QM-96 Compliance Monitoring
2021 Annual Summary
WWP Central Steam Plant
Oil Spill Remediation
Spokane, Washington

February 24, 2023

Prepared for

Avista Corporation
Spokane, Washington

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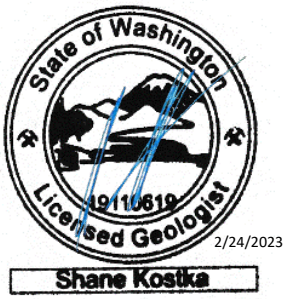

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LIST OF ABBREVIATIONS AND ACRONYMS

Apex ..... Apex Laboratories, LLC
ARI ..... Analytical Resources, Inc.
Avista ..... Avista Corporation
CAP ..... cleanup action plan
cfm ..... cubic feet per minute
City ..... City of Spokane
CO_2 ..... carbon dioxide
CP ..... condensate pump
CSO ..... combined sewer overflow
Ecology ..... Washington State Department of Ecology
EPA ..... US Environmental Protection Agency
FOG ..... fats, oil, and grease
ft ..... feet
HEM ..... N-Hexane Extractable Material
in-H_2O ..... inches of water
Landau ..... Landau Associates, Inc.
mg/L ..... milligrams per liter
MTCA ..... Model Toxics Control Act
NWTPH-Dx ..... Northwest gasoline-range total petroleum hydrocarbon extended
O&M ..... operation and maintenance
O_2 ..... oxygen
RL ..... reporting limit
QM ..... quarter of monitoring
QM-96 ..... 96th quarter of monitoring
SCADA ..... Supervisory Control and Data Acquisition
SCAPCA ..... Spokane County Air Pollution Control Authority
SGT-HEM ..... Silica Gel-Treated N-Hexane Extractable Material
site ..... Central Steam Plant site
SMC ..... Spokane Municipal Code
SRCAA ..... Spokane Regional Clean Air Agency
TPH ..... total petroleum hydrocarbons
UST ..... underground storage tank
VOC ..... volatile organic compound
WWP ..... Washington Water Power Company
WAC ..... Washington Administrative Code

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1.0 INTRODUCTION

Landau Associates, Inc. (Landau) prepared this quarterly compliance monitoring and annual data summary report for Avista Corporation (Avista), formerly the Washington Water Power Company (WWP), to support cleanup action activities at the Central Steam Plant site in Spokane, Washington (site, Figure 1). This report presents the results of quarterly compliance monitoring conducted during the 96th quarter (QM-96), October through December 2021, as well as a summary of the results of compliance monitoring conducted during calendar year 2021.

1.1 Background

The Central Steam Plant was constructed in 1915 and provided steam heat and electrical power to downtown Spokane until operations ceased in 1986. Seven concrete underground storage tanks (USTs) were used to store Bunker C fuel oil for steam plant operations. In June of 1982, WWP reported a release of Bunker C from one of the USTs to the Washington State Department of Ecology (Ecology).

Site cleanup activities are being performed in accordance with the cleanup action plan (CAP) developed by Ecology (Ecology 1996a), per the terms presented in the WWP/Ecology Amended Consent Decree (Ecology 1996b). By November 21, 1997, construction of the mechanical systems related to cleanup action remediation were substantially completed, and startup of the hydraulic control, free product recovery, bioventing, and stormwater control systems had been initiated. A Supervisory Control and Data Acquisition (SCADA) system continuously monitors mechanical remediation-system parameters, including groundwater extraction rates and elevations, free product recovery, and bioventing system parameters including airflow, pressures, and oxygen ($O_{2)}$ and carbon dioxide (CO_2) concentrations. Demonstration, validation, and calibration of the systems were performed during October–December 1997, and the cleanup action construction was summarized in the Final Cleanup Action Report (AGI 1998).

Since 1997, the remediation systems have operated per the CAP, and quarterly compliance monitoring activities have been performed in accordance with the final compliance monitoring plan (AGI 1998).

1.2 Compliance Monitoring and the Purpose of This Report

This compliance monitoring report presents the results of site compliance monitoring and mechanical system operation and maintenance (O&M) conducted during QM-96, as well as a summary of the results of compliance monitoring conducted during calendar year 2021, in accordance with the final compliance monitoring plan (AGI 1998) and Model Toxics Control Act (MTCA) Cleanup Regulations, Washington Administrative Code (WAC) 173-340-410 (Ecology 1996c). The two types of compliance monitoring addressed in this report are described as follows:

- ***Protection monitoring*** ensures that human health and the environment are adequately protected during construction and operation of the cleanup action. Protection monitoring includes conducting semiannual groundwater monitoring and previously included conducting quarterly air monitoring.
- ***Performance monitoring*** is conducted to demonstrate when cleanup standards have been met. In accordance with the final compliance monitoring plan, performance monitoring includes groundwater, stormwater, hydraulic control, and bioventing-system monitoring.

Further discussion of protection and performance monitoring conducted during QM-96 is included in Sections 3 and 4, respectively. A summary of performance monitoring is included in Section 6. Although groundwater monitoring can be categorized as both protection and performance monitoring, it is discussed only in Section 4.1.

After the first 3 years of system operation (QM-1 through QM-12), the performance monitoring program was reevaluated, and changes to the groundwater monitoring schedule were proposed in the QM-12 annual data summary report (Landau 2001a). Currently, groundwater sampling and elevation monitoring are conducted semiannually in accordance with the revised monitoring schedule accepted by Ecology (Ecology 2001) and presented in the QM-13 report (Landau 2001b).

2.0 OPERATION AND MAINTENANCE ACTIVITIES COMPLETED DURING QM-96

To ensure effective operation of the four remediation mechanical systems (hydraulic control, free product recovery, bioventing, and stormwater control), scheduled and unscheduled operation and maintenance site visits are periodically conducted. GeoEngineers completed the following operation and maintenance activities during QM-96 (GeoEngineers 2021; Appendix A):

October 7, 2021

- Groundwater level transducer PZ2 continued to indicate a groundwater elevation of approximately 10 feet (ft) lower than PZ1 and PZ3. Replacement of the PZ2 transducer is recommended by GeoEngineers.
- The stormwater detention tank's pump had remained off since the previous O&M event. The detention tank's pump control was switched to manual operation but remained off. GeoEngineers states that the detention tank's pump relay requires troubleshooting. According to the SCADA system, the tank level read 32 inches. Avista and GeoEngineers plan to continue monitoring detention tank levels and pump operation.
- One stormwater sample was collected, using a disposable bailer, from the stormwater detention tank located in the Avista substation yard. The sample was analyzed for fats, oils, and greases (FOG) as N-Hexane Extractable Material (HEM) and Silica Gel N-Hexane Extractable Material (SGT-HEM) by US Environmental Protection Agency (EPA) Method 1664A. Stormwater performance monitoring and the analytical results for this sample are discussed in Section 4.2.
- One groundwater sample was collected from extraction well EW-1 (Figure 3) using the sampling port in the EW1 vault. The sample was analyzed for FOG as HEM and SGT-HEM by EPA Method 1664A. Extracted groundwater performance monitoring and the analytical results for this sample are discussed in Section 4.3.2.
- The EW1 belt skimmer was adjusted because the belt was loose and slipping on the head pulley. A thick layer of free product was removed from the skimmer via hand spinning the skimmer belt after adjustment. The EW1 belt skimmer was operating properly after adjustment. All other belt skimmers were operating properly.
- The EW2 and EW3 product-recovery tank-level transmitters were reading inaccurate reservoir levels upon arrival. Both tank-level transmitters were cleaned and continued to read inaccurate levels in the SCADA system. All other vault product-recovery tank-level transmitters were operating within normal limits.
- The bioventing system condensate pump (CP) removed during the August 26, 2021 maintenance event during QM-95 was not replaced. A replacement CP was installed during the subsequent O&M event.

November 24, 2021

- Groundwater level transducer PZ2 continued to indicate the groundwater elevation inaccurately and was turned off. Replacement of transducer PZ2 is recommended by GeoEngineers.

- Maintenance was performed on the stormwater detention tank's pump. The propeller was found to be binding inside the pump, and so the propeller nut was adjusted. The pump appeared to be functioning properly following the adjustment. According to the SCADA system, the detention tank level was 58 inches. Avista and Geoengineers plan to continue monitoring detention tank levels and pump operation.
- The OR3 belt skimmer was on upon GeoEngineers' arrival, but the skimmer belt was torn. The OR3 belt skimmer was turned off and will remain off until the broken belt can be removed and replaced. The EW1 belt skimmer was adjusted because the belt was loose and slipping on the head pulley. A thick layer of free product was removed from the skimmer via hand spinning the skimmer belt after adjustment. The EW1 belt skimmer was operating properly after adjustment. All other belt skimmers were operating properly.
- The EW3 product-recovery tank-level transmitter was reading inaccurate reservoir levels upon arrival. It was removed and cleaned but continued to report inaccurate readings in the SCADA system. All other product-recovery tank-level transmitters were operating within normal limits.
- A new bioventing system CP was installed in the knockout tank. The pump will be tested in the future when sufficient moisture is present, because the pump is not recommended to be operated under dry conditions.

3.0 PROTECTION MONITORING

From 1997 to 2016, air protection monitoring was performed quarterly to ensure that discharge from the bioventing system complied with the requirements of the Spokane Regional Clean Air Agency (SRCAA; formerly the Spokane County Air Pollution Control Authority [SCAPCA]). As reported in the QM-74 report (Landau 2016), a letter from the SRCAA to Avista, dated April 13, 2016, stated that registration of the bioventing system would no longer be necessary because volatile organic compound (VOC) concentrations had decreased to less than 1 pound per year (SRCAA 2016).

4.0 PERFORMANCE MONITORING

This section includes a description of the various types of performance monitoring completed during QM-96. Figures 2, 3, and 4 show the approximate locations of the monitoring wells, the hydraulic control system, and the free product-recovery wells, respectively. The figures have been updated to reflect changes in property ownership and development.

4.1 Groundwater Performance Monitoring

As defined in the Amended Consent Decree (Ecology 1996b), the site consists of the area affected by petroleum hydrocarbons in soil above MTCA Method A cleanup levels. Because hazardous substances are contained on the site, the groundwater point of compliance was established as close as practicable to the edge of the contained hazardous substances, not to exceed the northern boundary of Steam Plant Square (Ecology 1996a). Groundwater performance monitoring is conducted to evaluate whether groundwater performance standards have been met. Groundwater performance monitoring includes groundwater sampling and laboratory analysis, and measurement of groundwater elevations. When free product is encountered in monitoring wells upgradient of the barrier wall, the thickness of free product is measured in conjunction with groundwater elevation measurements. Groundwater monitoring is conducted semiannually in accordance with the revised schedule specified by Ecology (Ecology 2001).

4.1.1 Groundwater Sampling

Semiannual groundwater sampling was not conducted during QM-96. The next groundwater sampling event is scheduled to occur in QM-97.

4.1.2 Groundwater Elevation Monitoring

Groundwater elevations in site monitoring wells were not measured during QM-96. Groundwater elevations in site monitoring wells will be measured in QM-97 in conjunction with semiannual groundwater sampling.

4.2 Stormwater Performance Monitoring

Stormwater monitoring is conducted to ensure that stormwater discharged to the combined sewer overflow (CSO) system is in compliance with City of Spokane (City) discharge criteria per Spokane Municipal Code (SMC) 13.03A.0201(B)(19). In accordance with the final compliance monitoring plan, during operation of the cleanup action, one stormwater sample per year is collected from the site stormwater detention tank for FOG analysis and compared to the City discharge limit of 100 milligrams per liter (mg/L). A stormwater sample was collected from the stormwater detention tank on October 7, 2021 for analysis of FOG as HEM and SGT-HEM by EPA Method 1664A. FOG was not reported above the laboratory reporting limit (RL) of 5.5 mg/L, which is less than the discharge limit. A

copy of the laboratory analytical report is included in Appendix C of the Geoengineers 4th quarter 2021 O&M report in (Appendix A).

4.3 Hydraulic Control Monitoring

Groundwater pumps in extraction wells EW1, EW2, and EW3 convey groundwater upgradient of the subsurface barrier wall to the CSO. Hydraulic monitoring is conducted to ensure that an inward gradient with respect to shallow groundwater is maintained across the barrier wall. Extracted groundwater from the hydraulic control system is sampled annually and analyzed for FOG as HEM and SGT-HEM using EPA Method 1664A.

4.3.1 Groundwater Elevation Monitoring

The groundwater elevations in extraction wells EW1, EW2, and EW3 and piezometer wells PZ1, PZ2, and PZ3 located upgradient of the barrier wall are continuously logged by groundwater level transducers, and the data is recorded by the SCADA system to monitor performance of the hydraulic control system. During semiannual groundwater sampling, the groundwater elevation in monitoring wells MW-012, MW-027, and MW-030 is also manually measured to verify that the groundwater elevation north of the barrier wall is above the groundwater elevation south of the wall, indicating an inward hydraulic gradient is present. Monitoring well locations are shown on Figure 2, and hydraulic control piezometer and extraction well locations are shown on Figure 3. Table 1 summarizes groundwater elevation data collected by the SCADA system. As discussed in Section 2.0, water levels recorded by the SCADA system in piezometer PZ2 were inaccurate and groundwater elevations at PZ2 during QM-95 are not presented. This transducer will be replaced during QM-97 (GeoEngineers 2021).

Water levels recorded for extraction wells EW1, EW2, and EW3 and for piezometer well PZ1 during QM-96 show that average groundwater levels upgradient of the barrier wall at these points were consistent with historical levels and below historical groundwater elevation readings recorded at MW-012, MW-027, and MW-030. Water levels recorded for piezometer well PZ3 were above historical levels but below historical levels measured at MW-030 (the nearest monitoring well). This suggests that an inward hydraulic gradient was maintained across the barrier wall during QM-96.

4.3.2 Extracted Groundwater Monitoring

Sampling and analysis of extracted groundwater is performed to ensure FOG in groundwater discharged to the City's CSO system does not exceed the 100 mg/L discharge limit. A sample of extracted groundwater was collected from extraction well EW1 on October 7, 2021 and analyzed for FOG as HEM and SGT-HEM by EPA Method 1664A. FOG was not reported above the RL of 5.5 mg/L, which is less than the discharge limit. A copy of the laboratory analytical report is included in Appendix C of the Geoengineers 4th quarter 2021 O&M report (Appendix A).

4.4 Product Recovery Monitoring

The SCADA system monitors free product recovery at groundwater extraction wells EW1, EW2, and EW3 and at oil recovery wells OR1 and OR3 to confirm performance of the belt skimmers and to track free product-recovery trends. When necessary, free product is removed by pumping directly from an individual well (well extraction).

4.4.1 Belt Skimmer Monitoring

Free product-recovery well locations are shown on Figure 4. Table 2 summarizes free product recovery data for QM-96. The product recovered by the belt skimmers includes water but is reported as total free product recovery because of the difficulty in quantifying the amount of recovered liquid that is free product. The SCADA system did not record free product recovery for the EW2 belt skimmer from October 11 through December 5, 2021 or for the EW3 belt skimmer from October 11 through December 31, 2021 (the end of QM-96). Also, the OR3 belt skimmer was turned off during the November 24, 2021 O&M event because of a broken belt and remained off for the rest of QM-96. No free product recovery was recorded by the SCADA system from the EW2 or EW3 belt skimmers during those periods. Therefore, the actual volume of free product recovered by the belt skimmers during QM-96 is likely greater than the amount reported by the SCADA system.

As reported by the SCADA system, approximately 112.2 gallons of free product were recovered by the belt skimmers during QM-96. Note that free product recovery at OR3 has been historically less than product recovery at other free product-recovery wells. The volume of fluid removed from oil recovery well reservoir tanks is listed in GeoEngineers' 4th quarter 2021 operation and maintenance report.

In accordance with the CAP (Ecology 1996b), product recovery is considered impracticable if less than 1 gallon of product is recovered per well during 2 consecutive quarters. However, groundwater from the extraction wells is sent to the City's CSO system, and product recovery from these wells, however small, is intended to be maintained throughout operation of the hydraulic control system.

4.4.2 Well Extraction

Well extraction was not conducted during QM-96.

4.5 Bioventing Performance Monitoring

Concentrations of CO_2 and O_2 are monitored in bioventing extraction wells to evaluate the performance of the bioventing system. O_2 is injected into the subsurface to enhance the activity of indigenous microorganisms and promote biodegradation of petroleum hydrocarbons. The optimal range of O_2 concentration (10 percent to 15 percent by volume; AGI 1998) should promote biodegradation. CO_2 is a byproduct of aerobic respiration from hydrocarbon-degrading bacteria, and a concentration of 0.20 percent by volume in the extraction wells indicates that biodegradation of

petroleum hydrocarbons is occurring at the designed rate, assuming all other performance standards are met (AGI 1998).

4.5.1 Bioventing Extraction Wells

Air extracted from the 10 bioventing extraction wells (BE1 through BE10; Figure 5) is monitored by the SCADA system to evaluate performance of the bioventing system and to measure biodegradation of free product. Table 3 summarizes bioventing system extraction well data for QM-96.

During QM-96, the quarterly average O_2 concentration for the 10 bioventing wells was 3.48 percent (Table 3), which is below the performance standard of 10 percent to 15 percent by volume, as well as below historical levels of approximately 13.5 percent by volume. During the same reporting period, the quarterly average CO_2 concentration for the 10 bioventing wells was 3.77 percent by volume, which is greater than the estimated optimal concentration of 0.20 percent by volume as well as greater than historical levels of 0.46 to 0.95 percent by volume.

The estimated total volume of free product biodegraded by the bioventing system as reported by the SCADA system is calculated using the relative percentages of O_2 and CO_2 and total airflow, with CO_2 having the greatest influence on the SCADA calculation for free product volume biodegraded. Because of the elevated recorded CO_2 levels, the estimated total volume of Bunker C biodegraded for QM-96 was above the historical average of approximately 80 to 100 gallons per month. The estimated total volume of free product biodegraded as reported by the SCADA system during QM-96 was approximately 2,540.14 gallons (Table 3).

4.5.2 Bioventing Injection Wells

Air injected into the subsurface through the seven bioventing injection wells (BI1 through BI7; Figure 5) is monitored to ensure satisfactory performance of the bioventing system. Bioventing injection data collected by the SCADA system during QM-96 are presented in Table 4.

Average monthly bioventing injection well pressures for QM-96 ranged between 0.23 (at bioventing injection well BI1 in November and December) and 6.49 (at bioventing injection well BI4 in November) inches of water (in-H_2O). Although the range extended outside the anticipated operating range of 3-10 in-H_2O (AGI 1998), the average pressure of all bioventing injection wells was 5.45 in-H_2O, which was within the anticipated operating range. Note that pressures in bioventing injection well BI1 have historically been lower than the bioventing injection pressures in the other injection wells. The average reported total air flow rate for QM-96 was 141.94 cubic feet per minute (cfm).

5.0 ACTIVITIES PLANNED FOR QM-97

Planned monitoring and maintenance activities for QM-97 include the following:

- Monitor extraction well operation and SCADA information to confirm extraction wells are functioning properly and accurate groundwater elevation and flow readings are being accurately displayed.
- Monitor detention tank level and pump operation.
- Perform corrective maintenance to belt skimmer components, as necessary.
- Perform scheduled system operation and maintenance.
- Replacement of the transducer in piezometer PZ2.
- Replacement of the OR3 belt skimmer belt.
- Troubleshooting of the EW3 product-recovery tank-level transmitter with a SCADA technician.
- Perform system component operational and calibration checks.
- Conduct scheduled semiannual groundwater sampling and elevation and product thickness monitoring at site monitoring wells.

6.0 SUMMARY AND CONCLUSIONS—QM-96

The following is a summary of the compliance monitoring data collected during QM-96 based on available SCADA system data:

- Groundwater elevation data collected by the SCADA system during QM-96 indicate that containment of groundwater was preserved, and inward gradient was maintained across the barrier wall.
- Active belt skimmers recovered approximately 112.2 gallons of liquid, including free product and entrained water, from extraction and oil recovery wells, as reported by the SCADA system, during QM-96.
- The SCADA system recorded an average O_2 level of 3.48 percent in bioventing extraction wells. The SCADA system recorded an average CO_2 level of 3.77 percent in bioventing extraction wells. The bioventing monitoring system will be monitored during subsequent quarters to evaluate the accuracy of the data recorded by the SCADA system.
- The estimated total volume of free product degraded by the bioventing system as reported by the SCADA system during QM-96 was approximately 2,540.14 gallons.
- Bioventing injection well pressures ranged between 0.23 and 6.49 in-H_2O. The average pressure of all bioventing injection wells was 5.45 in-H_2O, which is within the anticipated operating range of 3-10 in-H_2O. The average total airflow rate for the reporting period was 141.94 cfm.
- Laboratory results for the annual extracted groundwater sample did not exceed the discharge limit of 100 mg/L for FOG as HEM and SGT-HEM by EPA Method 1664A.
- Laboratory results for the annual stormwater sample collected from the detention basin did not exceed the discharge limit of 100 mg/L for FOG as HEM and SGT-HEM by EPA Method 1664A.

Results of compliance monitoring performed during QM-96 indicate that the Central Steam Plant Oil Spill remediation system is operating in accordance with regulatory criteria and permit levels.

7.0 ANNUAL SUMMARY—2021 COMPLIANCE MONITORING

This section summarizes the results of groundwater performance monitoring, stormwater management, hydraulic control, product recovery, and bioventing system operation during QM-93 through QM-96. Performance data from hydraulic control monitoring, free product recovery, and bioventing system parameters are recorded continuously by the SCADA system. The SCADA system was upgraded during 2021 to maintain the longevity of the system. A temporary malfunction during the system upgrade resulted in the SCADA system recording but not generating data, which could be downloaded from January 20 through January 31 of QM-93. All data in this report is based on available SCADA data provided by Avista.

7.1 Groundwater Performance Monitoring

Groundwater performance monitoring is conducted semiannually to ensure that hazardous substances at concentrations greater than cleanup levels are not migrating off-site. Groundwater performance monitoring includes groundwater quality monitoring and groundwater elevation monitoring and free product gauging.

7.1.1 Groundwater Quality Monitoring

2021 semiannual groundwater quality monitoring was performed by Landau in March (QM-93) and October (QM-95). Note that although QM-92 is prior to this annual reporting period, QM-92 groundwater monitoring analytical results affected the QM-93 and QM-95 sampling events. Therefore, QM-92 groundwater monitoring results are included in the discussion below. In accordance with the revised schedule specified by Ecology (2001), groundwater samples were collected from monitoring wells MW-006, MW-007, MW-012, MW-016, MW-017, MW-018, MW-020, MW-021, MW-023, MW-025, MW-027, MW-028, and MW-030 during both semiannual events. Monitoring wells MW-016, MW-017, and MW-018 are sampled annually during the first semiannual monitoring event if sufficient groundwater thickness is present to accommodate sampling. Groundwater samples were collected from monitoring wells MW-016 and MW-017 during the first semiannual monitoring event (QM-93). The monitoring well locations are shown on Figure 2.

Historically, groundwater samples have been submitted to Analytical Resources, Inc. (ARI), where they have been analyzed for diesel-, motor oil-, and Bunker C-range petroleum hydrocarbons using Ecology-approved Method Northwest gasoline-range total petroleum hydrocarbon extended (NWTPH-Dx) with acid wash and silica gel cleanup. Detections of motor oil-range petroleum hydrocarbons and/or Bunker C were reported above the laboratory RL during QM-92 (in monitoring wells MW-006, MW-007, and MW-025) and QM-93 (in monitoring wells MW-006, MW-007, MW-021, MW-023, MW-025, MW-028, and MW-030), and Bunker C-range petroleum hydrocarbons were reported above the site groundwater performance standard in monitoring well MW-025 during QM-92 and in MW-021, MW-025, and MW-028 during QM-93. The hydrocarbon detections were characterized by ARI as a response of unknown alkanes in the C24-C32 range and were not identified

as a petroleum fuel product but were reported in the Bunker C- and motor-oil ranges because the responses occurred within those hydrocarbon ranges. The detections were not considered to be associated with the Bunker C release.

Following receipt of the QM-92 and QM-93 laboratory data packages from ARI, the sample chromatograms were reviewed by Apex Laboratories, LLC's (Apex's) forensic services to further investigate the source of the detections. Apex identified the detection as a wax-dominant laboratory contaminant. Because these detections were identified as a wax-dominant laboratory contaminant, the motor-oil range and Bunker-C range total petroleum hydrocarbons (TPH) detected in QM-92 and QM-93 were not considered to be associated with the Bunker C release. However, additional laboratory analysis was conducted in QM-95 to verify this conclusion.

Split samples were collected from select monitoring wells during QM-95 groundwater sampling and sent to Apex for diesel-, motor oil-, and Bunker C-range petroleum hydrocarbons analysis using Ecology-approved Method NWTPH-Dx with and without acid wash and silica gel cleanup. A detection of motor oil-range organics was reported in a split sample collected from MW-028 during QM-95, analyzed by Apex without silica gel and acid wash cleanup, which was less than the site performance standard of 1.0 mg/L. No other detections in groundwater samples were reported during 2021.

The laboratory reports are included as appendices in the respective quarterly compliance monitoring reports, and the data from both groundwater sampling events completed in 2021 are presented in Table 5.

7.1.2 Groundwater Elevation Monitoring

Groundwater elevation monitoring and free product gauging during 2021 were conducted by Landau in conjunction with semiannual groundwater sampling. Groundwater elevation monitoring and free product gauging were performed at the monitoring wells shown on Figure 2. Data from all groundwater elevation measurements collected in 2021 are presented in the QM-93 and QM-95 quarterly reports and are presented in Table 6.

7.2 Stormwater Performance Monitoring

Stormwater performance monitoring is conducted to ensure stormwater discharged to the CSO system is in compliance with City discharge criteria. In accordance with the compliance monitoring plan, one sample per year is collected from the site stormwater detention basin during operation of the cleanup action. The annual sample of extracted groundwater was collected during QM-96 on October 7, 2021, analyzed for FOG as HEM and SGT-HEM by EPA Method 1664A, and compared to the discharge limit (100 mg/L) listed in SMC 13.03A.0201(B)(19). FOG was not detected above the laboratory RL, which is below the discharge limit.

7.3 Hydraulic Control Monitoring

Hydraulic monitoring is conducted to ensure that an inward gradient with respect to shallow groundwater is maintained across the barrier wall. Groundwater pumps in extraction wells EW1, EW2, and EW3 convey groundwater upgradient of the subsurface barrier wall to the CSO. Extracted groundwater from the hydraulic control system is sampled annually and analyzed for FOG using EPA Method 1664A HEM and SGT-HEM.

7.3.1 Groundwater Elevation Monitoring

Groundwater elevation data in extraction wells EW1, EW2, and EW3 and piezometer wells PZ1, PZ2, and PZ3 is recorded continuously by the SCADA system to monitor performance of the hydraulic control system and water levels upgradient of the barrier wall. Extraction and piezometer well locations are shown on Figure 3. Groundwater elevations presented in this section are based on available and downloadable SCADA data. The transducer in piezometer well PZ2 was not functioning during 2021, so groundwater elevations at PZ2 during 2021 are not presented. Groundwater elevation is measured semiannually by hand in MW-012, MW-027, and MW-030 to verify that that the groundwater elevation north of the barrier wall is above the groundwater elevation south of the wall, indicating an inward hydraulic gradient is present.

Groundwater level measurements recorded by the SCADA system indicate that groundwater upgradient of the barrier wall was below the elevation of the weir in the barrier wall (1,860 ft) throughout 2021, indicating containment of groundwater was maintained. During QM-95, extraction wells EW1, EW2, and EW3 were not functioning, as indicated by no flow recorded in the SCADA system, and groundwater rose above historical levels in extraction wells EW1, EW2, and EW3 and piezometers PZ1 and PZ3 during three distinct periods in August and September. .

According to the hourly data generated by the SCADA system, the groundwater elevations in PZ1 and PZ3 were above the groundwater elevations measured on September 15, 2021 during QM-95 at monitoring wells MW-012, MW-027, and MW-030 (located north of the barrier wall). These measurements were collected during one of the periods when the extraction wells were not functioning, as indicated by the SCADA system. Because a single groundwater elevation measurement was collected from the monitoring wells north of the barrier wall during QM-95, it is unclear whether an inward hydraulic gradient was maintained when the extraction wells were not functioning. However, the highest water level recorded by the SCADA system during QM-95 remained below the elevation of the weir in the barrier wall, indicating containment of groundwater upgradient of the barrier wall was maintained. Groundwater elevations recorded by the SCADA system during QM-95 for the extraction wells and piezometers were consistent with historical levels and below historical levels measured in MW-012, MW-027, and MW-030 when one or more extraction wells were functioning, indicating an inward hydraulic gradient was maintained across the barrier wall.

During QM-96 water levels in piezometer PZ3, as recorded by SCADA, were above historical levels and above historical groundwater elevation measurements taken at MW-012 and MW-027. However, water levels in PZ3 as recorded by SCADA were below historical levels measured in MW-030 (the nearest monitoring well), suggesting that an inward hydraulic gradient was maintained across the barrier wall.

Groundwater elevation data for the remainder of 2021 indicates groundwater levels are consistent with historical levels and an inward hydraulic gradient was maintained across the barrier wall. Table 7 summarizes the 2021 groundwater elevation data for the hydraulic control monitored by the SCADA system.

7.3.2 Extracted Groundwater Monitoring

Extracted groundwater from the hydraulic control system is monitored in accordance with criteria established by the City for discharge to the CSO system. One sample of extracted groundwater is collected annually and analyzed for FOG as HEM and SGT-HEM by EPA Method 1664A and compared to the cleanup standard of 100 mg/L. The annual sample for 2021 was collected from extraction well EW1 on October 7, 2021 (QM-96). FOG was not detected above the laboratory RL which is less than the discharge limit.

7.4 Product-Recovery Monitoring

The SCADA system monitors free product recovery at groundwater extraction wells EW1, EW2, and EW3 and at oil recovery wells OR1 and OR3 to confirm performance of the belt skimmers and to track free product-recovery trends. When necessary, free product is removed by pumping directly from an individual well (well extraction).

7.4.1 Belt Skimmer Monitoring

Free product-recovery well locations are shown on Figure 4. Table 8 summarizes free product-recovery data for 2021. Free product recovered from extraction wells (EW1, EW2, and EW3) and two oil recovery wells (OR1 and OR3) is monitored by the SCADA system to monitor performance of the respective belt skimmers and to monitor free product-recovery trends. Product levels in the EW2 and EW3 product-recovery tanks were not recorded by the SCADA system due to the EW2 product-recovery tank-level transmitter not functioning during QM-95 and from October 11 through December 5, 2021 during QM-96 and the EW3 product-recovery tank-level transmitter not functioning during QM-96 from October 11 through December 31, 2021 (end of QM-96). Therefore, the actual volume of free product recovered by the belt skimmers during 2021 is likely greater than the amount reported by the SCADA system. The SCADA system recorded approximately 607.3 gallons of free product recovered by the belt skimmers during 2021.

7.4.2 Well Extraction

Free product is removed directly from select wells when sufficient thickness has accumulated. No well extraction was performed during 2021.

7.5 Bioventing Performance Monitoring

Concentrations of CO_2 and O_2 were monitored in bioventing extraction wells during 2021 to evaluate the performance of the bioventing system. O_2 is injected into the subsurface to enhance the activity of indigenous microorganisms and promote biodegradation of petroleum hydrocarbons. Bioventing performance data presented below during QM-93 through QM-96 are based on available and downloadable SCADA data.

7.5.1 Bioventing Extraction Wells

Air extracted from the 10 bioventing wells (BE1 through BE10) is monitored by the SCADA system to evaluate the performance of the bioventing system. The gas analyzer, which reports O_2 and CO_2 percent by volume concentrations, was removed for calibration and preventative maintenance and reinstalled on May 11, 2021 of QM-94 by Avista personnel (Robbert 2023). The bioventing system piping was drained of approximately 5 gallons of moisture during the analyzer calibration event. As a result of the gas analyzer calibration event, the SCADA system did not report O_2 and CO_2 percent by volume concentrations for bioventing wells BE1 through BE10 from February 13 of QM-93 through May 11 of QM-94 (both O_2 and CO_2 were recorded as 0.00 percent by volume). This data was presented in quarterly monitoring reports QM-93 and QM-94.

As reported in quarterly monitoring report QM-94, beginning on May 12, 2021, CO_2 concentrations were reported by the SCADA system above historical levels and O_2 concentrations were reported by the SCADA system below historical levels. On August 26, 2021, corresponding with an O&M site visit during QM-95, an increase in both O_2 and CO_2 concentrations was recorded by the SCADA system in all bioventing wells. During QM-96, O_2 concentrations recorded by the SCADA system decreased in all bioventing wells, but the quarterly average recorded O_2 concentration for QM-96 was higher than the quarterly average recorded O_2 for QM-95 because of the decreased concentrations recorded July 1 through August 25, 2021 of QM-95.

The monthly average CO_2 concentrations combined for all wells during QM-93 through QM-96 ranged from 0.46 to 3.79 percent by volume, and the average recorded CO_2 concentration in 2021 was 1.69 percent by volume, which is above the optimal concentration of 0.20 percent by volume. The monthly average O_2 concentration for all wells during 2021 ranged from 1.27 to 13.49 percent by volume, with an annual 2021 average of 4.24 percent by volume, which is below the performance standard of 10-15 percent by volume.

Because of the elevated recorded CO_2 levels from August of QM-95 through the end of QM-96, the estimated total volume of Bunker C biodegraded was above historical levels and is likely not

representative of the actual volume of Bunker C degraded by the system. The SCADA system did not generate data for a portion of QM-93 and QM-94 due to the gas analyzer having been removed for calibration and preventative maintenance; therefore, the SCADA system did not calculate total free product volume biodegraded during these periods. The estimated volume of Bunker C biodegraded during 2021 was reported at approximately 4,361.85 gallons. Table 9 summarizes biodegradation and bioventing extraction well monitoring data for 2021.

7.5.2 Bioventing Injection Wells

Air injected into the subsurface through the seven bioventing injection wells (BI1 through BI7) is monitored to evaluate satisfactory performance of the bioventing system. Data collected by the SCADA system during 2021 are presented in Table 10. Average monthly injection well pressures for the entire bioventing injection system during 2021 ranged from 4.72 to 5.49 in-H_2O, with an annual 2021 system average of 5.15 in-H_2O, which is within the anticipated operating range of 3-10 in-H_2O (AGI 1998). Reported average airflow for 2021 was 137.62 cfm.

8.0 SUMMARY AND CONCLUSIONS—2021 COMPLIANCE MONITORING

The following is a summary of the compliance monitoring data collected during 2021 (QM-93 through QM-96).

- Groundwater quality monitoring for 2021 was performed by Landau during March (QM-93) and September (QM-95). The hydrocarbon detections reported in QM-93 were characterized by ARI as a response of unknown alkanes in the C24-C32 range and were not identified as a petroleum fuel product, and Apex forensic services identified the detections as a wax-dominant laboratory contaminant. Therefore, the detections reported in QM-93 are not considered to be associated with the Bunker C release. A detection of motor oil-range organics was reported in a split sample collected from MW-028 during QM-95, analyzed by Apex without silica gel and acid wash cleanup, which was below the site performance standard of 1.0 mg/L. No groundwater sampling analytical results considered to be associated with the Bunker C release were reported greater than the site performance standard of 1.0 mg/L during 2021.
- Groundwater elevations recorded during QM-93 and QM-94 were consistent with historical levels and indicate that an inward hydraulic gradient was maintained across the barrier wall. During periods of QM-95 the extraction wells were not functioning, and groundwater rose above historical levels but remained below the elevation of the weir in the barrier wall, indicating containment of groundwater was maintained. During QM-96, water levels recorded in PZ3 were above the historical average but below historical groundwater elevations measured at MW-030, indicating that an inward hydraulic gradient was maintained across the barrier wall.
- The annual sample for FOG as HEM and SGT-HEM in the site stormwater detention basin was collected on October 7, 2021 (QM-96). HEM and SGT-HEM was not detected above the RL, which is below the discharge limit of 100 mg/L.
- The annual sample for FOG as HEM and SGT-HEM in extracted groundwater was collected from EW1 on October 7, 2021 (QM-96). HEM and SGT-HEM was not detected above the RL, which is below the cleanup standard of 100 mg/L.
- Free product (including entrained water) recovered from extraction wells and oil recovery wells through active belt skimmers totaled approximately 607.3 gallons during 2021.
- The estimated volume of Bunker C biodegraded during 2021 was reported at approximately 4,361.85 gallons.
- The SCADA system was upgraded during 2021 to maintain the longevity of the system.

8.1 Conclusions

Results of compliance monitoring conducted for 2021 indicate that the Central Steam Plant Oil Spill remediation system is operating in accordance with permit levels. The detections of residual-range organics in the Bunker C range at MW-021, MW-025, and MW-028 during QM-93 were greater than the site performance standard of 1.0 mg/L but were characterized by ARI as a response of unknown alkanes in the C24-C32 range and were not identified as a petroleum fuel product. Apex forensic

services identified the detections as a wax-dominant laboratory contaminant. Therefore, the detections reported for QM-93 are not considered to be associated with the Bunker C release. Results of compliance monitoring conducted for 2021 demonstrate that the Central Steam Plant Oil Spill remediation system is operating in accordance with permit levels.

9.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of Avista for specific application to the Central Steam Plant site. The reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

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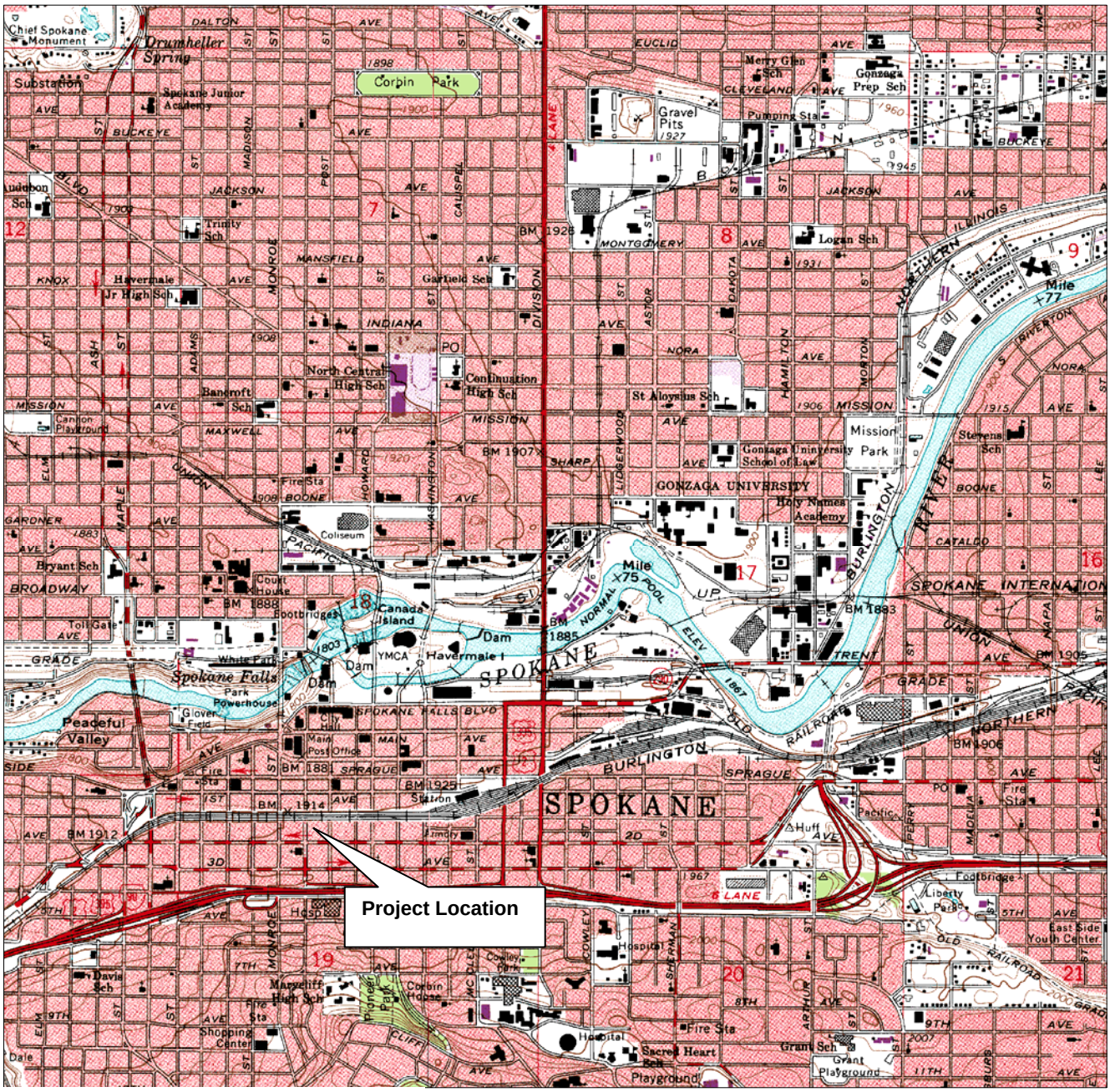

Source: USGS Spokane NW, WA Quad, 1974; PR 1986. Scale 1:24,000

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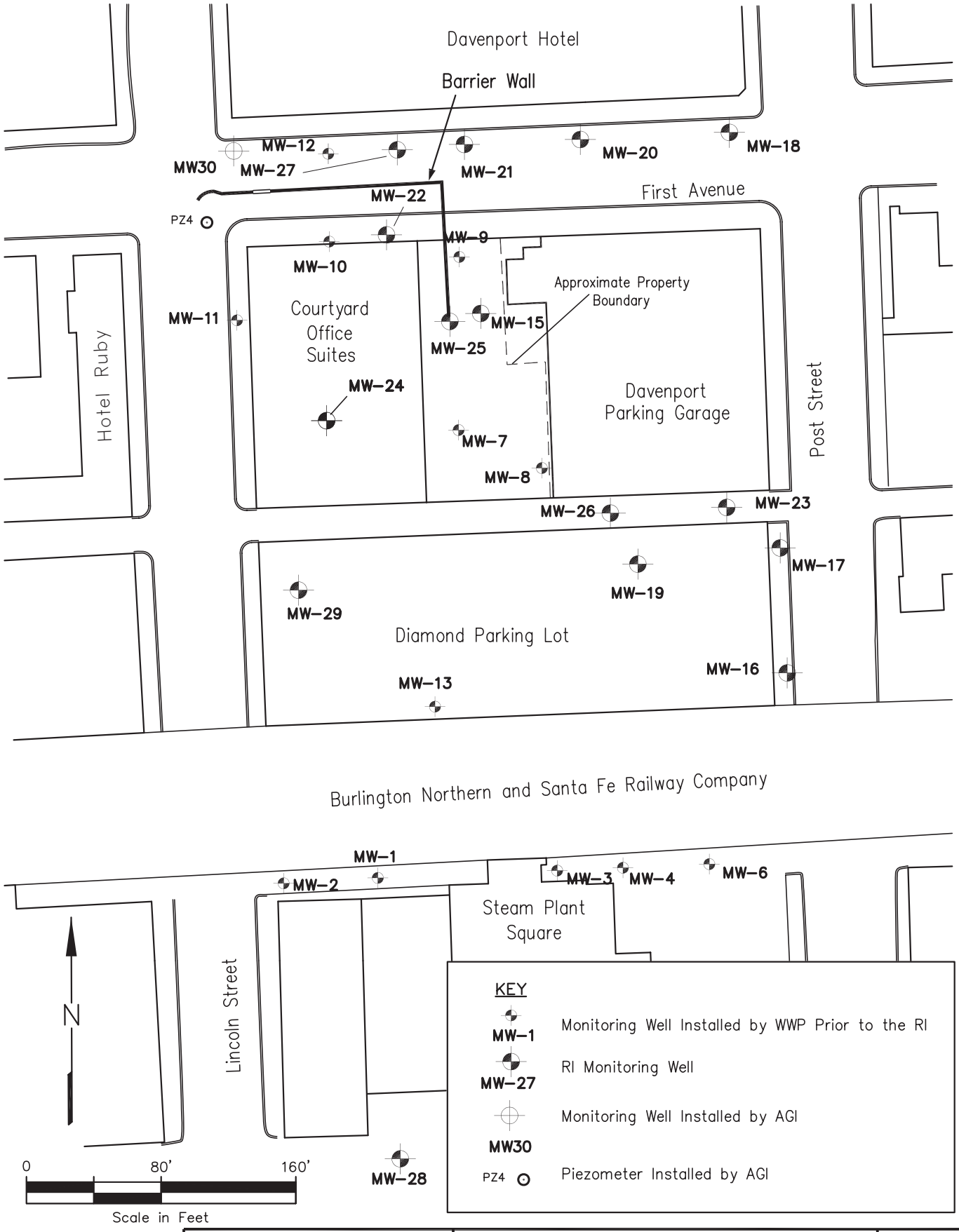
Central Steam Plant Oil Spill Remediation Spokane, Washington	**Site Location Map**	Figure 1



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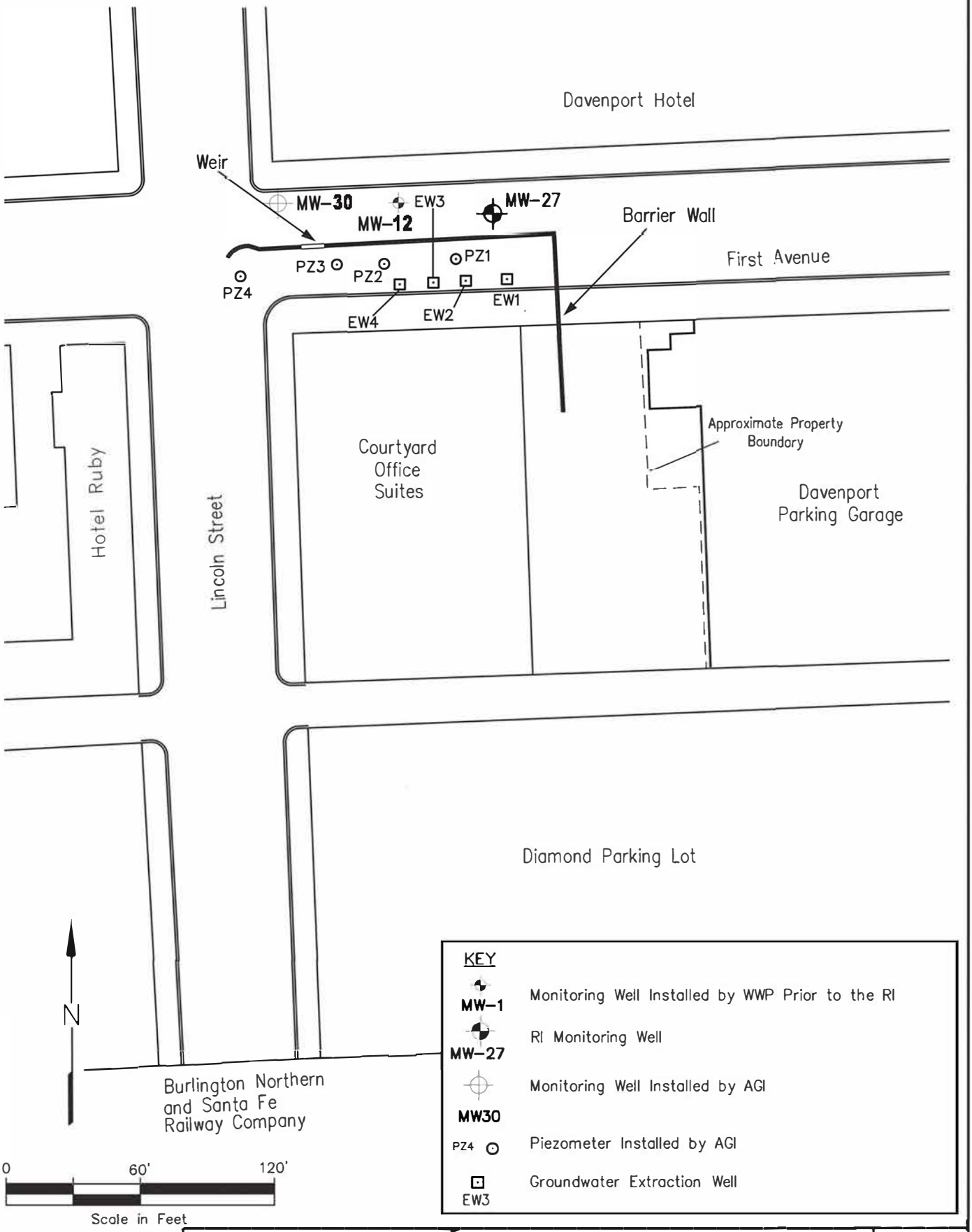
Central Steam Plant
Oil Spill Remediation
Spokane, Washington

Site Plan and Monitoring Well Locations

Figure 2



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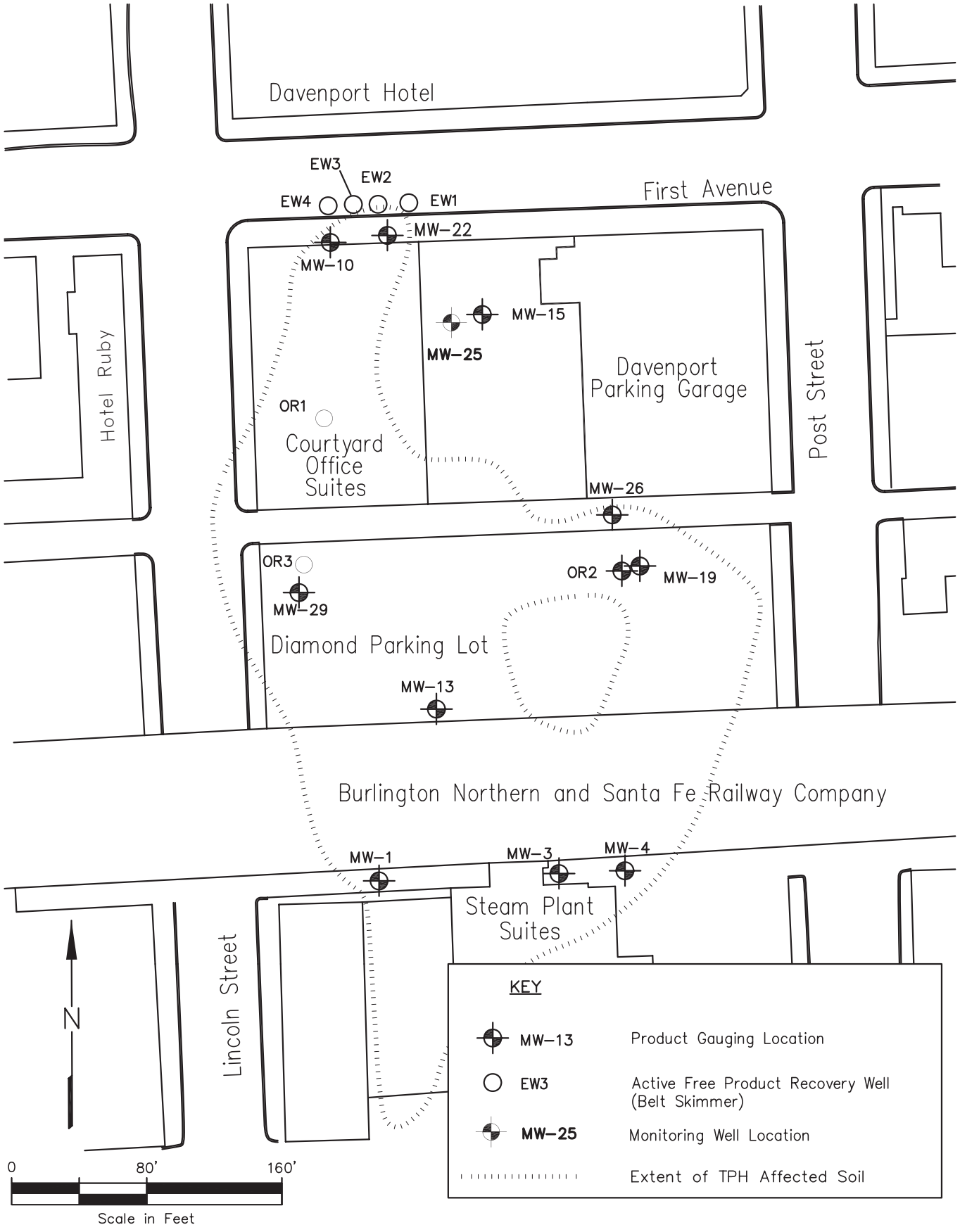
Central Steam Plant
Oil Spill Remediation
Spokane, Washington

Hydraulic Control System

Figure
3



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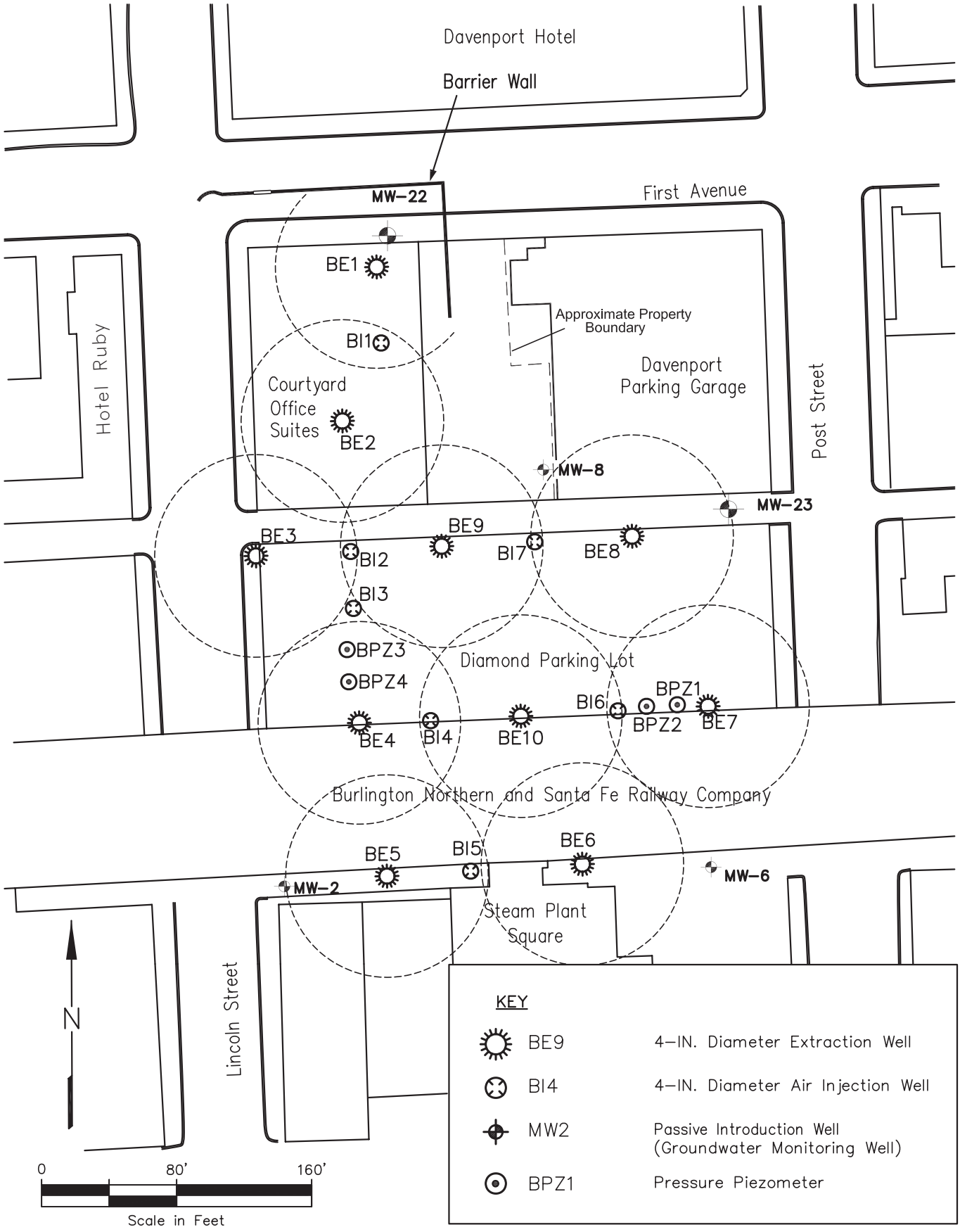
Central Steam Plant
Oil Spill Remediation
Spokane, Washington

Free Product Gauging and Recovery Locations

Figure
4



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Central Steam Plant
Oil Spill Remediation
Spokane, Washington

Bioventing Well Locations

Figure 5

Table 1
QM-96 Hydraulic Control Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

Well	QM-96 Groundwater Elevation (Feet)		
	October	November	December
EW1	1848.80	1848.79	1848.88
EW2	1849.04	1849.07	1848.90
EW3	1851.06	1850.98	1851.41
PZ1	1852.43	1852.45	1852.48
PZ2	-	-	-
PZ3	1855.10	1855.16	1855.22
MW-012	NM	NM	NM
MW-027	NM	NM	NM
MW-030	NM	NM	NM

Notes:

Data from extraction wells EW1, EW2, and EW3 and piezometer wells.
PZ1, PZ2, and PZ3 recorded by SCADA system.
WEIR elevation = 1,860 feet
Elevation datum is North American Vertical Datum of 1988 (NAVD88).
Values are average monthly water elevations for EW1–EW3 and PZ1–PZ3.
-- = not recorded due to transducer malfunction
MW-027 groundwater elevation hand measured September 19, 2021. MW-027 is located north of the barrier wall.

Abbreviations and Acronyms:

EW = extraction well
MW = monitoring well
NM = not measured
PZ = piezometer
QM = quarterly monitoring
SCADA = Supervisory Control and Data Acquisition

Table 2
QM-96 Free Product Recovery Data
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

Location	Monthly Free Product Recovery (gal)			QM-96 Total (gal)
	October	November (a)(c)	December (b)	
Belt Skimmer				
EW1	1.0	1.0	2.0	4.0
EW2	15.6	0.0	52.6	68.2
EW3	38.4	0.0	0.0	38.4
OR1	0.9	0.3	0.3	1.5
OR3 (d)	0.0	0.0	0.0	0.1
Total	56.0	1.4	54.9	112.2

Notes:

Data recorded by SCADA system.

(a) EW2 and EW3 product-recovery tank-level transmitter was not functioning from 10/11 -12/5.

(b) EW3 product-recovery tank-level transmitter was not functioning during December of QM-96.

(c) Belt skimmer OR3 turned off because of a broken belt on 11/24.

(d) Free product recovery at OR3 historically lower than at other belt skimmers.

Values are rounded to tenth of a gallon.

Recovery measurements are for total liquids (including water entrained within the free product).

Accuracy for belt skimmer volumes is 0.1 gallons. Production data are based on physical recovery rates from measurement of free product level in reservoir tanks.

Volume of fluid removed from reservoir tanks is listed in GeoEngineers Fourth Quarter 2021 operation and maintenance report.

Abbreviations and Acronyms:

EW = extraction well
gal = gallons
OR = oil recovery well
QM = quarterly monitoring
SCADA = Supervisory Control and Data Acquisition

Table 3
QM-96 Bioventing System Data - Extraction Well Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

		QM-96 Extraction Well Monitoring				
		October	November	December	Average	Total
Free Product Volume Biodegraded (gal)		831.30	839.42	869.42	846.71	2540.14
Average Total Flow (cfm)		112.57	113.03	111.05	112.22	NA
BE1	Avg. pressure (in-H_20)	-4.35	-4.53	-4.92	-4.60	NA
	O_2 (%)	3.52	3.32	3.20	3.35	NA
	CO_2 (%)	3.76	3.80	3.77	3.78	NA
BE2	Avg. pressure (in-H_20)	-1.97	-2.35	-2.93	-2.42	NA
	O_2 (%)	3.29	3.14	3.06	3.17	NA
	CO_2 (%)	3.76	3.79	3.76	3.77	NA
BE3	Avg. pressure (in-H_20)	-1.82	-2.03	-2.39	-2.08	NA
	O_2 (%)	3.42	3.27	3.17	3.29	NA
	CO_2 (%)	3.77	3.79	3.76	3.77	NA
BE4	Avg. pressure (in-H_20)	-0.79	-0.87	-1.07	-0.91	NA
	O_2 (%)	4.04	3.81	3.62	3.82	NA
	CO_2 (%)	3.75	3.78	3.75	3.76	NA
BE5	Avg. pressure (in-H_20)	-7.99	-8.55	-9.37	-8.64	NA
	O_2 (%)	3.72	3.50	3.35	3.52	NA
	CO_2 (%)	3.76	3.79	3.75	3.77	NA
BE6	Avg. pressure (in-H_20)	-0.89	-0.97	-1.90	-1.25	NA
	O_2 (%)	4.19	3.90	3.71	3.93	NA
	CO_2 (%)	3.75	3.79	3.75	3.76	NA
BE7	Avg. pressure (in-H_20)	-1.23	-1.21	-1.38	-1.27	NA
	O_2 (%)	3.91	3.62	3.43	3.65	NA
	CO_2 (%)	3.76	3.79	3.76	3.77	NA
BE8	Avg. pressure (in-H_20)	-6.58	-7.26	-8.15	-7.33	NA
	O_2 (%)	3.21	3.11	3.05	3.12	NA
	CO_2 (%)	3.77	3.80	3.76	3.78	NA
BE9	Avg. pressure (in-H_20)	-2.86	-3.23	-4.54	-3.55	NA
	O_2 (%)	3.29	3.14	3.07	3.17	NA
	CO_2 (%)	3.77	3.80	3.76	3.78	NA
BE10	Avg. pressure (in-H_20)	-0.94	-2.21	-5.10	-2.75	NA
	O_2 (%)	4.03	3.70	3.50	3.75	NA
	CO_2 (%)	3.75	3.79	3.76	3.76	NA
Average	Avg. pressure (in-H_20)	-2.94	-3.32	-4.17	-3.48	NA
	O_2 (%)	3.66	3.45	3.32	3.48	NA
	CO_2 (%)	3.76	3.79	3.76	3.77	NA

Notes:

Data recorded by SCADA system.

Total flow, pressure, O_2, and CO_2 values represent monthly averages

On 8/26 of QM-95 an increase in both O_2 and CO_2 was recorded by the SCADA system in all bioventing wells. Increased values were recorded during QM-96, which resulted in higher than historical average of free product volume biodegraded.

Abbreviations and Acronyms:

% = percent of total air volume
Avg = average
BE = bioventing extraction well
cfm = cubic feet per minute
CO_2 = carbon dioxide
gal = gallon
in-H2O = inches of water
NA = not applicable
O_2 = oxygen
QM = quarterly monitoring
SCADA = Supervisory Control and Data Acquisition

Table 4
QM-96 Bioventing System Data - Injection Well Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

	QM-96 Injection Well Monitoring			
	October	**November**	**December**	**Average**
Average Total Flow (cfm)	140.82	142.49	142.52	141.94
Average Well Pressure (in-H_2O)				
Injection Well				
BI1	0.26	0.23	0.23	0.24
BI2	6.30	6.44	6.42	6.39
BI3	6.07	6.30	6.28	6.22
BI4	6.32	6.49	6.47	6.43
BI5	6.32	6.38	6.34	6.34
BI6	6.13	6.26	6.25	6.22
BI7	6.24	6.33	6.31	6.29

Notes:
Data recorded by SCADA system.
Total flow and pressure values represent monthly averages

Abbreviations and Acronyms:
BI = bioventing injection well
cfm = cubic feet per minute
in-H_2O = inches of water
QM = quarterly monitoring
SCADA = Supervisory Control and Data Acquisition

Table 5
2021 Groundwater Sampling Results
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

Sample Location	Laboratory	Total Petroleum Hydrocarbons (a)					
		QM-93			QM-95		
		Diesel Range	Bunker C Range	Motor Oil Range	Diesel Range	Bunker C Range	Motor Oil Range
		mg/L			mg/L		
MW-006	ARI	0.100 U	**0.954 (c)**	**0.283**	0.100 U	0.500 U	0.200 U
MW-007	ARI	0.100 U	**0.698 (c)**	**0.205**	0.100 U	0.500 U	0.200 U
MW-012	ARI	0.100 U	0.500 U	0.200 U	0.100 U	0.500 U	0.200 U
MW-016	ARI	0.100 U	0.500 U	0.200 U	-	-	-
MW-017	ARI	0.100 U	0.500 U	0.200 U	-	-	-
MW-020	ARI	0.100 U	0.500 U	0.200 U	0.100 U	0.500 U	0.200 U
MW-021 (d)	ARI	0.100 U	**1.39 (c)**	**0.397**	0.100 U/0.100 U	0.500 U/0.500 U	0.200 U/0.200 U
	Apex				0.076 U/0.076 U	-- (e)	0.152 U/0.152 U
MW-023	ARI	0.100 U	**0.567 (c)**	0.200 U	0.100 U	0.500 U	0.200 U
Duplicate (b)	ARI	0.100 U	0.500 U	0.200 U	0.100 U	0.500 U	0.200 U
MW-025 (d)	ARI	0.100 U	**1.89 (c)**	**0.555**	0.100 U/0.100 U	0.500 U/0.500 U	0.200 U/0.200 U
	Apex				0.076 U/0.076 U	-- (e)	0.152 U/0.152 U
MW-027	ARI	0.100 U	0.500 U	0.200 U	0.100 U	0.500 U	0.200 U
MW-028 (d)	ARI	0.100 U	**1.06 (c)**	**0.288**	0.100 U	0.500 U	0.200 U
	Apex				0.076 U/0.076 U	-- (e)	**0.243 J**/0.151 U
MW-030	ARI	0.100 U	**0.760 (c)**	**0.226**	0.100 U	0.500 U	0.200 U
Performance Standard		1.0	1.0	1.0	1.0	1.0	1.0

Notes:

(a) Total petroleum hydrocarbons analyzed using method NWTPH-Dx with silica gel cleanup.

(b) Field duplicate sample of MW-023 for QM-93 and of MW-021 for QM-95

(c) The laboratory case narrative indicates the result includes a response of unknown alkanes in the C24-C32 range and is not identified as a petroleum fuel product. The response must be included in the reported result for motor oil and Bunker C because it falls within the designated hydrocarbon ranges, but it is designated as residual range organics, which indicates it is not an identified petroleum fuel product, only an unknown response in the characteristic carbon range.

(d) Sample analysis reported without and with silica gel wash and acid cleanup, respectively. Only applicable to QM-95.

(e) Because no Bunker C was identified in samples analyzed by Apex, a calibration curve using the free product sample collected from OR-1 to quantify Bunker C in the samples was not performed. Apex included a statement in the case narrative of their analytical report stating that the reporting limit of Bunker C would have been approximately 0.300 mg/L with no detections in samples collected from monitoring wells MW-021, MW-025, and MW-028.

Bold = detected compound

Boxed value with shading = exceedance of site performance standard

A free product sample standard collected from extraction well EW-3 on October 24, 2018, is used by the laboratory to curve instrument analysis and compare results to detections of bunker C in associated groundwater samples.

Abbreviations and Acronyms:

-- = not analyzed

ARI = Analytical Resources, Incorporated

Apex = Apex Laboratories, LLC

EW = extraction well

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

mg/L = milligrams per liter

MW = monitoring well

NWTPH-Dx = Northwest total petroleum hydrocarbon diesel-range extended

OR = oil recovery well

QM = quarterly monitoring

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

Table 6
2021 Groundwater Elevation Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

Groundwater Elevation Monitoring						
Well	**QM-93 Measurement Date**	**QM-93 Elevation**	**QM-93 Product Presence**	**QM-93 Measurement Date**	**QM-95 Elevation**	**QM-95 Product Presence**
MW-001	3/25/2021	1879.83	No	9/16/2021	Dry	No
MW-002	3/25/2021	Dry	No	9/16/2021	Dry	No
MW-003	3/25/2021	1879.43	**Trace**	9/16/2021	1879.19	No
MW-004 (a)	3/25/2021	Dry	No	9/16/2021	Dry	No
MW-006	3/25/2021	1880.05	No	9/15/2021	1879.75	No
MW-007	3/25/2021	1867.39	No	9/15/2021	1869.78	No
MW-008	3/26/2021	1865.36	No	NM	NM	No
MW-009	3/26/2021	1854.92	No	NM	NM	No
MW-010	3/26/2021	1854.63	**Sig**	9/16/2021	1854.88	**Sig**
MW-011	3/26/2021	1860.57	No	NM	NM	No
MW-012	3/25/2021	1854.98	No	9/15/2021	1854.89	No
MW-013	3/25/2021	Dry	No	9/16/2021	Dry	No
MW-015	3/26/2021	1870.76	No	9/16/2021	1871.93	No
MW-016	3/25/2021	1872.17	No	9/16/2021	1871.80	No
MW-017	3/25/2021	1869.68	No	9/16/2021	1869.46	No
MW-018	3/25/2021	1863.77	No	9/15/2021	1863.86	No
MW-019	3/26/2021	1868.87	**Sig**	9/16/2021	1866.42	**Sig**
MW-020	3/25/2021	1855.06	No	9/15/2021	1854.96	No
MW-021	3/25/2021	1855.01	No	9/15/2021	1854.90	No
MW-022	3/26/2021	1852.21	**Trace**	NM	NM	**Trace**
MW-023	3/25/2021	1870.49	No	9/15/2021	1870.25	No
MW-025	3/25/2021	1863.99	No	9/15/2021	1865.49	No
MW-026	3/26/2021	1866.58	**Trace**	9/16/2021	1866.48	**Trace**
MW-027	3/25/2021	1855.00	No	9/15/2021	1854.88	No
MW-028	3/25/2021	1889.38	No	9/15/2021	1889.49	No
MW-029	3/26/2021	1859.48	**Sig**	9/16/2021	NA	**Sig**
MW-030	3/25/2021	1855.49	No	9/15/2021	1855.42	No

Notes:

(a) Well partially filled with soil during construction of remediation system.
Sounded well depth is above water table

NA = no water present

NM = not measured. Automobile parked over well location.

No = no visual evidence of free product.

QM = quarterly monitoring

Sig = significant amount of free product present.

Trace = trace of free product visible in water column.

Table 7
2021 Hydraulic Control Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

Well	Groundwater Elevation (Feet)														
	QM-93 Elevation			QM-94 Elevation			QM-95 Elevation					QM-96 Elevation			
	January (a)	February	March	April	May	June	July	August (b)		September (b)		October	November	December	
EW1	1849.02	1849.02	1849.03	1849.02	1848.93	1848.96	1849.06	1849.38	1854.83	1849.08	1855.14	1848.80	1848.79	1848.88	
EW2	1848.67	1848.75	1848.76	1850.46	1849.45	1848.86	1852.44	1850.02	1855.02	1850.21	1855.31	1849.04	1849.07	1848.90	
EW3	1851.79	1851.28	1852.73	1851.13	1852.09	1851.76	1852.94	1852.14	1855.21	1851.60	1855.54	1851.06	1850.98	1851.41	
PZ1	1852.71	1852.50	1852.53	1852.65	1852.59	1852.36	1853.04	1852.85	1855.57	1852.74	1855.89	1852.43	1852.45	1852.48	
PZ2	--	--	--	--	--	--		-		-		-	-	-	
PZ3	1855.03	1854.93	1854.96	1854.97	1854.98	1855.00	1855.03	1855.11	1855.86	1855.14	1856.14	1855.10	1855.16	1855.22	
MW-012	NM	NM	1854.98	NM	NM	NM	NM	NM		1854.89		NM	NM	NM	
MW-027	NM	NM	1855.00	NM	NM	NM	NM	NM		1854.88		NM	NM	NM	
MW-030	NM	NM	1855.49	NM	NM	NM	NM	NM		1855.42		NM	NM	NM	

Notes:

Data from extraction wells EW1, EW2, and EW3 and piezometer wells PZ1, PZ2, and PZ3 recorded by SCADA system.

-- = not recorded due to PLC or transducer malfunction

Extraction wells EW1, EW2, and EW3 were not functioning 8/3, 8/4, 8/14 - 8/23 and 9/13 - 9/29 during QM-95

WEIR elevation = 1,860 feet

Elevation datum is North American Vertical Datum of 1988 (NAVD88).

Values are average monthly water elevations for EW1–EW3 and PZ1–PZ3.

Monitoring well MW-027 groundwater elevation hand measured in conjunction with semi-annual monitoring. MW-027 is located north of the barrier wall.

Transducer PZ2 not functional during 2021

(a) SCADA system not generating data 1/20 - 1/31. Janauary monthly averages based on SCADA system data from 1/1 - 1/19

(b) Average groundwater elevation with and without extraction wells functioning, respectively.

Abbreviations and Acronyms:

EW = extraction well

MW = monitoring well

NM = not measured

PZ = piezometer

QM = quarterly monitoring

SCADA = Supervisory Control and Data Acquisition

Table 8
2021 Free Product Recovery Data
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

Location	Free Product Recovered (gal)																
	QM-93				QM-94				QM-95 (b)				QM-96				
	Jan (a)	Feb	Mar	QM-93 Total	Apr	May	June	QM-94 Total	Jul	Aug	Sep	QM-95 Total	Oct	Nov (c)	Dec (d)	QM-96 Total	2021 Total
Belt Skimmer																	
EW1	30.7	2.2	1.6	34.5	0.1	4.3	5.2	9.6	4.8	1.3	3.6	9.7	1.0	1.0	2.0	4.0	57.9
EW2	17.2	16.9	22.9	57.0	0.8	23.0	9.9	33.7	0.0	0.0	0.0	0.0	15.6	0.0	52.6	68.2	158.9
EW3	15.7	16.6	41.5	73.8	17.9	38.5	38.5	94.8	63.7	36.0	76.8	176.5	38.4	0.0	0.0	38.4	383.5
OR1	0.3	0.3	0.5	1.1	0.5	0.6	0.5	1.6	0.9	0.4	0.8	2.1	0.9	0.3	0.3	1.5	6.4
OR3	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.5
Total	64.0	36.1	66.5	166.6	19.2	66.5	54.2	139.9	69.5	37.8	81.2	188.5	56.0	1.4	54.9	112.2	607.3

Notes:

Data recorded by SCADA system.

-- = not recorded due to PLC or transducer malfunction

Final totals are rounded.

Recovery measurements are for total liquids (including water entrained within the product).

Accuracy for belt skimmer volumes is 0.1 gallons. Production data are based on physical recovery rates from measurement of oil level in reservoir tanks.

Volume of fluid removed from reservoir tanks listed in GeoEngineers quarterly 2021 operation and maintenance reports.

(a) SCADA system not generating data 1/20 - 1/31. January product recovery based on SCADA system data from 1/1 - 1/19.

(b) EW2 product-recovery tank-level transmitter was not functioning during QM-95

(c) EW2 and EW3 product-recovery tank-level transmitter was not functioning from 10/11 -12/5

(d) EW3 product-recovery tank-level transmitter was not functioning during December of QM-96

Abbreviations and Acronyms:

EW = extraction well

gal = gallon.

QM = quarterly monitoring

OR = oil recovery well

SCADA = Supervisory Control and Data Acquisition

Table 9
2021 Bioventing System Data - Extraction Well Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

		Extraction Well Monitoring													
		QM-93			QM-94 (e)			QM-95			QM-96			2021	2021
		January (a)	February (b)	March (c)	April (c)	May (d)	June	July	August (f)	September	October	November	December	Average	Total
Free Product Volume Biodegraded (gal)		61.39	72.51	0.00	0.00	130.95	204.67	208.79	302.80	840.60	831.30	839.42	869.42	363.49	4361.85
Average Total Flow (cfm)		105.23	106.67	107.89	106.46	108.17	109.21	109.69	109.04	111.60	112.57	113.03	111.05	109.22	NA
BE1	Avg. pressure (in-H_2O)	-3.75	-4.10	-3.98	-3.72	-3.69	-3.58	-3.58	-5.39	-7.79	-4.35	-4.53	-4.92	-4.45	NA
	O_2 (%)	13.52	13.38	0.00	0.00	1.16	2.21	2.76	3.01	3.53	3.52	3.32	3.20	4.13	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.95	0.96	0.95	1.38	3.77	3.76	3.80	3.77	1.69	NA
BE2	Avg. pressure (in-H_2O)	-0.11	-0.08	-0.10	-0.11	-0.13	-0.16	-0.18	-0.46	-2.01	-1.97	-2.35	-2.93	-0.88	NA
	O_2 (%)	13.50	13.36	0.00	0.00	1.09	2.13	2.66	2.86	3.38	3.29	3.14	3.06	4.04	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.95	0.96	0.95	1.38	3.77	3.76	3.79	3.76	1.69	NA
BE3	Avg. pressure (in-H_2O)	-3.16	-3.10	-3.12	-2.96	-2.67	-2.42	-2.34	-2.34	-1.92	-1.82	-2.03	-2.39	-2.52	NA
	O_2 (%)	13.51	13.36	0.00	0.00	1.09	2.13	2.72	2.97	3.52	3.42	3.27	3.17	4.10	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.95	0.96	0.95	1.39	3.78	3.77	3.79	3.76	1.69	NA
BE4	Avg. pressure (in-H_2O)	-1.76	-1.92	-1.97	-1.81	-1.60	-1.45	-1.38	-1.30	-0.82	-0.79	-0.87	-1.07	-1.40	NA
	O_2 (%)	13.47	13.33	0.00	0.00	1.45	2.59	3.24	3.53	4.13	4.04	3.81	3.62	4.43	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.94	0.96	0.95	1.38	3.76	3.75	3.78	3.75	1.68	NA
BE5	Avg. pressure (in-H_2O)	0.09	0.10	0.10	0.10	0.09	0.07	0.05	-1.22	-8.64	-7.99	-8.55	-9.37	-2.93	NA
	O_2 (%)	13.48	13.33	0.00	0.00	1.31	2.43	3.05	3.31	3.85	3.72	3.50	3.35	4.28	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.94	0.96	0.95	1.38	3.76	3.76	3.79	3.75	1.69	NA
BE6	Avg. pressure (in-H_2O)	-2.51	-7.07	-8.10	-8.02	-6.58	-2.05	-0.50	-0.57	-0.90	-0.89	-0.97	-1.90	-3.34	NA
	O_2 (%)	13.46	13.34	0.00	0.00	1.50	2.69	3.23	3.61	4.37	4.19	3.90	3.71	4.50	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.94	0.95	0.95	1.38	3.75	3.75	3.79	3.75	1.68	NA
BE7	Avg. pressure (in-H_2O)	-0.90	-1.43	-3.37	-4.62	-3.62	-1.66	-0.84	-0.78	-1.24	-1.23	-1.21	-1.38	-1.86	NA
	O_2 (%)	13.53	13.39	0.00	0.00	1.33	2.47	3.17	3.49	4.11	3.91	3.62	3.43	4.37	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.94	0.95	0.95	1.38	3.76	3.76	3.79	3.76	1.69	NA
BE8	Avg. pressure (in-H_2O)	0.00	0.05	0.00	-0.05	-0.08	-0.09	-0.16	-1.01	-6.59	-6.58	-7.26	-8.15	-2.49	NA
	O_2 (%)	13.50	13.36	0.00	0.00	1.18	2.28	2.89	3.08	3.24	3.21	3.11	3.05	4.08	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.95	0.96	0.95	1.39	3.79	3.77	3.80	3.76	1.69	NA
BE9	Avg. pressure (in-H_2O)	-5.18	-5.41	-5.44	-5.13	-4.19	-3.64	-3.48	-3.45	-3.01	-2.86	-3.23	-4.54	-4.13	NA
	O_2 (%)	13.49	13.36	0.00	0.00	1.05	2.08	2.59	2.82	3.35	3.29	3.14	3.07	4.02	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.95	0.96	0.96	1.39	3.78	3.77	3.80	3.76	1.69	NA
BE10	Avg. pressure (in-H_2O)	-4.77	-4.68	-4.85	-4.65	-2.51	-1.15	-1.20	-1.21	-1.00	-0.94	-2.21	-5.10	-2.86	NA
	O_2 (%)	13.49	13.35	0.00	0.00	1.50	2.69	3.40	3.63	4.25	4.03	3.70	3.50	4.46	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.94	0.96	0.95	1.37	3.75	3.75	3.79	3.76	1.68	NA
Monthly	Avg. pressure (in-H_2O)	-2.21	-2.76	-3.08	-3.10	-2.50	-1.61	-1.36	-1.77	-3.39	-2.94	-3.32	-4.17	-2.69	NA
	O_2 (%)	13.49	13.36	0.00	0.00	1.27	2.37	2.97	3.23	3.77	3.66	3.45	3.32	4.24	NA
	CO_2 (%)	0.46	0.46	0.00	0.00	0.95	0.96	0.95	1.38	3.77	3.76	3.79	3.76	1.69	NA

Notes:

Data recorded by SCADA system.
SCADA system not generating data 1/20 - 1/31,

(a) January free product volume biodegraded and extraction well monthly averages based on SCADA system data from 1/1-1/19.
(b) The gas analyzer which reports O_2 (%) and CO_2 (%) was removed for calibration and preventative maintenance. O2 (%) and CO2 (%) values were not reported by the SCADA system for extraction wells BE1 - BE10 from 2/13 - 5/11. The O_2 (%) and CO_2 (%) averages presented for February are from 2/1 - 2/12.
(c) O2 (%) and CO2 (%) not read by SCADA system for extraction wells BE1 - BE10 from 2/13 - 5/11.
(d) The O_2 (%) and CO_2 (%) averages presented for May are from 5/12 - 5/31.
(e) Free Product volume biodegraded based on SCADA system from 5/12 - 6/30.
(f) On 8/26 an increase in both O2 and CO2 was recorded by the SCADA system in all bioventing wells. Increased values were recorded for the remainder of QM-95 and through QM-96 which resulted in higher than historical average of oil volume biodegraded.

Abbreviations and Acronyms:

Avg = average
cfm = cubic feet per minute
gal = gallon
in-H2O = inches of water
BE = bioventing extraction well
QM = quarterly monitoring
NA = not applicable
O_2 = oxygen
% = percent of total air volume
NM = not measured
-- = not recorded due to PLC or transducer malfunction

Table 10
2021 Bioventing System Data - Injection Well Monitoring
Central Steam Plant Oil Spill Remediation
Spokane, Washington

	Injection Well Monitoring												2021 Average
	QM-93			QM-94			QM-95			QM-96			
	January (a)	February	March	April	May	June	July	August	September	October	November	December	
Average Total Flow (cfm)	137.15	136.94	138.42	135.19	135.08	131.70	132.83	137.78	140.49	140.82	142.49	142.52	137.62
Average Well Pressure (in-H_2O)													
Injection Well													
BI1	0.21	0.20	0.21	0.22	0.22	0.24	0.27	0.27	0.26	0.26	0.23	0.23	0.24
BI2	6.16	6.04	6.07	5.81	5.79	5.53	5.62	6.06	6.26	6.30	6.44	6.42	6.04
BI3	5.99	5.90	5.90	5.60	5.56	5.30	5.34	5.79	6.02	6.07	6.30	6.28	5.84
BI4	6.22	6.12	6.14	5.86	5.84	5.56	5.62	6.04	6.27	6.32	6.49	6.47	6.08
BI5	6.14	6.00	6.05	5.82	5.81	5.55	5.66	6.10	6.27	6.32	6.38	6.34	6.04
BI6	6.01	5.90	5.92	5.67	5.64	5.37	5.45	5.89	6.08	6.13	6.26	6.25	5.88
BI7	6.06	5.93	5.97	5.72	5.71	5.47	5.57	6.02	6.19	6.24	6.33	6.31	5.96
Monthly Average Pressure (in-H_2O)	5.26	5.16	5.18	4.96	4.94	4.72	4.79	5.17	5.33	5.38	5.49	5.47	5.15

Notes:

Data recorded by SCADA system.

SCADA system not generating data 1/20 - 1/31.

(a) January injection well monitoring based on SCADA system data from 1/1 - 1/19.

Abbreviations and Acronyms:

BI = bioventing injection well

cfm = cubic feet per minute

in-H_2O = inches of water

SCADA = Supervisory Control and Data Acquisition

QM = quarterly monitoring

APPENDIX A

QM-96
Quarterly Operation and Maintenance Report

Quarterly Operation and Maintenance Report

Fourth Quarter 2021
(October through December 2021)
Central Steamplant Oil Spill Remediation
Spokane, Washington

for
Avista Corporation

December 23, 2021

GeoEngineers
Earth Science + Technology

Quarterly Operation and Maintenance Report

Fourth Quarter 2021
(October through December 2021)
Central Steamplant Oil Spill Remediation
Spokane, Washington

for
Avista Corporation

December 23, 2021

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Quarterly Operation and Maintenance Report

Fourth Quarter 2021
(October through December 2021)
Central Steamplant Oil Spill Remediation
Spokane, Washington

File No. 2522-013-05

December 23, 2021

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Table of Contents

1.0 INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) is pleased to present the operation and maintenance (O&M) results for the remedial system operating at the Avista Steamplant Oil Remediation Site (Site) during the fourth quarter of 2021 (October through December). Two O&M events were conducted occurring on October 7 and November 24, 2021. In general, O&M activities for the quarter included:

1. Removing liquids from product recovery reservoirs and vaults using a drum-mounted vacuum pump;
2. Adjusting and monitoring belt skimmer operation;
3. Replacing belt skimmer components;
4. Monitoring oil recovery reservoir components;
5. Monitoring detention tank levels and components;
6. Collecting fats, oils, and grease (FOG) samples;
7. Troubleshooting and replacing SVE system components; and
8. Completing remedial system component operational and calibration checks.

2.0 O&M EVENT – OCTOBER 7, 2021

2.1. Personnel

- Joshua M. Lee, GeoEngineers Inc. (GeoEngineers)

2.2. Subcontractors

- Spokane Environmental Services (SES) (liquid removal and equipment maintenance)
- Spokane Traffic (traffic control)

2.3. Activities

GeoEngineers visited the Site on October 7, 2021 to document O&M activities. SES removed oil and water from the vault floors and product recovery reservoirs in vaults OR1, OR3, EW1, EW2 and EW3 using a 3-foot-long polyvinyl chloride (PVC) stinger connected to a drum-mounted vacuum. Liquid removed from the vault floors was a mix of infiltrated precipitation and overflow from product recovery tanks; liquid removed from the recovery tanks was a mixture of oil and water. The liquid from the product recovery tanks and vaults was pumped into 55-gallon drums and transported to Avista's storage yard for disposal. SES removed approximately 5 gallons of liquid (about 4 gallons of oil) from OR1, 15 gallons of liquid (about 5 gallons of oil) from OR3, 5 gallons of liquid (0.5 gallon of oil) from EW1, 15 gallons of liquid (about 22 gallons of oil) from EW2 and 45 gallons of liquid (about 5 gallons of oil) from EW3, as seen in Appendix B.

2.4. Hydraulic Control System

2.4.1. Groundwater Pumps

On arrival, the groundwater pumps in EW1, EW2 and EW3 were on and functioning properly displaying real-time pressure and flow rates on the supervisory control and data acquisition (SCADA) system. Avista requested periodic monitoring of extraction well groundwater pump operation.

The groundwater pump flow rate in extraction well EW1 was about 16.2 to 17.4 gallons per minute (gpm) with a pressure reading of 9.0 pounds per square inch (psi) on the SCADA control system. The groundwater pump flow rate in extraction well EW2 was 26.9 to 27.0 gpm with a pressure of 9.1 psi. The groundwater pump flow rate in extraction well EW3 was 10.2 to 10.4 gpm with a pressure of 100.9 psi.

2.4.2. Surfactant Pumps

Surfactant pumps in EW1, EW2 and EW3 were on and functioning upon arrival. The surfactant pumps remained on.

2.4.3. Piezometer Water Level Transducers

Water level transducers PZ1 and PZ3 were functioning properly, displaying real-time groundwater elevations on the SCADA system. Water level transducer PZ2 continued to read a groundwater elevation of approximately 10 feet lower than PZ1 and PZ3; SES recommends replacement of the PZ2 water level transducer.

2.4.4. Detention Tank

On arrival, the detention tank pump remained off from the previous maintenance event. The detention tank pump was switched to "hand" but remained off; the detention tank pump relay requires troubleshooting. The detention tank level read 32 inches (approximately 64,000 gallons) on SCADA. Avista and GeoEngineers plan to continue to monitor detention tank levels and pump operation.

2.5. Fats, Oils and Grease (FOG) Sampling

On October 7, 2021, John Wehr (Avista) provided access to the stormwater detention tank located in the sub-station yard. One water sample (DT:100721) was obtained from the stormwater detention tank using a disposable bailer. SES collected one water sample from EW1 (EW1:100721) using the sampling port in the EW1 vault. The water samples were submitted to Eurofins TestAmerica located in Spokane Valley, Washington for FOG analysis using Method 1664A N-Hexane Extractable Material (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM). Analytical results are attached in Appendix C, Chemical Analytical Laboratory Reports and summarized below.

- Results for HEM and SGT-HEM methods were non-detect for FOG in the two samples (EW1:100721 and DT:100721) collected.

2.6. Free Product Recovery System

2.6.1. Belt Skimmers

SES inspected belts and belt skimmer components as described in Appendix A. The belt skimmers in OR1, OR3, EW2 and EW3 were on and operating properly. The EW1 belt skimmer was on upon arrival, but the skimmer belt was loose and slipping on the head pulley. SES adjusted the EW1 belt skimmer knife and belt tension. SES hand spun the skimmer belt, removing a thick layer of oil, until the EW1 belt skimmer was functioning properly.

2.6.2. Product Recovery Reservoirs

The accuracy of the product-recovery tank-level transmitters was checked by measuring the level of Light Nonaqueous Phase Liquid (LNAPL), or free product, accumulated in each oil recovery tank with respect to

the tank's bottom both before and after liquid was removed by SES. These measurements were compared to tank-level transmitter readings. The sensors in vaults OR1, OR3 and EW1 were operating within normal limits. The sensor in vault EW2 displayed an initial product reservoir level of 33.1 inches on the SCADA system, although the product recovery reservoir was about 12 inches. The sensor in vault EW3 displayed an initial product reservoir level of 0.0 inches on the SCADA system, although the product recovery reservoir was overflowing (approximately 35 inches). SES removed and cleaned the EW2 and EW3 reservoir sensors. After cleaning, the EW2 and EW3 reservoir sensors continued to read inaccurate reservoir levels on the SCADA system (EW2 at 33.1 inches and EW3 at 0.0 inches).

2.7. Quarterly Air Monitoring

The notice of construction (NOC) for the oil spill remediation (OSR) was voided by Spokane Regional Clean Air Authority (SRCAA) on April 13, 2016, so checks on the bioventing system and letters to SRCAA are no longer necessary. GeoEngineers recorded bioventing data from the SCADA system but did not perform field measurements on the bioventing system.

The bioventing system condensate pump (CP) removed during the previous maintenance event and remains out of service until a new condensate pump can be installed.

3.0 O&M EVENT – NOVEMBER 24, 2021

3.1. Personnel

- Justin D. Orr, GeoEngineers

3.2. Subcontractors

- SES (liquid removal and equipment maintenance)
- Spokane Traffic (traffic control)

3.3. Activities

3.3.1. Detention Tank Maintenance

GeoEngineers visited the Site on November 24, 2021, to document O&M activities. SES removed oil and water from the vault floors and product recovery reservoirs in vaults OR3, EW1, EW2 and EW3 using a 3-foot-long PVC stinger connected to a drum-mounted vacuum. Vault OR1 had a miniscule amount of oil and water and did not warrant liquid removal. Liquid removed from the vault floors was a mix of infiltrated precipitation and overflow from product recovery tanks; liquid removed from the recovery tanks was a mixture of oil and water. The liquid from the product recovery tanks and vaults was pumped into 55-gallon drums and transported to Avista's storage yard for disposal. SES removed approximately 30 gallons of liquid (1.5 gallons of oil) from OR3, 5 gallons of liquid (0.0 gallons of oil) from EW1, 70 gallons of liquid (about 4.5 gallons of oil) from EW2 and 70 gallons of liquid (about 7 gallons of oil) from EW3, as seen in Appendix B.

3.4. Hydraulic Control System

3.4.1. Groundwater Pumps

On arrival, the groundwater pumps in EW1, EW2 and EW2 were on and functioning properly displaying real-time pressure and flow rates on the SCADA system. The groundwater pump flow rate in extraction well EW1 was about 16.6 to 17.5 gpm with a pressure reading of 9.7 psi on the SCADA control system. The groundwater pump flow rate in extraction well EW2 was 22.7 to 25.4 gpm with a pressure of 7.5 psi. The groundwater pump flow rate in extraction well EW3 was 10.2 to 10.4 gpm with a pressure of 100.7 psi.

3.4.2. Surfactant Pumps

Surfactant pumps in EW1, EW2 and EW3 were on and functioning upon arrival. The surfactant pumps remained on.

3.4.3. Piezometer Water Level Transducers

Water level transducers PZ1 and PZ3 were functioning properly, displaying real-time groundwater elevations on the SCADA system. Water level transducer PZ2 continued to read inaccurate groundwater elevations on the SCADA system. SES turned off the PZ2 water level transducer and recommends replacement of the transducer.

3.4.4. Detention Tank

Upon arrival, the detention tank pump remained off from the previous maintenance event. SES diagnosed the detention tank pump and found that the pump had power, but the pump propeller was binding inside the pump. SES adjusted the propeller nut and the pump appeared to be functioning properly. The detention tank level read 58 inches (approximately 114,000 gallons) on SCADA. Avista and GeoEngineers plan to continue to monitor detention tank levels and pump operation.

3.5. Free Product Recovery System

3.5.1. Belt Skimmers

SES inspected belts and belt skimmer components, as described in Appendix A. The belt skimmers in OR1, EW2 and EW3 were on and operating properly. The OR3 belt skimmer was on upon arrival but the belt skimmer belt was torn. SES turned the OR3 belt skimmer off until the broken belt can be removed and replaced. The EW1 belt skimmer was on upon arrival, but the skimmer belt was loose and slipping on the head pulley. SES adjusted the EW1 belt skimmer knife and belt tension. SES hand spun the skimmer belt, removing a thick layer of oil, until the EW1 belt skimmer was functioning properly.

3.5.2. Product Recovery Reservoirs

The accuracy of the product-recovery tank-level transmitters was checked by measuring the level of LNAPL, or free product, accumulated in each oil recovery tank with respect to the tank's bottom both before and after liquid was removed by SES. These measurements were compared to tank-level transmitter readings. The sensors in vaults OR1, OR3, EW1 and EW2 were operating within normal limits. The sensor in vault EW3 displayed an initial product reservoir level of 0.0 inches on the SCADA system, although the product recovery reservoir was overflowing (approximately 35 inches). SES removed and cleaned the EW3 reservoir sensor, but the sensor continued to read inaccurate reservoir levels on the SCADA system (EW3 at 0.0 inches).

3.6. Quarterly Air Monitoring

The NOC for the OSR was voided by SRCAA on April 13, 2016, so checks on the bioventing system and letters to SRCAA are no longer necessary. GeoEngineers recorded bioventing data from the SCADA system but did not perform field measurements on the bioventing system.

SES installed a new Hayward R-Series Model RC03 1-horsepower condensate pump for the bioventing system knockout tank. The new condensate pump will be tested when the knockout pot has sufficient liquid, The condensate pump is not recommended to operate dry.

4.0 ACTION ITEMS – FIRST QUARTER 2022

1. The next O&M event will be scheduled for January 18, 2022.
2. Monitor extraction well (EW1, EW2 and EW3) operation and SCADA information.
3. Replace OR3 belt.
4. Replace PZ2 transducer.
5. Troubleshoot EW3 level sensor with SCADA technician.
6. Monitor detention tank level and pump operation.
7. Perform corrective maintenance to belt skimmer components, as necessary.

This report has been prepared on behalf of the Avista Corporation. Should you have any questions regarding the monitoring results or other aspects of this project, please do not hesitate to call us at your earliest convenience.

APPENDICES

GeoEngineers

APPENDIX A
Maintenance and Calibration/Adjustment Logs

Maintenance Log
WWP Central Steam Plant/Oil Spill Remediation
Spokane, WA

Scheduled ?							
Yes	No	Date	Time	System	Equipment Description	Action Taken (brief description)	Action Required (leave blank if none required)
		10/7/2021	730	EW1	Surf Pump		
					Heater		
					Light		
					Vault	Pumped out product reservoir and storm water from vault	
					Belt Skimmer	Adjusted belt tension	
					GW Pump		Monitor pump and SCADA
				EW2	Surf Pump		
					Heater		
					Light		
					Vault	Pumped out product reservoir and storm water from vault; cleaned level sensor and checked connections	Diagnose reservoir level sensor reading on SCADA
					Belt Skimmer		
					GW Pump		Monitor pump and SCADA
				EW3	Surf Pump		
					Heater		
					Light		
					Vault	Pumped out product reservoir and storm water from vault	Diagnose reservoir level sensor reading on SCADA
					Belt Skimmer		
					GW Pump		Monitor pump and SCADA
				OR3	Vault	Pumped out product reservoir and storm water from vault	
					Belt Skimmer		
					Light		
					Heater		
				OR2	Vault		
				OR1	Vault	Pumped out product reservoir	
					Belt Skimmer		
					Light		
					Heater		
				PZ1	piezometer		
				PZ2	piezometer		Replace transducer and recalibrate with SCADA technician.
				PZ3	piezometer		
					Lift Station-P5		
					Lift Station-P6		
					Detention Tank-P7		Diagnose DT Pump operation
					Passive Skimmer-CB1		
					Passive Skimmer-CB2		
					Passive Skimmer-CB3		
				BV	Condensate Pump		Rebuild pump and reinstall

Calibration/Adjustment Log
WWP Central Steam Plant/Oil Spill Remediation
Spokane, Washington

Date	Time	System	Equipment Description	Water level Solinst	Reading		Error	Action Taken (brief description)
					Actual	PLC/SCADA		
11/24/2021	655	EW1	DTW (feet)	-	-	1849.07		Removed oil and water from vault and reservoir.
			Oil Tank-before (inches)	N/A	0	1.6		
			Oil Tank-after (inches)	N/A	0	0.4		
			Surf Tank (inches)	N/A	-	0.7		
			Flow (gpm)	N/A	-	16.6-17.5		
			Pressure (psi)	N/A	-	9.7		
		EW2	DTW (feet)	-	-	1849.33		Removed oil and water from vault and reservoir
			Oil Tank-before (inches)	N/A	34.3	35.0		
			Oil Tank-after (inches)	N/A	0	0.0		
			Surf Tank (inches)	N/A	-	8.8		
			Flow (gpm)	N/A	-	22.7-25.4		
			Pressure (psi)	N/A	-	7.5		
		EW3	DTW (feet)	-	-	1851.15		Removed oil and water from vault and reservoir; cleaned reservoir level sensor and checked connections.
			Oil Tank-before (inches)	N/A	35/full	0.0		
			Oil Tank-after (inches)	N/A	0	0.0		
			Surf Tank (inches)	N/A	-	23.0		
			Flow (gpm)	N/A	-	10.2-10.4		
			Pressure (psi)	N/A	-	100.7		
		PZ1	DTW (feet)	N/A	-	1852.44		Pumped water from PZ2 vault and repaired corroded connections; SCADA reported incorrect level.
		PZ2	DTW (feet)	-	-	-		
		PZ3	DTW (feet)	-	-	1855.19		
		SW	Det Tank-level		-	58		Diagnosed and repaired pump
			Det Tank-flow	N/A	-	-		
			lift station-level		-	-		
		OR1	Oil Tank-before (inches)	N/A	2	0.0		
			Oil Tank-after (inches)	N/A	0	2.1		
		OR3	Oil Tank-before (inches)	N/A	3	3.5		Removed oil and water from vault and reservoir.
			Oil Tank-after (inches)	N/A	0	3.3		

Calibration/Adjustment Log
WWP Central Steam Plant/Oil Spill Remediation
Spokane, Washington

Date	Time	System	Equipment Description	Pressure		Flow			O2 (%)	CO2 (ppm)	RH (%)	Action Taken (brief description)	Action Required (leave blank if none required)
				Actual (in H2O)	PLC/SCADA (in H2O)	Velocity (FPM)	Actual Flow (CFM)	PLC/SCADA (CFM)					
11/24/2021	655	BV	Extraction-BE-1	-	-4.87	-	-	8.5	3.28	3.83	34.2		
			-BE-2	-	-2.85	-	-	8.6	3.08	3.83	42.8		
			-BE-3	-	-2.27	-	-	16.7	3.24	3.83	42.6		
			-BE-4	-	-0.95	-	-	14.7	3.74	3.83	36.8		
			-BE-5	-	-8.92	-	-	0.0	3.44	3.83	39.4		
			-BE-6	-	-1.01		-	11.3	3.81	3.83	33.2		
			-BE-7	-	-1.28	-	-	11.1	3.55	3.83	35.9		
			-BE-8	-	-7.39	-	-	0.0	3.09	3.83	36.7		
			-BE-9	-	-3.46	-	-	13.9	3.11	3.83	39.5		
			-BE-10	-	-2.42	-	-	10.4	3.69	3.82	34.4		
			Injection-BI-1		0.23								
			-BI-2		6.74								
			-BI-3		6.60								
			-BI-4		6.81								
			-BI-5		6.67								
			-BI-6		6.56								
			-BI-7		6.61								
			Manifold	-	FPM								
			Manifold Temp	-	deg F								
			Vacuum - MS										
			Total Flow SCADA (BI)	39.5	46.1								
		BV	SCAPCA monitoring	Calibration check of OVM									
			Cal gas =	none	isobutylene								
			Background=	none	ppm								
			Result=	none	ppm								
			Total Flow SCADA (BE)=	115.3	CFM								
			Kurz=										

"-" = not measured.

APPENDIX B
Product Vacuum Extraction

Product Vacuum Extraction (Extraction and Recovery Wells)
WWP Central Steam Plant/Oil Spill Remediation
Spokane, Washington
Fourth Quarter 2021 (October to December)

Date	System	Estimated Removed (Gallons)		Total Liquid Removed (Gallons)
		Product	Water	
10/7/2021	OR1	4.0	1.0	5.0
	OR3	5.0	10.0	15.0
	EW1	0.5	4.5	5.0
	EW2	2.0	13.0	15.0
	EW3	5.0	40.0	45.0
11/24/2021	OR1	0.0	0.0	0.0
	OR3	1.5	28.5	30.0
	EW1	0.0	5.0	5.0
	EW2	4.5	65.5	70.0
	EW3	7.0	63.0	70.0
Totals		29.5	230.5	260

APPENDIX C
Chemical Analytical Laboratory Report

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Spokane
11922 East 1st Ave
Spokane, WA 99206
Tel: (509)924-9200

Laboratory Job ID: 590-16077-1
Client Project/Site: Avista Steam Plant/02522-013-05

For:
GeoEngineers Inc
523 East Second Ave
Spokane, Washington 99202

Attn: Scott Lathen

Authorized for release by:
10/18/2021 10:12:42 AM

Randee Arrington, Lab Director
(509)924-9200
Randee.Arrington@Eurofinset.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at:
www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Case Narrative

Client: GeoEngineers Inc
Job ID: 590-16077-1
Project/Site: Avista Steam Plant/02522-013-05

Job ID: 590-16077-1

Laboratory: Eurofins TestAmerica, Spokane

Narrative

Receipt
The samples were received on 10/7/2021 11:30 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 16.7º C.

Receipt Exceptions
The following samples were received at the laboratory outside the required temperature criteria: DT:100721 (590-16077-1) and EW1:100721 (590-16077-2). The samples are considered acceptable since they were collected and submitted to the laboratory on the same day and there is evidence that the chilling process has begun.

General Chemistry
Method 1664A: The reference method requires samples to be preserved to a pH of 2 or less or analyzed within 4 hours of the collection time. The following samples were received at the laboratory with a pH of greater than 2: DT:100721 (590-16077-1) and EW1:100721 (590-16077-2).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Sample Summary

Client: GeoEngineers Inc
Project/Site: Avista Steam Plant/02522-013-05

Job ID: 590-16077-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
590-16077-1	DT:100721	Water	10/07/21 09:10	10/07/21 11:49
590-16077-2	EW1:100721	Water	10/07/21 09:30	10/07/21 11:49

Definitions/Glossary

Client: GeoEngineers Inc
Job ID: 590-16077-1
Project/Site: Avista Steam Plant/02522-013-05

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Client Sample Results

Client: GeoEngineers Inc
Job ID: 590-16077-1
Project/Site: Avista Steam Plant/02522-013-05

Client Sample ID: DT:100721
Lab Sample ID: 590-16077-1
Date Collected: 10/07/21 09:10
Matrix: Water
Date Received: 10/07/21 11:49

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	ND		4.8		mg/L		10/16/21 14:17	10/16/21 16:42	1
SGT-HEM (TPH)	ND		4.8		mg/L		10/16/21 14:17	10/16/21 16:42	1

Client Sample ID: EW1:100721
Lab Sample ID: 590-16077-2
Date Collected: 10/07/21 09:30
Matrix: Water
Date Received: 10/07/21 11:49

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	ND		4.7		mg/L		10/16/21 14:17	10/16/21 16:42	1
SGT-HEM (TPH)	ND		4.7		mg/L		10/16/21 14:17	10/16/21 16:42	1

QC Sample Results

Client: GeoEngineers Inc
Project/Site: Avista Steam Plant/02522-013-05

Job ID: 590-16077-1

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 580-370798/1-A
Matrix: Water
Analysis Batch: 370807

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 370798

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	ND		5.5		mg/L		10/16/21 22:17	10/16/21 16:42	1
SGT-HEM (TPH)	ND		5.5		mg/L		10/16/21 22:17	10/16/21 16:42	1

Lab Sample ID: LCS 580-370798/2-A
Matrix: Water
Analysis Batch: 370807

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 370798

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
HEM (Oil & Grease)			44.3	37.9		mg/L		86	78 - 114		
SGT-HEM (TPH)			22.1	15.4		mg/L		70	64 - 132		

Lab Sample ID: LCSD 580-370798/3-A
Matrix: Water
Analysis Batch: 370807

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 370798

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HEM (Oil & Grease)			44.4	37.1		mg/L		83	78 - 114	2	18
SGT-HEM (TPH)			22.2	14.8		mg/L		67	64 - 132	4	34

Lab Chronicle

Client: GeoEngineers Inc
Job ID: 590-16077-1
Project/Site: Avista Steam Plant/02522-013-05

Client Sample ID: DT:100721
Lab Sample ID: 590-16077-1
Date Collected: 10/07/21 09:10
Matrix: Water
Date Received: 10/07/21 11:49

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1664A			1032 mL	1000 mL	370798	10/16/21 14:17	FCG	FGS SEA
Total/NA	Analysis	1664A		1			370807	10/16/21 16:42	FCG	FGS SEA

Client Sample ID: EW1:100721
Lab Sample ID: 590-16077-2
Date Collected: 10/07/21 09:30
Matrix: Water
Date Received: 10/07/21 11:49

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1664A			1071 mL	1000 mL	370798	10/16/21 14:17	FCG	FGS SEA
Total/NA	Analysis	1664A		1			370807	10/16/21 16:42	FCG	FGS SEA

Laboratory References:

FGS SEA = Eurofins FGS, Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: GeoEngineers Inc
Job ID: 590-16077-1
Project/Site: Avista Steam Plant/02522-013-05

Laboratory: Eurofins FGS, Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-004	02-19-22
ANAB	Dept. of Defense ELAP	L2236	01-19-22
ANAB	Dept. of Energy	L2236	01-19-22
ANAB	ISO/IEC 17025	L2236	01-19-22
California	State	2954	06-30-21 *
Florida	NELAP	E87575	06-30-22
Kentucky (WW)	State	KY98042	12-31-21
Louisiana	NELAP	03073	06-30-22
Maine	State	2020012	05-02-22
Montana (UST)	State	NA	04-14-27
New Jersey	NELAP	WA014	06-30-22
New York	NELAP	11662	04-01-22
Oregon	NELAP	4167	07-07-22
US Fish & Wildlife	US Federal Programs	058448	05-31-22
USDA	US Federal Programs	P330-20-00031	02-10-23
Washington	State	C788	07-13-22
Wisconsin	State	399133460	08-31-22

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: GeoEngineers Inc
Project/Site: Avista Steam Plant/02522-013-05

Job ID: 590-16077-1

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	FGS SEA
1664A	HEM and SGT-HEM (SPE)	1664A	FGS SEA

Protocol References:

1664A = EPA-821-98-002

Laboratory References:

FGS SEA = Eurofins FGS, Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Chain of Custody Record

575314 eurofins | Environment Testing TestAmerica

Address: _____

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other: TAL-8210

Client Contact	Project Manager: Josh Lee	Site Contact:	Date:	COC No:
Company Name: GeoEngineers, Inc.	Tel/Email: 406-239-7810	Lab Contact:	Carrier:	1 of 1 COCs
Address: 523 E Second Ave	Analysis Turnaround Time			Sampler:
City/State/Zip: Spokane, WA 99202	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone: 509-363-3125	TAT if different from Below			Walk-in Client:
Fax:	☐ 2 weeks Std.			Lab Sampling:
Project Name: Avista - Steamplant	☐ 1 week			
Site: 2522-013-05	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	1664B-HEM + SGT-HEM	Sample Specific Notes:
DT:100721	10/7/21	0910	G	W	2			X	
EW1:100721	10/7/21	0930	G	W	2			X	

590-16077 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: 16.6 Corr'd: 16.7 Therm ID No.: IR006

	Company	Date/Time		Company	Date/Time
Relinquished by:	GEI	10/7/21 11:30	Received by:	EDS SRC	10/7/21 11:30
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Eurofins TestAmerica, Spokane
11922 East 1st Ave
Spokane, WA 99206
Phone: 509-924-9200 Fax: 509-924-9290

Chain of Custody Record

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Arrington, Randee E	Carrier Tracking No(s):	COC No: 590-6358.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Randee.Arrington@Eurofinset.com	State of Origin: Washington	Page: Page 1 of 1
Company: Eurofins Frontier Global Sciences LLC		Accreditations Required (See note): State Program - Washington		Job #: 590-16077-1
Address: 5755 8th Street East, ,	Due Date Requested: 10/20/2021			
City: Tacoma	TAT Requested (days):			
State, Zip: WA, 98424				
Phone: 253-922-2310(Tel) 425-420-9210(Fax)	PO #:			
Email:	WO #:			
Project Name: Avista Steam Plant/02522-013-05	Project #: 59000704			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Preservation Code:	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	1664A/1664A_SPE (MOD) HEM and SGT-HEM	Total Number of containers	Special Instructions/Note:
DT:100721 (590-16077-1)	10/7/21	09:10 Pacific		Water				X	2	
EW1:100721 (590-16077-2)	10/7/21	09:30 Pacific		Water				X	2	

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins TestAmerica.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1	M. Vaughan	10/07/2021 14:27	SPO EFA		10/8/21 0945	EFGS
2	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
3	Relinquished by:	Date/Time	Company	Received by:	Date/Time	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:
		0.3 10/8/21 IR2 = 0.0

10/18/2021

Login Sample Receipt Checklist

Client: GeoEngineers Inc

Job Number: 590-16077-1

Login Number: 16077
List Number: 1
Creator: Vaughan, Madison 1

List Source: Eurofins TestAmerica, Spokane

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	False	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: GeoEngineers Inc

Job Number: 590-16077-1

Login Number: 16077
List Number: 2
Creator: Greene, Ashton R

List Source: Eurofins FGS, Seattle
List Creation: 10/08/21 01:26 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	IR8 -0.3 / 0.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

GeoEngineers