Report
Quarterly Compliance Monitoring—QM-94
WWP Central Steam Plant
Oil Spill Remediation
Spokane, Washington

January 14, 2022

Prepared for

Avista Corporation
1411 East Mission Avenue
Spokane, Washington 99220

LANDAU ASSOCIATES
10 North Post Street, Suite 218
Spokane, WA 99201
(509) 327-9737

Report
Quarterly Compliance Monitoring—QM-94
WWP Central Steam Plant
Oil Spill Remediation
Spokane, Washington

This document was prepared by, or under the direct supervision of, the undersigned, whose seal is affixed below.

Name: Shane Kostka
Washington State/No. 19110619

Date: January 14, 2022

Document prepared by: _____ Shane Kostka, LG
Project Geologist

Document reviewed by: _____ Thomas D. Briggs, PE, LHG
Senior Associate

Date: January 14, 2022
Project No.: 0236040.150
File path: L:\236-Avista\040-Oil Spill\WIP\PROG-RPT\QM-94\QM-94-signature page.docx
Project Coordinator: tac

LANDAU ASSOCIATES

This page intentionally left blank.

TABLE OF CONTENTS

FIGURES

TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

Avista ..... Avista Corporation
CAP ..... cleanup action plan
cfm ..... cubic feet per minute
City ..... City of Spokane
CO_2 ..... carbon dioxide
CSO ..... combined sewer overflow
Ecology ..... Washington State Department of Ecology
EPA ..... US Environmental Protection Agency
FOG ..... fats, oil, and grease
HEM ..... N-hexane extractable material
in-H_2O ..... inches of water
LAI ..... Landau Associates, Inc.
mg/L ..... milligrams per liter
O_2 ..... oxygen
QM-94 ..... 94th 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
SRCAA ..... Spokane Regional Clean Air Agency
WWP ..... Washington Water Power Company

This page intentionally left blank.

1.0 INTRODUCTION

Landau Associates, Inc. (LAI) has prepared this quarterly compliance monitoring report for Avista Corporation (Avista), formerly the Washington Water Power Company (WWP), to support cleanup activities at the Central Steam Plant site in Spokane, Washington (site; Figure 1). This quarterly monitoring report presents the results of compliance monitoring conducted during the 94th quarter (QM-94), April through June 2021.

1.1 Background

Site cleanup is being performed consistent with the Cleanup Action Plan (CAP) developed by the Washington State Department of Ecology (Ecology; 1996b), under the terms of the WWP/Ecology Amended Consent Decree (Ecology 1996a). Substantial completion of cleanup action construction and startup of the four mechanical systems (hydraulic control, free product recovery, bioventing, and stormwater control) was achieved on November 21, 1997. Demonstration, validation, and calibration of the systems were performed during October through December 1997. Cleanup action construction is summarized in the Final Cleanup Action Report (AGI 1998). Following substantial completion of cleanup action construction in 1997, 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 quarterly compliance monitoring report presents the results of all site compliance monitoring conducted during QM-94, in accordance with the final compliance monitoring plan (AGI 1998). The two types of compliance monitoring addressed in this report are described as follows:

- ***Protection monitoring*** confirms that human health and the environment are adequately protected during construction and operation of the cleanup action. Protection monitoring includes semiannual groundwater monitoring and previously included 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.

QM-94 protection monitoring is discussed in Section 2.0, and QM-94 performance monitoring is discussed in Section 3.0. Although groundwater monitoring is considered both protection and performance monitoring, it is discussed only in Section 3.1.

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 presented in the QM-12 annual data summary report (LAI 2001a). Currently, groundwater sampling and elevation monitoring are conducted semiannually in accordance with the revised monitoring schedule accepted by Ecology (2001) and presented in the QM-13 report (LAI 2001b).

1.3 Operation and Maintenance Activities Completed During the Reporting Period

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 and Spokane Environmental Services (SES) completed the following operation and maintenance activities during QM-94 (GeoEngineers 2021):

May 5, 2021

- Removed liquid (including free product) from product recovery vault floors and product recovery reservoirs at belt skimmer locations EW1, EW2, EW3, and OR3.
- Groundwater pumps EW2 and EW3 were off upon arrival. Reset pumps at EW2 and EW3 on the Supervisory Control and Data Acquisition (SCADA) system, and pumps functioned within normal limits. Groundwater pump EW1 was reported to be functioning normally.
- The belt skimmer motor, head pulley, and tail pulley at EW1 were replaced. The EW1 belt skimmer was reported to be functioning properly following the replacement. Belt skimmers at EW2, EW3, OR1, and OR3 were functioning within normal limits.
- Performed operational and calibration checks on remedial system components. The surfactant pumps in extraction wells EW1, EW2, and EW3; piezometer water level transducers in piezometers PZ1, PZ2, and PZ3; and product recovery tank level transducers in vaults OR1, OR3, EW1, and EW2 were operating within normal limits. Product recovery tank level transducer in vault EW3 displayed an incorrect reservoir level on the SCADA system. Liquid from the reservoir was removed and the EW3 tank level transducer was reported to display accurate readings following removal of the liquid.
- The stormwater detention tank pump remained off following the March 2–10, 2021 dewatering of the detention tank and discharge piping component replacement. The detention tank level was reported to read 8 inches on the SCADA system. GeoEngineers reports that the detention tank level and detention tank pump operation will continue to be monitored.

June 22, 2021

- Removed liquid (including free product) from product recovery vault floors and product recovery reservoirs at belt skimmer locations EW1, EW2, EW3, OR1, and OR3.
- Groundwater pump at EW3 was off upon arrival. Reset EW3 pump on the SCADA system and the pump functioned within normal limits. Groundwater pumps at EW1 and EW2 were reported to be functioning normally.
- Belt skimmers at EW2, EW3, OR1, and OR3 were functioning within normal limits. The belt skimmer motor, head pulley, and tail pulley at EW1 were replaced. The EW1 belt skimmer was reported to be functioning properly following the replacement.
- Performed operational and calibration checks on remedial system components. The surfactant pumps in extraction wells EW1, EW2, and EW3; piezometer water level transducers in

piezometers PZ1, PZ2, and PZ3; and product recovery tank level transducers in vaults OR1, OR3, EW1, EW2, and EW3 were operating within normal limits.

- The storm water detention tank pump remained off. The detention tank level was reported to read 16 inches on the SCADA system. GeoEngineers reports that the detention tank level and detention tank pump operation will continue to be monitored.

2.0 PROTECTION MONITORING

Air protection monitoring was historically performed to ensure that bioventing system discharge to the atmosphere was in compliance with the Spokane Regional Clean Air Agency (SRCAA; formerly Spokane County Air Pollution Control Authority [SCAPCA]). As presented in the QM-74 monitoring report (LAI 2016), the soil bioventing operation was removed from SRCAA registration and air protection monitoring was discontinued after QM-73.

3.0 PERFORMANCE MONITORING COMPLIANCE

This section discusses groundwater monitoring and performance of the stormwater, hydraulic control, product recovery, and bioventing systems during QM-94. Figures 2, 3, and 4 show the locations of the monitoring wells, hydraulic control system, and free product recovery wells, respectively. The figures have been updated to include changes in property ownership and development.

3.1 Groundwater Performance Monitoring

Where concentrations of hazardous substances exceed site cleanup levels, groundwater performance monitoring is conducted to ensure no offsite migration. Groundwater performance monitoring includes groundwater elevation monitoring, sampling, and chemical analysis. Groundwater sampling and monitoring are conducted semiannually in accordance with the revised schedule specified by Ecology (2001).

3.1.1 Groundwater Sampling

Semiannual groundwater sampling was not conducted during QM-94. The next groundwater sampling event is scheduled to occur in QM-95.

3.1.2 Groundwater Elevation Monitoring

Groundwater elevations in site monitoring wells were not measured during QM-94. Groundwater elevations in site monitoring wells will be measured in QM-95 in conjunction with semiannual groundwater sampling.

3.2 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 of 100 milligrams per liter (mg/L). In accordance with the final compliance monitoring plan, one stormwater sample per year is collected from the site stormwater detention basin for analysis of fats, oil, and grease (FOG) as N-hexane extractable material (HEM) and silica gel treated HEM (SGT-HEM) by US Environmental Protection Agency (EPA) Method 1664A HEM and SGT-HEM. A stormwater sample was not collected from the detention basin during QM-94. The next stormwater sampling is scheduled for QM-96.

3.3 Hydraulic Control Monitoring

3.3.1 Groundwater Elevation Monitoring

Groundwater elevations at extraction wells EW1 through EW3 and piezometers PZ1 through PZ3 are recorded continuously by the (SCADA) system to monitor performance of the hydraulic control system and water levels upgradient of the barrier wall. The groundwater elevation at monitoring well MW-027 is also measured semiannually and compared with the groundwater elevations in EW1, EW2, and EW3 and in PZ1, PZ2, and PZ3 to verify that the hydraulic control system is maintaining an inward

hydraulic gradient with respect to shallow groundwater downgradient of the barrier wall. Hydraulic control piezometer and extraction well locations are shown on Figure 3, and Table 1 summarizes groundwater elevation data collected by the SCADA system for the hydraulic control system during QM-94. Based on SCADA system readings, the transducer in PZ2 was not functioning during QM-93.

Water levels recorded for extraction wells EW1, EW2, and EW3 and piezometers PZ1, PZ2, and PZ3 during QM-94 show that average groundwater levels upgradient of the barrier wall were below historical levels measured at MW-027, including the groundwater level measurement made at MW-27 on March 25, 2021, indicating that an inward hydraulic gradient was maintained across the barrier wall.

3.3.2 Extracted Groundwater Monitoring

Extracted groundwater from the hydraulic control system is sampled once per year for FOG to monitor compliance with the City's CSO system discharge criteria (100 mg/L). A sample of extracted groundwater was collected from extraction well EW1 on December 30, 2020 and analyzed for FOG as HEM and SGT-HEM by EPA Method 1664A. Extracted groundwater was not sampled during QM-94. The next extracted groundwater sampling is scheduled for QM-96.

3.4 Product Recovery Monitoring

3.4.1 Belt Skimmer Monitoring

Free product recovery at groundwater extraction wells and at two oil recovery wells (OR1 and OR3) is monitored by the SCADA system to ensure performance of the respective belt skimmers and to monitor oil recovery trends. The free 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. Free product is also removed, when necessary, by pumping directly from an individual well (well extraction); however, well extraction was not conducted during QM-94. Free product recovery well locations are shown on Figure 4, and Table 2 summarizes free product recovery data reported by the SCADA system for QM-94. As reported by the SCADA system, approximately 139.9 gallons of free product were recovered by the belt skimmers during QM-94.

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

3.5 Bioventing Performance Monitoring

Concentrations of carbon dioxide (CO_2) and oxygen (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 (10-15 percent by volume; AGI 1998) represents a level that 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 is considered an indication that biodegradation of petroleum hydrocarbons is occurring at the designed rate, assuming all other performance standards are met (AGI 1998).

3.5.1 Bioventing Extraction Wells

Air extracted from the 10 bioventing extraction wells (BE1 through BE10; Figure 5) is monitored to evaluate performance of the bioventing system and to measure biodegradation of Bunker C fuel oil. The SCADA system did not record 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. All bioventing extraction data presented in this report are based on available SCADA system readings. The average O_2 concentration for the 10 bioventing wells from May 12 through June 30 (the end of QM-94) was 1.82 percent by volume as seen in Table 3. This value is below the performance standard of 10-15 percent by volume. The average CO_2 concentration for the 10 bioventing wells during QM-93 was 0.95 percent by volume, which is greater than the estimated optimal concentration of 0.20 percent by volume.

Total oil volume biodegraded is based on O_2 and CO_2 percent by volume concentrations. As the SCADA system did not record O_2 and CO_2 percent by volume concentrations for bioventing well BE1 through BE10 from February 13 of QM-93 through May 11 of QM-94, the estimated total volume of Bunker C biodegraded is based on SCADA system readings from May 12 through June 30. The estimated total volume of Bunker C oil biodegraded by the bioventing system as reported by the SCADA system during QM-94 was approximately 335.61 gallons (Table 3).

3.5.2 Bioventing Injection Wells

Monitoring of air injected into the subsurface through the seven bioventing injection wells (BI1 through BI7) is performed to ensure satisfactory performance of the bioventing system. Bioventing injection well locations are shown on Figure 5, and data collected from the SCADA system for QM-94 is presented in Table 4.

Average monthly bioventing injection well pressures ranged between 0.22 and 5.86 inches of water (in-H_20), which is close to or within the anticipated operating range of 3-10 in-H_20 (AGI 1998). The average pressure of all bioventing injection wells was 4.87 in-H_20, which is within the anticipated operating range. The average airflow rate measured was 133.99 cubic feet per minute (cfm).

4.0 ACTIVITIES PLANNED FOR QM-95

The following monitoring and maintenance activities are planned for QM-95:

- Perform scheduled system operation and maintenance.
- Perform system component operational and calibration checks.
- Semiannual groundwater sampling and elevation monitoring.

5.0 SUMMARY AND CONCLUSIONS—QM-94

5.1 Summary

The following is a summary of the compliance monitoring data collected during QM-94 based on available SCADA system data:

- Groundwater elevation data recorded during QM-94 indicate that hydraulic control was maintained, and an inward gradient was maintained across the barrier wall.
- Free product (including entrained water) recovered from extraction wells and oil recovery wells through active belt skimmers totaled approximately 139.9 gallons, as reported by the SCADA system, during QM-94.
- The average oxygen concentration measured in bioventing extraction wells from May 12 through June 30 was 1.82 percent by volume, which is below the performance standard of 10-15 percent by volume. The average CO_2 concentration recorded during QM-93 in bioventing extraction wells was 0.95 percent by volume, which exceeds the optimal CO_2 concentration of 0.20 percent.
- The estimated total volume of Bunker C oil degraded by the bioventing system as reported by the SCADA system from May 12 through June 30 was approximately 335.61 gallons.
- Bioventing injection well pressures ranged between 0.22 and 5.86 in-H_2O, which is close to or within the anticipated operating range of 3-10 in-H_20. The average pressure of all bioventing injection wells was 4.87 in-H_20, which is within the anticipated operating range. The average airflow rate measured was 133.99 cfm.

5.2 Conclusions

Results of compliance monitoring conducted for QM-94 indicate that the Central Steam Plant Oil Spill remediation system is operating in accordance with permit levels, and hydraulic control of the site was maintained for the reporting period.

6.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of Avista Corporation for specific application to the WWP Central Steam Plant site in Spokane, Washington. The reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by LAI, shall be at the user's sole risk. LAI 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.

7.0 REFERENCES

AGI. 1998. Final Cleanup Action Report, Central Steam Plant Oil Spill Remediation, Spokane, Washington. AGI Technologies.

Ecology. 1996a. Amended Consent Decree No. 94-2-05788-4, State of Washington, Department of Ecology, Plaintiff, v. The Washington Water Power Company, Defendant. Washington State Department of Ecology.

Ecology. 1996b. Final Cleanup Action Plan, WWP Central Steam Plant Site, Spokane, Washington. Edited by Eastern Regional Office. Washington State Department of Ecology.

Ecology. 2001. Revised Sampling Frequency for the WWP Central Steam Plant Site in Spokane, Washington. Washington State Department of Ecology.

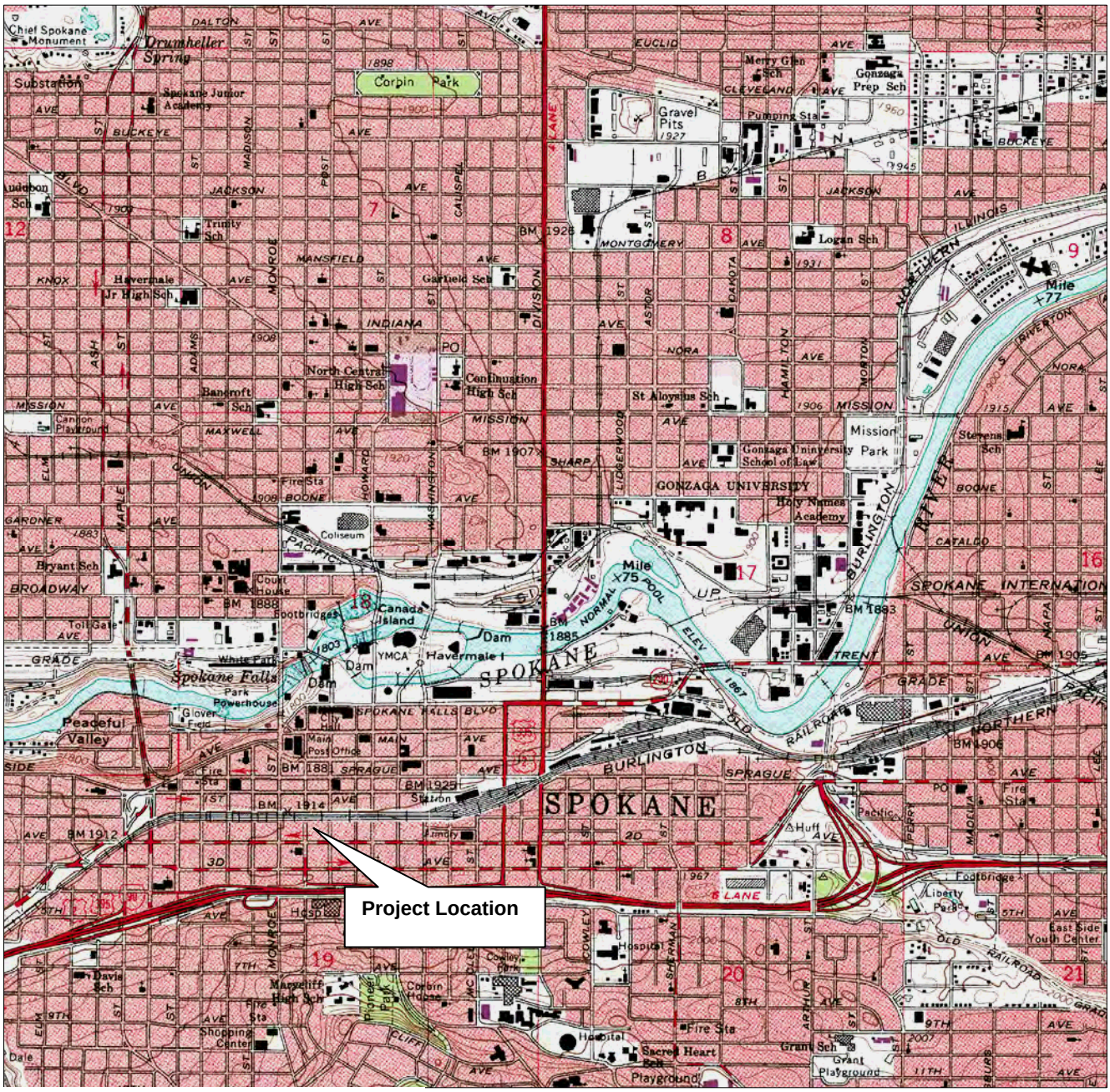
EPA. 2017. National Functional Guidelines for Superfund Organic Methods Data Review. EPA-540-R-2016-002 OLEM 9355.0-134. US Environmental Protection Agency. September.

GeoEngineers. 2021. Quarterly Operation and Maintenance Report, Second Quarter 2021 (April through June 2021), Central Steam Plant Oil Spill Remediation, Spokane, Washington. August 23.

LAI. 2001a. Quarterly Compliance Monitoring – QM-12 and Annual Summary WWP Central Steam Plant Oil Spill Remediation, Spokane, Washington. Landau Associates, Inc.

LAI. 2001b. Quarterly Compliance Monitoring – QM-13 WWP Central Steam Plant Oil Spill Remediation, Spokane, Washington. Landau Associates, Inc.

LAI. 2016. Quarterly Compliance Monitoring – QM-74 WWP Central Steam Plant Oil Spill Remediation, Spokane, Washington. Landau Associates, Inc. October 18.

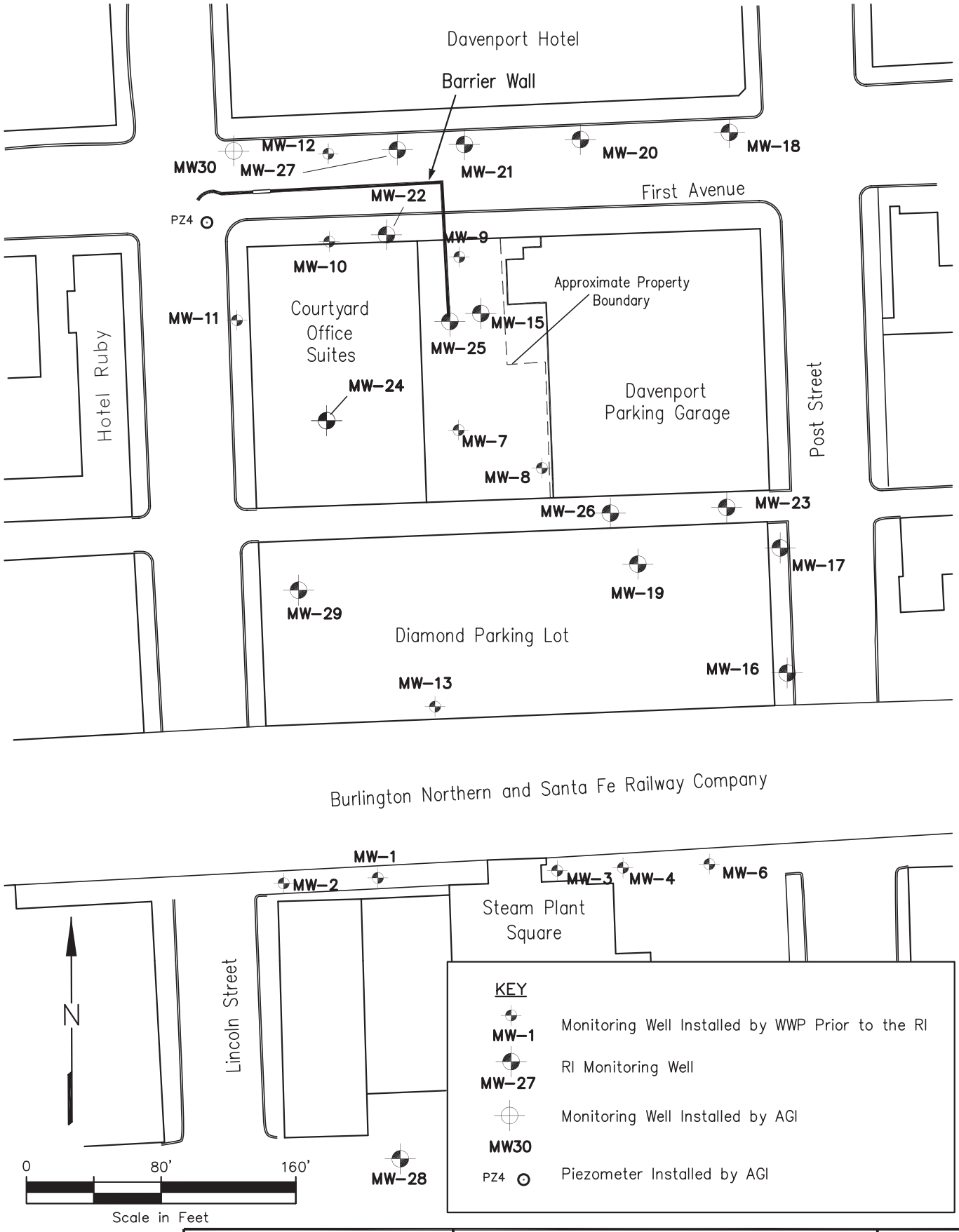


Source: USGS Spokane NW, WA Quad, 1974; PR 1986. Scale 1:24,000

6/4/09 I:\CAD\figures-ADOBE-dwg\1236\040- Steam Plant.doc

LANDAU ASSOCIATES

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



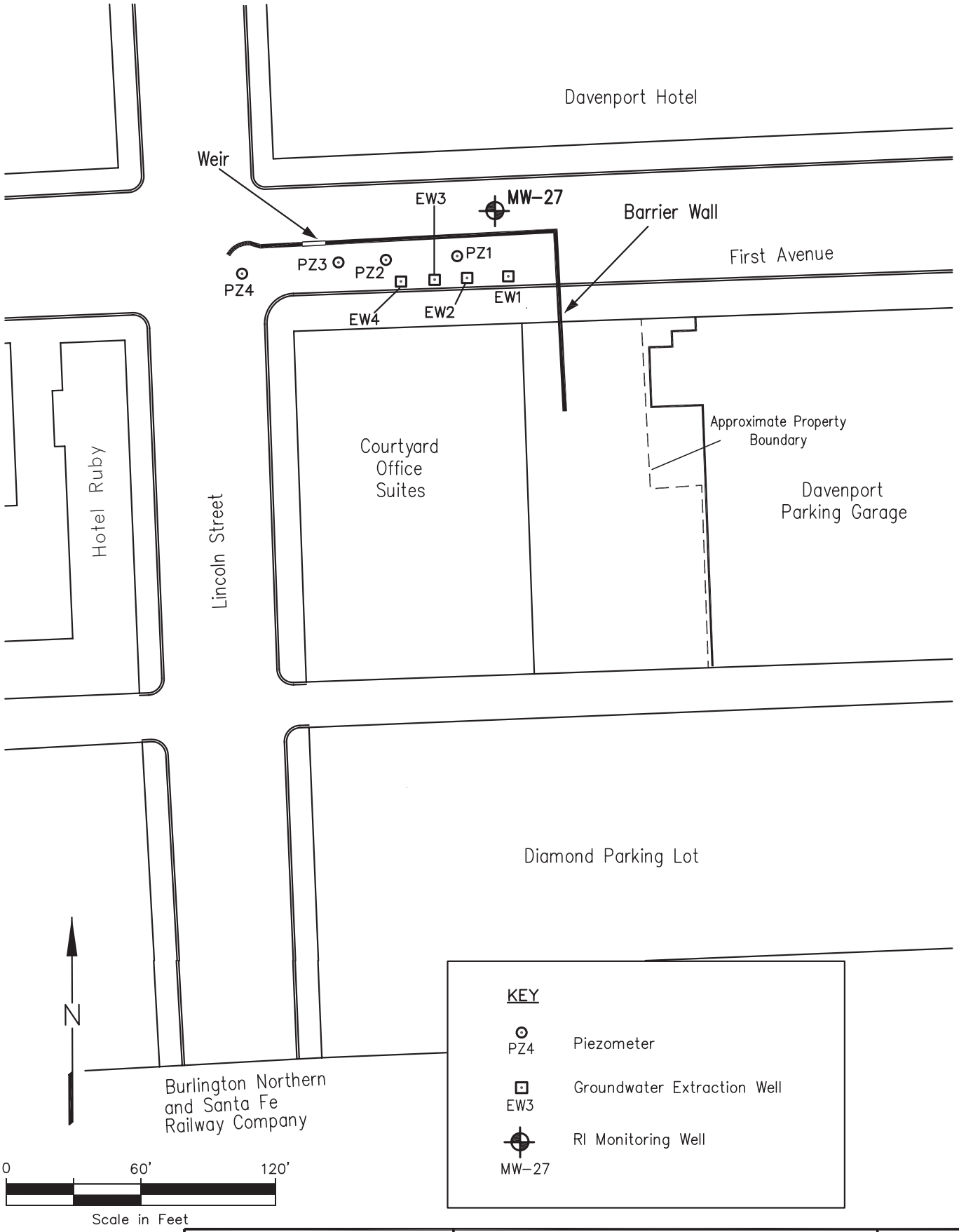
QM13 Rpt. I:\cad\plt-file\236040\12\mw (A) 4/2003

LANDAU ASSOCIATES

Central Steam Plant
Oil Spill Remediation
Spokane, Washington

Site Plan and Monitoring Well Locations

Figure 2



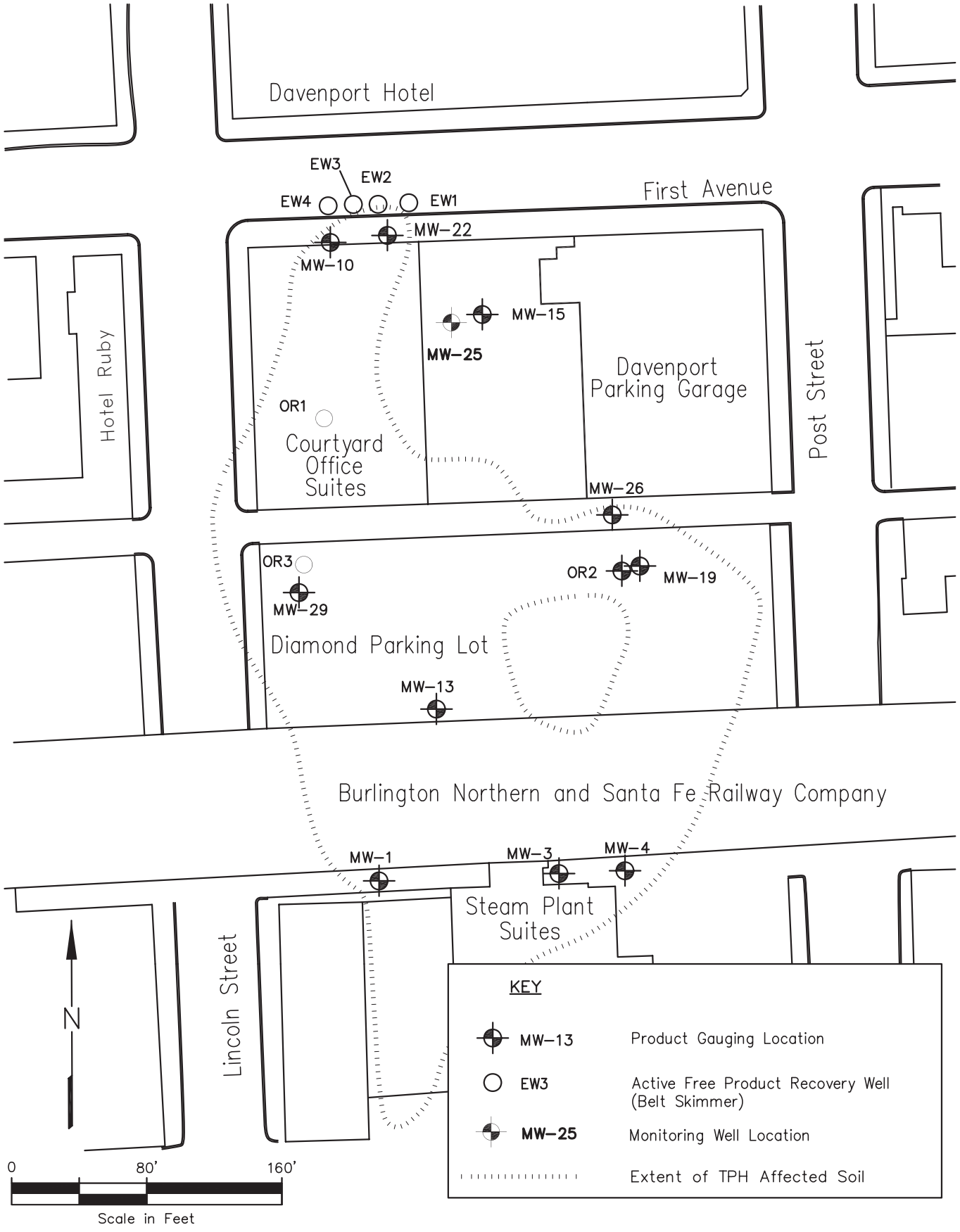
QM13 Rpt. I:\cad\plt-file\236040\12\hydsys (A) 4/2003

LANDAU ASSOCIATES

Central Steam Plant
Oil Spill Remediation
Spokane, Washington

Hydraulic Control System

Figure
3



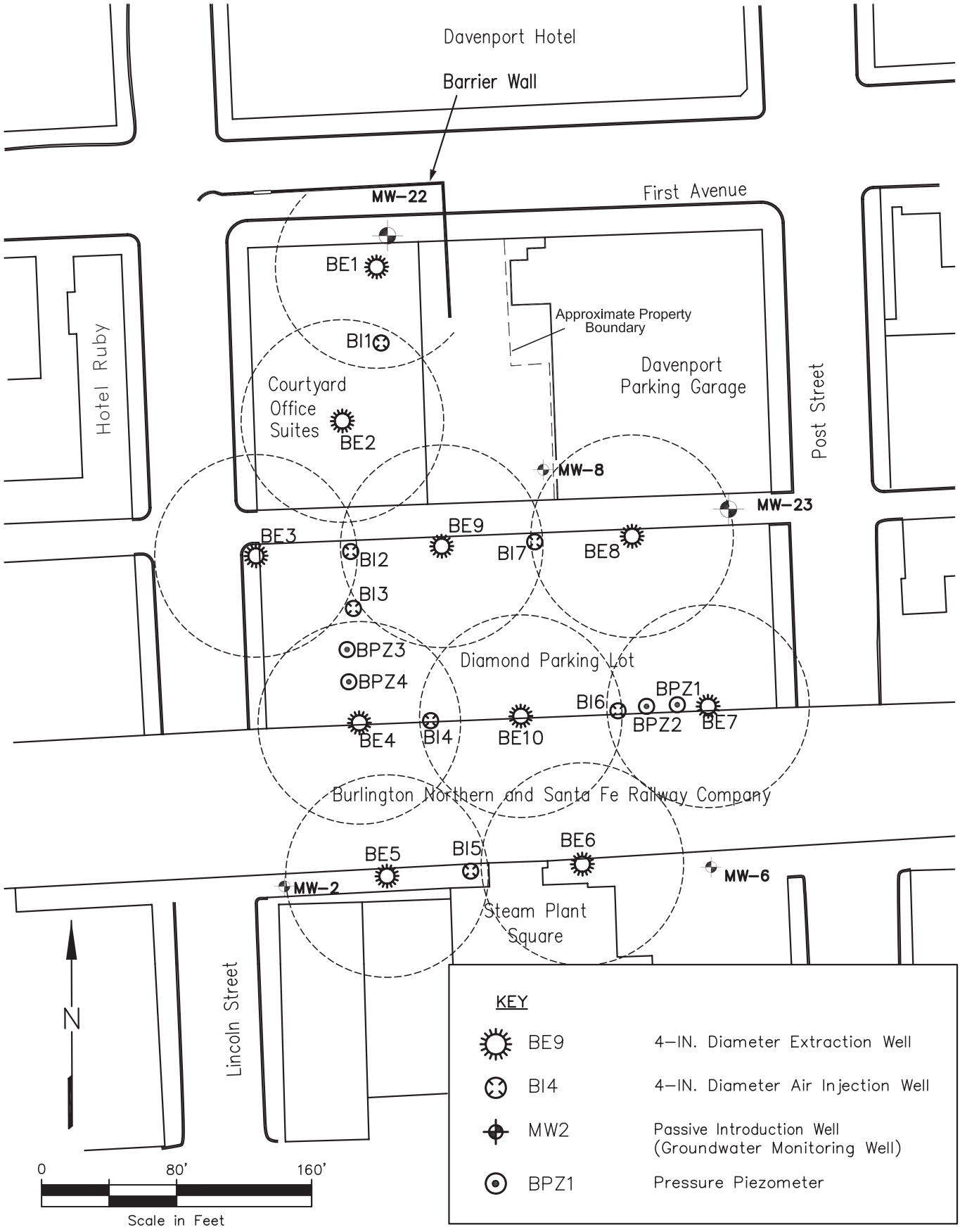
QM13 Rpt. I:\cad\plt-file\236040\12\pwrecov (A) 5/2002

LANDAU ASSOCIATES

Central Steam Plant
Oil Spill Remediation
Spokane, Washington

Free Product Gauging and Recovery Locations

Figure
4



QM13 Rpt. I:\cad\plt-file\236040\12\biov (A) 4/2003

LANDAU ASSOCIATES

Central Steam Plant
Oil Spill Remediation
Spokane, Washington

Bioventing Well Locations

Figure 5

Table 1
QM-94 Hydraulic Control Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

Well	QM-94 Groundwater Elevation (Feet)		
	April	May	June
EW1	1849.02	1848.93	1848.96
EW2	1850.46	1849.45	1848.86
EW3	1851.13	1852.09	1851.76
PZ1	1852.65	1852.59	1852.36
PZ2	--	--	--
PZ3	1854.97	1854.98	1855.00
MW-027	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 at 1855.00 on March 25, 2021.

MW-027 is located north of the barrier wall.

Transducer in PZ2 not functional during QM-94

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-94 Free Product Recovery Data
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

Location	Monthly Product Recovery (gal)			QM-94 Total (gal)
	April	May	June	
Belt Skimmer				
EW1	0.1	4.3	5.2	9.6
EW2	0.8	23.0	9.9	33.7
EW3	17.9	38.5	38.5	94.8
OR1	0.5	0.6	0.5	1.6
OR3	0.0	0.1	0.1	0.2
Total	19.2	66.5	54.2	139.9

Notes:

Data recorded by SCADA system.
Values are rounded to tenth of a gallon.
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 levels in reservoir tanks.
Volume of fluid removed from reservoir tanks is listed in GeoEngineers Second 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-94 Bioventing System Data - Extraction Well Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

		QM-94 Extraction Well Monitoring				
		April[1]	May[2]	June	Average[3]	Total[4]
Oil Volume Biodegraded (gal)		0.00	130.95	204.67	111.87	335.61
Average Total Flow (cfm)		106.46	108.17	109.21	107.95	NA
BE1	Avg. pressure (in-$H_2$0)	-3.72	-3.69	-3.58	-3.66	NA
	O_2 (%)	0.00	1.16	2.21	1.68	NA
	CO_2 (%)	0.00	0.95	0.96	0.95	NA
BE2	Avg. pressure (in-$H_2$0)	-0.11	-0.13	-0.16	-0.13	NA
	O_2 (%)	0.00	1.09	2.13	1.61	NA
	CO_2 (%)	0.00	0.95	0.96	0.96	NA
BE3	Avg. pressure (in-$H_2$0)	-2.96	-2.67	-2.42	-2.68	NA
	O_2 (%)	0.00	1.09	2.13	1.61	NA
	CO_2 (%)	0.00	0.95	0.96	0.96	NA
BE4	Avg. pressure (in-$H_2$0)	-1.81	-1.60	-1.45	-1.62	NA
	O_2 (%)	0.00	1.45	2.59	2.02	NA
	CO_2 (%)	0.00	0.94	0.96	0.95	NA
BE5	Avg. pressure (in-$H_2$0)	0.10	0.09	0.07	0.08	NA
	O_2 (%)	0.00	1.31	2.43	1.87	NA
	CO_2 (%)	0.00	0.94	0.96	0.95	NA
BE6	Avg. pressure (in-$H_2$0)	-8.02	-6.58	-2.05	-5.55	NA
	O_2 (%)	0.00	1.50	2.69	2.10	NA
	CO_2 (%)	0.00	0.94	0.95	0.94	NA
BE7	Avg. pressure (in-$H_2$0)	-4.62	-3.62	-1.66	-3.30	NA
	O_2 (%)	0.00	1.33	2.47	1.90	NA
	CO_2 (%)	0.00	0.94	0.95	0.95	NA
BE8	Avg. pressure (in-$H_2$0)	-0.05	-0.08	-0.09	-0.08	NA
	O_2 (%)	0.00	1.18	2.28	1.73	NA
	CO_2 (%)	0.00	0.95	0.96	0.95	NA
BE9	Avg. pressure (in-$H_2$0)	-5.13	-4.19	-3.64	-4.32	NA
	O_2 (%)	0.00	1.05	2.08	1.57	NA
	CO_2 (%)	0.00	0.95	0.96	0.96	NA
BE10	Avg. pressure (in-$H_2$0)	-4.65	-2.51	-1.15	-2.77	NA
	O_2 (%)	0.00	1.50	2.69	2.10	NA
	CO_2 (%)	0.00	0.94	0.96	0.95	NA
Average	Avg. pressure (in-$H_2$0)	-3.10	-2.50	-1.61	-2.40	NA
	O_2 (%)	0.00	1.27	2.37	1.82	NA
	CO_2 (%)	0.00	0.95	0.96	0.95	NA

Notes:

Data recorded by SCADA system.

[1]O2 (%) and CO2 (%) not read by SCADA system for extraction wells BE1 - BE10 from 2/13 - 5/11.

[2]The O_2 (%) and CO_2 (%) averages presented for May are from 5/12 - 5/31.

[3]Averages based on available SCADA system data.

[4]Total oil volume biodegraded based on SCADA system from 5/12 - 6/30.

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-94 Bioventing System Data - Injection Well Monitoring
WWP Central Steam Plant Oil Spill Remediation
Spokane, Washington

	QM-94 Injection Well Monitoring		
	April	**May**	**June**
Average Total Flow (cfm)	135.19	135.08	131.70
Average Well Pressure (in-H_2O)			
Injection Well			
BI1	0.22	0.22	0.24
BI2	5.81	5.79	5.53
BI3	5.60	5.56	5.30
BI4	5.86	5.84	5.56
BI5	5.82	5.81	5.55
BI6	5.67	5.64	5.37
BI7	5.72	5.71	5.47

Notes:
Data recorded by SCADA system.

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