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Div of Waste Management
and Radiation Control

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June 8, 2017

DSHW-2017-004884

Mr. Scott T. Anderson, Director
Division of Waste Management and Radiation Control
PO Box 144880
Salt Lake City, Utah 84114-4880

RE: Response to Comments, RFI Phase I Work Plan
North Salt Lake Refinery, EPA ID UTD045267127 ✓

Dear Mr. Anderson:

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) 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). On behalf of BWO, Johnston Leigh, Inc. is submitting the attached Response to Comments and Revised RFI Phase I Work Plan (Phase I WP) for the BWO North Salt Lake Refinery located at 333 West Center Street in North Salt Lake, Utah.

The WMRC comment is cited below followed by BWO response. The BWO response has been incorporated into the attached Revised Phase I WP dated May 1, 2017.

1. *WMRC Comment Site Sampling Strategy Rational.*
Please provide discussions regarding historic waste characteristics at each Solid Waste Management Unit (SWMU). This discussion should identify the nature of the waste (solid, liquid, et.) identify specific constituents of concern (COCs), the identification of any hazardous waste which may have been present and provide conceptual models of how waste constituents are expected to have moved and may be distributed at each SWMU.

<u>BWO Response</u>:
The updated sections of the Contaminant Conceptual Model (Sections 2.3.5, 2.3.6) of the Phase I WP presents the potential waste streams known at the refinery, the analytical methods to detect the waste streams and the background sampling data that shows the distribution of known impacts to soil and groundwater. Additionally, background groundwater data is used in the conceptual model to demonstrate that soil and groundwater impacts are limited to the upper unconfined aquifer and impacts to the lower confined aquifer are highly unlikely given the vertical potential gradient separating the upper and lower aquifers.

In addition to the contaminant conceptual model presented in Section 2.0, a new section has been added under the description of each SWMU, titled "SWMU Potential Waste Characteristics". This new section, in table format (example as included below for SWMU 1), further describes the potential waste stream, COCs, and conceptual model for impact and migration at each SWMU.

4.1.1 SWMU 1 Potential Waste Characteristics

The potential wastes that may be present at SWMU 1 are presented below. Surface soil staining was noted by WMRC during their initial inspection in 1998.

SWMU 1				
Waste Characterization			**Conceptual Model**	
Solid	**Liquid**	**Other**	**Potential COC**	**Waste Distribution/Migration Potential**
K051 API Separator sludge	D004-D011 Metals		Metals SVOC VOC	1. Potential overflow of separator causing surface impacts.
D004-D001 Metals	D018 Reformer reactor waste		Metals SVOC VOC	2. Potential surface impacts migrate to groundwater.
F037 Oil/water separation debris	K049 Slop oil		Metals SVOC VOC	3. Potential leaks in subsurface influent and effluent piping and migration to groundwater.
				4. Comingling with former tank water draw groundwater plume.

2. *Of the COCs identified for the site and at each SWMU, risk may be driven by Volatile Organic Contaminants (VOCs) and metals. How will laser-induced fluorescence (LIF) readings ensure that site risks are adequately being characterized? Some complex hydrocarbon chains that are relatively non-soluble may tend to adhere to soil and concentrate in shallow subsurface soil (greater than ½ foot). LIF readings could target those shallow hydrocarbons for sampling. Whereas, simple hydrocarbon constituents that are water soluble may have migrated to greater depths. PID readings may confirm the presence of soluble hydrocarbons at depth. Please revise the proposed sampling rational to ensure adequate characterization of site risk.*

<u>BWO Response</u>:

BWO understands the WMRC concern for subsurface impacts by simple hydrocarbons like benzene that may be vertically separated from the residual LNAPL impacted soil detected by the LIF. The Contaminant Conceptual Model in Section 2.3.5 has been updated to include the following:

"Between September 11-18, 1991, 42 test pits were excavated at the Refinery to below first encountered groundwater (GeoWest, 1993). The soil was screened in the field using a PID with a 10.2 eV bulb for general levels of volatile organics, and an air pump with a detector tube specific for benzene.

The results of this investigation indicate that although benzene, toluene, ethylbenzene and xylenes (BTEX) were detected in all of the soil samples; the distribution of the four compounds in relation to the total BTEX concentration showed xylenes the most abundant compound followed by ethylbenzene then toluene and lastly benzene. Benzene has a significantly higher vapor pressure and water solubility than the other BTEX compounds. The benzene in the soil most likely migrated to groundwater leaving the less volatile and less water soluble compounds adhered to soil.

The method used to field screen soil for benzene during the 1991 investigation was a PID and detector tube for benzene. The PID measurement and corresponding analytical result for benzene in soil and groundwater (GeoWest, 1993) are presented in **Table 2-1**. Cursory review of the data in **Table 2-1** suggests there was significant variability in field benzene concentrations compared to analytical concentrations of benzene."

The significant variability of PID measurements and benzene concentrations in soil samples is widely known in the industry. However, BWO agrees that PID field screening techniques in combination with the LIF may increase the probability that the higher concentrations of petroleum impacted soil are being sampled. Each soil core sample will be screened using a PID following the procedures outlined in SOP 6 (**Appendix C**). If a PID measurement above 100 parts per million (ppm) suggests inconsistencies between LIF and PID screening data, a second soil sample may be collected and analyzed only for VOC. The most likely location for benzene is just above or in the groundwater based on its higher vapor pressure and water solubility.

Section 3.5 was updated to include discussion on potential metals impacts and highest LIF %RE values as shown below.

3.5 Metals

Metals are more likely associated with the refinery waste water collection and treatment. The API separators, bundle cleaning pad, and pump wash down pad are examples of potential locations for waste water impacts with metals. Lead may be encountered given its use in gasoline prior to 1980. The conceptual model is that metals are more likely to be associated with petroleum contamination that would be detected using LIF. Sampling the highest LIF RE% and/or highest PID measurement at each boring is a reasonable approach to potentially detect metals contamination.

3. *Section 5.2.3.1. What is the site/SWMU LNAPL standard characteristic to be used and how are they determined? This should correlate to question one above. How does the standard correlate to the likely risk drivers [VOCs, Semi-volatile Organic Contaminants (SVOCs) and metals] for the site and specific SWMUs? Targeting*

the greatest concentration of hydrocarbons does not necessarily adequately characterize risk.

BWO Response:
The site/SWMU LNAPL standard is explained in updated Section 3.2.1: "The laser is sensitive to a known range of common fuels. Each product fluoresces uniquely and the LIF system detects the differences between them. Impacted soil and LNAPL collected from the Refinery will be compared to the standard in an emulation test before the sampling begins. The emulation test will verify that the LIF can detect the LNAPL and/or differentiate between several LNAPL fuels (i.e gasoline, diesel, jet fuel, crude oil). The SOP for daily LIF calibration is included in **Appendix C**."

The following Sections have been added to Section 3.0 to further describe the field techniques to identify the potentially greatest concentrations of the COCs and assist in identification of potential risks:

3.3 PID Screening for VOC

Benzene impacts to soil were detected at the Refinery by GeoWest in 1993. GeoWest excavated test pits to depths of less than two (2) feet to 12 feet below grade. Most of the test pits were excavated to a depth of four to eight feet below grade. Soil samples collected by GeoWest were representative of worst-case conditions based on visual observations and PID screening measurements.

Judgmental screening of the soil core samples will be used in addition to the LIF results. PID screening of the soil may be necessary if visual or olfactory indications suggest simple hydrocarbon impacts (i.e. benzene) are present within or below the LIF smear zone interval. Each soil core sample will be screened using a PID following the procedures outlined in SOP 6 (**Appendix C**). If a relatively high PID measurement suggests impacted soil not coincidental with the highest LIF measurement, a second soil sample may be collected and analyzed only for VOC. However, as shown in **Table 2-1** (GeoWest 1993), the highest PID field measurement does not necessarily yield high detections of benzene.

3.4 SVOC

SVOC are comprised of more complex hydrocarbons and the greatest LIF %RE is more likely to be associated with the highest concentration of SVOC. Therefore, the highest LIF %RE will be sampled for SVOC.

3.5 Metals

Metals are more likely associated with the refinery waste water collection and treatment. The API separators, bundle cleaning pad, and pump wash down pad are examples of potential locations for waste water impacts with metals. Lead may be encountered given its use in gasoline prior to 1980. The conceptual model is that metals are more likely to be associated with petroleum contamination that would be detected using LIF. Sampling the highest LIF RE% and/or highest PID measurement at each boring is a reasonable approach to potentially detect metals contamination.

4. *At what level is the LIF deemed too low to direct sampling efforts and is there any level where PID measurements that do not correlate with LIF readings become significant for sample consideration?*

   BWO Response:
   There is not an analytical concentration that is used for this type of comparison. Experience has shown that a RE% less than 5% correlates to BTEX concentrations that are generally less than most clean up levels. The Field Sampling Techniques in Section 3.0 has been updated to include specific procedures for field screening soil for VOC, SVOC and metals. Field screening using a PID in conjunction with laboratory analysis of at least one soil and one groundwater sample at each boring will ensure sufficient data collection in the event the LIF readings are below detection.

5. *Neither the Standard Operating Procedures (SOPs) nor plan narratives appears to address LIF calibration, yet address other equipment standards. Please revise as needed.*

   BWO Response:
   The LIF calibration procedures have been updated in Section 3.2.1 and included in **Appendix C**.

6. *Section 3.6 – The plan proposes to use four-foot screened interval lowered to the bottom of borings to collect groundwater samples. SWMUs typically specify borings proposed for groundwater sampling will be advanced from 12 to 15 feet in depth without regards to depth of the upper most groundwater interface. The screened interval needs to be sampled from the top of the groundwater, especially when LNAPLs are likely present. Please revise as needed.*

   BWO Response:
   The reference to screen interval in Section 3.9 has been revised to read: "After the collection of the continuous soil core samples to the total depth, a 0.75-inch prepack well screen is lowered to the bottom of the outer casing with the screen interval extending above the groundwater surface."

7. *SOP 3 – Section 2.1, Well Gauging. The text specifies that wells can be used to assess LNAPL thickness if present. This can only be accomplished if it is ensured that the screen interval coincides with the upper most groundwater level. Please revise as needed.*

BWO Response:

The reference to screen interval in Section 3.9 has been revised to read: "After the collection of the continuous soil core samples to the total depth, a 0.75-inch prepack well screen is lowered to the bottom of the outer casing with the screen interval extending above the first encountered groundwater surface."

8. *Please indicate if existing groundwater wells will be utilized for elevation measurements and sampling.*

BWO Response:

BWO proposes to utilize select pre-existing Refinery and LTA wells for elevation and groundwater sampling. Section 4.3 Groundwater Monitoring Wells has been added to the text.

4.30.1 Refinery Groundwater Monitoring Wells

A total of 19 groundwater monitor wells were installed inside the refinery and downgradient in the undeveloped area to the west in response to Utah Department of Environmental Quality (DEQ) concerns over potential impacts to groundwater from the former surface impoundments (SWMUs 6, 7 and 8). The wells were installed in 1985 and include S-85-1 through S-85-19 and P-85-10. All of these wells were screened in the first encountered shallow aquifer at depths of between 2.5 and 25 feet BGS except well P-85-10. Well P-85-10 was screened in the deeper confined aquifer at a depth of 65-70 feet BGS. The equilibrated groundwater elevations in well P-85-10 typically rose above ground surface meaning it was a flowing well. The groundwater elevation in the shallow or unconfined aquifer remained below grade typically between 4-8 feet BGS. Therefore, the vertical potential gradient was up and groundwater in the shallow aquifer does not migrate to the deeper aquifer.

The current Refinery well database presented in **Table 3-1** indicates that some of the wells have had groundwater surface above the screen interval. For the purpose of groundwater elevation data, all the wells in **Table 3-1** can be used after the damaged ones are repaired and all are re-surveyed. However, only Refinery and LTA wells S-85-2, S-85-4, S-85-6, S-85-8, S-85-12, S-85-15A, S-85-18, S-2 and S-4 are screened across the groundwater surface and can be used for groundwater sampling wells.

4.30.2 Groundwater Sampling

The Refinery monitoring wells will be inventoried for well integrity and wells that are deemed salvageable for future use will be repaired accordingly. The repair data will be documented in the Phase I report. It is anticipated that at a minimum wells S-85-2, S-85-4, S-85-6, S-85-8, S-85-12, S-85-15A, S-85-18, S-2 and S-4 will be sampled following procedures in **SOP 3**.

9. *Slug tests are to be conducted at select wells but no wells are identified for testing. Please provide a list of wells proposed to be tested. If an assessment of potential plume migration is to be modeled by the data, the Division recommends performing the tests towards the leading edge of plumes.*

   BWO Response:
   The slug tests are to be performed on the temporary well points. In Section 4.0, a slug test is identified and the temporary well it is proposed to be performed on is also identified. Additionally, the slug tests are identified on **Table 4-1** Phase I Soil and Groundwater Sampling Schedule.

10. *SOP 9 Investigation Derived Waste (IDW). Analytical methods specified are those in Section 3.3.4. No such numbered section exists. Section 2.3.4 lists analytical methods used for site characterization purposes, mainly for risk assessment purposes which are generally on a total basis. The specified analysis may be needed however, to address LDR requirements to assess concentrations of underlying hazardous constituents or to verify the presence of listed hazardous waste. The Division feels that applicable hazardous waste determinations for site waste should also assess corrosively, ignitability and toxicity through appropriate analysis. Please revise as warranted.*

    BWO Response:
    In SOP 9 the section under "Soil" has been changed and now reads, "The soil will be disposed of at Safety Clean Grassy Mountain facility in Tooele County, Utah. A Waste Profile Sheet will be completed with the required analytical documentation and reviewed by Safety Clean prior to disposal. All waste manifests will be included in the report documentation of the Phase I activities."

11. *The Community Relations Plan's community profile is exclusive to the 84054 zip code. The Division notes that the refinery is located generally near the center of this area. It is also noted that a highly populated community begins about 2,000 feet northeast of the northeast most corner of the site (this is a void that exists in the 84054 zip area). The Division recommends Big West Oil consider expanding the community relation plan's community profile.*

BWO Response:
The community relations plan's focus area will include the general area of zip code 84054 and a small portion of 84011 zip code as shown on **Figure 3-1** in the Community Relations Plan.

12. *The listed information repository at the Big West Oil North Salt Lake Refinery may not be considered by some members of the public as a community friendly location. To address this concern the Division recommends adding the Multi-Agency State Office Building to the repository list.*

BWO Response:
BWO will add the additional information repository as recommended. The Community Relations Plan has been updated accordingly.

13. *Division staff recalls facility representatives in a past meeting indicating that Big West Oil would maintain a public assessable website to share facility RCRA related information. The draft plan does not mention this option. The Division notes that Big West Oil maintains a website under which the Community tab identifies a 2013 EPA Consent Decree, but nothing related to RCRA. Is this the website that was being considered to include the RCRA information?*

BWO Response:
BWO plans to add information concerning RCRA to this website. The purpose of the website information will be to provide interested parties with contact information and direction on obtaining documents or additional information concerning the RCRA status of the refinery. The Community Relation Plan has been updated accordingly.

14. *6.0 Data Management and Reporting Plan. The reporting plan narrative focuses on software, spreadsheets, digital maps and pull down menus. This is adequate for the purpose of Division staff review. However, as a public agency, hardcopy reports are required in a format that is public friendly. Perhaps the mention of such a report was merely an oversight.*

BWO Response:
Section 6.5 Reporting has been added to the text and reads as follows. "Draft and final version of all reports will be prepared in electronic and hardcopy formats, and delivered to the WMRC. The reports will include text, tables, figures and supporting appendices."

15. *Wind Rose 1.3.4 and Figure 1-4. The wind rose provided was for the Salt Lake International Airport. Is there other available data closer to the facility or to the Wasatch Front? The Wind Rose presented depicts wind directions and speed from July 1. 2015 to December 31, 2015. This appears rather seasonal in representation. Does this short time interval (184 days correlate well with historic data.*

BWO Response:
Section 1.3.4 has been updated and now reads: "Based on information from the Western Regional Climate Center (WRCC), the prevailing wind direction in Salt Lake City from 1992 to 2002 was from the south-southeast (WRCC, 2016). The wind speed and direction chart near the Salt Lake City airport from January 1, 1998 to December 31, 2016 was south-southeast as shown below on **Figure 1-5** (MetroBlue, 2017). Based on data from WRCC, winds are generally calm in the

morning and increase in velocity in the afternoon. From July 1 to December 31, 2015 average wind speeds peaked between 19-25 miles per hour (MPH) from the south-southeast approximately 15% of the time and are associated with typical weather fronts that impact the Salt Lake Valley."

16. *Section 29 of the Consent Order specifies that the Phase I RFI Work Plan shall contain a schedule.*

BWO Response:
The estimated schedule has been added to the text in Section 3.13 Schedule, and includes the following table:

Task	Approximate Dates
Work Plan Submittal	06/08/2017
Survey and repair BWO monitoring wells	June 2017
Geophysical survey for utilities at all proposed sampling locations	June-July 2017
Phase I Sampling	Within 90 days following receipt of Work Plan approval
Prepare Report of Phase I Sampling	Within 180 days following receipt of Work Plan approval

17. *The Division notes that Appendix A HASP contains an Appendix A (SOPs) within itself. Appendix C also contains SOPs with similar topics. Are the two sets of SOPs identical?*

BWO Response:
Although it's repetitive when submitting the Work Plan, it's efficient when using the individual documents in the field.

18. *Section 5.3. The certification provided in Appendix E specifies that certification expired 6/30/2013. Please provide current certification or provide for a replacement analytical laboratory.*

BWO Response:
The current certification for ESC Laboratory has been included in Appendix E.

19. *The title of the subject proposal is RCRA RFI Phase I Work Plan. This is redundant. RFI stands for RCRA Facility Investigation.*

BWO Response:
The title has been changed to RFI Phase I Work Plan. The headers and footers have been changed as needed.

20. The proposed project completion of 90 percent is low. Missing data can however be made up during the Phase II especially if there is a request for NFA.

BWO Response:
The proposed project completeness has been changed to a goal of 95 percent or higher.

If you have questions or require additional information please contact me by phone at (801) 726-6845, email at leigh@johnstonleighinc.com, or Molly Gregersen of BWO at (801) 296-7700.

Sincerely,

Leigh Beem, P.G., UT 5538610-2250
Johnston Leigh, Inc.

CC: Ms. Molly Gregersen, P.G., Big West Oil

Attachments: RFI Phase I Work Plan, BWO North Salt Lake Refinery, EPA ID UTD045267127012, June 8, 2017 (paper version and CD disk)