - 34.2 mg/kg surface soil sample.

1.3.5 Groundwater Analytical Results

Seven VOCs including benzene, ethylbenzene, xylenes, naphthalene, methyl tert butyl ether (MTBE), 1,2,4-trimethylbenzene (1,2,4-TMB) and 1,3,5-trimethylbenzene (1,3,5-TMB) were detected in groundwater samples above the Target Groundwater Concentration (TGC) (**Table 1-3**). The TGC represents the concentration that may pose a risk to indoor air migration. Naphthalene was detected and reported as a

VOC and an SVOC. The groundwater concentrations above TGC values were collected from wells in the center part of the refinery (SWMUs 2, 20, 26, 29). The groundwater results for the purpose of the risk assessment are therefore skewed to relatively small area of the refinery compared to all refinery groundwater.

Table 1-3 VOCs Groundwater vs Tap Water RSL and Soil to Groundwater Target Groundwater Concentrations

VOC	Tap Water RSL	TGC	Range of Concentrations
	(mg/l)	(mg/l)	(mg/l)
Benzene	0.00046	0.069	0.000131 - 3.58
Ethylbenzene	0.0015	0.015	0.000191 - 2.74
Xylenes	0.19	1.6	0.000332 - 12.4
Naphthalene	0.00012	0.020	0.000494 - 0.727
MTBE	0.014	2.0	0.00015 - 0.53
1,2,4-TMB	0.056	1.0	0.000131 - 3.62
1,3,5-TMB	0.06	0.730	0.000332 - 12.4

TGC = Target Groundwater Concentration - value that may pose risk to indoor air migration

TGC = Target C vapor VISL/HLC X 0.001 x (1000L/m3))

HLC = Henry's Law Constant

Attenuation factor, default 0.001

VISL – Vapor Intrusion Screening Level

1.4 Exposure Pathways

The existing and likely future land use of the Refinery for the foreseeable future is petroleum refining into fuels consisting of gasoline, distillates, gas oils, fuel oils, sulfur and LPG. The completed exposure pathways at the Refinery are:

- Ingestion of soil
- Dermal contact with soil
- Inhalation of particulates and volatiles emitted from soil
- Sub-slab vapor intrusion into indoor air
- Groundwater/LNAPL vapor intrusion into indoor air

1.5 Composite Workers Risk for Soil

The risk to Refinery workers (defined as Composite Workers) to soil at each SWMU was defined in the RFI Risk Assessment Report (JLI, 2021), and shown to be between 1.01 E-06 and 1.38 E-05 with a Hazard Index (HI) of less than 1 for all SWMUs (**Table 1-4**). This SMP therefore pertains to ground disturbance activities at all the SWMUs and one AOC listed in **Table 1-1**.

Table 1-4. Composite Worker Sum Risk to Soil Ingestion, Dermal and Inhalation

SWMU #	Non-Carcinogenic Hazard Index	Carcinogenic Risk
1	2.73E-02	2.50E-06
2	7.38E-02	7.29E-06
5	1.83E-01	2.45E-06
17	4.49E-02	3.31E-06
20	1.47E-01	1.38E-05
22	1.85E-02	1.92E-06
23	1.31E-02	1.01E-06
24	3.26E-02	4.82E-06
26	1.05E-01	1.12E-05
29	6.43E-02	5.71E-06
34	5.65E-02	7.91E-06
41	5.58E-02	4.31E-06
AOC1	8.78E-02	6.58E-06

1.6 Composite Worker Risk Sub-Slab Vapor Intrusion

The Refinery worker risks to vapor intrusion from soil media and groundwater inside buildings with slab on grade construction is summarized on **Table 1-5**.

Table 1.5. Composite Worker Sum Risk to Sub-Slab Vapor Intrusion from COPC

Location	Non-Carcinogenic Risk	Carcinogenic Hazard Index
Maintenance Building	1.18E+02	4.97E-03
Groundwater	1.21E+01	5.44E-04

The Maintenance Building and Refinery groundwater has a risk factor greater than 1E-04 and will be addressed in the Corrective Action Plan (CAP).

1.7 Activities Covered Under this Site Management Plan

In summary, the activities regulated under this SMP at the Refinery are specific to ground disturbance within SWMUs that would disturb soil including but not limited to soil excavation, hydro-excavation, soil borings and construction activities. Groundwater that is exposed during soil excavation is managed under this SMP by monitoring potential off-gassing of volatile organic compounds (VOC) into ambient air.

2.0 Site Management Plan

The SMP is designed to minimize the potential risks to human health from soil through access restrictions and limitations imposed on land usage within the 14 SWMUs and one AOC. The boundary of each SWMU is shown on **Figure 1-2**. Groundwater that is exposed within the SWMUs and AOC will be managed under this SMP concurrent with the procedures outlined in the CAP (pending).

2.1 Access Restrictions

All workers that enter the refinery for the purpose of BWO approved work are required to complete and pass a BWO approved Industrial Safety Training class including but not limited to, BOP, BRP, Refinerypass.com, OSHA 10, OSHA 30, CSTOP, RSO and Utah Safety Council, Contractor Safety Orientation for Refinery Workers. Upon satisfactory passing the industrial training course, the worker is then allowed to complete but must pass the two-hour BWO Site Specific Refinery Safety Training class. The worker is then issued a refinery entry badge and if requested and approved, a vehicle entry pass.

Al visitors that enter the refinery must complete Option 1 or 2 below. Both options require the visitor be escorted inside the refinery by a BWO representative and wear appropriate personal protective equipment including :

- Flame resistant clothing (pant, long sleeve shirt or long sleeve coverall)
- Steel toed boots
- Hard hat
- Safety glasses
- Ear protection

Option 1: A visitor can request entry into the refinery by making an appointment with BWO Safety Department. The visitor would complete a 20-minute orientation video at the refinery, don the required PPE listed above and be escorted by BWO representative inside the refinery.

Option 2: A visitor may elect to apply for a Category 2 Badging which is specific for non-working personnel that are just observing or reviewing work inside the Refinery. The Category 2 badging would be active for 1-year and allow the visitor reoccurring access inside the refinery. The visitor would be required to complete and pass the BWO approved Industrial Safety Training and BWO Site Specific Refinery Safety Training classes described above. The visitor would be required to wear the PPE described above and be escorted by a BWO employee representative within the refinery property.

2.2 Land Use Limitations

Current land usage at the refinery is petroleum refining and this process is not going to change for the foreseeable future. The undeveloped land to the west of the refinery is planned for expansion of refinery support structures including but not limited to shop/maintenance buildings and equipment storage structures. There is no land within the Refinery property that is or will be used for public infrastructure and development.

2.3 SWMU Land Usage

The land within the SWMUs boundary may be used for industrial purposes including but not limited to, normal petroleum refining operations such as 1) bulk loading and unloading, 2) petroleum refining process, 3) crude and refined storage, and 4) refinery maintenance operations. The land within each SWMU and the one AOC can be used for building construction (both human occupancy and/or storage) provided engineering controls are used to reduce carcinogenic risks to below $1E^{-04}$ for indoor air migration from soil and/or groundwater (see Corrective Action Plan(CAP), in preparation)

2.4 Groundwater

2.4.1 Groundwater Usage

Shallow groundwater (typically encountered in the upper 5-10 feet of sediments) is not used by BWO for any purpose. BWO does have water rights to the Principal Aquifer and has drilled and installed one production well for the purpose of Refinery cooling and firefighting water (water right 31-2232). BWO receives its culinary water from South Davis Water which enters the refinery through one pipe on the east property line and is then distributed throughout the refinery.

2.4.2 Groundwater Off-Gassing

Groundwater may be encountered during excavation procedures including hydro-excavation and soil borings. Groundwater in some locations of the Refinery has the potential to off-gas causing potential indoor air migration. However, an open excavation with exposed groundwater may also off-gas at concentrations exceeding US EPA 2010 Acute Exposure Guidelines (AEGLs) for benzene and ethylbenzene. Currently, only COPC benzene and ethylbenzene have AEGLs. Air monitoring of open excavations including soil borings and hydro-excavations will be performed to maintain compliance with the appropriate AEGL limits for benzene and ethylbenzene based on the exposure time at the open

excavation. These measurements will be documented on the Ground Disturbance Permit (GDP) explained in **Section 3.0**

2.5 Permitting SWMU Access

The SWMUs are in four different operating areas identified as Refinery Departments indicated on **Table 2-1**.

Table 2-1 BWO DEPARTMENTS Access to SWMUs/AOC

SWMU Number	SWMU Name	Department
SWMU 1	API Separator 1	Tank Farm
SWMU 2	API Separator 2	Tank Farm
SWMU 5	Process Tank 1-A	Tank Farm
SWMU 17	Tank 7	Tank Farm
SWMU 20	Tank Farm, Draw Disposal Area	Tank Farm
SWMU 22	Heat Exchanger Bundle Cleaning Pad	Alky
SWMU 23	Refinery Process Sewer Water	Tank Farm, Safety
SWMU 24	North End Rail Loading/Unloading Area	Tank Farm
SWMU 26	Spent Caustic Tank	Crude
SWMU 29	90-day Hazardous Waste Storage Area	Tank Farm
SWMU 34	Open Ditch between API 2 and API 3	Tank Farm
SWMU 39	Flare-Stained Soil Area	Safety
SWMU 41	Former Ponds at Current Location Tank 17	Tank Farm
AOC 1	Former Administration Building	Safety

In addition to the access restrictions, and land use and groundwater limitations indicated above, Refinery personnel and authorized subcontractors have to obtain a Hot Work or Safe Work permit from the Refinery department where the SWMU is located before any work is performed within a SWMU boundary. The authorization is mandatory and no work is performed anywhere in the Refinery without a permit. The permit includes a description of the work that will be performed, the tools and equipment that will be used, the Safety Lead that will be responsible for the work throughout the day, and engineering controls that will be utilized during the work period. The permit is closed out by the Department where the SWMU is located, and returned to the Refinery Safety Department for further review and filing.

Further, in addition to the Refinery permit described above, any work inside a SWMU that will involve excavation requires a GDP and an Excavation Plan (EP). Both permits are completed by the responsible

party performing the work and then approved by the Department where the SWMU is located and the Safety Department. The EP is discussed below and the GDP is presented in **Section 3.0**.

2.6 Excavation Plan

All excavations (including hydro-excavation and soil borings) within the Refinery (SWMUs and AOC1 included) deeper than four feet or near foundations and footing require a BWO Excavation Plan. The EP complies with OSHA standards for excavation and also requires notification to the BWO Environmental Department if a GDP will be required. The EP is signed by the BWO Coordinator, the competent person (BWO employee or contractor performing the work) and the Safety Representative.

2.7 Construction

Any structure associated with the refinement of petroleum product can be built inside a SWMU boundary. This would include storage buildings designed to house maintenance and/or heavy equipment (e.g., cranes, bulldozers, trackhoe, backhoe, etc.). Buildings designed for human occupancy include engineering control of potential vapor migration such that indoor air meets industrial indoor air Regional Screening Levels (RSL). All construction activities in the SWMU boundary will be required to obtain a GDP as described below. The BWO Project Manager is responsible for implementation of the GDP requirements that must be followed by the construction crew associated with the project.

3.0 Ground Disturbance Permit

The purpose of the GDP is to provide procedures by which BWO Refinery personnel can perform work inside a SWMU to comply with the this SMP which is required based on the approved Risk Assessment (JLI, 2021). The GDP is to be completed by BWO Project Managers for any activity that disturbs soil within the regulated SWMUs and/or AOC1. The GDP is reviewed and approval by BWO Environmental Department and the Refinery Manager. Additional pages may be added to the GDP including maps, analytical results, permit related communication, etc., and reference is included in the GDP Documentation page. The GDP is included in **Appendix A** and summarized below:

1. Purpose of excavation including construction drawings, if applicable.
2. Detailed map of the proposed excavation area including width, length, and depth dimensions.
3. Volume of soil planned to be removed.
4. Soil excavated from the within the SWMU boundary will be managed under the GDP and can be used as backfill inside the SWMU boundary as long as a minimum 0.5-foot clean top soil cover caps the backfilled soil.
5. Soil temporarily stockpiled within the SWMU boundary shall be placed on a flat surface bermed to control water runoff and erosion, covered to prevent wind transportation and potential leaching into soil and/or runoff to surface water. Samples of the stockpiled soil will be collected by BWO or their representative to characterize the stockpiled soil using EPA Method 6010 for RCRA metals, 8260B for Volatile Organic Compounds (VOCs) and 8270 Sims for Semi-Volatile Organic Compounds (SVOCs). Soil excavated from within the SWMU boundary can be used as backfill at the source SWMU.
6. Soil from a SWMU temporarily stockpiled outside of the SWMU boundary shall be placed on a flat surface and onto an impervious liner, bermed to control water runoff and erosion, and covered to prevent wind transportation and potential leaching into soil and surface water. Samples of the stockpiled soil will be collected by BWO or their representative to adequately characterize the stockpiled soil using EPA Method 6010 for RCRA metals, 8260B for VOCs and 8270 Sims for SVOCs. The stockpiled soil can be used as backfill at the source SWMU.
7. Soil not used for backfill that is scheduled for an offsite removal, will be profiled using Toxicity Characteristic Leaching Procedure (TCLP) and then properly manifested as directed by the receiving depository.
8. If excavated soil is transported for offsite disposal, the following will be attached to the GDP and retained in accordance with applicable regulatory requirements:
    1. All laboratory analytical results for soil characterization, and
    2. Shipping manifest (Bill of Lading) from company transporting the soil, including the amount of material received by the facility.

4.0 Site Management Plan Provisions

4.1 Update

The SMP will be reviewed and updated with current conditions every five (5) years. BWO will notify WMRC by letter the first month of the year the plan is to be updated. BWO will include in the letter the proposed changes to the plan, and if necessary, a meeting between BWO and WMRC may occur.

4.2 Deviation from the SMP

In the event BWO becomes aware of a substantial deviation from the SMP, WMRC will be notified orally within five days of becoming aware of the deviation, followed by a written report within 25 days of becoming aware of the deviation. BWO and WMRC will then evaluate the current SMP and decide if the SMP requires modification outside the five-year review period.

4.3 Termination of the SMP

BWO may request termination of the SMP for individual SWMUs if soil and groundwater sampling at the SWMU indicates that residential RSL or background levels have been met. BWO may also request that SMP be terminated for the Refinery if the same conditions apply site wide.

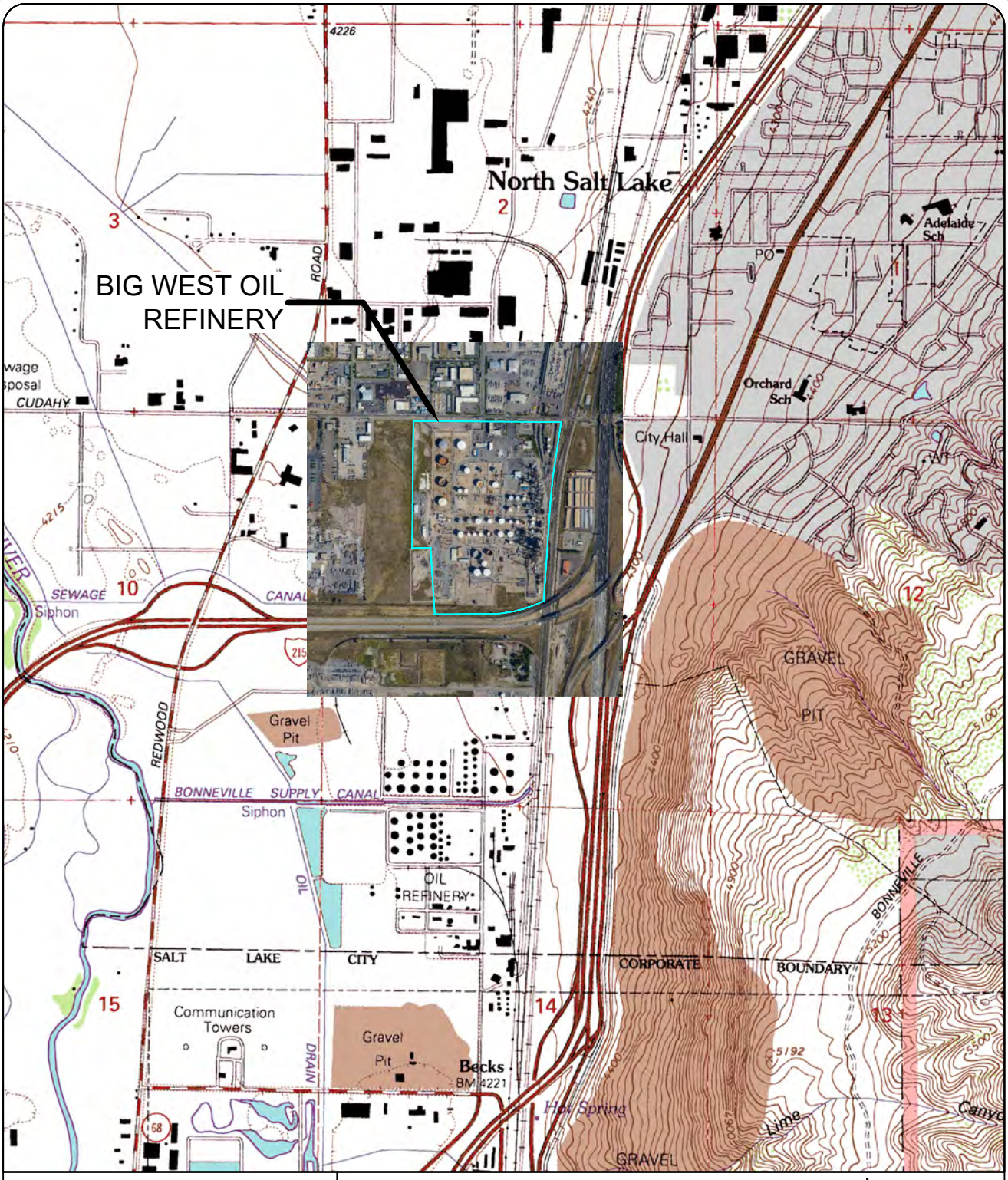
5.0 References

Johnston Leigh Inc., 2018b. RFI Phase I Report, North Salt Lake Refinery, EPA ID UTD045267127. October 5, 2018.

Johnston Leigh Inc., 2020. RFI Phase II Report, Big West Oil North Salt Lake Refinery, EPA ID UTD045267127. May 1, 2020.

Johnston Leigh Inc., 2021. RFI Risk Assessment, Big West Oil North Salt Lake Refinery, EPA ID UTD045267127. December 16, 2021.

FIGURES



0 2000 4000

SCALE IN FEET

N

TOPO: USGS SALT LAKE CITY NORTH
7.5 MINUTE QUADRANGLE, 1975
REVISED BY USDA FOREST SERVICE 1998
2015 AERIAL PHOTO

Johnston Leigh Inc.
(801) 726-6845

PREPARED BY:	DATE:	REVISION:	FILE NAME:
PJS	09/30/2022	0	

FIGURE 1-1

BWO Refinery and Location Map

BWO RFI SITE MANAGEMENT PLAN

BIG WEST OIL, LLC

NORTH SALT LAKE, UT

SWMU 20 c
SWMU 23
AOC 1
SWMU 24
SWMU 20 d
SWMU 17
SWMU 34
SWMU 41
SWMU 5
SWMU 2
SWMU 23
SWMU 29
SWMU 26
SWMU 23
SWMU 20 a
SWMU 20 b
SWMU 1
SWMU 22
SWMU 23
SWMU 39

130 65 0 130 260 390 520
Feet

N

Job No.:
Drawn By: PJS
Date: 09/30/2022
File:

Joshnston Leigh Inc.
(801) 726-6845

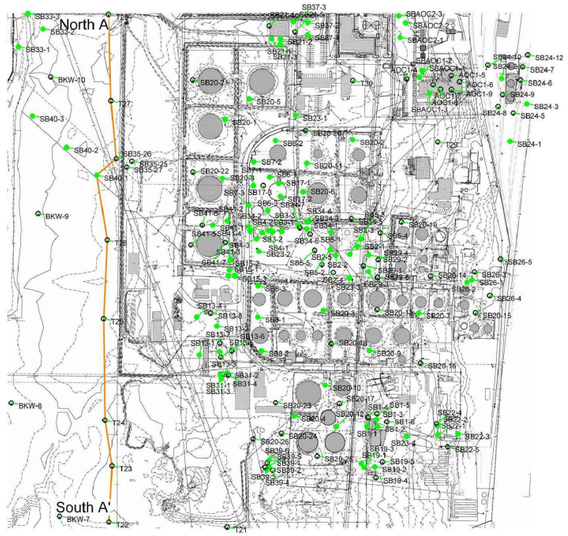
SWMU LOCATIONS

BWO RFI SITE MANAGEMENT PLAN

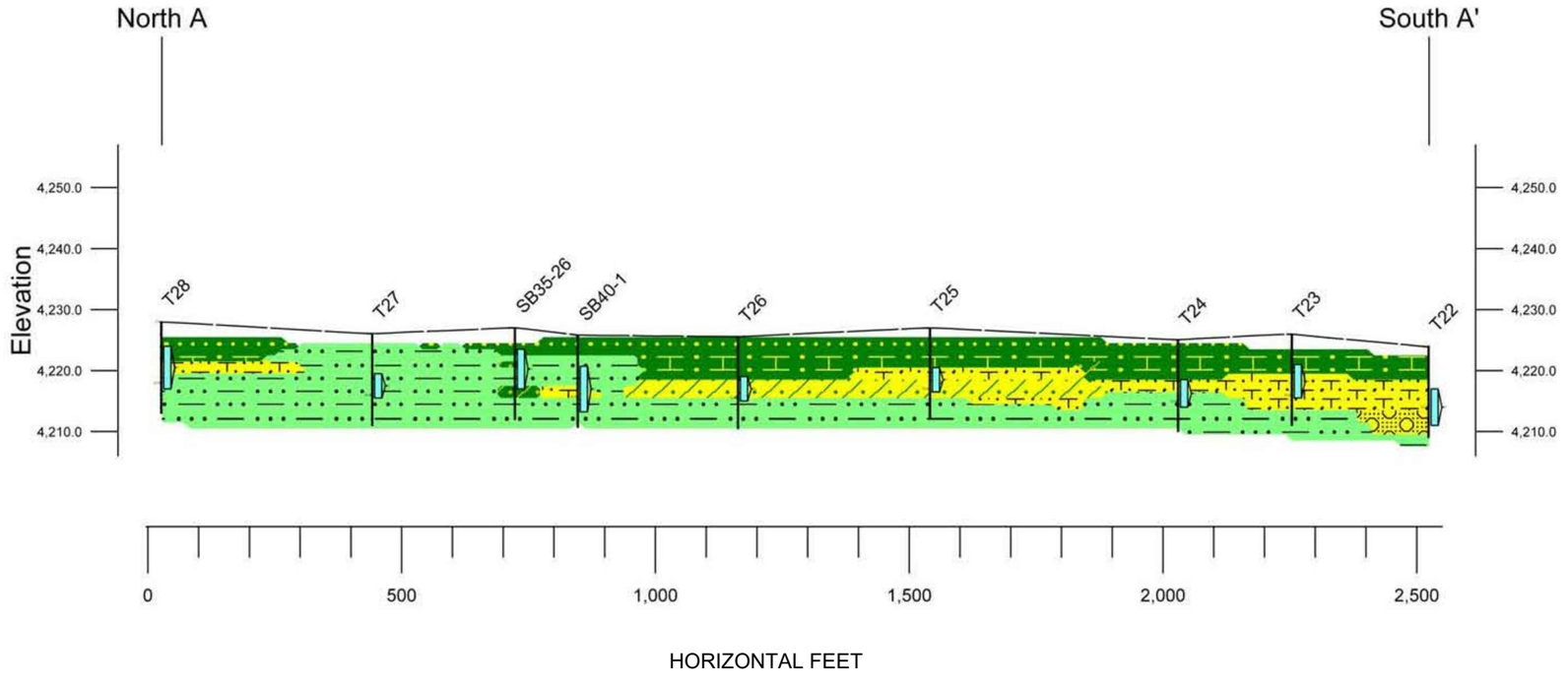
NORTH SALT LAKE REFINERY

FIGURE

1-2



North South Cross Section A-A'



Lithology Index

- Clayey Gravel
- Clayey Sand
- Clayey Silt
- Poorly Sorted Sand
- Sandy Clay
- Silty Clay
- Silty Sand
- Well Sorted Sand

ENCOUNTERED GROUNDWATER

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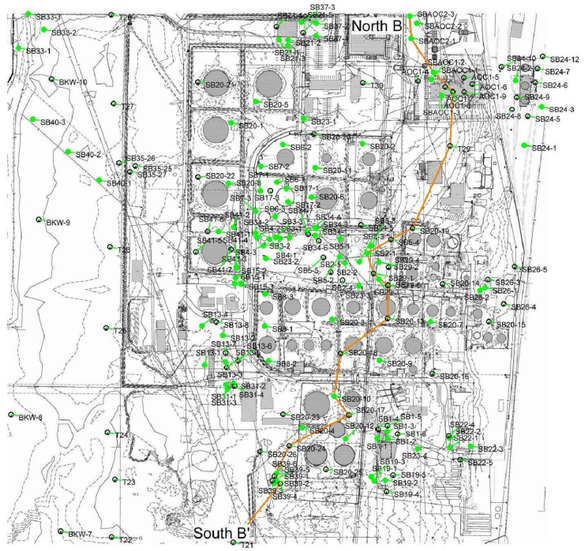
NORTH-SOUTH CROSS SECTION A-A'

BWO RFI SITE MANAGEMENT PLAN

NORTH SALT LAKE REFINERY

FIGURE

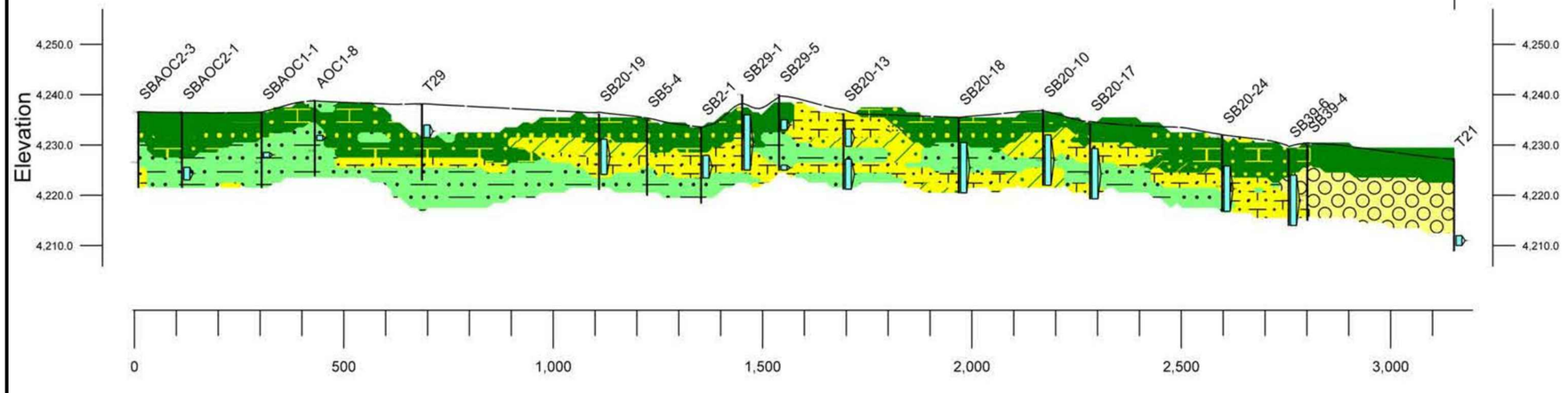
1-3



North B

North South Cross Section B-B'

South B'



HORIZONTAL FEET

Lithology Index

- Clayey Gravel
- Clayey Sand
- Clayey Silt
- Poorly Sorted Sand
- Sandy Clay
- Silty Clay
- Silty Sand
- Well Sorted Sand

ENCOUNTERED GROUNDWATER

Job No:
Drawn By: pjs
Date: 09/30/2022
QC: PE:
File:

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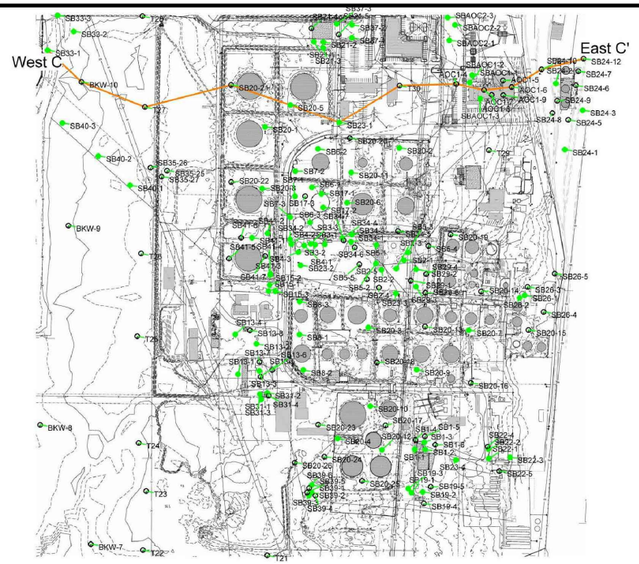
NORTH-SOUTH CROSS SECTION B-B'

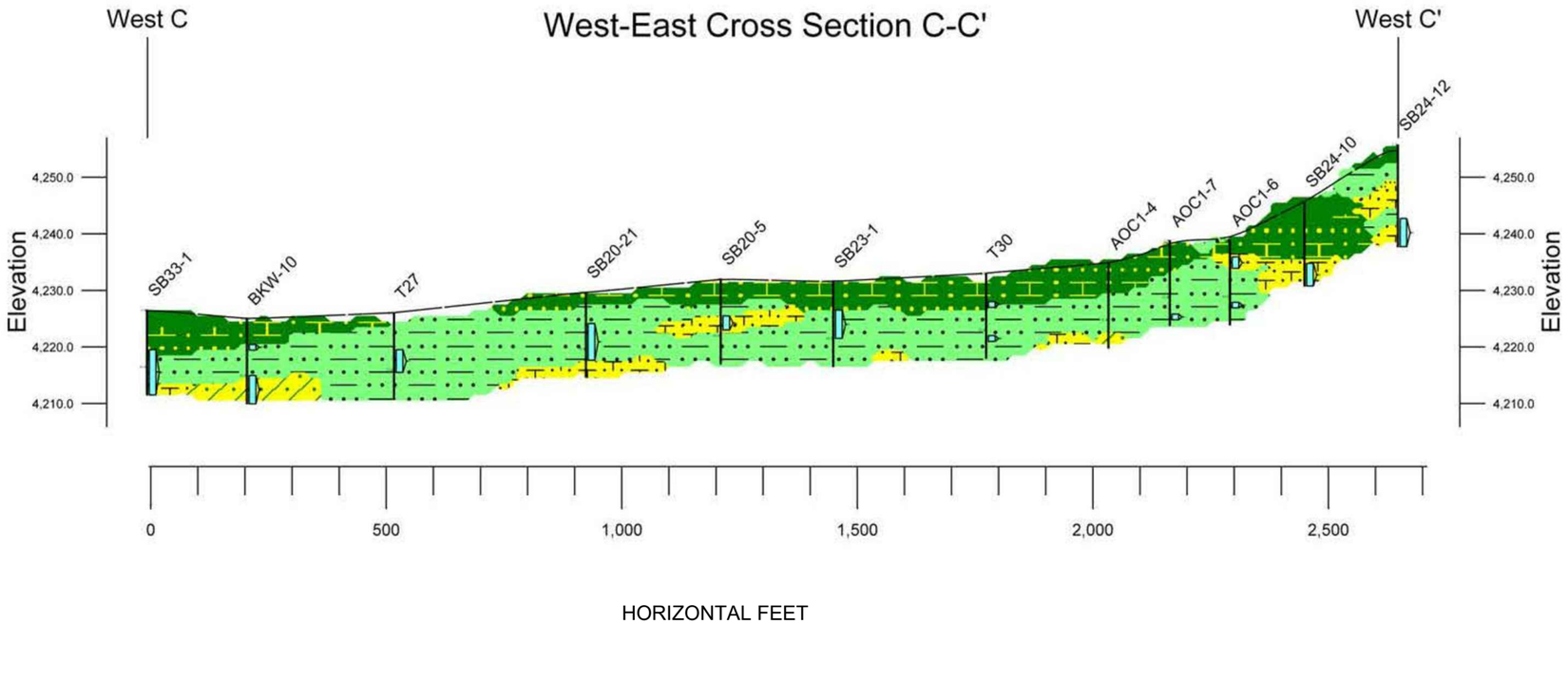
BWO RFI SITE MANAGEMENT PLAN

NORTH SALT LAKE REFINERY

FIGURE

1-4





Job No:
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Date: 09/30/2022
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File:

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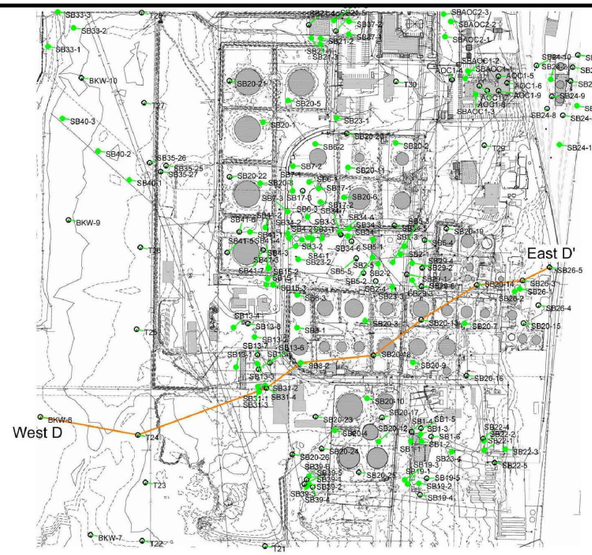
WEST-EAST CROSS SECTION C-C'

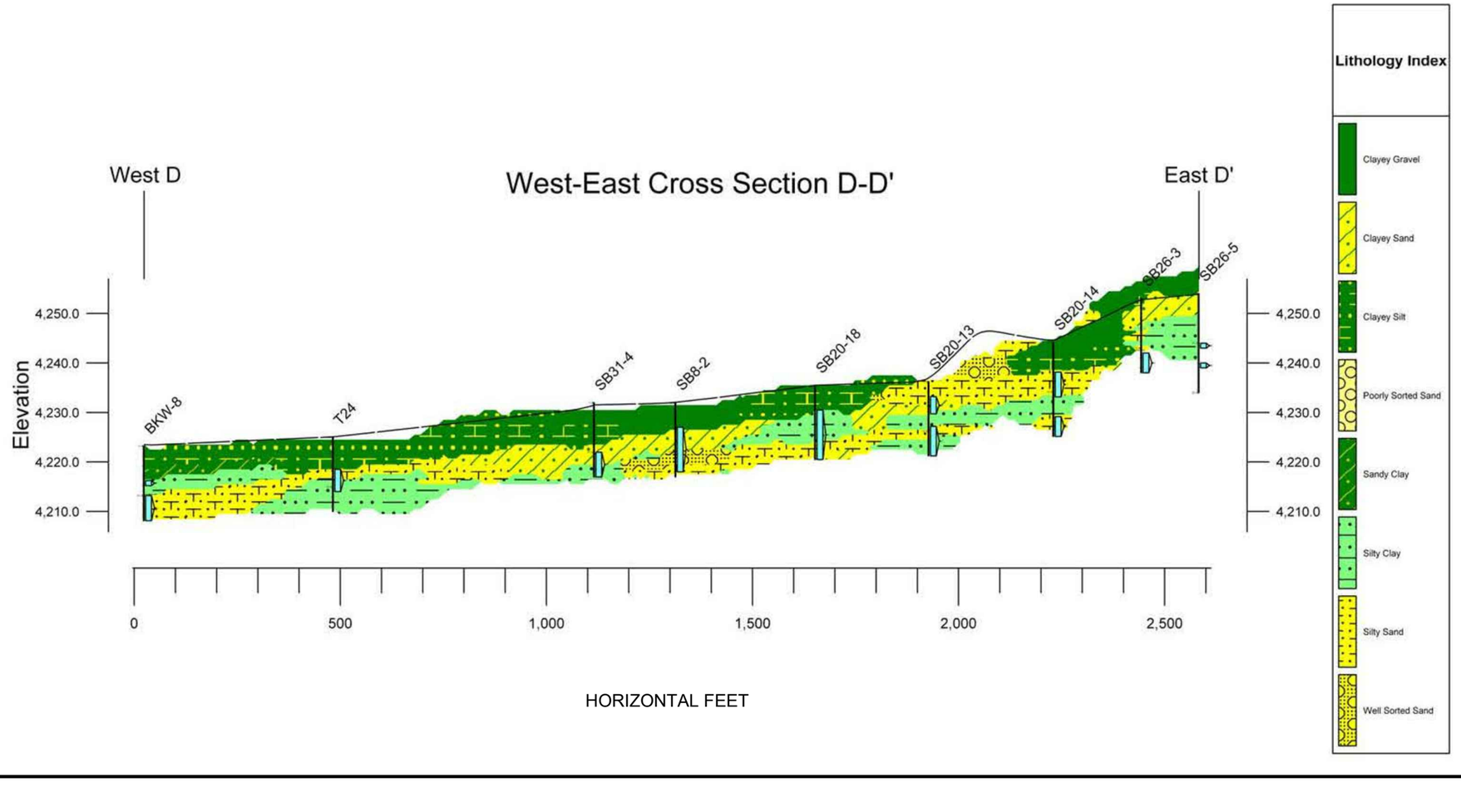
BWO RFI SITE MANAGEMENT PLAN

NORTH SALT LAKE REFINERY

FIGURE

1-5





Job No:
Drawn By: pjs
Date: 09/30/2022
QC: PE:
File:

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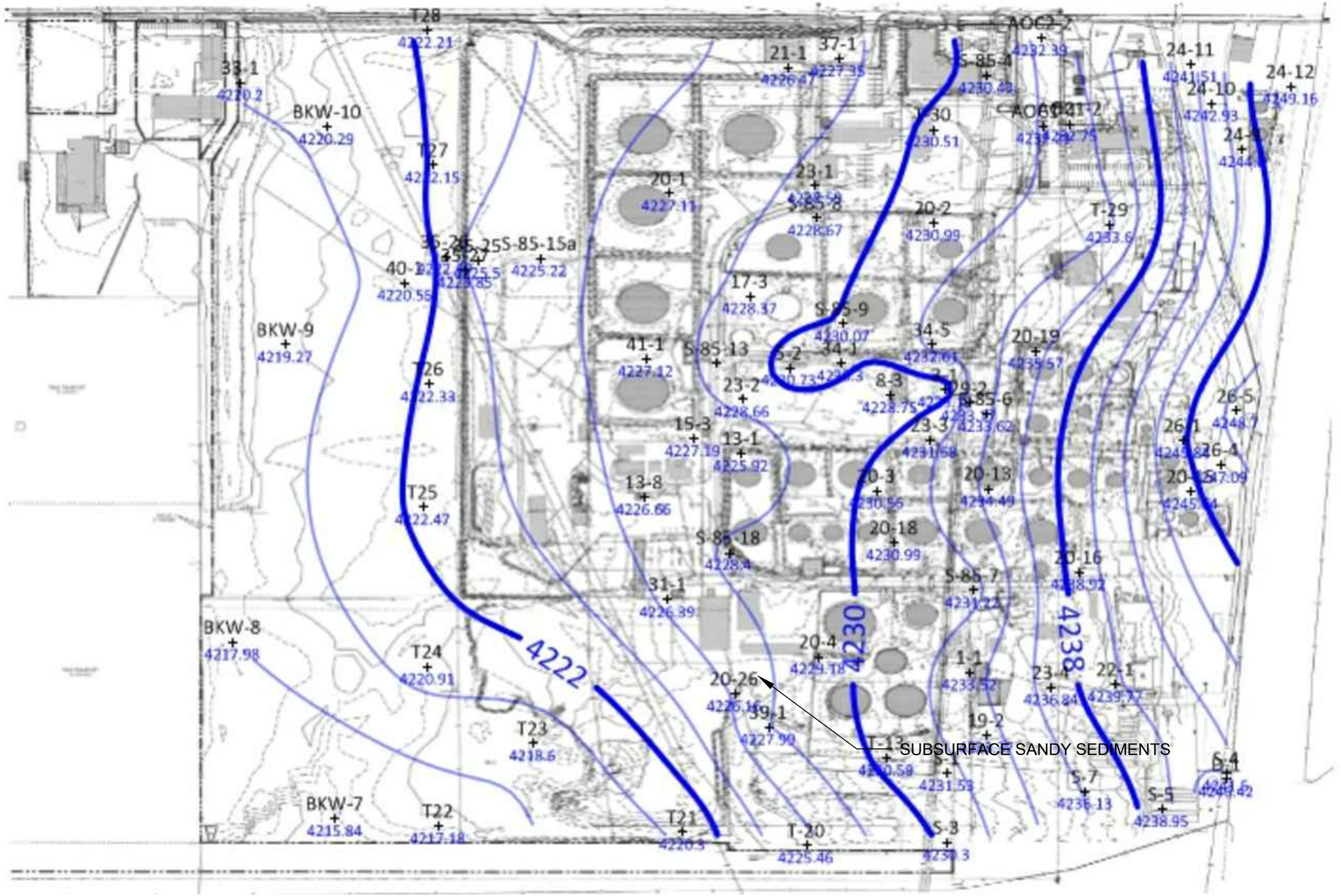
WEST-EAST CROSS SECTION D-D'

BWO RFI SITE MANAGEMENT PLAN

NORTH SALT LAKE REFINERY

FIGURE

1-6



Job No:	
Drawn By:	pjs
Date:	09/30/2022
QC:	PE:
File:	

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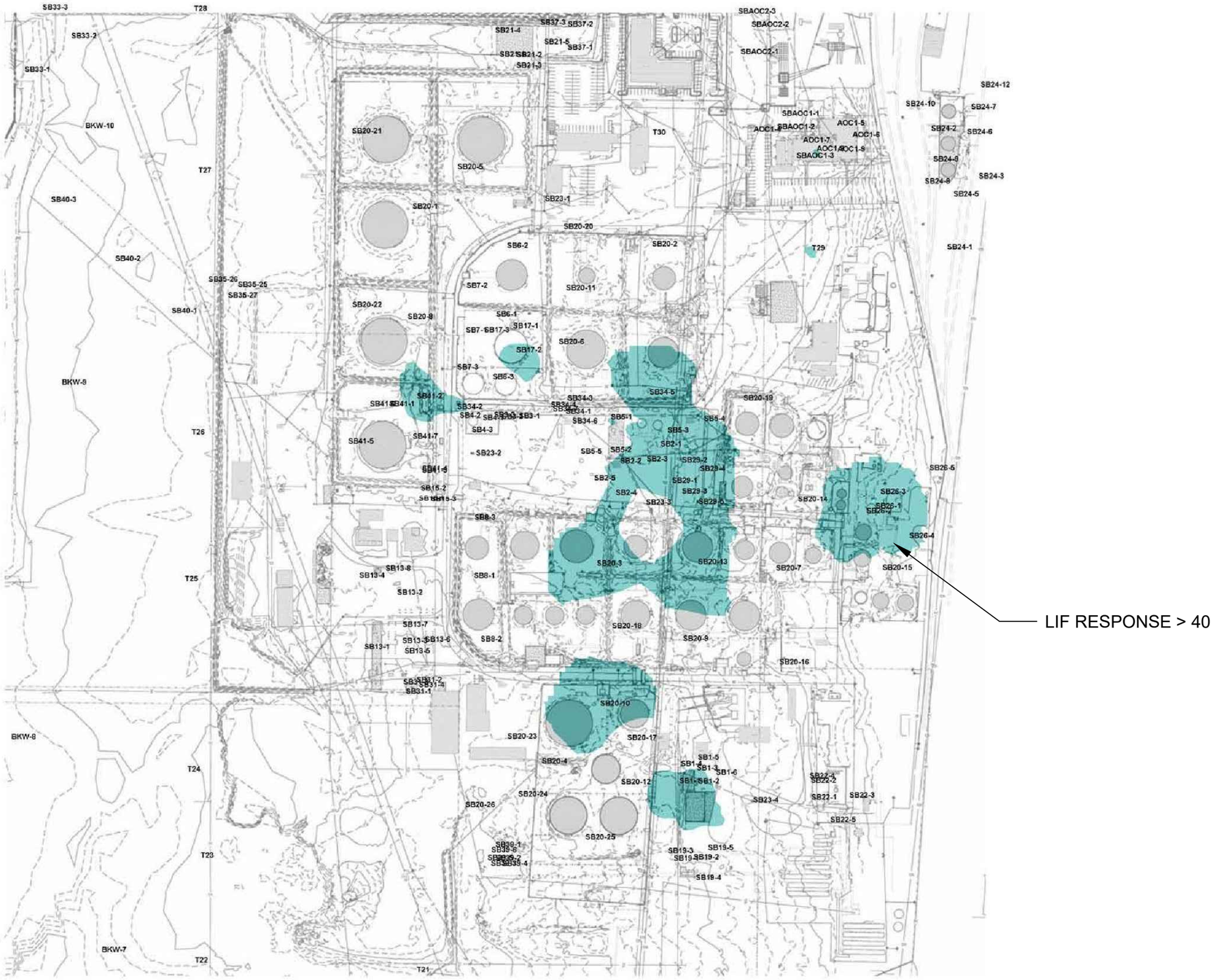
GROUNDWATER POTENTIOMETRIC SURFACE NOVEMBER 14, 2019

BWO RFI SITE MANAGEMENT PLAN

NORTH SALT LAKE REFINERY

FIGURE

1-7



Job No:
Drawn By: pjs
Date: 09/30/2022
QC: PE:
File:

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LIF RESPONSE >40

BWO RFI SITE MANAGEMENT PLAN

NORTH SALT LAKE REFINERY

FIGURE

1-8

BENZENE IN SOIL ABOVE INDUSTRIAL RSL

BWO RFI SITE MANAGEMENT PLAN

NORTH SALT LAKE REFINERY

FIGURE

1-9

Job No:

Drawn By: pjs

Date: 09/30/2022

QC: PE:

File:

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(801) 726-6845

APPENDIX A

Ground Disturbance Permit

THIS PERMIT MUST BE COMPLETED PRIOR TO ANY GROUND DISTURBANCE PROJECT IN ALL SWMU'S AND AOC1. The purpose of the Ground Disturbance Permit (GDP) is to comply with the State of Utah Waste Management Radiation Control (WMRC) Approved Site Management Plan (SMP, 2022), which is required based on sampling data that indicate contaminated soil and groundwater exist within the Refinery area. As outlined in the SMP, any development activities that impact the subsurface area within the developed Refinery boundary require review and approval by BWO Environmental Department and the Refinery Manager. Be advised that construction of structures meant for employee occupancy will require additional engineering controls to reduce or prevent potential sub slab vapor intrusion. This GDP should be completed during the early stages of project inception in order to allow for appropriate review of project design with respect to WMRC regulatory restrictions imposed on the Refinery and associated environmental conditions. This GDP is void and must be re-issued if: a) The permit expires; b) there is a change in designated permittee; c) the construction scope of work changes.

Applicant/Permittee:		**Permit Application Date:**	
Project Name:		**MOC #:**	
Permit Expiration Date:		**SWMU(s):**	

DEPT APPROVAL	NAME	SIGNATURE	DATE
BWO Project Manager			
Restrictions/Comments:			
BWO Environmental Department Review			
Restrictions/Comments:			
BWO Refinery Manager			
Restrictions/Comments:			

Project Description (attach detailed construction plans with excavation area dimensions and depth).

Excavation Depth: _____Volume of soil to be excavated: _____

Will temporary or permanent **de-watering** be required? ☐ Y ☐ N

If ***Yes,*** describe water treatment plan. Groundwater within the Refinery boundary is considered potentially contaminated and cannot be discharged without applicable testing and regulatory permitting.

Excavated soil will be:

(check all that apply)

☐ Stockpiled within the SWMU/AOC1 boundary[1], show location(s) on map

at_____ **(location)1**

_____

_____

☐ Temporarily stockpiled on refinery property, outside of the SWMU/AOC1, show location(s) on map

at_____ (location)[2]

_____

_____

☐ Transported for off-site disposal

at _____ (disposal facility)[3]

_____

Requirements:

1. Soil excavated from the within the SWMU boundary will be managed under the GDP and can be used as backfill inside the SWMU boundary if a minimum 0.5-foot clean top soil cover caps the backfilled soil.
2. Soil temporarily stockpiled within and/or outside the SWMU boundary shall be placed on a flat surface bermed to control water runoff and erosion, covered to prevent wind transportation and potential leaching into soil and/or runoff to surface water. Samples of the stockpiled soil will be collected by BWO or their representative to adequately characterize the stockpiled soil using EPA Method 6010 for RCRA metals, 8260B for Volatile Organics and 8270 for Semi-volatile organic compounds (SVOC). Soil excavated from within the SWMU boundary can be used as backfill at the source SWMU.
3. Soil not used for backfill that is scheduled for an offsite removal, will be profiled using Toxicity Characteristic Leaching Procedure (TCLP) and then properly manifested as directed by the receiving depository.
4. If excavated soil is transported for offsite disposal, the following will be attached to the GDP and retained in accordance with applicable regulatory requirements:
    3. All laboratory analytical results for soil characterization, and
    4. Shipping manifest (Bill of Lading) from company transporting the soil, including the amount of material received by the facility.

Ground Disturbance Permit Documentation

BWO Environmental Department

	Permit Attachment	Date(s)	Project Manager Reviewed
SWMU or AOC1 **GDP Location Map**			
Location of **Excavation** **Soil Borings** **Other**			
Water Discharge Permit			
Air Monitoring Data Excavation Soil Borings			
Analytical Reports Soil			
Analytical Reports Water			
Waste Manifests Bill of Lading			