Third Periodic Review
Washington Water Power Central Steam Plant

S Lincoln St and W First Ave, Spokane, WA 99201
Facility Site ID: 726, Cleanup Site ID: 682

Toxics Cleanup Program, Eastern Region

Washington State Department of Ecology
Spokane, Washington

May 2023

Document Information

This document is available on the Department of Ecology's Washington Water Power Central Steam Plant cleanup site page.[1]

Related Information

- Facility Site ID: 726
- Cleanup Site ID: 682

Contact Information

Toxics Cleanup Program

Eastern Regional Office
Ted Uecker, Site Manager
4601 N Monroe St
Spokane, WA 99205
Email: ted.uecker@ecy.wa.gov
Phone: 509-342-5564

Website: Washington State Department of Ecology[2]

ADA Accessibility

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Section 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

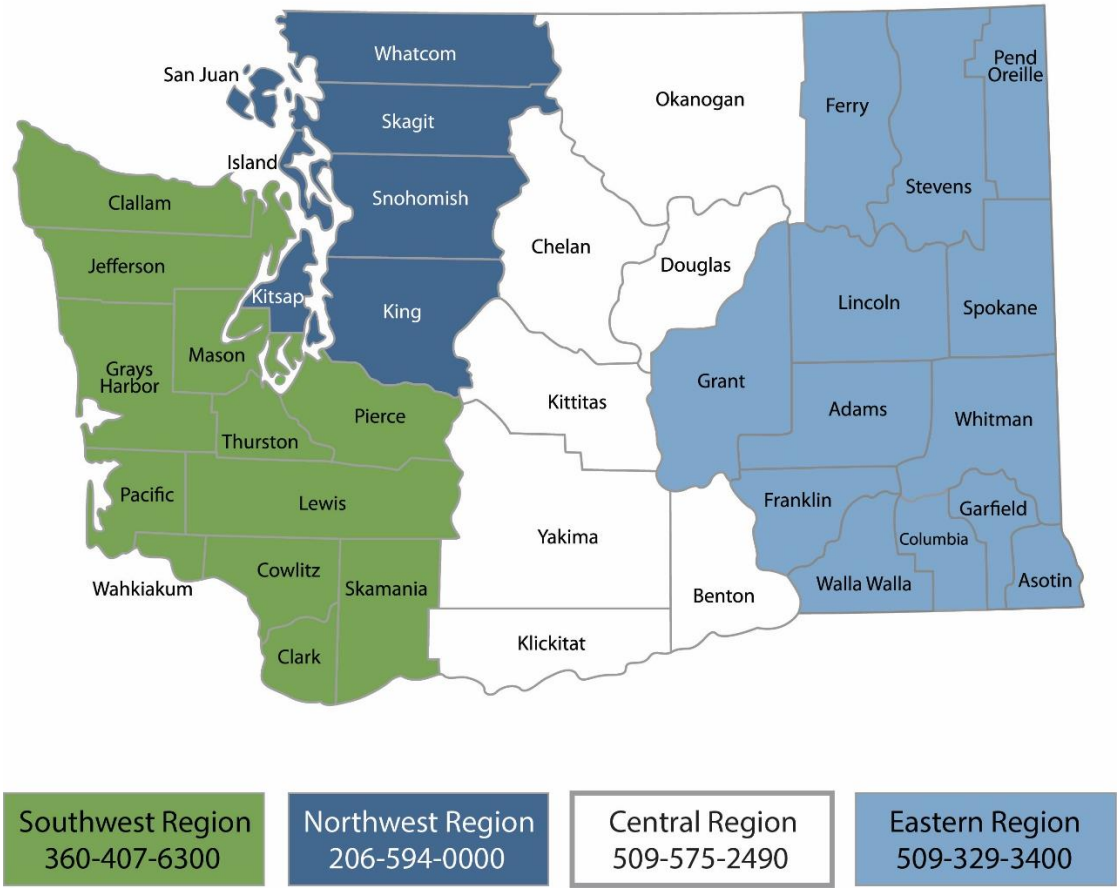
To request an ADA accommodation, contact the Ecology ADA Coordinator by phone at 360-407-6831 or email at ecyadacoordinator@ecy.wa.gov. For Washington Relay Service or TTY call 711 or 877-833-6341. Visit Ecology's website[3] for more information.

---

[1] https://apps.ecology.wa.gov/cleanupsearch/site/682
[2] https://ecology.wa.gov/About-us/Who-we-are/Our-Programs/Toxics-Cleanup
[3] https://ecology.wa.gov/About-us/Accountability-transparency/Our-website/Accessibility

Department of Ecology's Regional Offices

Map of Counties Served



Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

Table of Contents

Introduction **1**

Summary of Site Conditions **2**

Site description and history 2

Site investigations 2

Cleanup actions 3

Cleanup standards 4

Restrictive Covenant 5

Operations and maintenance 6

Protection monitoring 6

Performance monitoring 6

Periodic Review **7**

Effectiveness of completed cleanup actions 7

New scientific information for individual hazardous substances or mixtures present at the Site 9

New applicable state and federal laws for hazardous substances present at the Site 10

Current and projected Site and resource uses 10

Availability and practicability of more permanent remedies 10

Availability of improved analytical techniques to evaluate compliance with cleanup levels 10

Conclusions **10**

Next review 11

References **12**

Appendix C. Groundwater Monitoring Data **18**

Appendix D. Photo Log **19**

Photo 1: W First Ave, approximate location of subsurface groundwater barrier, from the west 19

Photo 2: Free product recovery well (belt skimmer) in the Diamond Parking Lot 19

Photo 3: Monitoring well location in alley next to BNSF railway, from the west 20

Photo 4: Alley with monitoring and bioventing wells next to Steam Plant Square, from the east 20

Photo 5: Free product recovery well (belt skimmer) in the Courtyard Office Suites underground parking garage, from the south 21

Photo 6: Remediation system control center in the Courtyard Office Suites underground parking garage 21

Introduction

The Washington State Department of Ecology (Ecology) reviewed post-cleanup site conditions and monitoring data to ensure human health and the environment are being protected at the Washington Water Power Central Steam Plant cleanup site (Site). Site cleanup was implemented under the Model Toxics Control Act (MTCA) regulations, Chapter 173-340 Washington Administrative Code (WAC). This is the third periodic review conducted for this Site. Ecology completed the first and second periodic reviews in January 2009 and July 2014.

Cleanup activities at this Site were completed under a Consent Decree (CD) filed in Washington State Superior Court for Spokane County on November 8, 1994, and amended on December 2, 1996. Residual concentrations of total petroleum hydrocarbons (TPH) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) that exceeded MTCA cleanup levels remain on the property. The MTCA cleanup levels for soil and groundwater are established under WAC 173-340-740[4] and WAC 173-340-720,[5] respectively.

Ecology determined institutional controls in the form of a restrictive covenant would be required as part of the cleanup action for the Site. WAC 173-340-420(2)[6] requires Ecology to conduct a periodic review of certain sites every five years. For this Site, a periodic review is required because the department approved the cleanup actions under a CD.

When evaluating whether human health and the environment are being protected, Ecology must consider the following factors (WAC 173-340-420(4)):

a) The effectiveness of ongoing or completed cleanup actions, including the effectiveness of engineered controls and institutional controls in limiting exposure to hazardous substances remaining at the site

b) New scientific information for individual hazardous substances or mixtures present at the site

c) New applicable state and federal laws for hazardous substances present at the site

d) Current and projected site and resource uses

e) The availability and practicability of more permanent remedies

f) The availability of improved analytical techniques to evaluate compliance with cleanup levels

Ecology publishes a notice of all periodic reviews in the *Site Register* and provides an opportunity for public comment.

[4] https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-740
[5] https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-720
[6] https://app.leg.wa.gov/wac/default.aspx?cite=173-340-420

Summary of Site Conditions

Site description and history

The Site includes most of the City block bounded to the north by West First Avenue, to the west by South Lincoln Street, to the south by West Second Avenue, and to the east by South Post Street.

The Site is in a commercial area, which is occupied by retail stores, restaurants, hotels, and commercial parking lots. Steam Plant Square, Diamond Parking Lot, Davenport Parking Garage, the Courtyard Office Suites, and the West Railroad Ave right-of-way cover most of the petroleum-hydrocarbon-impacted soils.

The Central Steam Plant was built in 1915 to burn coal to produce steam heat and electric power for downtown Spokane. In the mid-1960s, all plant boilers were converted to use petroleum products.

Seven concrete underground storage tanks (USTs) were constructed at the Site between 1966 and 1975 to store Bunker C fuel oil. The tanks were labeled Tank A, B, C, D, F, G and H, and ranged from 75,000-gallons to 140,000-gallons.

In May 1982, workers noticed petroleum was seeping through cracks in the steam plant basement wall. Monitoring in one of the USTs detected a drop in the product level of 1.5 inches in 20 days. An investigation was completed in 1984, and Ecology determined no further action was required at that time. The Central Steam Plant stopped operating in 1986.

A vicinity map is in Appendix A, and a Site plan is in Appendix B.

Site investigations

In 1991, Washington Water Power (WWP) conducted further investigations to determine if any additional releases had occurred. Thirty-nine soil borings were advanced, 13 of which were completed as groundwater monitoring wells. Data from those borings confirmed TPH and cPAHs in soil and TPH in groundwater.

In 1994, WWP entered into a CD with Ecology and conducted a remedial investigation/feasibility study (RI/FS) to determine the nature and extent of contamination and to select an appropriate remedial action. Ecology developed a Site cleanup action plan (CAP) that was incorporated into the amended CD in 1996. The goals of the CAP were to:

1. Remove the potential for migration of contaminants of concern from Site soil containing TPH and/or cPAH concentrations above MTCA Method A cleanup levels.
2. Prevent human contact with or ingestion of Site soil containing TPH and/or cPAH concentrations above MTCA Method A cleanup levels.
3. Prevent human contact with or ingestion of Site groundwater containing TPH concentrations above MTCA Method A cleanup levels.

4. Prevent off-site migration of groundwater containing TPH concentrations above MTCA Method A cleanup levels.
5. Recover non-aqueous-phase liquid petroleum hydrocarbons (free product) to the maximum extent practicable and in a manner that minimizes the spread of hazardous substances.
6. Protect beneficial uses of groundwater.

Cleanup actions

The CAP required the activities listed below. WWP completed these activities in 1996 and 1997.

1. Tank Closure and Shallow Soil Excavation – Tanks A through D were closed in accordance with WAC 173-360-385 through 398. Shallow soil near the Steam Plant tanks was excavated and disposed off-site. The resulting tank excavations were left open and used as part of the Steam Plant Square redevelopment.
2. Subsurface Barrier Wall – A subsurface barrier wall was constructed north of the Site's boundary, north of the Courtyard Office Suites on First Avenue, to prevent off-site migration of hazardous substances in groundwater. Groundwater extraction wells were located upgradient to achieve hydraulic control of Site groundwater behind the subsurface barrier wall.
3. Hydraulic Control – Four groundwater extraction wells were installed to achieve hydraulic control of Site groundwater behind the subsurface barrier wall, helping to prevent potential off-site migration of soil contaminants via groundwater. Extracted water is discharged into the combined sewer overflow (CSO) system.
4. Free-Product Recovery – Free petroleum product was recovered from the four groundwater extraction wells and from two oil recovery wells within the area of TPH-affected soil. Free product continues to be collected quarterly from select wells using belt skimmers and vacuum extraction.
5. Soil Bioventing – Injection and extraction bioventing wells were installed throughout the Site to promote in-situ soil treatment to the maximum extent practicable. Off-gas treatment is not necessary, as approved by the Spokane Regional Clean Air Agency (SRCAA) (formerly Spokane County Air Pollution Control Authority), due to the low volatility of the Bunker C contaminants.
6. Stormwater Management and Paving – Paving, pavement repair/sealing, and stormwater management measures were implemented to minimize soil contaminants potentially mobilizing due to infiltrating precipitation and subsequent groundwater flow. Stormwater is collected from Diamond Parking, Steam Plant Square Redevelopment, the WWP substation, and other adjacent areas and piped to WWP tanks F, G, and H for detention. After the conclusion of the storm event, pumps in the tanks discharge the water to the CSO.

Cleanup standards

Cleanup standards include cleanup levels, the location where these cleanup levels must be met (point of compliance), and any other regulatory requirements that apply to the Site.

Cleanup levels

The CD identified MTCA Method A cleanup levels as applicable to the Site. WAC 173-340-704[7] states MTCA Method A may be used to establish cleanup levels at sites that have few hazardous substances, are undergoing a routine cleanup action, and where numerical standards are available for all indicator hazardous substances in the media for which the Method A cleanup level is being used.

The cleanup actions conducted at the Site were determined to be routine, few hazardous substances were found at the Site, and numerical standards were available in the MTCA Method A table for each hazardous substance. MTCA Method A cleanup levels effective at the time of the CD and CAP are still applicable at the Site. Those cleanup levels are available below:

- Soil – Method A established soil cleanup levels of 200 milligrams per kilogram (mg/kg) for TPH-diesel (TPH-D), 100 mg/kg for TPH-gasoline (TPH-G), and 1 mg/kg for total cPAHs.
- Groundwater – Method A cleanup levels were determined to be appropriate for Site groundwater. The Method A cleanup level of 1,000 micrograms per liter (µg/L) was used for TPH. This level is also used as the performance standard for current groundwater monitoring.
- Free Product – Free product is being removed as practicable to help achieve groundwater cleanup levels.

Points of compliance

The CD defines the Site as the area affected by petroleum hydrocarbons in soil above MTCA Method A cleanup levels. The point of compliance established for soil is based on protection of groundwater per WAC 173-340-900[8] and is defined as throughout the lateral extent of the Site from the surface extending vertically below the water table.

The groundwater point of compliance was established as throughout the Site from the uppermost level of the saturated zone to the lowest depth that could be affected by the Site.

Because hazardous substances are contained on the Site, the groundwater point of compliance is established as close as is practicable to the edge of the contained hazardous substances, not to exceed the northern boundary of the Steam Plant property south of Railroad Avenue.

[7] https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-704
[8] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-900

Restrictive Covenant

Ecology determined that institutional controls would be required as part of the cleanup action to document the remaining contamination, protect the cleanup action, and protect human health and the environment. On December 30, 1997, institutional controls in the form of a Restrictive Covenant[9] (Covenant) were recorded for the Site.

The Covenant recorded for the Site imposes the following limitations:

1. The residual contamination that is the subject of this Covenant consists of petroleum hydrocarbons and polynuclear aromatic hydrocarbons and is located in the area shown in Exhibit "A". Remediation or removal of these contaminants must be addressed before the owner or successor owner alters or modifies the property in any manner that causes the residual contamination to be exposed or accessible.
2. The owner or successor owner/s must ensure that all the requirements in the final CAP for containing the contaminants left on the property are met, including long term monitoring and maintenance.
3. Any activity that would threaten the viability of the containment as set forth in the final CAP is prohibited.
4. Groundwater withdrawn for any purposes, including domestic, agricultural, commercial, or industrial, is prohibited.
5. The owner of the property must give written notice to Ecology, or its successor agency, of the owner's intent to convey any interest in the property.
6. No conveyance of title, easement, lease, or other interest in the property shall be consummated by the property owner without adequate and complete provision for continued compliance with this Covenant.
7. The owner must notify Ecology, or its successor agency, prior to any use of the property that is inconsistent with the terms of this Covenant and must obtain Ecology's, or its successor agency's approval prior to any use of the property that is inconsistent with the terms of this Covenant.
8. The owner shall allow authorized representatives of Ecology, or its successor agency, the right to enter the property at a reasonable time for the purpose of evaluating the Cleanup Action, to take samples, to inspect remedial actions conducted at the property, and to inspect records related to the Cleanup Action.
9. The owner of the Site and the owner's assigns and successors in interest reserve the right under WAC 173-340-440(7) to record an instrument which provides that this Covenant shall no longer limit use of the property or be of any further force or effect. However, such an instrument may be recorded only with the consent of Ecology, or its successor agency may consent to the recording of such an instrument only after appropriate public notice and comment.

[9] https://apps.ecology.wa.gov/cleanupsearch/document/17

Operations and maintenance

Four mechanical systems operate continuously at the Site. They include hydraulic control, free-product recovery, bioventing, and stormwater management. These systems are continuously monitored by a Supervisory Control and Data Acquisition (SCADA) system, with operating parameters including groundwater extraction rates and elevations, free-product recovery, and bioventing parameters such as airflow, pressure, and oxygen and carbon dioxide concentrations. Maintenance activities are reported as they occur, and operating parameters of the four systems are reported quarterly.

Protection monitoring

Protection monitoring confirms human health and the environment are adequately protected during construction and operation of the cleanup action. Protection monitoring at this Site consists of semiannual groundwater monitoring. Air protection monitoring was performed quarterly on the biovent discharge from 1997 to 2016 but was discontinued beginning in April 2016 (the 74th quarter, or QM-74) at SRCAA's approval since volatile organic compound concentrations decreased to less than 1 pound per year.

Performance monitoring

Performance monitoring is conducted to demonstrate when the cleanup action has attained cleanup standards. In accordance with the final compliance monitoring plan, performance monitoring includes groundwater, stormwater, hydraulic control, and bioventing monitoring.

Groundwater monitoring

Groundwater performance monitoring is conducted to ensure no off-site migration of hazardous materials. Groundwater monitoring was scheduled for 12 quarters in the CAP and was to be evaluated at that time. In 2001, Ecology accepted a revised monitoring plan that reduced the monitoring frequency to semiannual. Currently, groundwater monitoring continues on a semiannual schedule due to the significant presence of free product remaining at the Site.

Groundwater monitoring consists of sampling 10–12 wells across the Site. This review will evaluate performance groundwater monitoring through the 99th quarter (QM-99) in September 2022, the most recent sampling event for which groundwater monitoring data summaries have been provided to Ecology.

Stormwater monitoring

Stormwater performance monitoring is conducted on an annual basis. Samples are collected from the detention basin in the CSO to ensure stormwater discharged to the system complies with the City of Spokane discharge criteria.

Hydraulic control monitoring

Hydraulic control monitoring is performed to ensure performance of the hydraulic control system. Four piezometers were installed along the barrier wall to monitor water levels upgradient of the wall. Hydraulic control monitoring is conducted in conjunction with groundwater elevation monitoring.

Extracted groundwater monitoring

Extracted groundwater is monitored annually for fats, oil, and grease in accordance with criteria established by the City of Spokane for discharge to the CSO.

Free-phase petroleum product monitoring

Monitoring of free product recovery volumes is performed quarterly to evaluate the performance of the product recovery system. According to the CAP, product recovery is considered impractical if less than 1 gallon of product is recovered from a well during two consecutive quarters.

Biovent monitoring

Bioventing performance monitoring is conducted to optimize the efficiency of the bioventing system. Bioventing performance monitoring consists of subsurface temperature and pressure monitoring, bioventing extraction well monitoring, injected and introduced air monitoring, and soil sampling to evaluate TPH concentrations after bioventing system operation has been terminated.

Periodic Review

Effectiveness of completed cleanup actions

During the Site visit conducted on February 8, 2023, Ecology found no indications the integrity of the remedial action has been compromised. There were no indications of undocumented Site excavation or disturbance activities, and no visual indications of possible disturbance of the asphalt surface. A photo log is in Appendix C.

Direct contact

Cleanup actions at the Site were intended to eliminate human exposure to contaminated soils and groundwater at the Site. The exposure pathways to contaminated soils and free product (ingestion, direct contact) have been removed by the presence of asphalt surface and buildings on the Site, as well as the tank removal and shallow excavation conducted during the initial cleanup. The potential exposure pathway to contaminated groundwater has been removed by the subsurface groundwater barrier wall, the hydraulic control system, and the Covenant that prohibits use of groundwater from the Site.

Institutional controls

The Covenant for the Site was recorded and is in place. This Covenant prohibits groundwater use from any well in the property, prohibits activities that will result in the release of contaminants contained as part of the cleanup without Ecology's approval, and prohibits other uses. This Covenant will maintain the integrity of the Site surface and the groundwater barrier system installed during the cleanup.

Monitoring results

Groundwater monitoring

Groundwater monitoring has been conducted at the Site for 26 years from 1997 through 2023. Groundwater monitoring has not detected gasoline- or diesel-range TPH above 1996 MTCA Method A cleanup levels since the 29th quarter of sampling in February 2005. Diesel-, oil-, and Bunker C-range petroleum hydrocarbons continue to be detected at relatively low concentrations in select Site groundwater monitoring wells.

The most recent groundwater data summary submitted to Ecology was from QM-99 in September 2022. Groundwater samples were analyzed for the full range of diesel-, heavy oil-, and Bunker C-range petroleum hydrocarbons using the NWTPH-Dx analytical method. Prior to analysis, these samples underwent silica gel cleanup, which removes polar metabolites associated with organic material interference and weathered diesel products. One sample from MW-028 was reported above the laboratory method reporting limits (MRLs) for diesel- and Bunker C-range petroleum hydrocarbons during QM-97 and exceeded the Site TPH performance standard of 1,000 µg/L. The laboratory determined the detections did not match the Bunker C-range petroleum products identified at the Site. In addition, MW-028 is upgradient of the Bunker C-impacted soil; therefore, the reported detection was determined to not be associated with the Bunker C release. One sample collected from MW-023 was reported above the MRL for oil-range petroleum hydrocarbons during QM-99 but did not exceed the Site TPH performance standard. No other concentrations of petroleum hydrocarbons were reported above the performance standard in groundwater samples collected during 2022. Groundwater monitoring data from 2022 (QM-97 and QM-99) are in Appendix C.

Groundwater elevation has been consistent with historical measurements and indicates a continued inward hydraulic gradient is being maintained across the subsurface barrier wall. Based on this data, the institutional and engineered controls being used at the Site continue to effectively prevent the downgradient spread of contaminated groundwater.

Stormwater performance monitoring

The annual sample of extracted groundwater was collected on November 17, 2022, and analyzed for fats, oil, and grease by EPA Method 1664. They were not detected above the MRL in the stormwater sample collected during QM-100.

Free product recovery

Free product continues to be recovered, though the actual volume is likely less than reported as the recovered liquid includes entrained water. Approximately 100.8 gallons of free product were recovered by belt skimmers from extraction wells EW-1 through EW-3 and oil extraction wells OR-1 and OR-3 at the Site during QM-100. The SCADA system recorded a total of approximately 603.8 gallons of free product recovered by belt skimmers during 2022.

Free product is also vacuum extracted directly from select wells when sufficient thickness has accumulated. During QM-100, approximately 173 gallons of liquid (8.5 gallons of free product and 164.5 gallons on product/water mix) were recovered from piezometer well PZ2, monitoring wells MW-101 and MW-029, extraction wells EW-1 through EW-3, and oil recovery wells OR-2 and OR-3. A total of approximately 1,531 gallons of liquid (70 gallons of free product and 1,461 gallons of product/water mix) were vacuum extracted from the wells in 2022.

Bioventing

Concentrations of oxygen and carbon dioxide are monitored in the ten bioventing extraction wells to evaluate the performance of the bioventing system. During 2022, the average oxygen level in the bioventing extraction wells was 3.69 percent, which is below the performance standard of 10–15 percent by volume. The average carbon dioxide level in the extraction wells was 3.71 percent, which is greater than the design concentration of 0.20 percent by volume. Combined with the airflow reported by the SCADA system, these results indicate that approximately 2,173.24 gallons of free product were biodegraded during QM-100, and a total of approximately 8,911.96 gallons of free product were biodegraded during 2022. This exceeds the historical average of 80 to 100 gallons per month.

Summary

Soils with TPH concentrations higher than MTCA Method A cleanup levels are still present. Free product continues to be recovered in significant quantities. However, the structures and asphalt surface prevent human exposure to this contamination by ingestion and direct contact with soils. The Covenant ensures contaminated groundwater from the Site will not spread or be extracted for use, and the integrity of the protective surfaces will be protected through maintaining the current Site use. The hydraulic barrier wall and active hydraulic control will ensure contaminated groundwater from the Site will not spread and cause additional downgradient impacts.

New scientific information for individual hazardous substances or mixtures present at the Site

There is no new relevant scientific information for the hazardous substances remaining at the Site.

New applicable state and federal laws for hazardous substances present at the Site

This cleanup is governed by Chapter 173-340 WAC (1996 ed.). This regulation was amended in 2001. Although TPH cleanup levels changed because of this modification, Site cleanup levels determined in the CAP will not change. WAC 173-340-702(12) (c) [2001 ed.] provides:

> "A release cleaned up under the cleanup levels determined in (a) or (b) of this subsection shall not be subject to further cleanup action due solely to subsequent amendments to the provision in this chapter on cleanup levels, unless the department determines, on a case-by-case basis, that the previous cleanup action is no longer sufficiently protective of human health and the environment."

Cleanup levels changed for gasoline, diesel, and volatile organic compounds due to modifications to MTCA in 2001; however, contamination remains at the Site above MTCA Method A cleanup levels, and the cleanup action is still protective of human health and the environment.

Current and projected Site and resource uses

The Site is used for commercial and industrial purposes. There have been no changes in current or projected future Site or resource uses. The current Site use is not likely to have a negative impact on the protectiveness of the cleanup action.

Availability and practicability of more permanent remedies

The remedy implemented included containing hazardous substances, and it continues to be protective of human health and the environment. While more permanent remedies may be available, they are still not practicable at this Site.

Availability of improved analytical techniques to evaluate compliance with cleanup levels

The analytical methods used at the time of the cleanup action were capable of detection below the selected MTCA cleanup levels. The presence of improved analytical techniques would not affect decisions or recommendations made for the Site.

Conclusions

- The cleanup actions completed at the Site appear to be protective of human health and the environment.
- Soil and groundwater cleanup levels have not been met at the Site; however, the cleanup action complies with cleanup standards under WAC 173-340-740(6)(f), since the long-term

integrity of the containment system is ensured and the requirements for containment technologies have been met.

- The Covenant for the property is in place and is effective in protecting human health and the environment from exposure to hazardous substances and the integrity of the cleanup action.

Based on this periodic review, Ecology has determined the requirements of the Covenant are being followed. No additional cleanup actions are required by the property owner at this time. The property owner is responsible for continuing to inspect the Site to ensure the integrity of the cleanup action is maintained, including the surface cap, groundwater monitoring controls, groundwater barrier, and stormwater controls.

Next review

Ecology will schedule the next review for the Site five years from the date of this periodic review. If additional cleanup actions or institutional controls are required, the next periodic review will be scheduled five years after those activities are completed.

References

Ecology. Site Visit. February 8, 2023.

Ecology. *Second Periodic Review*. 2014.

Ecology. *Periodic Review*. 2008.

Ecology. *Amended Consent Decree*. 1996.

Ecology. *Consent Decree*. 1994.

Landau Associates. *Quarterly Compliance Monitoring QM-100 and 2022 Annual Summary, WWP Central Steam Plant Oil Spill Remediation*. April 20, 2023.

Landau Associates. *Quarterly Compliance Monitoring QM-99, WWP Central Steam Plant Oil Spill Remediation*. April 20, 2023.

Landau Associates. *Quarterly Compliance Monitoring QM-98, WWP Central Steam Plant Oil Spill Remediation*. April 20, 2023.

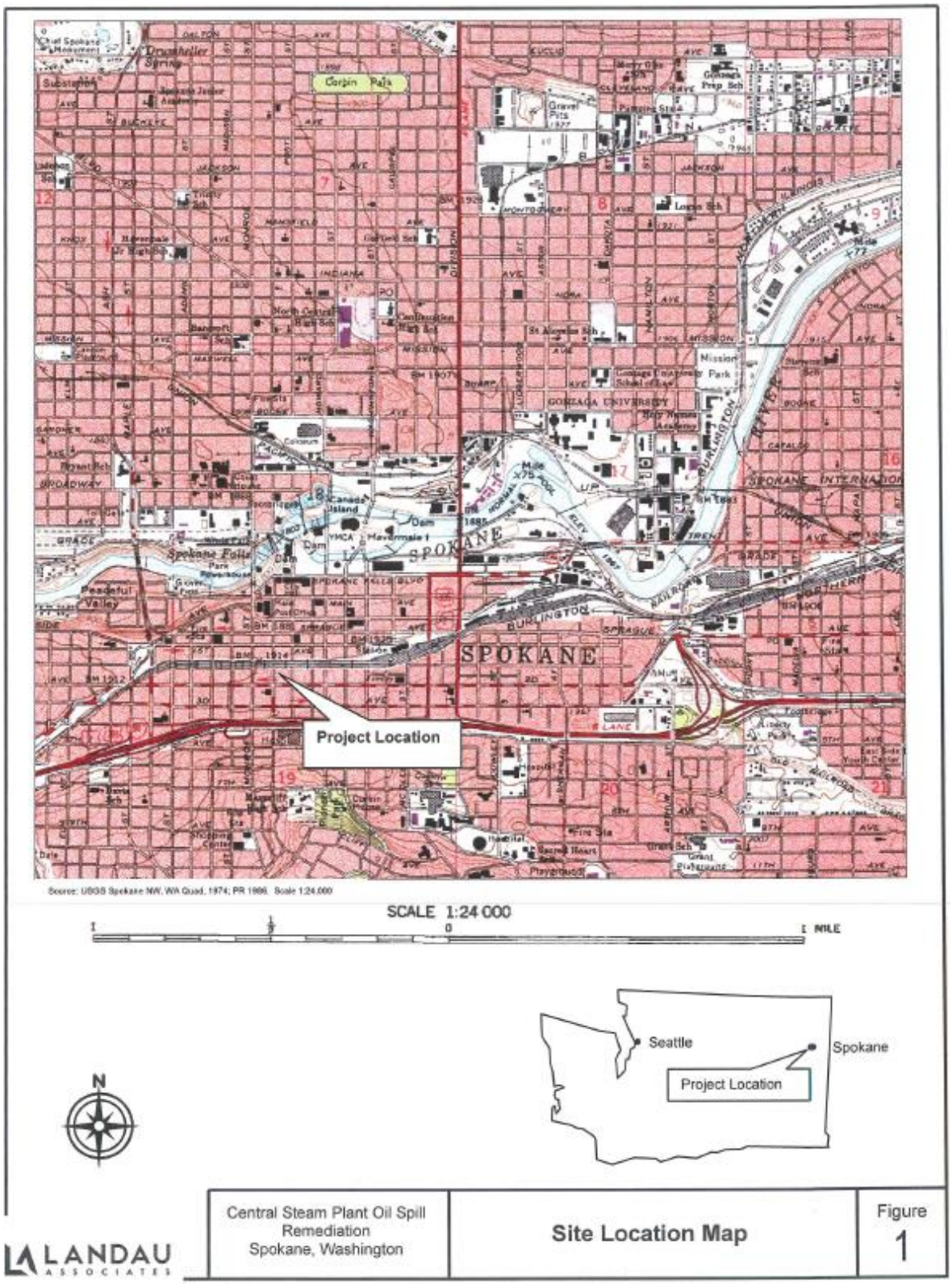
Landau Associates. *Quarterly Compliance Monitoring QM-97, WWP Central Steam Plant Oil Spill Remediation*. April 20, 2023.

Landau Associates. *Quarterly Compliance Monitoring QM-96 and 2021 Annual Summary, WWP Central Steam Plant Oil Spill Remediation*. February 24, 2023.

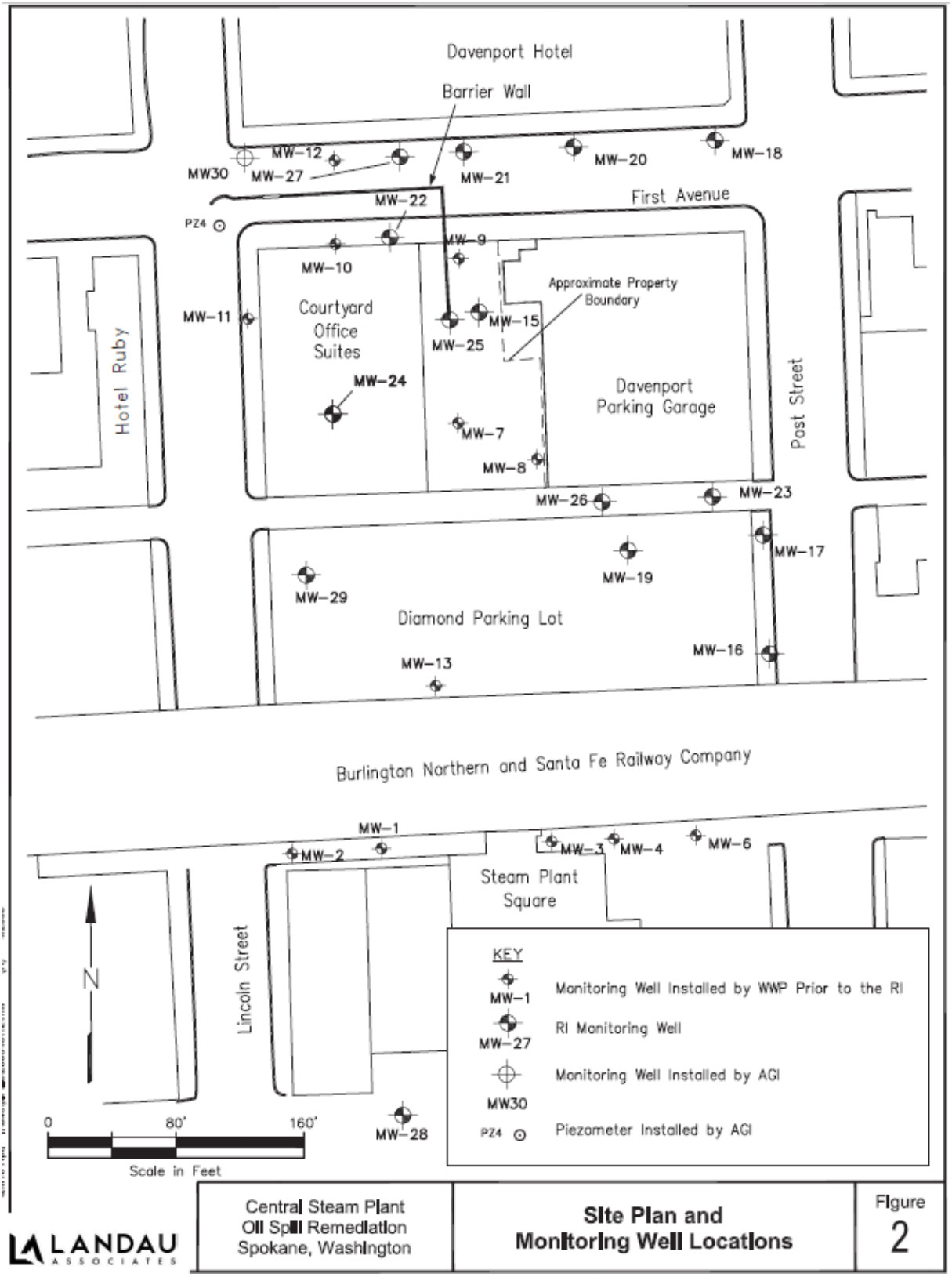
Landau Associates. *Quarterly Compliance Monitoring QM-95, WWP Central Steam Plant Oil Spill Remediation*. February 24, 2023.

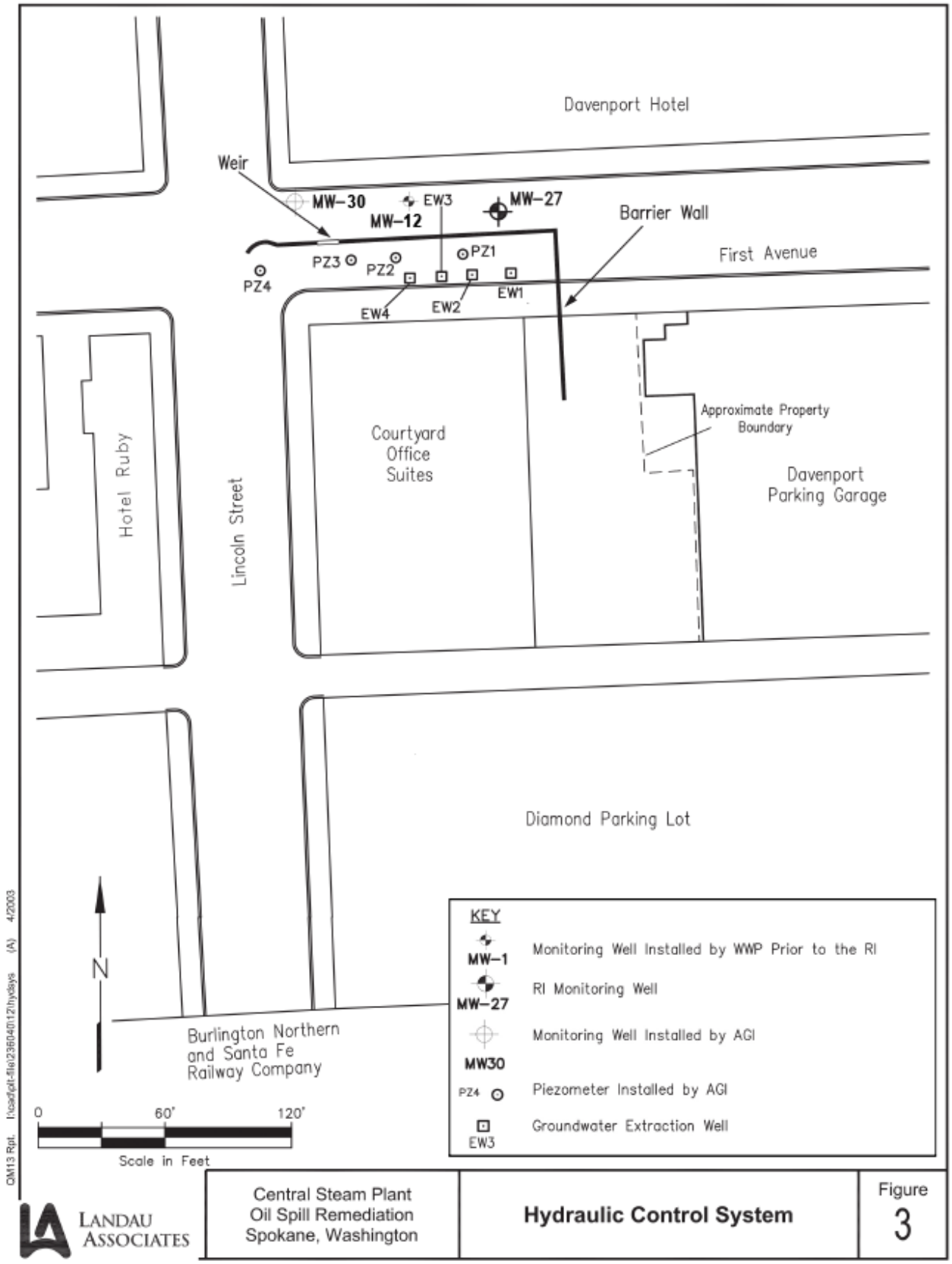
Landau Associates. *Quarterly Compliance Monitoring QM-94, WWP Central Steam Plant Oil Spill Remediation*. January 14, 2022.

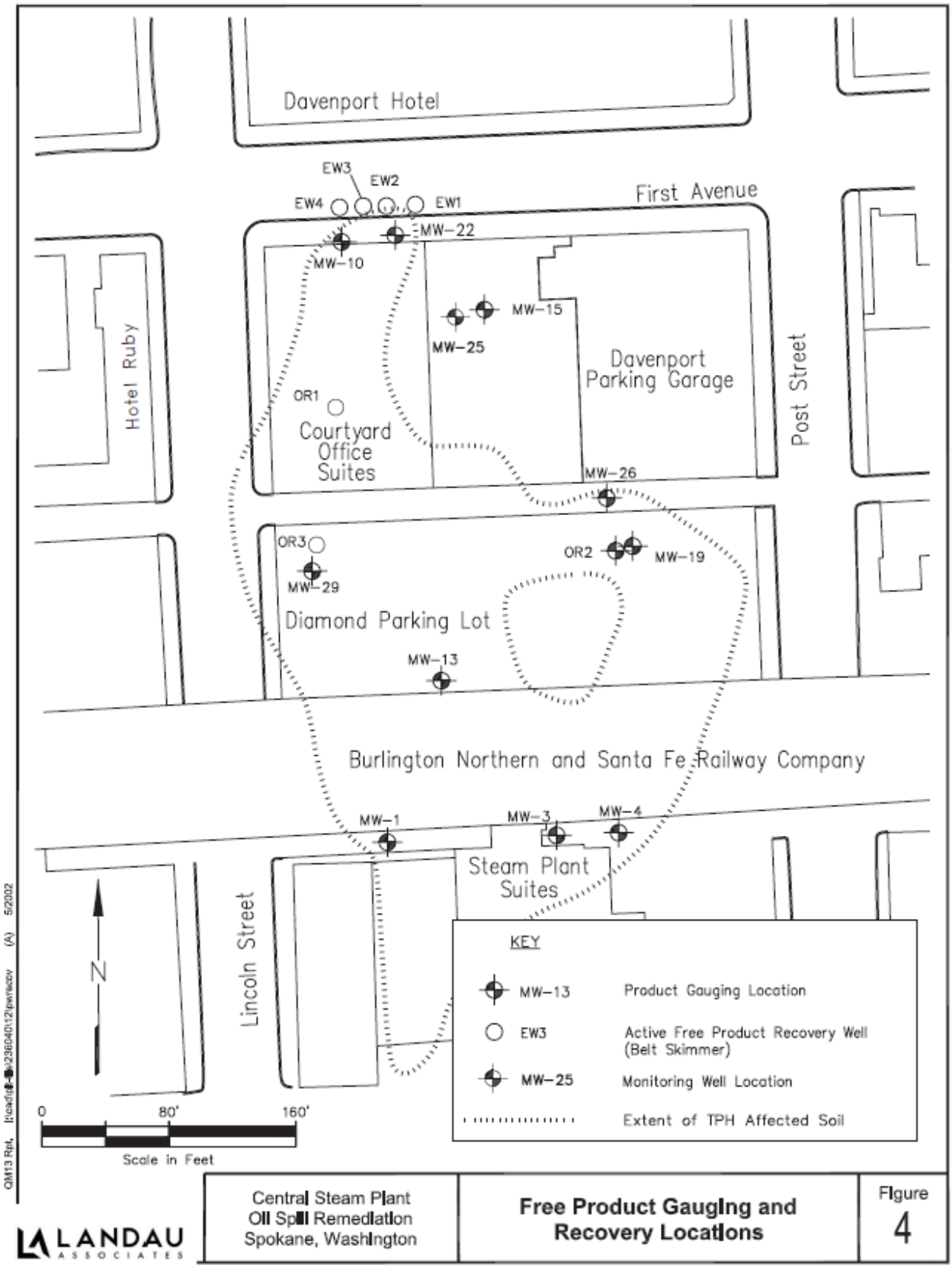
Appendix A. Vicinity Map

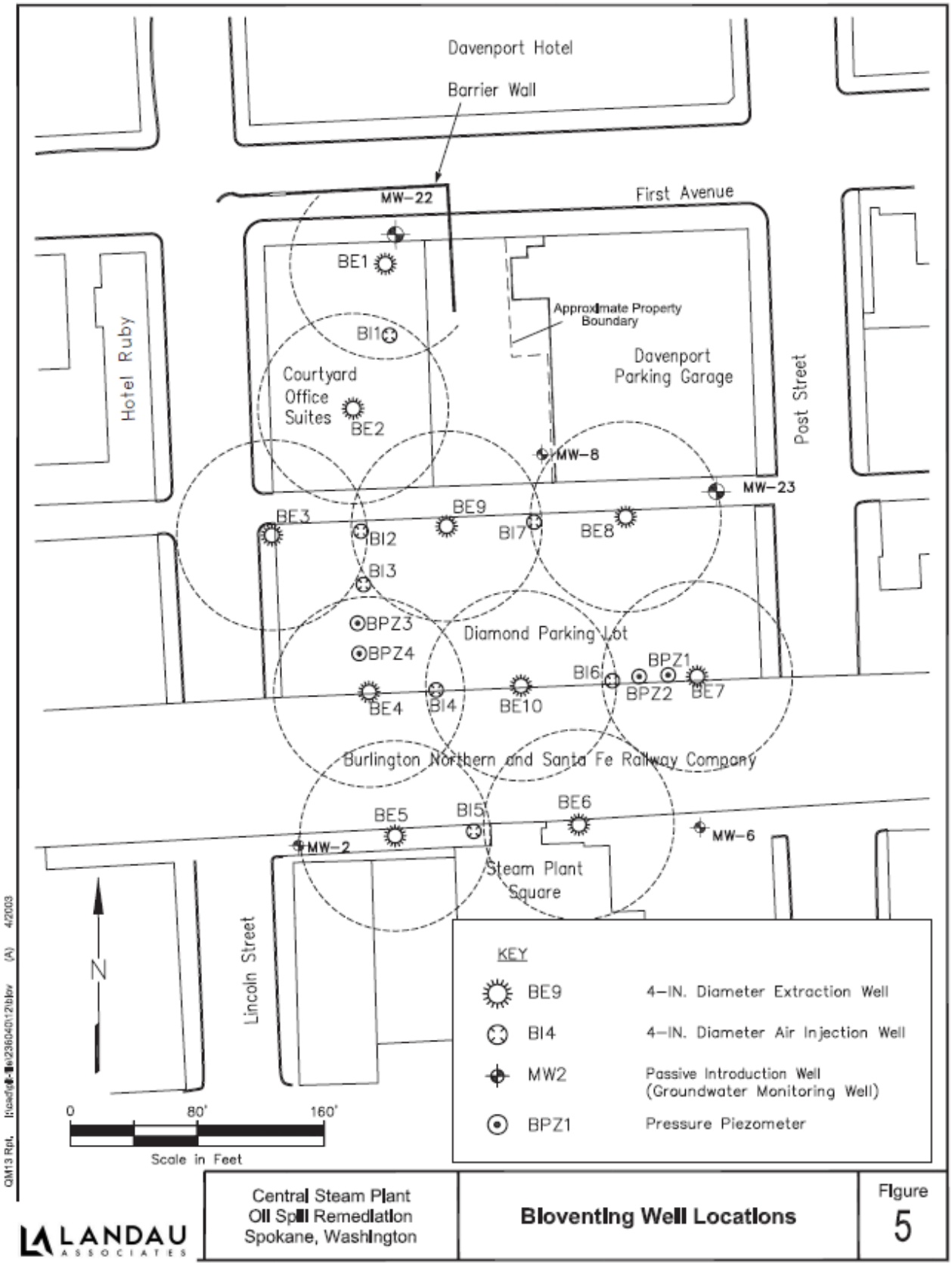


Appendix B. Site Plans




Davenport Hotel
Weir
MW-30
EW3
MW-27
MW-12
Barrier Wall
PZ1
PZ3
PZ2
First Avenue
PZ4
EW1
EW4
EW2
Approximate Property Boundary
Courtyard Office Suites
Davenport Parking Garage
Hotel Ruby
Lincoln Street
Diamond Parking Lot
N
Burlington Northern and Santa Fe Railway Company
KEY
MW-1
Monitoring Well Installed by WWP Prior to the RI
MW-27
RI Monitoring Well
MW30
Monitoring Well Installed by AGI
PZ4
Piezometer Installed by AGI
EW3
Groundwater Extraction Well
0
60'
120'
Scale in Feet
LANDAU ASSOCIATES
Central Steam Plant
Oil Spill Remediation
Spokane, Washington
Hydraulic Control System
Figure
3


Davenport Hotel
First Avenue
EW3
EW2
EW4
EW1
MW-22
MW-10
MW-15
MW-25
Hotel Ruby
Davenport Parking Garage
Post Street
OR1
Courtyard Office Suites
MW-26
OR3
OR2
MW-19
MW-29
Diamond Parking Lot
MW-13
Burlington Northern and Santa Fe Railway Company
MW-1
MW-3
MW-4
Steam Plant Suites
Lincoln Street
N
KEY
MW-13 Product Gauging Location
EW3 Active Free Product Recovery Well (Belt Skimmer)
MW-25 Monitoring Well Location
Extent of TPH Affected Soil
0
80'
160'
Scale in Feet
LANDAU ASSOCIATES
Central Steam Plant
Oil Spill Remediation
Spokane, Washington
Free Product Gauging and Recovery Locations
Figure
4


Davenport Hotel
Barrier Wall
MW-22
First Avenue
BE1
BI1
Approximate Property Boundary
Hotel Ruby
Courtyard Office Suites
BE2
Davenport Parking Garage
Post Street
MW-8
MW-23
BE3
BI2
BE9
BI7
BE8
BI3
BPZ3
BPZ4
Diamond Parking Lot
BI6
BPZ1
BPZ2
BE7
BE4
BI4
BE10
Burlington Northern and Santa Fe Railway Company
BE5
BI5
BE6
MW-2
MW-6
Steam Plant Square
Lincoln Street
N
0
80'
160'
Scale in Feet
KEY
BE9 4-IN. Diameter Extraction Well
BI4 4-IN. Diameter Air Injection Well
MW2 Passive Introduction Well (Groundwater Monitoring Well)
BPZ1 Pressure Piezometer
LANDAU ASSOCIATES
Central Steam Plant
Oil Spill Remediation
Spokane, Washington
Bioventing Well Locations
Figure
5

Appendix C. Groundwater Monitoring Data

Table 1. 2022 Groundwater monitoring for petroleum hydrocarbons

Sample Location	Date Sampled	Diesel-range (µg/L)	Oil-range (µg/L)	Bunker C-range (µg/L)
MW-006	3/30/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
MW-007	3/29/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
MW-012	3/29/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
MW-016	3/30/22	100 U	200 U	500 U
MW-017	3/29/22	100 U	200 U	500 U
MW-020	3/29/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
MW-021	3/29/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
MW-023	3/29/22 9/6/22	100 U 100 U	200 U **253***	500 U 500 U
MW-025	3/29/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
MW-027	3/29/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
MW-028	3/30/22 9/6/22	**256*** 100 U	200 U 200 U	**903*** 500 U
MW-030	3/29/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
MW-051 (field blank)	3/29/22 9/6/22	100 U 100 U	200 U 200 U	500 U 500 U
Performance standard	Not applicable	1,000	1,000	1,000

MW = monitoring well
µg/L = micrograms per liter
U = not detected at laboratory method detection limit
Bold* = detected above laboratory method detection limit

Appendix D. Photo Log

Photo 1: W First Ave, approximate location of subsurface groundwater barrier, from the west

Photo 2: Free product recovery well (belt skimmer) in the Diamond Parking Lot

Photo 3: Monitoring well location in alley next to BNSF railway, from the west

Photo 4: Alley with monitoring and bioventing wells next to Steam Plant Square, from the east

Photo 5: Free product recovery well (belt skimmer) in the Courtyard Office Suites underground parking garage, from the south

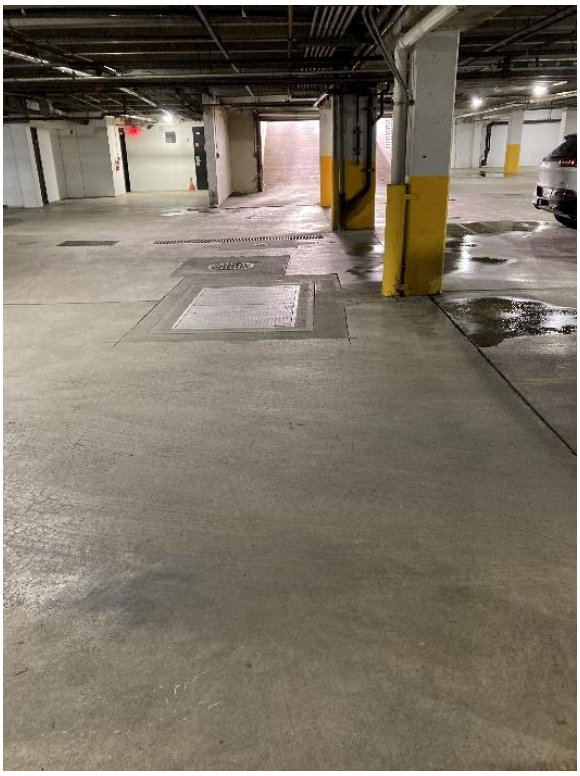


Photo 6: Remediation system control center in the Courtyard Office Suites underground parking garage