# Groundwater Monitoring Plan
For
Chemical Waste Management of the Northwest, Inc.

Arlington Facility • ORD 089 452 353
17629 Cedar Springs Lane
Arlington, Oregon

Standalone No. 7

This document is issued by the
Oregon Department of Environmental Quality

May 2024

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# 1 INTRODUCTION

This Groundwater Monitoring Plan (referred to herein as the Plan) summarizes the site and regional hydrogeology and presents the groundwater monitoring and data evaluation methodologies for the Chemical Waste Management of the Northwest (CWM) facility (hereinafter referred to as the Facility). As shown on Figure 7-1, the Facility is located in Gilliam County, Oregon, approximately 12 road miles south/southwest of the town of Arlington. A site layout map showing natural features, building locations and the boundaries of the permitted landfill units and surface impoundments is presented on Figure 7-2. This Plan incorporates permanent monitoring elements to provide environmental protection during and after CWM development.

## 1.1 Compliance Period

The compliance period during which the ground-water protection standard of 40 CFR 264.92 applies is the number of years equal to the active life of the waste management area (including any waste management activity prior to permitting, and the closure period).

CWM is an existing hazardous waste landfill owned and operated by Chemical Waste Management of the Northwest, Inc. (CWMNW), a subsidiary of WM, under Permit ORD 089 452 353 (Permit). This Plan applies to both the detection monitoring and compliance monitoring programs (if required) at the Facility and applicable requirements outlined in the Permit. In case of a discrepancy between this Plan and the Permit, the Permit takes precedence.

## 1.2 Overview

This Plan describes the hydrogeologic setting of the Facility, the design of the monitoring network and the basis for its configuration, background, detection, and compliance monitoring frequencies for each monitor point, monitoring parameters, and a sampling and analysis program. This Plan complies with federal requirements for hazardous waste landfills as promulgated under the Subtitle C rules of the Resource and Conservation Recovery Act (RCRA). This Plan also describes requirements for monitoring past practice units at the Facility under the Toxic Substances Control Act (TSCA) and as part of post-closure care maintenance procedures required by the Facility's Permit. This Plan will serve as a guidance document for personnel performing site monitoring during the active life of the Facility and during closure and post-closure periods. Each section of the Plan is introduced in the following paragraphs.

The groundwater monitoring program at the site is based on the distinct hydrogeologic characteristics of the area and the potential influence of the existing surface impoundments and landfill units on the hydrogeologic system as it exists today and is projected to exist in the future (based on planned additional landfill phases). The geology and hydrogeology of the region and site are discussed in the Hydrogeologic Setting section.

The Groundwater Monitoring Program section presents details of the existing groundwater monitoring parameters, Waste Management Areas (WMAs), Point of Compliance (POC) monitoring well network, and sampling schedule for the Facility.

The Data Evaluation section describes the evaluation methods that will be used to assess if detection monitoring criteria (or, if compliance monitoring is required under the Permit, the groundwater concentration limits) are exceeded. This section further includes a discussion regarding verification sampling procedures.

The Purging and Sampling Procedures section describes the methods and procedures that will be followed for purging and sampling monitoring wells at the Facility.

The Laboratory Analysis Plan section presents the laboratory analytical methods, analyte reporting limits, laboratory quality control procedures, and quality control samples that will be collected.

The Data Quality Review, Reporting, and Record-Keeping section presents data quality review procedures, reporting procedures, and record-keeping measures.

The References section lists the technical and regulatory documents cited in this Plan.

Appendices A through C present supporting field forms, sampling methodology development, an inventory of the current piezometers and monitoring wells and the long-term optimized monitoring wells and piezometer network.

## 1.3 Federal and State-Specific Context

The detection and compliance monitoring efforts outlined in this Plan will be performed to verify attainment of performance objectives for the Facility, at appropriate points of compliance, in accordance with the Code of Federal Regulations (CFR), *Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities* (and its revisions), initially promulgated on July 26, 1982 in 40 CFR Part 264 Subpart F (40 CFR §264.90 through 40 CFR §264.101). The regulations include requirements for the location, design, and installation of groundwater monitoring systems and set standards for groundwater sampling and analysis.

The Permit was jointly issued for the site by the United States Environmental Protection Agency (EPA), the Oregon Environmental Quality Commission, and the Oregon Department of Environmental Quality (DEQ) on March 11, 1988, and reissued on August 10, 2006. Subsequent to issuance of the Permit in 1988, DEQ became fully authorized to administer the Permit.

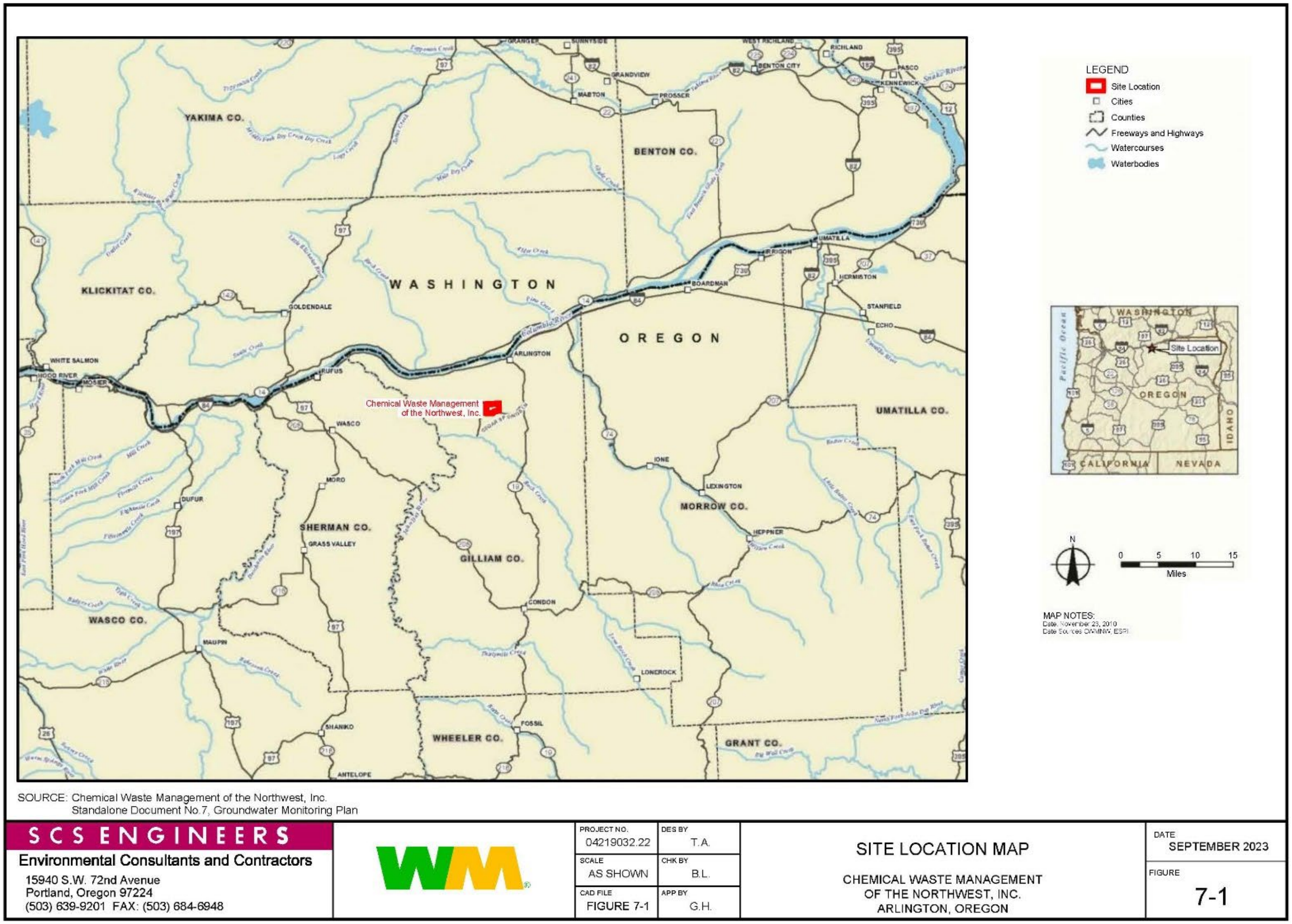


**Figure 7-1 Site Location Map**

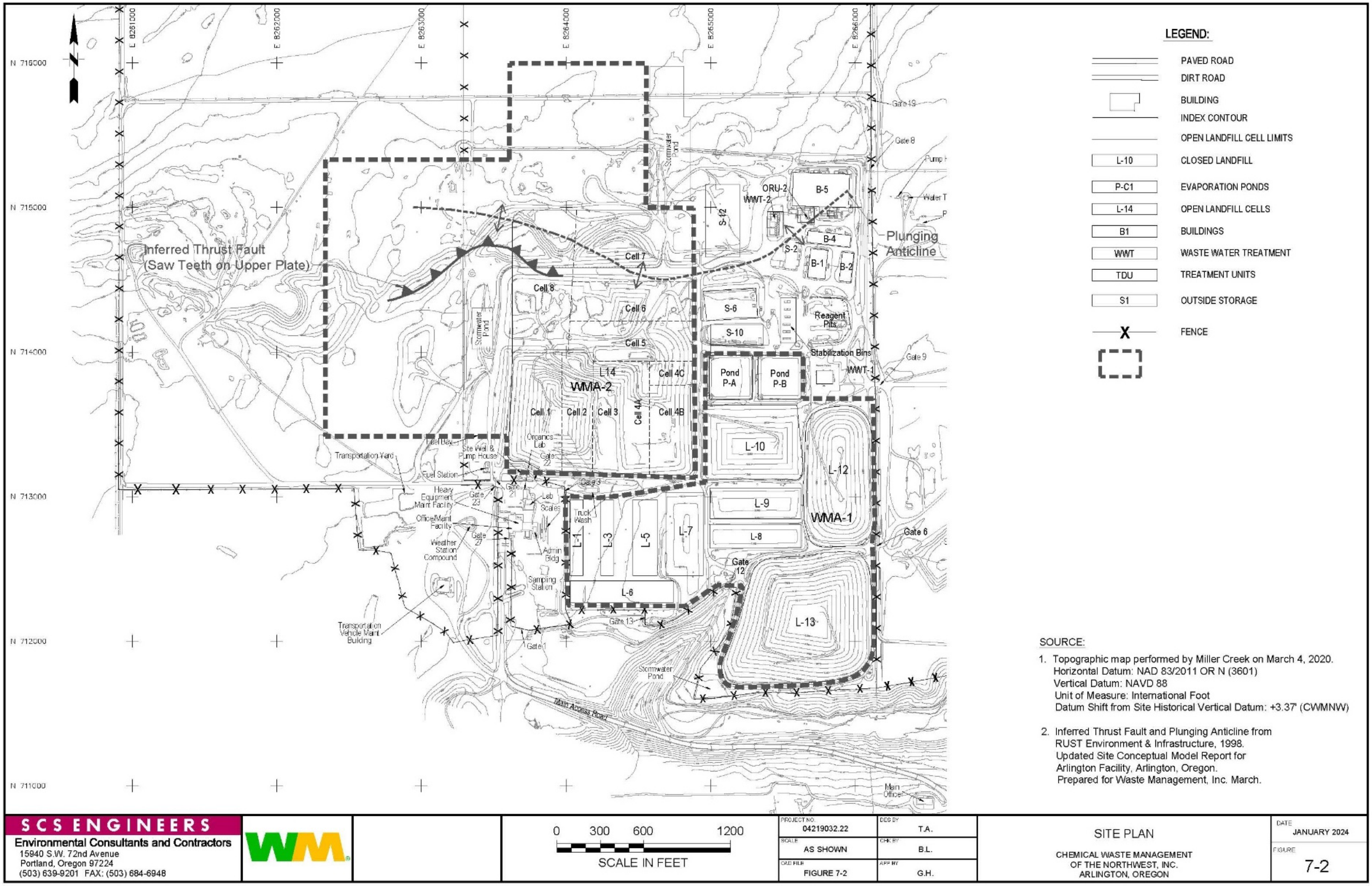


**Figure 7-2 Site Plan**

# 2 HYDROGEOLOGIC SETTING

As required by 40 CFR §264, a groundwater monitoring system has been designed for Facility landfills and surface impoundments. The groundwater monitoring system designed for the Facility monitors the Selah Member of the Ellensburg Formation (Selah), which contains the uppermost saturated zone beneath the Facility.

The Selah consists of a heterogeneous clayey to sandy siltstone, interlayered with thin to thick, discontinuous sands and clays. The Selah underlies the more permeable sands and gravels of the Alkali Canyon Formation and overlies the Priest Rapids Member of the Wanapum Basalt (PRB). Potentiometric surfaces within the saturated Selah are spatially variable, due to the low permeability nature of the fine-grained sediments.

The Alkali Canyon Formation occurs from the surface to depths of approximately 100 feet below ground surface (ft-bgs). The underlying Selah occurs at a depth of approximately 100 ft-bgs and ranges in thickness from approximately 115 to 160 feet beneath the upland plateau where the active area of the CWM facility is located. The lowest 20 to 70 feet of the Selah contains the uppermost saturated zone beneath the facility. Groundwater in the Selah occurs under unconfined to semi-confined conditions at depths generally ranging from 130 to 200 ft-bgs in the upland plateau area. The Priest Rapids Member of the Wanapum Basalt underlies the Selah and occurs at depths of approximately 250 to greater than 325 ft-bgs. Brecciated interflow zones within the Priest Rapids Basalt (PRB) are locally saturated but have low water-yielding capacity due to limited permeability and the compartmentalized character of the saturated zones (CH2M HILL, 2006).

The saturated thickness of the Selah Member has been divided into Upper Level (Level 1) and Lower Level (Level 2) intervals for groundwater monitoring. Groundwater recharge and flow in the Selah are structurally controlled by an anticline located in the northern part of the Facility and the Selah's stratigraphic layers and the underlying PRB's structural dip, which is gently toward the southeast. South of the anticline, groundwater in the Level 1 and Level 2 water-bearing zones generally flows toward the southeast (see Figures 7-7A and 7-7B) at a gradient of approximately 0.015 to 0.035 foot/foot (ft/ft), and rates of between 0.77 and 6.9 feet per year (ft/yr). Discharge of groundwater occurs predominately through evapotranspiration where the Selah is exposed along the northern bluff of Alkali Canyon within the southern boundary of the Facility (see Figure 7-2).

A more detailed discussion of the Facility hydrogeology can be found in the following documents:

- *Geologic and Hydrogeologic Site Characterization Report, Part B Permit Application*, prepared for Chem-Security Systems, Inc. by Dames and Moore, dated April 1987;
- *Draft Final RCRA Facility Investigation Report for Landfill Units L-9 and L-10*, prepared for Waste Management, Inc. (Arlington, Oregon) by CH2M HILL and Rust Environment and Infrastructure, Inc., dated May 20, 1996;
- *Hydrogeologic Investigation and Engineering Design Report for Landfill L-14, Arlington, Oregon*, prepared for Waste Management, Inc. by Rust Environment and Infrastructure Inc., dated April 1998a;
- *Updated Site Conceptual Model Report,* prepared for Waste Management, Inc.

(Arlington, Oregon) by Rust Environment and Infrastructure, Inc., dated April 1998b;

- *Agency Review Draft: Analysis of Potential Water Movement from the Selah Member to the Columbia River Basalt Group*, prepared for Waste Management, Inc. by CH2M HILL, dated August 2006; and
- *Updated Hydrogeologic Conceptual Site Model Report,* prepared for Waste Management, Inc. by CH2M HILL, June 2007 (CH2M HILL, 2007a).

# 3 GROUNDWATER MONITORING PROGRAM

This section describes the following:

- The groundwater monitoring well network:
- The constituents to be analyzed for in groundwater samples submitted to the laboratory:
- The program for inspecting monitoring wells and piezometers:
- The abandonment and decommissioning procedures: and
- The sampling schedule and frequency for monitoring wells under each regulatory program (RCRA and TSCA).

As further described in the sections below, the monitoring network is comprised of two phases: (1) Phase 1 (Phase 1 Monitoring Well Network) section below and (2) long-term optimized (Long Term Optimization of the Groundwater Network) section below. The Phase 1 monitoring network is the current program until the long-term optimized network is established. Facility development, well abandonments/decommissioning, and well installations will dictate when the monitoring network transitions from Phase 1 to the long-term optimized program, and this transition may occur in phases across the Facility.

## 3.1 Phase 1 Monitoring Well Network

The monitoring program has been developed in accordance with 40 CFR 264 Subpart F and in conjunction with extensive discussions with DEQ and EPA Region X. As agreed upon by these agencies and CWM, the Facility is monitored along the point-of-compliance (POC) that are located along the downgradient side the WMAs, which are composed of several regulated units. Figure 7-3 depicts the WMAs, their associated POCs, and associated monitoring wells for WMA-1 and WMA-2.

Groundwater wells comprising the monitoring well network at the Facility is designed and maintained to: 1) obtain groundwater samples representative of Level 1 of the Selah aquifer; and 2) provide an effective means of detection in the event of a release of contaminants from the WMAs. The network of piezometers and monitoring wells is also designed and maintained for the purpose of determining groundwater elevations.

The Phase 1 monitoring network at the Facility is monitored by 16 monitoring wells completed in the shallow Selah (Level 1) that are distributed along the POC boundaries hydraulically downgradient of WMA-1 and WMA-2 (see Figure 7-3). Table 7-11 identifies the relationship between the monitoring wells and WMA-1 and WMA-2. Details regarding the design of the groundwater detection monitoring program are described by Golder Associates (1987b), CH2M HILL (2004, 2005a, and 2007b) and GSI (2011). It should be noted that additional POC wells may be required if groundwater flow direction(s) north of WMA-2 is not consistent with historical groundwater flow directions in the shallow Selah (i.e., Level 1) due to the potential influence of geologic structure(s) on groundwater flow in this portion of the facility.

Piezometers and select POC locations for measuring groundwater elevations are specified in Table 7-2. Figure 7-4 shows the locations of the wells where groundwater elevation measurements will be taken (monitoring wells and piezometers). Water level measurements may voluntarily be taken at other existing wells and piezometers not listed in Tables 7-3 and 7-4/7-5 (not Permit-required) to supplement the water level information that is provided by the wells listed in those tables. The list of wells provided in Table 7-2 is current as of the date of this Plan and also reflects the outcome of the ongoing well decommissioning program. This list will change over time, with DEQ approval, as well network maintenance activities (such as abandoning, decommissioning and, where necessary, replacing wells in the monitoring network) occurs in association with ongoing site maintenance activities and the decommissioning and replacement program outlined in the Well Abandonment Activities section below.

In addition to the monitoring well and piezometer network, there are additional piezometers maintained at the Facility for possible future uses, such as landfill development, optional supplemental downgradient and background monitoring, and corrective action, if it becomes necessary. Wells and piezometers at the Facility are inspected annually while water level measurements are being collected and also during purging activities.

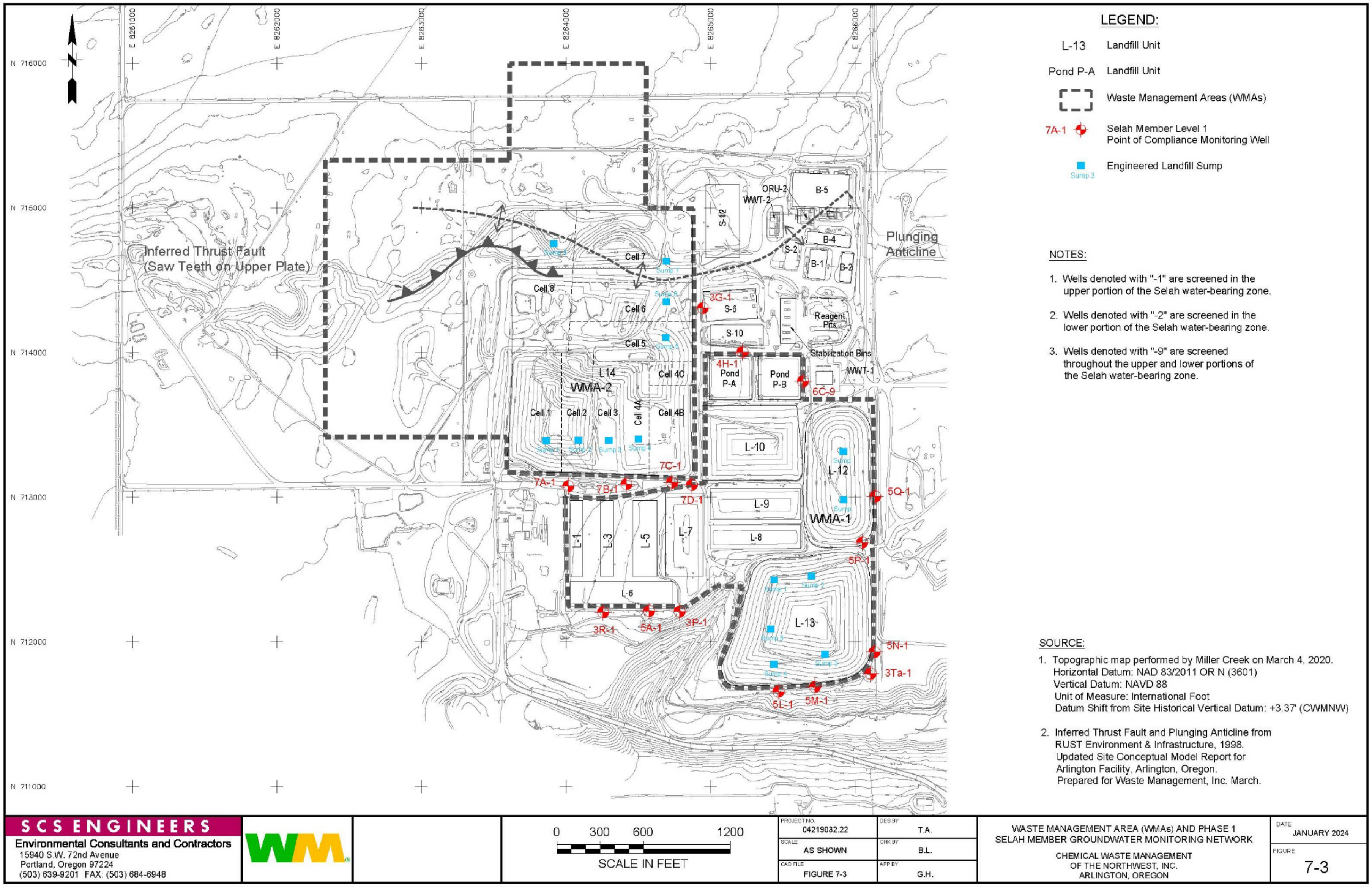


**Figure 7-3 Locations of WMAs and Phase 1 Selah Member Groundwater Monitoring Network**

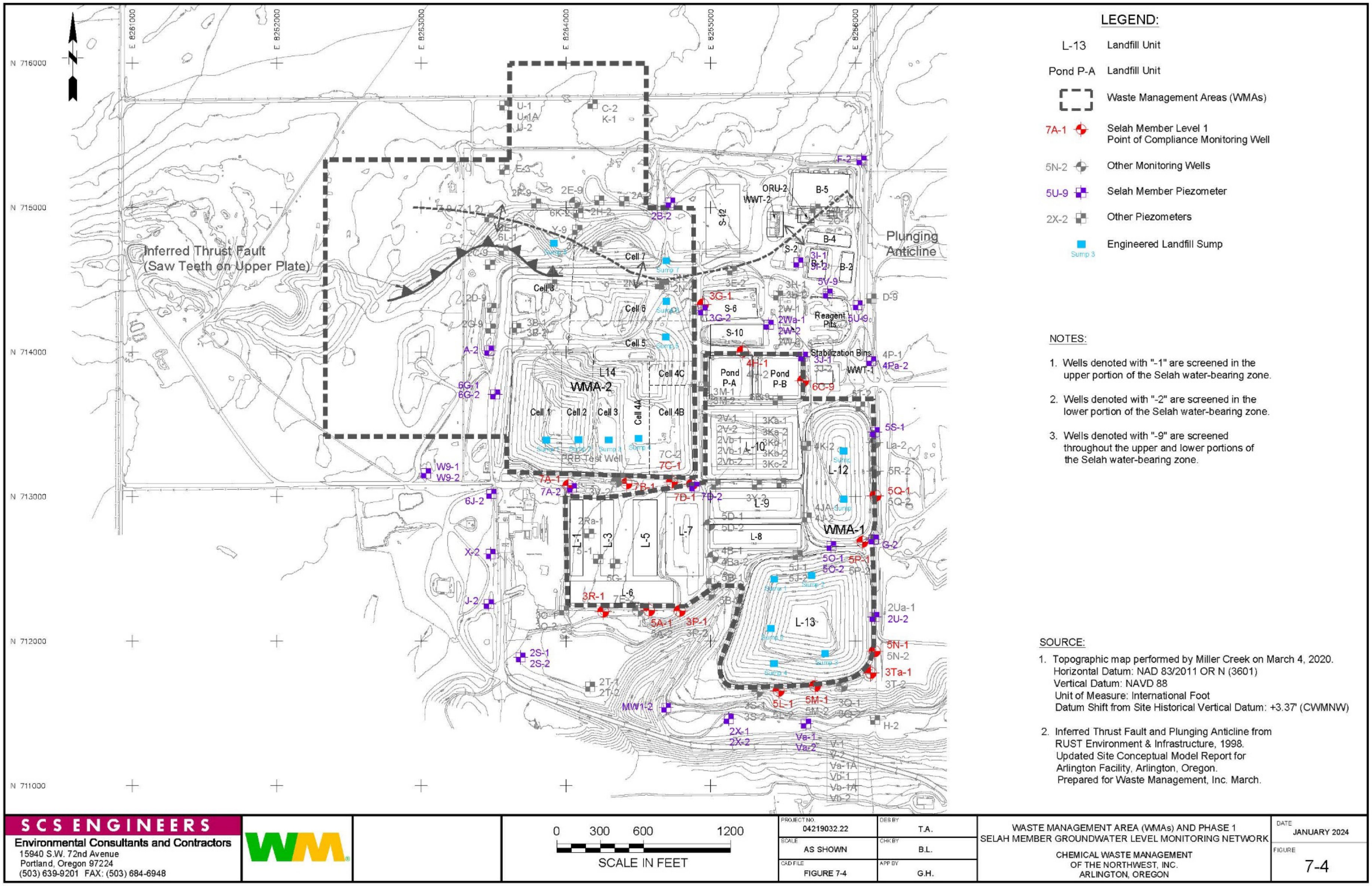


**Figure 7-4 Locations of WMAs and Monitoring Locations for Groundwater Level Monitoring**

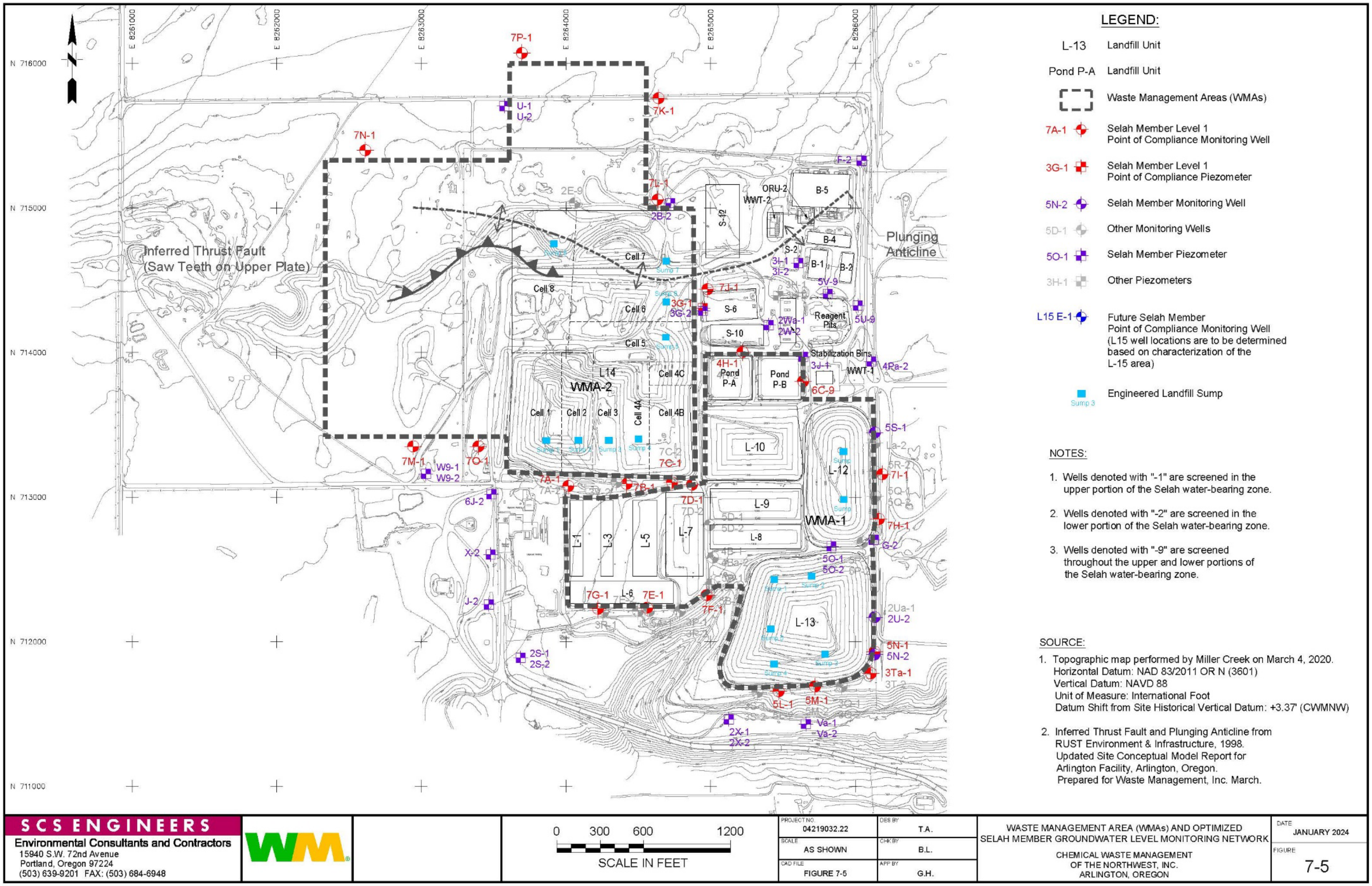


Figure 7-5 Locations of WMAs and Optimized Selah Member Groundwater Monitoring Network

**Table 7-1**

**Phase 1 Monitoring Well Program Specifications and Sampling Frequency**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Compliance Point ID | Location [a] Northing | Location [a] Easting | TOC Elevation (ft) [a,b] | Stickup (ft) [c] | Extn. (ft) [d] | Well Dia. (in) | Well Screen [c] top (ft) | Well Screen [c] base (ft) | Well Screen [c] lgth (ft) | Filter Interval [c] top (ft) | Filter Interval [c] base (ft) | Filter Interval [c] lgth (ft) | TSCA Monitoring Frequency | RCRA Monitoring Frequency [e] | Post-Closure Monitoring | Purging and Sampling Method [f] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WASTE MANAGEMENT AREA WMA-1: (Landfill Units L-1, L-3, L-5, L-6, L-7, L-8, L-9, L-10, L-12, L-13, and Ponds A and B)** | | | | | | | | | | | | | | | | |
| 3P-1 | 712209.42 | 8264785.41 | 1025.84 | 2.75 | 16.25 | 4 | 207.10 | 222.10 | 15.00 | 206.00 | 223.10 | 17.10 | Not Required | Semiannual | Yes | Low-Flow |
| 3R-1 | 712204.75 | 8264256.48 | 1010.90 | 1.82 | 0.00 | 4 | 172.80 | 182.80 | 10.00 | 171.82 | 182.82 | 11.00 | Not Required | Semiannual | Yes | Low-Flow |
| 3Ta-1 | 711780.29 | 8266107.22 | 1029.90 | 2.73 | 0.00 | 4 | 228.30 | 238.30 | 10.00 | 227.13 | 238.33 | 11.20 | Annual | Semiannual | Yes | Low-Flow |
| 5A-1 | 712212.18 | 8264574.73 | 1017.04 | 2.41 | 0.00 | 5 | 180.96 | 207.46 | 26.50 | 175.49 | 207.46 | 31.97 | Not Required | Semiannual | Yes | Low-Flow |
| 5L-1 | 711656.26 | 8265469.62 | 1002.39 | 3.11 | 0.00 | 4 | 186.71 | 211.71 | 25.00 | 183.11 | 211.71 | 28.60 | Annual | Semiannual | Yes | Low-Flow |
| 5M-1 | 711689.41 | 8265721.27 | 1021.38 | 2.52 | 0.00 | 4 | 209.02 | 229.02 | 20.00 | 205.52 | 229.02 | 23.50 | Annual | Semiannual | Yes | Low-Flow |
| 5N-1 | 711930.00 | 8266133.57 | 1031.72 | 2.61 | 0.00 | 4 | 215.11 | 235.11 | 20.00 | 212.11 | 235.11 | 23.00 | Annual | Semiannual | Yes | Low-Flow |
| 5P-1 | 712673.72 | 8266058.07 | 1025.56 | 2.74 | 0.00 | 4 | 202.70 | 227.37 | 24.67 | 199.44 | 227.74 | 28.30 | Annual | Semiannual | Yes | Low-Flow |
| 5Q-1 | 712993.93 | 8266138.51 | 1035.65 | 2.82 | 0.00 | 4 | 214.52 | 231.95 | 17.43 | 210.82 | 232.32 | 21.50 | Annual | Semiannual | Yes | Low-Flow |
| 6C-9 | 713801.00 | 8265639.00 | 1018.66 | 2.90 | 0.00 | 4 | 187.90 | 207.90 | 20.00 | 184.80 | 207.90 | 23.10 | Not Required | Semiannual | No | Low-Flow |
| **WASTE MANAGEMENT AREA WMA-2: Landfill Unit L-14** | | | | | | | | | | | | | | | | |
| 3G-1 | 714300.29 | 8264947.14 | 1018.55 | 1.85 | 0 | 4 | 173.20 | 183.20 | 10.00 | 169.50 | 183.00 | 13.50 | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 4H-1 | 714000.38 | 8265225.41 | 1021.43 | 2.40 | 0.00 | 4 | 184.50 | 199.50 | 15.00 | 183.40 | 200.90 | 17.50 | Annual | Semiannual [h] | Yes | Low-Flow |
| 7A-1 | 713074.69 | 8264024.77 | 990.47 | 2.09 | 0.00 | 4 | 142.19 | 152.19 | 10.00 | 140.09 | 153.49 | 13.40 | Annual | Semiannual [h] | Yes | Low-Flow |
| 7B-1 | 713091.15 | 8264418.42 | 1003.59 | 2.07 | 0.00 | 4 | 158.77 | 168.77 | 10.00 | 155.77 | 168.87 | 13.10 | Annual | Semiannual [h] | Yes | Low-Flow |
| 7C-1 | 713103.22 | 8264745.81 | 1018.13 | 2.06 | 0.00 | 4 | 180.26 | 190.26 | 10.00 | 178.16 | 191.16 | 13.00 | Annual | Semiannual [h] | Yes | Low-Flow |
| 7D-1 | 713082.85 | 8264881.81 | 1022.18 | 1.93 | 0.00 | 4 | 188.23 | 198.23 | 10.00 | 186.13 | 200.03 | 13.90 | Annual | Semiannual [h] | Yes | Low-Flow |

Notes:

[a] RUST 1994 Survey; Oregon State Plane North, North American Datum 1983-1991

[b] Top of casing elevation relative in feet to historical site datum (RUST, 1998)

[c] Depth below top of casing (calculated from boring logs)

[d] Casing extensions by CWM (calculated from original TOC elevation - 1993 Tenneson resurvey)

[e] Semiannual sampling will occur during the spring and fall sampling events every year; annual sampling will occur during the fall sampling event every year

[f] All pumps are Well Wizard bladder pumps

[g] Quarterly for first year of monitoring, then semiannual

[h] Wells associated with L-14will be monitored for PFAS (Table 7-2)

**TABLE 7-1 Monitoring Wells Specifications and Sampling Frequency**

**Table 7-2**
**Phase 1 Groundwater Elevation Monitoring Locations**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Location ID | Location [a] | | TOC Elevation [b] | Selah Member Level [c] | Location Use[d] |
|---|---|---|---|---|---|
| | Easting | Northing | | | |
| Va-1 | 8265656.61 | 711421.45 | 794.30 | 1 | P |
| W9-1 | 8263032.76 | 713160.82 | 998.14 | 1 | P |
| 2S-1 | 8263689.85 | 711892.18 | 983.37 | 1 | P |
| 2Wa-1 | 8265398.81 | 714177.28 | 1020.03 | 1 | P |
| 2X-1 | 8265124.28 | 711463.38 | 915.94 | 1 | P |
| 3G-1 | 8264947.14 | 714300.29 | 1018.55 | 1 | MW |
| 3I-1 | 8265611.36 | 714614.22 | 1009.28 | 1 | P |
| 3J-1 | 8265639.57 | 713970.21 | 1019.13 | 1 | P |
| 3P-1 | 8264785.41 | 712209.42 | 1025.84 | 1 | MW |
| 3R-1 | 8264256.48 | 712204.75 | 1010.90 | 1 | MW |
| 3Ta-1 | 8266107.22 | 711780.29 | 1029.90 | 1 | MW |
| 4H-1 | 8265225.41 | 714000.38 | 1021.43 | 1 | MW |
| 5A-1 | 8264574.73 | 712212.18 | 1017.04 | 1 | MW |
| 5S-1 | 8266134.93 | 713441.01 | 1037.87 | 1 | P |
| 5L-1 | 8265469.62 | 711656.26 | 1002.39 | 1 | MW |
| 5M-1 | 8265721.27 | 711689.41 | 1021.38 | 1 | MW |
| 5N-1 | 8266133.57 | 711930.00 | 1031.72 | 1 | MW |
| 5O-1 | 8265838.39 | 712657.32 | 1019.98 | 1 | P |
| 5P-1 | 8266058.07 | 712673.72 | 1025.56 | 1 | MW |
| 5Q-1 | 8266138.51 | 712993.93 | 1035.65 | 1 | MW |
| 6G-1 | 8263511.11 | 713699.93 | 995.70 | 1 | P |
| 7A-1 | 8264024.77 | 713074.69 | 990.47 | 1 | MW |
| 7B-1 | 8264418.42 | 713091.15 | 1003.59 | 1 | MW |
| 7C-1 | 8264745.81 | 713103.22 | 1018.13 | 1 | MW |
| 7D-1 | 8264881.81 | 713082.85 | 1022.18 | 1 | MW |
| 5U-9 | 8266018.49 | 714324.88 | 1037.76 | 1 & 2 | P |
| 5V-9 | 8265809.45 | 714405.50 | 1029.43 | 1 & 2 | P |
| 6C-9 | 8265639.00 | 713801.00 | 1018.66 | 1 & 2 | MW |
| A-2 | 8263468.42 | 714011.17 | 1009.54 | 2 | P |
| F-2 | 8266048.01 | 715326.01 | 1048.33 | 2 | P |
| G-2 | 8266127.52 | 712704.47 | 1024.31 | 2 | P |
| J-2 | 8263466.71 | 712256.68 | 982.91 | 2 | P |
| MW1-2 | 8264694.07 | 711538.99 | 930.84 | 2 | P |
| Va-2 | 8265662.57 | 711426.10 | 912.25 | 2 | P |
| W9-2 | 8263032.76 | 713160.82 | 998.19 | 2 | P |
| X-2 | 8263481.30 | 712602.86 | 986.73 | 2 | P |
| 2B-2 | 8264724.72 | 715031.73 | 1008.12 | 2 | P |
| 2S-2 | 8263689.85 | 711892.18 | 983.37 | 2 | P |
| 2U-2 | 8266133.98 | 712168.56 | 1031.39 | 2 | P |
| 2W-2 | 8265398.63 | 714203.30 | 1018.37 | 2 | P |
| 2X-2 | 8265124.28 | 711463.38 | 915.95 | 2 | P |

**Table 7-2**
**Phase 1 Groundwater Elevation Monitoring Locations**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| | | | | | |
|---|---|---|---|---|---|
| 3G-2 | 8264947.47 | 714310.85 | 1018.31 | 2 | P |
| | | | | | |
| 3I-2 | 8265610.45 | 714624.44 | 1010.16 | 2 | P |
| 4Pa-2 | 8266105.95 | 713933.82 | 1037.78 | 2 | P |
| 5O-2 | 8265827.97 | 712658.15 | 1019.83 | 2 | P |
| 6G-2 | 8263511.11 | 713699.93 | 995.87 | 2 | P |
| 6J-2 | 8263481.40 | 713020.15 | 994.58 | 2 | P |
| 7A-2 | 8264015.95 | 713076.45 | 990.11 | 2 | P |
| 7D-2 | 8264870.37 | 713085.44 | 1021.72 | 2 | P |

Notes:
[a] Coordinates in Oregon State Plane North.
[b] Top of casing (TOC) elevation relative to historical site datum (RUST, 1998)
[c] The Selah Member has been divided into the upper level (Level 1) and lower level (Level 2)
[d] P = piezometer; MW = Monitoring Well; Location use is consistent with Appendix C

**TABLE 7-2 Piezometer Location**

### 3.2 Wells and Piezometers

Each monitoring well and piezometer at the Facility that is used for monitoring water quality or water levels is completed within the Selah Member. Each monitoring well and piezometer has been given a numeric suffix designation based on the stratigraphic location of the well screen as follows:

"-1" Level 1 - screened at the water table within the Selah:

"-2" Level 2 - screened at the base of the saturated zone within the Selah: and

"-9" Level 9 - screened across the entire saturated zone within the Selah:

Level 3 and 4 wells have been installed in the Priest Rapids Basalt underlying the Selah uppermost aquifer and are not part of the groundwater quality monitoring program for the facility. Two additional types of nomenclature designations have been used to further define the placement of monitoring wells and piezometers at the Facility:

- Monitoring wells and piezometers generally have been installed sequentially in groups or series. The first series of monitoring wells and piezometers installed at the Facility are labeled A through Z (although not inclusively). The second series is labeled 2A through 2Y and so on. The most recent monitoring wells are in the 7th series (wells 7A through 7D) for Landfill L-14 and 7E which replaced POC well 3U-2 downgradient of L-6. Because of a number of well abandonments and the sequencing of various well installation programs, not all alphanumeric characters are used at the site.
- Other lower case letter designations have been added, such as a "-1a" for monitoring a thin "grey clay" interval zone that is present at some locations, and an "a-" for a replacement well. For example:
    - Well 4Ja-1 was completed in Selah Level 1 as a replacement for well 4J-1
    - Well 6G-1a was completed in the grey zone clay and is not a replacement well

Drilling and well construction methods have evolved over the nearly four decades of well installation and monitoring at the site. The key documents describing well installation are:

- Dames and Moore, 1987a. *Geologic and Hydrogeologic Site Characterization Report: RCRA Part B Permit Application*. Describes early well installation activities at the site leading up to the original RCRA Part B permit application.
- Golder Associates, 1987. *Ground-Water Monitoring Well Installation Program at Arlington Hazardous Waste Facility, Arlington, Oregon*. Describes installation of eight wells (5D, 5E, 5A-1, 5A-2, 5B-1, 5B-2, 5C-1, and 5C-2) and repair of two wells (3P-1 and 3P-2). Wells 5A-1, 5A-2, 5B-1, 5B-2, 5C-1, 5C-2, 5D, and 5E were subsequently renamed in 1988 to 5L-1, 5L-2, 5M-1, 5M-2, 5N-1, 5N-2, 5U-9, and 5V-9, respectively.
- Golder Associates, 1988. *Installation of Ground Water Monitoring Wells 6B and 6C, Arlington, Oregon.*
- Golder Associates, 1990. *Installation of Eight Groundwater Monitoring Wells at the Arlington Hazardous Waste Facility, Arlington, Oregon: November 2, 1989 to January 9, 1990*. Describes installation of eight wells (5A-1, 5A-2, 5B-1, 5B-2, 5D-1, 5D-2, 5J-1, and 5J-2).

- Sirrine Environmental Consultants, Inc., 1990. *Draft Report: Ground-Water Monitoring Well Installation Program at Arlington Hazardous Waste Facility, Arlington, Oregon*. Describes installation of seven wells (5E-1, 5F-1, 5G-1, 5H-1, 5I-1, 5K-1, and 6F-1,2 [later renamed 6F-9]).
- Shannon and Wilson, Inc., 1990. *Groundwater Monitoring Well 2Ra-1 at the Arlington Treatment, Storage, Disposal Facility, Arlington, Oregon*. Describes replacement of well 2R-1 with well 2Ra-1.
- SEC Donohue, 1992. *Supplemental Ground-Water Monitoring Well Installation Report.* Describes installation of wells 2Qa-2 and 2Na-1 and abandonment of wells 2Q-2 and 2N-1.
- CH2M HILL and RUST Environment & Infrastructure, Inc., 1996. *Draft Final RCRA Facility Investigation Report for Landfill Units L-9 and L-10.* Describes installation of wells 3Kb-1 and 3Kc-2.
- RUST Environnent & Infrastructure, Inc., April 1998. *Hydrogeologic Investigation and Engineering Design Report for Landfill L-14, Arlington, Oregon*. Describes installation of ten wells (6G-1, 6G-1A, 6G-2, 6H-2, 6I-1, 6I-1A, 6I-2, 6J-2, 6K-2, and 6L-1).
- CH2M HILL, 2005b. *Landfill Unit L-14 Well Installation Report.* Describes installation of seven wells (7A-1, 7A-2, 7B-1, 7C-1, 7C-2, 7D-1, and 7D-2).
- Aspect, 2018. *Detection Monitoring Well 7E-2 Installation Report, Agency Review Draft.* Describes the installation of monitoring well 7E-2 to replace monitoring well 3U-2

## 3.3 Well/Piezometer Construction Activities

Monitoring wells (detection or compliance if needed) and piezometers for future installation at the Facility shall continue to be constructed as approved by the DEQ. A well installation work plan shall be submitted to the DEQ, for approval, for all new and replacement monitoring wells and piezometers. Any replacement monitoring wells or piezometers that may be required shall be installed as close as appropriate and practical to the well or piezometer being taken out of service. If a well or piezometer is to be replaced, it shall be done so within 90 calendar days of being taken out of service, unless the DEQ approves a longer period of time. Within 60 calendar days of the installation of a new well or piezometer, a revised version of Table 7-1, 7-2, Figure 7-3, Figure 7-4 and Appendix B and C, as appropriate, shall be provided to the DEQ. Changes in the number, location, depth, or design of wells are subject to permit modification as described in 40 CFR 270.42.

All new monitoring wells (detection or compliance if needed) and piezometers shall be designed and installed in accordance with Oregon Water Resources Department (OWRD) Oregon Administrative Rule (OAR) 690-240, or a variance will be obtained from the OWRD in situations which warrant deviation from the prescribed standards. All reasonable precautions shall be taken during drilling to prevent cross contamination between hydrogeologic water bearing zones.

## 3.4 Sample Analysis

Specific chemical constituents to be analyzed in the laboratory under the detection monitoring program are those listed in Table 7-11. This group of constituents has been selected for analysis as requested by DEQ and EPA because many compounds within this group are synthetic, have high detectability (that is, readily detectable at low reporting limits using standard laboratory methods) and are mobile in the environment, which makes them good indicators of a potential release from a WMA. Specific chemical constituents to be analyzed in the laboratory under the compliance monitoring program (i.e. Appendix IX) is described below.

### 3.5 Groundwater Sampling Schedule

Detection monitoring shall be conducted at the frequency specified in Table 7-1. The timing of the semiannual RCRA groundwater sampling shall occur in the spring (March through May) and the fall (September through November) of each year. Annual TSCA sampling shall be performed in the fall (September through November) of each year. For all semiannual, annual, and all other groundwater sampling events, the Facility will notify the Department within five (5) working days prior to the sampling event.

When needed, background monitoring (i.e., initial data collection) for a new monitoring well included in the detection monitoring program will typically be performed on a quarterly basis (i.e. winter, spring, summer and fall) for a minimum of four quarters.

### 3.6 Well and Piezometer Inspection Program

Wells and piezometers shall be inspected annually while water level measurements are being collected and also during purging activities. The condition of each well and its surrounding area shall be observed and recorded on a well condition inspection form. The inspection form is contained in Appendix A.

Monitoring wells will be maintained in good working order, making necessary repairs in a timely manner so that sampling activities do not occur outside the sampling timeframes. The Facility will maintain an adequate supply (or have readily available) of replacement parts and repair equipment so that each groundwater sampling event is not unreasonably delayed. Monitoring wells included in the detection and compliance monitoring programs shall be sounded to measure the total depth every five years during a semiannual event to evaluate if silt is accumulating in the wells and as a measure to evaluate borehole integrity. The last depth-sounding event were performed in 2017 and 2022, and the next depth sounding event will be scheduled for 2027 and beyond.

### 3.7 Well Abandonment Activities

Out of service wells shall be abandoned and decommissioned in general accordance with OAR 690-240 and the current DEQ guidance. Written approval for well or piezometer decommissioning will be obtained from the DEQ prior to completing the work. Within 60 calendar days of completing the work, decommissioning documentation as required by OAR 690-240 and revisions to Table 7-1, Table 7-2, Figure 7-3, Figure 7-4/7-5 and Appendix B and C, as appropriate, will be provided to DEQ.

By written direction from the Department, the Facility will decommission monitoring wells that do not meet the requirements in 40 CFR 264.97(c). In determining whether to issue the written direction, the Department will consider the Facility’s evaluation, if any, for whether the monitoring well meets the requirements in 40 CFR 264.97(c).

### 3.8 Long Term Optimization of the Groundwater Monitoring Network

Many of the existing Facility monitoring wells and piezometers were installed prior to the development of well construction standards and guidance documents for monitoring well construction by the OWRD and DEQ. While best practices at the time of program development were observed, the existing wells installed and abandoned locations prior to 1996 have developed integrity concerns over time due to the age of the wells and the original construction of the wells. It has been demonstrated that the occurrence of VOCs in groundwater at the Facility is related to the well integrity issues allowing downward vertical migration of soil vapor through the compromised wells, piezometers and aged abandoned boreholes, wells and piezometers at the site (RUST and CH2M HILL, 1996; CH2M HILL, 2008; GSI, 2013, EA Engineering, 2016, SCS, 2020b and SCS 2021).

Additionally, the understanding of the geologic and hydrogeologic conditions at the site has also advanced from additional characterization work, groundwater modeling, recent well installations performed as part of development of the Facility and investigations related to well integrity issues. Specifically it has been demonstrated that: 1) the limited vertical hydraulic conductivity will prevent downward migration to the deeper Selah water bearing zone and to the deeper confined regional Columbia River Basalt aquifers; 2) the limited aerial extent of the Selah Member which is exposed on the Facility property by Alkali Canyon would preclude offsite impacts to ecological and human health receptors hydraulically downgradient of the Facility; and 3) previous evaluation of the beneficial use of the Selah groundwater by CH2M Hill indicates that there are no beneficial uses for Selah groundwater near the facility (2007a).

Given this information, the long-term optimized program incorporates future planned Facility development and more efficiently protects groundwater by doing the following:

- Locating detection monitoring wells at the POC boundary in the uppermost water bearing zone in the Selah hydraulically downgradient of existing and future sump locations in engineered landfills:
- Removing and/or replacing wells in the groundwater monitoring program suspected of well integrity issues, and:
- Designing new wells with a well screen interval that targets the highest yielding portions of the uppermost Selah water bearing zone to improve application of the site-specific purging and sampling methodology developed due to the low-yielding nature of the majority of the existing wells installed prior to 2006.

The long-term optimization program would be performed in a phased approach as the facility develops while continuing to ensure that the Phase 1 groundwater monitoring program for WMA-1 and WMA-2 is effective until the optimization program is completed. The following sections outline the phased approach and implementation of improvements to the current groundwater monitoring program presented in Table 7-3, Table 7-4, Figure 7-6 and Figure 7-4.

### 3.8.1 Well and Piezometer Abandonment and Decommissioning

To address well integrity concerns, CWM plans a phased approach to abandoning and decommissioning (and in some instances replacing) the ageing detection monitoring wells and piezometers that no longer meet the requirements of a groundwater protection program outlined in the 40 CFR §264 Subpart F.

The 40 CFR §264 Subpart F contains the regulations for groundwater monitoring at permitted hazardous waste land disposal facilities. The 40 CFR §264.97(a) requires that the monitoring program include a sufficient number of wells, screened in the uppermost aquifer that:

- Represent groundwater quality at the POC immediately hydraulically downgradient of the WMA boundary, and:
- Allow for the detection of contamination when hazardous waste or hazardous waste constituents have migrated from the WMA to the uppermost aquifer.

The 40 CFR §264.97(c) requires that wells be cased in a manner that maintains borehole integrity, screened, or perforated and packed with gravel or sand, and the annular space must be sealed above the sampling depth to prevent contamination of samples and the groundwater. CWM has performed multiple investigations that address the well integrity concerns identified at the facility (CH2M HILL, 2005c; CH2M HILL, 2005d; CH2M HILL, 2008; GSI, 2013; EA, 2016; Aspect, 2018).

CWM plans to abandon and decommission a series of wells and piezometers as part of the Facility development and select wells that have identified well integrity issues (Table 7-3). Of the total locations identified for abandonment and decommissioning, some are to accommodate Facility construction and development and the remaining locations were selected based on the following criteria:

- Proximity to unlined past practice units
- Elevated soil vapor concentrations
- Location relative to WMA boundary (i.e., internal to the WMA)
- Construction date (i.e., prior to 1994)
- History of VOC occurrence
- Previous well integrity evaluation information, specifically physical or geophysical evaluations if available

The abandonment and decommissioning of these wells/piezometers is a more protective approach for maintaining and improving the groundwater monitoring program. 40 CFR §264.97(c) requires that wells be cased in a manner that maintains borehole integrity, screened, or perforated and packed with gravel or sand, and the annular space must be sealed above the sampling depth to prevent contamination of samples and groundwater. The wells/piezometers planned to be abandoned or decommissioned do not meet all of these requirements. The rationale for the abandonment and decommissioning criteria is based on the findings from previous alternative source demonstrations and investigations at the Facility.

The evaluation presented in past investigations has demonstrated that VOC detections is not representative of actual groundwater conditions at the point-of-compliance in the uppermost aquifer as required under 40 CFR § 264.97(a). Consistent with previous findings, the primary source of the VOCs appears to be soil vapor migration through (1) ageing, damaged or insufficient grout seals, and/or ageing or poorly sealed polyvinyl chloride casing of wells/piezometers or (2) previously abandoned boreholes with potentially insufficient grout seals. The preponderance of evidence suggests that the VOCs in groundwater are an artifact of the well installation and construction prior to the development of state regulatory standards for monitoring well construction.

The well decommissioning program will improve the groundwater protection program by removing suspect wells that were constructed prior to development of guidance by the DEQ and OWRD, advancements in well drilling methods and construction and a better understanding of Facility groundwater occurrence and conditions. This program will be performed with the well and piezometer locations of the greatest concern and those in the footprint of Facility development being prioritized for decommissioning first as the Facility is further developed (Table 7-3).

The selected wells will be abandoned and decommissioned in groups presented in Table 7-3; however, CWM may need to adjust the groups and schedule based on Facility development or other considerations to reprioritize the well decommissioning programs. Piezometers and wells not in the current groundwater detection monitoring program will be abandoned by grouting in place after the Part B Permit Renewal approval. Five (3P-1, 3R-1, 5A-1, 5P-1, and 5Q-1) of the Level 1 wells to be abandoned and decommissioned are detection monitoring wells in the Phase 1 groundwater monitoring program that will be replaced (Table 7-4).

The detection monitoring well locations that are in the Phase 1 groundwater monitoring network that are scheduled for replacement will have the new wells installed and sampled for four quarters (background data collection) prior to the abandonment and decommissioning of the detection monitoring wells they are replacing. The schedule may need to be modified to accommodate changes in the site development schedule.

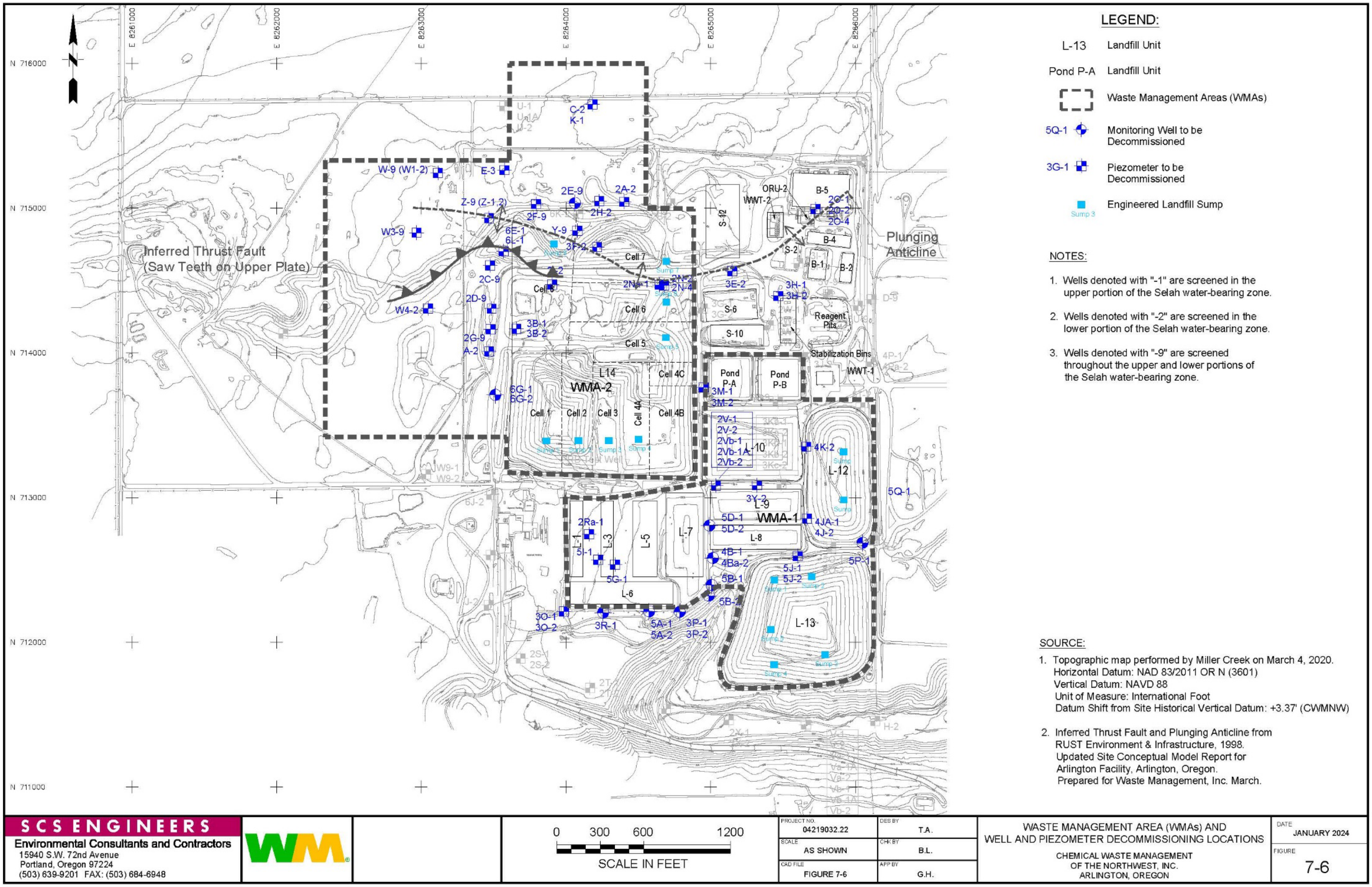


**Figure 7-6** Map Showing Locations of WMAs and Well and Piezometer Decommissioning Program

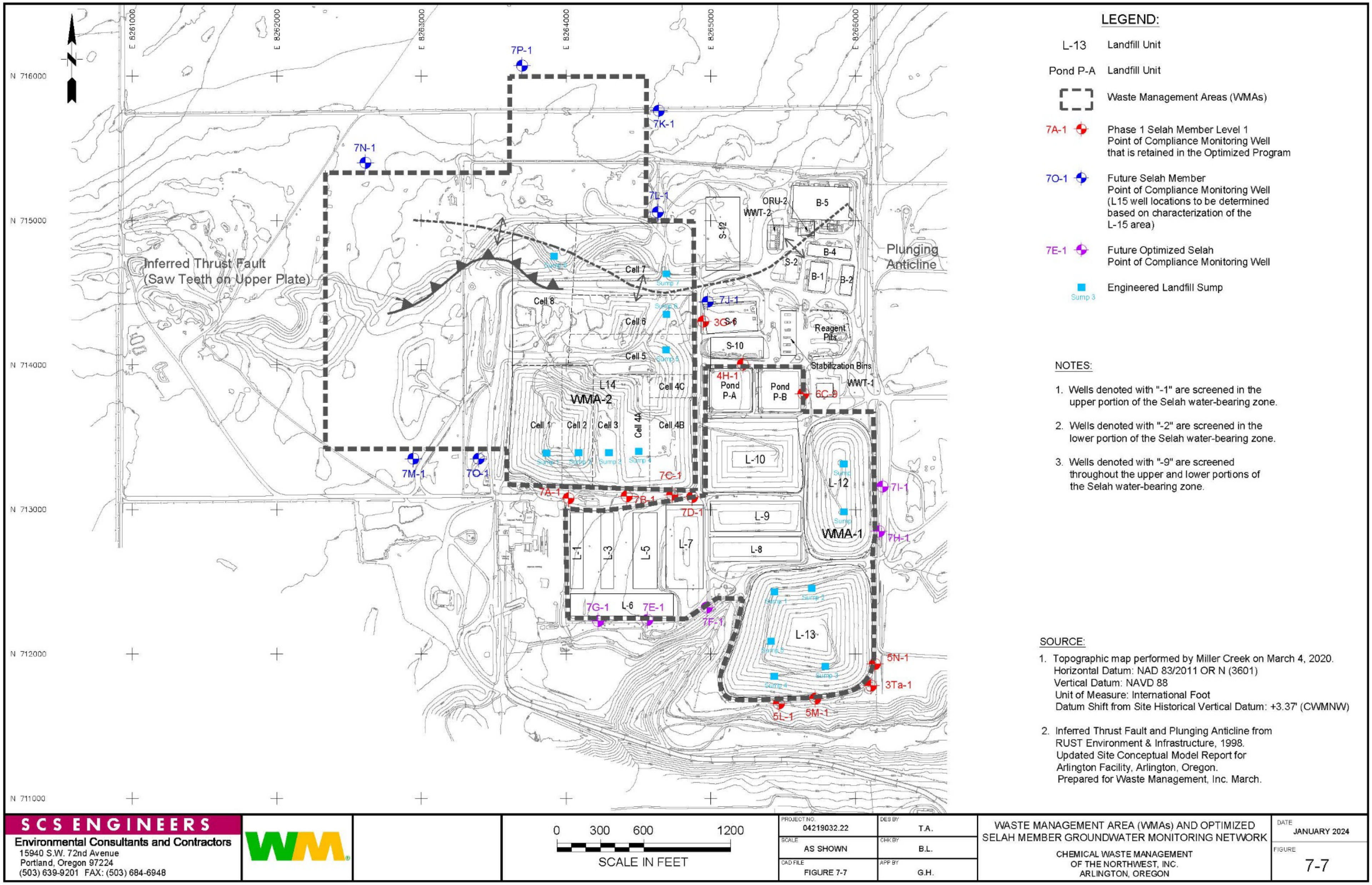


**Figure 7-7 Locations of WMAs and Optimized Selah Member Groundwater Monitoring Network**

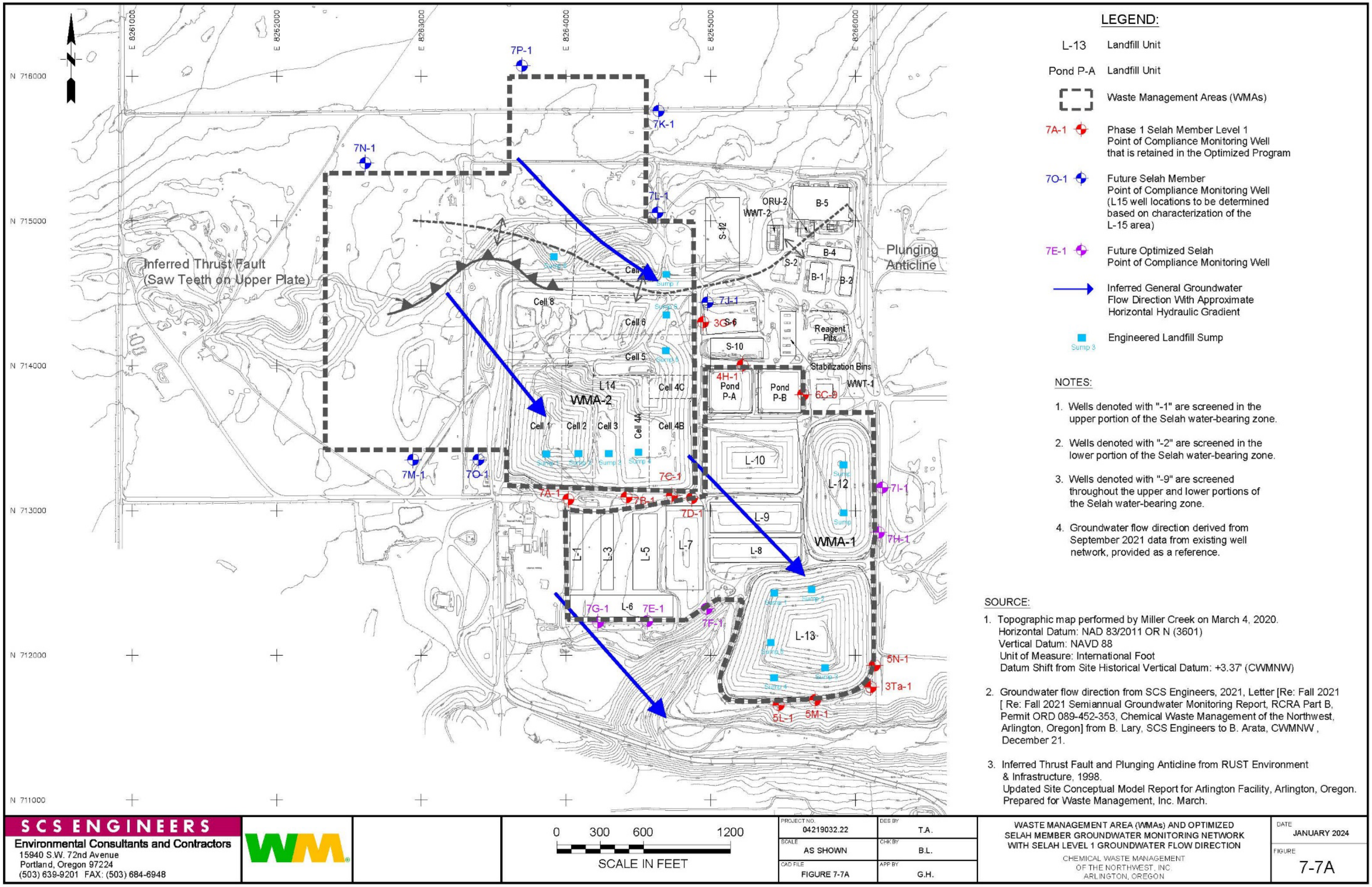


**Figure 7-7A Locations of WMAs and Optimized Selah Member Groundwater Monitoring Network and Level 1 Flow Direction**

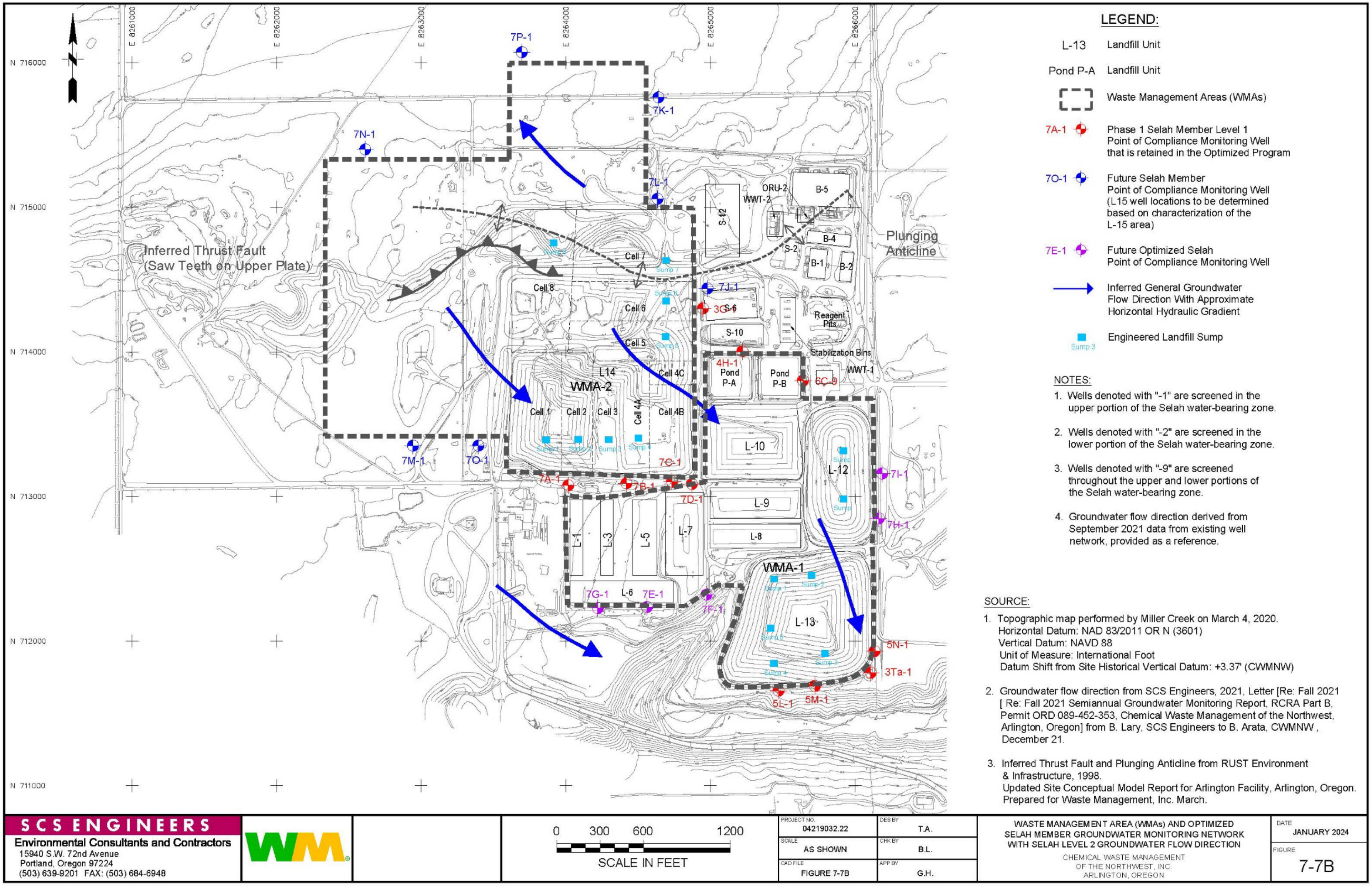


**Figure 7-7B Locations of WMAs and Optimized Selah Member Groundwater Monitoring Network and Level 2 Flow Direction**

#### 3.8.2 Groundwater Protection Program Optimization

This section outlines the modifications to the groundwater monitoring program during the transition from the Phase 1 program approved as part of the Part B renewal to the optimized groundwater monitoring program. The optimized groundwater monitoring network for all WMAs is shown in Figure 7-7 and summarized in Table 7-4. The site-wide monitoring well and piezometer inventory is shown in Appendix C (Table 7-15).

#### 3.8.3 Detection Monitoring Program Optimization Goals and Summary

Historically, the groundwater protection program at CWM has monitored the upper and lower portion of the Selah water bearing zone (i.e., Level 1 and Level 2) upgradient and downgradient of the WMAs. Previous hydrogeologic characterizations and evaluations of a potential release from the facility identified that the impacts to groundwater would be limited to the uppermost portion of the Selah (CH2M HILL, 2007a, Rust Environmental and Infrastructure, 1998a). More recent vertical and horizontal flow profiling of the Selah using hydrophysical logging methods confirmed that the majority of groundwater flow occurs in the uppermost Selah (Aspect, 2018).

As part of the optimization, the existing Level 1 detection monitoring well locations were evaluated relative to the predominately stable groundwater flow direction in the shallow Selah observed since the site has operated. Based on those observations, CWM will relocate and/or replace five wells (3P-1, 3R-1, 5A-1, 5P-1, and 5Q-1) with new Level 1 POC wells (7E-1 through 7I-1) to be directly hydraulically downgradient of WMA-1 (Table 7-4). The optimized detection monitoring well network locations are shown in Figure 7-7. Replacement detection monitoring well installation will begin after the Part B Permit Renewal or Part B Permit Class III Modification is approved and is summarized in Table 7-4. The schedule may be adjusted based upon site construction and operation activities of the Organics Recovery Unit (ORU) unit or other Facility development activities.

Additionally, the current RCRA detection monitoring program evaluates VOCs for semiannual routine monitoring and PCBs on an annual basis under TSCA. These analytes are anthropogenic and therefore would not be anticipated to occur naturally in groundwater upgradient of the Facility based on historic land uses and hydrogeologic conditions of the Facility. Given this information, the Facility plans to reduce the number of background detection monitoring wells (i.e., upgradient) over time from the Phase 1 program for WMA-1 and WMA-2.

#### 3.8.4 Groundwater Monitoring Program

This section outlines the modifications to the groundwater monitoring program for water level monitoring, the detection monitoring program, and data evaluation as part of the optimization.

##### 3.8.4.1 Water Level Elevation Monitoring

Water levels for piezometers and monitoring wells completed in the Level 1, Level 2 and Level 9 of the Selah for locations listed in Table 7-2 will continue to be monitored on a semiannual basis to evaluate groundwater horizontal and vertical hydraulic gradients, groundwater flow directions, and conditions in the shallow and deeper water-bearing zone. CWM currently monitors additional wells and piezometers completed in Level 1, Level 2 and Level 9 of the Selah and in piezometers completed in Level 3 and Level 4 of the PRB to supplement the list of wells in Table 7-2. The monitoring wells and supplemental piezometers are shown in Figure 7-4.

Groundwater level measurements for each monitoring well are obtained prior to purging the well. In order to minimize the potential for error caused by temporal variations, the Facility shall obtain all water level measurements within as short a time as practicable. On each day that water level measurements are being collected, the barometric pressure shall be recorded and entered into the operating record.

### 3.8.4.2 Initial Background Data Collection (New or Replacement Wells)

The general groundwater detection monitoring requirements for new or replacement wells under §264.97 allows for the following:

- Determination of groundwater quality at wells that are not hydraulically upgradient of the waste management area where the well can represent the quality of water passing the POC.
- A minimum of four samples taken at intervals that assures an independent sample is obtained based on the uppermost aquifer's properties.
- Application of an alternate sampling procedure proposed by the owner or operator and approved by the Regional Administrator.

On this basis, new and replacement Level 1 detection monitoring wells near WMAs will be sampled for the constituents listed in Table 7-11 on a quarterly basis for four (4) events to establish water quality downgradient of the WMA at the POC. Additionally, new or replacement Level 1 wells will be sampled quarterly for the following indicator parameters: chloride, iron, manganese, phenols, sodium, sulfate, pH, specific conductance, total organic carbon, and total organic halogens. New or replacement wells will transition into the detection monitoring program after completion of the four (4) quarters of background monitoring.

Data will be evaluated using the procedures outlined in the "Data Evaluation" section below. The application of the site-specific low flow sampling method will be used to evaluate purging and drawdown criteria outlined and included in Appendix B and Table 7-14 for the detection monitoring network. Table 7-14 will be revised once the well construction and well development is completed and depth-to-water criteria for low flow sampling is determined at each new or replacement detection monitoring well.

### 3.8.4.3 Groundwater Quality

The current detection-monitoring program evaluates VOCs (see Table 7-1) for semiannual routine monitoring and PCBs on an annual basis. Groundwater sampling will continue to be performed on a semiannual basis for VOCs and on an annual basis for PCBs in the detection monitoring wells using the sampling procedures outlined in the "Purging and Sampling Procedures" section below. The detection monitoring network for long term optimization of the groundwater sampling program is presented in Table 7-4.

### 3.8.4.4 Data Evaluation

Data evaluation will be performed for the new detection monitoring wells consistent with the approach described below. In existing detection monitoring wells where VOCs were not detected, the detection monitoring criteria is set equal to the reporting limit for each constituent as indicated in Table 7-11 (i.e., alternative statistical approach with the Double Quantification Rule). At locations with historical VOC detections, the criteria (i.e. five times the reporting limit) is described in the "Data Evaluation" section below.

The USEPA Unified Guidance (USEPA, 2009) recommends a uniform approach for dealing with monitoring constituents not historically detected in background (e.g., VOCs and other trace organic compounds). The Unified Guidance recommends that the Double Quantification rule be used as an alternate data evaluation protocol, approved by the Regional Administrator. As stated in the guidance, the alternative approach indicates that:

> *A confirmed exceedance is registered if any well-constituent pair in the '100% non-detect' group exhibits quantified measurements (i.e., at or above the reporting limit [RL]) in two consecutive sample and resample events.*

The Unified Guidance refers to the Double Quantification rule as a "quasi-statistical" method with the form of a statistical prediction limit test. As indicated in the Unified Guidance, requiring a verified quantification for previously non-detected constituents should ensure that spurious lab results do not falsely trigger a facility into compliance/assessment monitoring, and will more reliably indicate the true presence of chemicals not previously observed.

Assessment of possible releases shall be made by comparing the reported data from each monitoring event against the detection monitoring criteria. Reported concentrations above these criteria shall be considered possible indications of a release, subject to verification re-sampling and/or demonstration by CWM of an alternative source other than a release from a WMA (as discussed in detail in the sections below. Additional response actions and alternatives are also described in the applicable portions of the "Data Evaluation" section below.

**Table 7-3**
**Monitoring Well and Piezometer Decommissioning Program**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Point ID | Northing | Easting | Phase 1 Program Use | Decommission Grouping [1,2] | Replace (Y/N) | Purpose for Decommissioning |
|---|---|---|---|---|---|---|
| 2A-2 | 715043.20 | 8264402.60 | P | TBD | N | In Pond P-C Footprint |
| 2E-9 | 715031.29 | 8264077.75 | P | TBD | N | In Pond P-C Footprint |
| 2F-9 | 715028.69 | 8263793.16 | P | TBD | N | In Pond P-C Footprint |
| 2H-2 | 715047.16 | 8264231.15 | P | TBD | N | In Pond P-C Footprint |
| 2O-1 | 714993.49 | 8265728.62 | P | TBD | N | In ORU Footprint |
| 2O-2 | 714993.49 | 8265728.62 | P | TBD | N | In ORU Footprint |
| 2O-4 | 714981.29 | 8265732.30 | P | TBD | N | In ORU Footprint |
| E-3 | 715262.83 | 8263575.36 | P | TBD | N | In Pond P-C Footprint |
| Y-9 | 714843.09 | 8264080.53 | P | TBD | N | In L-14 Cell 7 Footprint |
| K-1 | 715712.29 | 8264181.39 | P | TBD | N | In Pond P-C Footprint |
| C-2 | 715720.88 | 8264187.28 | P | TBD | N | In Pond P-C Footprint |
| 2I-2 | 714471.40 | 8263904.32 | P | A | N | In L-14 Cell 8 Footprint |
| 2N-2 | 714456.14 | 8264678.83 | P | A | N | In L-14 Cell 7 Footprint |
| 2N-4 | 714456.14 | 8264680.72 | P | A | N | In L-14 Cell 7 Footprint |
| 2Na-1 | 714468.80 | 8264648.44 | P | A | N | In L-14 Cell 7 Footprint |
| 3F-2 | 714729.31 | 8264216.78 | P | A | N | In L-14 Cell 7 Footprint |
| 3B-1 | 714166.47 | 8263657.58 | P | A[3] | N | In L-14 Cell 8 Footprint |
| 3B-2 | 714166.47 | 8263657.58 | P | A[3] | N | In L-14 Cell 8 Footprint |
| 3P-1 | 712209.42 | 8264785.41 | POC | B | Y | VOC Detections |
| 3H-1 | 714386.23 | 8265469.54 | P | TBD | N | Old Well, VOC Detections |
| 3H-2 | 714396.38 | 8265470.60 | P | TBD | N | Old Well Near 3H-1 |
| 3R-1 | 712204.75 | 8264256.48 | POC | B | Y | VOC Detections |
| 5A-1 | 712212.18 | 8264574.73 | POC | B | Y | VOC Detections |
| 5P-1 | 712673.72 | 8266058.07 | POC | B | Y | Near L-12/L-13 |
| 5A-2 | 712190.02 | 8264593.74 | P | B | N | VOC Detections |
| 5B-1 | 712395.18 | 8265005.39 | P | B | N | VOC Detections |
| 5D-1 | 712805.20 | 8264991.15 | P | B | N | VOC Detections |
| 5Q-1 | 712993.93 | 8266138.51 | POC | B | Y | VOC Detections |
| 3P-2 | 712211.09 | 8264794.07 | P | C | N | Near L-6 |
| 4B-1 | 712592.50 | 8265015.07 | P | C | N | VOC Detections |
| 4Ba-2 | 712581.78 | 8265015.06 | P | C | N | Near L-7 |
| 5B-2 | 712321.89 | 8264986.63 | P | C | N | Near L-7 |
| 2V-1 | 713084.27 | 8265043.25 | P | C | N | Near L-9/L-10 |
| 2V-2 | 713084.27 | 8265043.25 | P | D | N | Near L-9/L-10 |
| 2Vb-1 | 713079.27 | 8265035.42 | P | D | N | Near L-9/L-10 |
| 2Vb-1A | 713079.27 | 8265035.42 | P | D | N | Near L-9/L-10 |
| 2Vb-2 | 713079.27 | 8265035.42 | P | D | N | Near L-9/L-10 |
| 3Y-2 | 713083.81 | 8265321.14 | P | D | N | Near L-9/L-10 |
| 4Ja-1 | 712855.32 | 8265674.19 | P | E | N | Near L-9 |
| 4K-2 | 713352.84 | 8265659.85 | P | E | N | Near L-10 |
| 5D-2 | 712825.81 | 8264994.29 | P | E | N | Near L-7 |
| 2Ra-1 | 712745.10 | 8264160.51 | P | E | N | Near L-1/L-3 |
| 5I-1 | 712568.48 | 8264225.10 | P | E | N | Near L-1/L-3 |
| 3O-1 | 712213.62 | 8263981.08 | P | F | N | Near L-6 |
| 3O-2 | 712212.00 | 8263990.41 | P | F | N | Near L-6 |
| 4J-2 | 712854.68 | 8265662.98 | P | F | N | Near L-9 |
| 5G-1 | 712536.04 | 8264338.18 | P | F | N | Near L-3/L-5 |
| 3E-2 | 712596.08 | 8265589.94 | P | G | N | Near L-8 |
| 5J-1 | 712597.72 | 8265613.13 | P | G | N | Near L-8 |
| 5J-2 | 712596.08 | 8265589.94 | P | G | N | Near L-8 |
| 3M-1 | 713776.95 | 8264951.00 | P | G | N | Near L-10 |
| 3M-2 | 713766.84 | 8264951.31 | P | G | N | Near L-10 |
| W-9 (W1-2) | 715243.55 | 8263114.39 | P | TBD | N | In Pond E Area |
| Z-9 (Z1-2) | 714930.86 | 8263467.78 | P | TBD | N | In Pond E Area |
| W3-9 | 714830.14 | 8262967.59 | P | TBD | N | In Pond E Area |
| 6E-1 | 714701.60 | 8263568.27 | P | TBD | N | In Pond E Area |
| 6L-1 | 714701.10 | 8263567.17 | P | TBD | N | In Pond E Area |
| 2C-9 | 714603.76 | 8263478.23 | P | TBD | N | In Pond E Area |
| 2D-9 | 714309.03 | 8263481.99 | P | TBD | N | In Pond D Area |
| W4-2 | 714306.44 | 8263046.87 | P | TBD | N | In Pond D Area |
| 2G-9 | 714163.27 | 8263478.07 | P | TBD | N | In Pond D Area |
| A-2 | 714011.17 | 8263468.42 | P | TBD | N | In Pond D Area |
| 6G-1 | 713699.93 | 8263511.11 | P | TBD | N | In Pond D Area |
| 6G-2 | 713699.93 | 8263511.11 | P | TBD | N | In Pond D Area |

***Notes:***
P = Piezometer
POC = Point of Compliance Detection Monitoring Well
ORU = Organic Recovery Unit
VOC = Volatile Organic Compound
Coordinates in RUST 1994 Survey; Oregon State Plane North, North American Datum 1983-1991
Each replacement well will be installed and sampled for four quarters prior to closing the original well.

[1] Wells and Piezometers in the footprint of Facility development and/or infrastructure will be abandoned per site development schedules

[2] Grouping are based off qualitative criteria and are shown in decreasing priority from A to G

[3] Piezometers 3B-1 and 3B-2 share the same borehole.

**TABLE 7-3 Well Decommissioning Program Table**

**Table 7-4**
**Point of Compliance Monitoring Well Optimization Program[1]**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Well Designation | Approximate Optimized Location | Phase 1 POC Well Location Being Replaced |
|---|---|---|
| *WMA-1 (L-1, L-3, L-5, L-6, L-7, L-9, L-10, L-12, L-13, Ponds P-A and P-B)* | | |
| 5L-1 | South of L-13 Sumps 4,5 | -- |
| 3Ta-1 | Southeast of L-13 Sumps 1,3 | -- |
| 5M-1 | South of L-13 Sumps 1,4,5 | -- |
| 5N-1 | Southeast of L-13 Sump 2 | -- |
| 6C-9 | East of Pond P-B | -- |
| 7E-1 | South of L-6 Eastside | 5A-1 |
| 7F-1 | Southeast of L-7 | 3P-1 |
| 7G-1 | South of L-6 Westside | 3R-1 |
| 7H-1 | Southeast of L-12 Sump S | 5P-1 |
| 7I-1 | Southeast of L-12 Sump N | 5Q-1 |
| *WMA-2 (L-14, Ponds P-C, P-D and P-E)* | | |
| 7A-1 | East of L-14 Sump 1 | -- |
| 7B-1 | East of L-14 Sump 2 | -- |
| 7C-1 | East of L-14 Sump 3 | -- |
| 7D-1 | East of L-14 Sump 4 | -- |
| 4H-1 | East of L-14 Sump 5 | -- |
| 3G-1 | East of L-14 Sump 6 | -- |
| 7J-1 | East of L-14 Sump 7 and 8 | -- |
| 7K-1 | East of Ponds P-C1 and P-C4 | -- |
| 7L-1 | East of Pond P-C1 | -- |
| 7M-1 | South of Pond P-D4 | -- |
| 7N-1 | North of Pond P-E4 | -- |
| 7O-1 | South of Pond P-D3 | -- |
| 7P-1 | North of Pond P-C4 | -- |
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__Notes:__
[1] After Part B Permit renewal or Part B Permit Class III Modification approval and optimized well network is installed for a WMA.

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**TABLE 7-4 Point of Compliance Well Optimization Schedule**

**Table 7-5**
**Long Term Optimization Monitoring Well Program Specifications and Sampling Frequency**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Compliance Point ID | Location [a] Northing | Easting | TOC Elevation (ft) [a,b] | Stickup (ft) [c] | Extn. (ft) [d] | Well Dia. (in) | Well Screen [c] top (ft) | base (ft) | lgth (ft) | Filter Interval [c] top (ft) | base (ft) | lgth (ft) | TSCA Monitoring Frequency | RCRA Monitoring Frequency [e] | Post-Closure Monitoring | Purging and Sampling Method [f] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WASTE MANAGEMENT AREA WMA-1 OPTIMIZATION: (Landfill Units L-1, L-3, L-5, L-6, L-7, L-8, L-9, L-10, L-12, L-13, and Ponds A and B)** | | | | | | | | | | | | | | | | |
| 5L-1 | 711656.26 | 8265469.62 | 1002.39 | 3.11 | 0.00 | 4 | 186.71 | 211.71 | 25.00 | 183.11 | 211.71 | 28.60 | Annual | Semiannual | Yes | Low-Flow |
| 3Ta-1 | 711780.29 | 8266107.22 | 1029.90 | 2.73 | 0.00 | 4 | 228.30 | 238.30 | 10.00 | 227.13 | 238.33 | 11.20 | Annual | Semiannual | Yes | Low-Flow |
| 5M-1 | 711689.41 | 8265721.27 | 1021.38 | 2.52 | 0.00 | 4 | 209.02 | 229.02 | 20.00 | 205.52 | 229.02 | 23.50 | Annual | Semiannual | Yes | Low-Flow |
| 5N-1 | 711930.00 | 8266133.57 | 1031.72 | 2.61 | 0.00 | 4 | 215.11 | 235.11 | 20.00 | 212.11 | 235.11 | 23.00 | Annual | Semiannual | Yes | Low-Flow |
| 6C-9 | 713801.00 | 8265639.00 | 1018.66 | 2.90 | 0.00 | 4 | 187.90 | 207.90 | 20.00 | 184.80 | 207.90 | 23.10 | Not Required | Semiannual | No | Low-Flow |
| 7E-1 (5A-1) | 712235.08 | 8264560.98 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Not Required | Semiannual[g,h] | Yes | Low-Flow |
| 7F-1 (3P-1) | 712320.40 | 8264971.13 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Not Required | Semiannual[g,h] | Yes | Low-Flow |
| 7G-1 (3R-1) | 712227.33 | 8264220.48 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Not Required | Semiannual[g,h] | Yes | Low-Flow |
| 7H-1 (5P-1) | 712847.81 | 8266162.89 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 7I-1 (5Q-1) | 713158.05 | 8266186.11 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual[g,h] | Yes | Low-Flow |
| **WASTE MANAGEMENT AREA WMA-2 OPTIMIZATION: (L-14 and Ponds C, Ponds D, and Ponds E)** | | | | | | | | | | | | | | | | |
| 3G-1 | 714300.29 | 8264947.14 | 1018.55 | 1.85 | 0 | 4 | 173.20 | 183.20 | 10.00 | 169.50 | 183.00 | 13.50 | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 4H-1 | 714000.38 | 8265225.41 | 1021.43 | 2.40 | 0.00 | 4 | 184.50 | 199.50 | 15.00 | 183.40 | 200.90 | 17.50 | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 7A-1 | 713074.69 | 8264024.77 | 990.47 | 2.09 | 0.00 | 4 | 142.19 | 152.19 | 10.00 | 140.09 | 153.49 | 13.40 | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 7B-1 | 713091.15 | 8264418.42 | 1003.59 | 2.07 | 0.00 | 4 | 158.77 | 168.77 | 10.00 | 155.77 | 168.87 | 13.10 | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 7C-1 | 713103.22 | 8264745.81 | 1018.13 | 2.06 | 0.00 | 4 | 180.26 | 190.26 | 10.00 | 178.16 | 191.16 | 13.00 | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 7D-1 | 713082.85 | 8264881.81 | 1022.18 | 1.93 | 0.00 | 4 | 188.23 | 198.23 | 10.00 | 186.13 | 200.03 | 13.90 | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 7J-1 | 714437.86 | 8264977.71 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual[g,h] | Yes | Low-Flow |
| 7K-1 | 715759.80 | 8264639.97 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual | No | Low-Flow |
| 7L-1 | 715057.53 | 8264632.36 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual | No | Low-Flow |
| 7M-1 | 713351.29 | 8262942.99 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual | No | Low-Flow |
| 7N-1 | 715399.36 | 8262612.04 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual | No | Low-Flow |
| 7O-1 | 713351.29 | 8263394.39 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual | No | Low-Flow |
| 7P-1 | 716071.81 | 8263694.96 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Annual | Semiannual | No | Low-Flow |
| 1 | | | | | | | | | | | | | | | | |

Notes:
Wells in parentheses will be decommissioned and replaced with a new detection monitoring well; TBD = to be determined
[a] RUST 1994 Survey; Oregon State Plane North, North American Datum 1983-1991
[b] Top of casing elevation in feet relative to historical site datum (RUST, 1998)
[c] Depth below top of casing (calculated from boring logs)
[d] Casing extensions by CWM (calculated from original TOC elevation - 1993 Tenneson resurvey)
[e] Semiannual sampling will occur during the spring and fall sampling events every year; annual sampling will occur during the fall sampling event every year
[f] All pumps are Well Wizard bladder pumps or similar
[g] Quarterly for first year of monitoring, then semiannual
[h] Well will be sampled per the list in Table 7-11.

**TABLE 7-5 Long Term Optimization Monitoring Well Program Specifications and Sampling Frequency**

**Table 7-6**
**Long Term Optimized Groundwater Elevation Monitoring Locations**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Location ID | Location [a] | | TOC Elevation [b] | Selah Member Level [c] | Location Use[d] |
|---|---|---|---|---|---|
| | Easting | Northing | | | |
| Va-1 | 8265656.61 | 711421.45 | 794.30 | 1 | P |
| W9-1 | 8263032.76 | 713160.82 | 998.14 | 1 | P |
| 2S-1 | 8263689.85 | 711892.18 | 983.37 | 1 | P |
| 2Wa-1 | 8265398.81 | 714177.28 | 1020.03 | 1 | P |
| 2X-1 | 8265124.28 | 711463.38 | 915.94 | 1 | P |
| 3G-1 | 8264947.14 | 714300.29 | 1018.55 | 1 | MW |
| 3I-1 | 8265611.36 | 714614.22 | 1009.28 | 1 | P |
| 3J-1 | 8265639.57 | 713970.21 | 1019.13 | 1 | P |
| | | | | | |
| 3Ta-1 | 8266107.22 | 711780.29 | 1029.90 | 1 | MW |
| 4H-1 | 8265225.41 | 714000.38 | 1021.43 | 1 | MW |
| 5S-1 | 8266134.93 | 713441.01 | 1037.87 | 1 | P |
| 5L-1 | 8265469.62 | 711656.26 | 1002.39 | 1 | MW |
| 5M-1 | 8265721.27 | 711689.41 | 1021.38 | 1 | MW |
| 5N-1 | 8266133.57 | 711930.00 | 1031.72 | 1 | MW |
| 5O-1 | 8265838.39 | 712657.32 | 1019.98 | 1 | P |
| | | | | | |
| 7A-1 | 8264024.77 | 713074.69 | 990.47 | 1 | MW |
| 7B-1 | 8264418.42 | 713091.15 | 1003.59 | 1 | MW |
| 7C-1 | 8264745.81 | 713103.22 | 1003.59 | 1 | MW |
| 7D-1 | 8264881.81 | 713082.85 | 1022.18 | 1 | MW |
| 5U-9 | 8266018.49 | 714324.88 | 1037.76 | 1 & 2 | P |
| 5V-9 | 8265809.45 | 714405.50 | 1029.43 | 1 & 2 | P |
| 6C-9 | 8265639.00 | 713801.00 | 1018.66 | 1 & 2 | MW |
| | | | | | |
| F-2 | 8266048.01 | 715326.01 | 1048.33 | 2 | P |
| G-2 | 8266127.52 | 712704.47 | 1024.31 | 2 | P |
| J-2 | 8263466.71 | 712256.68 | 982.91 | 2 | P |
| MW1-2 | 8264694.07 | 711538.99 | 930.84 | 2 | P |
| Va-2 | 8265662.57 | 711426.10 | 912.25 | 2 | P |
| W9-2 | 8263032.76 | 713160.82 | 998.19 | 2 | P |
| X-2 | 8263481.30 | 712602.86 | 986.73 | 2 | P |
| 2B-2 | 8264724.72 | 715031.73 | 1008.12 | 2 | P |
| 2S-2 | 8263689.85 | 711892.18 | 983.37 | 2 | P |
| 2U-2 | 8266133.98 | 712168.56 | 1031.39 | 2 | P |
| 2W-2 | 8265398.63 | 714203.30 | 1018.37 | 2 | P |
| 2X-2 | 8265124.28 | 711463.38 | 915.95 | 2 | P |
| 3G-2 | 8264947.47 | 714310.85 | 1018.31 | 2 | P |
| | | | | | |
| 3I-2 | 8265610.45 | 714624.44 | 1010.16 | 2 | P |
| 4Pa-2 | 8266105.95 | 713933.82 | 1037.78 | 2 | P |
| 5O-2 | 8265827.97 | 712658.15 | 1019.83 | 2 | P |
| | | | | | |
| 6J-2 | 8263481.40 | 713020.15 | 994.58 | 2 | P |
| 7A-2 | 8264015.95 | 713076.45 | 990.11 | 2 | P |
| 7D-2 | 8264870.37 | 713085.44 | 1021.72 | 2 | P |
| 7E-1 | 8264560.98 | 712235.08 | TBD | 1 | MW |
| 7F-1 | 8264971.13 | 712320.40 | TBD | 1 | MW |
| 7G-1 | 8264220.48 | 712227.33 | TBD | 1 | MW |
| 7H-1 | 8266162.89 | 712847.81 | TBD | 1 | MW |
| 7I-1 | 8266186.11 | 713158.05 | TBD | 1 | MW |

**Table 7-6**
**Long Term Optimized Groundwater Elevation Monitoring Locations**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| | | | | | |
|---|---|---|---|---|---|
| 7J-1 | 8264977.71 | 714437.86 | TBD | 1 | MW |
| 7K-1 | 8264639.97 | 715759.80 | TBD | 1 | MW |
| 7L-1 | 8264632.36 | 715057.53 | TBD | 1 | MW |
| 7M-1 | 8262942.99 | 713351.29 | TBD | 1 | MW |
| 7N-1 | 8262612.04 | 715399.36 | TBD | 1 | MW |
| 7O-1 | 8263394.39 | 713351.29 | TBD | 1 | MW |
| 7P-1 | 8263694.96 | 716071.81 | TBD | 1 | MW |
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Notes:
[a] Oregon State Plane North System
[b] Top of casing (TOC) elevation relative to historical site datum (RUST, 1998)
[c] The Selah Member has been divided into the upper level (Level 1) and lower level (Level 2)
[d] P = piezometer; MW = Monitoring Well; Location use is consistent with Appendix C
[e] L15 E-1 and L15 F -1 will be used solely as piezometers after background monitoring for 4 quarters is completed.

## TABLE 7-6 Long Term Groundwater Elevation Locations

# 4 DATA EVALUATION

The following subsections describe the criteria by which data will be evaluated at the Facility under the RCRA Permit.

## 4.1 Detection Monitoring Program

The detection monitoring program will consist of evaluating analytical results for regulated constituents listed in Table 7-11 for wells located along the point of compliance (POC) of each of the three WMAs listed in Tables 7-11 and 7-12 of this Plan, as applicable. Prior to including a new well or replacement well into the groundwater detection monitoring program a minimum of four samples will be collected to establish background conditions for both regulated (i.e., VOCs and PCBs) and non-regulated compounds. Background monitoring for emerging non-regulated contaminants per- and polyfluoroalkyl substances (PFAS) will also be performed in detection monitoring wells downgradient of the landfill unit L-14 at the WMA-2 POC.

The detection monitoring criteria is set equal to the current reporting limit (RL) for each constituent listed in Table 7-11. For POC wells with VOCs detected at low concentrations, the detection monitoring criteria was 5 times the reporting limit.

For any VOCs that have been previously detected in detection monitoring wells 4B-1, 5Q-1 and 7D-1 (Chlorobenzene, Chloromethane, Dichlorodifluoromethane, 1,1-Dichloroethane, 1,1-Dichloroethene, Methylene chloride, Naphthalene, Tetrachloroethene, Toluene, 1,1,1-Trichloroethane, Trichloroethene, and Trichlorofluoromethane), the detection monitoring criteria will be 5 times the reporting limit (RL) listed in 7-11. For any new VOCs detected in detection monitoring wells 4B-1, 5Q-1 and 7D-1 that are degradation products of the VOCs listed above, the Permittee may add those new VOCs to the list of compounds that utilize the detection monitoring criteria of 5 times the reporting limit, after Department approval.

Of the three listed above, only well 7D-1 is planned to be retained for the long-term optimized detection monitoring program, whereas wells 4B-1 and 5Q-1 are not retained because of known integrity issues. Well 7D-1 was installed in 2006 to monitor downgradient of L-14 Cell 4. Although this well is relatively new compared to the old Facility wells with integrity issues, it is not a replacement well.

A previously accepted investigation in 2020 demonstrated that well 7D-1 was designed/constructed to be cased in a manner that maintains borehole integrity, screened or perforated and packed with gravel or sand, and the annular space sealed above the sampling depth. As such, no well integrity issues are suspected at 7D-1. This investigation demonstrated that the likely pathway of VOCs to groundwater near L-14 Cell 4 is due to the legacy of poorly constructed wells and improperly abandoned wells installed for geologic and hydrogeologic site characterization located near 7D-1 (SCS, 2020b).

The occurrence of VOCs in well 7D-1 are not from the regulated unit (Cell 4 of Landfill L-14) that 7D-1 was intended to monitor. The legacy of historical practices of well construction and abandonment for geotechnical borings and/or piezometers near well 7D-1 are within the radius of influence during sampling, and subsequently effected groundwater quality near well 7D-1. This phenomenon is not anticipated to occur with planned replacement wells. In the event VOCs are detected in planned replacement wells, a similar investigation on the source and occurrence will be performed (e.g., alternative source demonstration).

Evaluation of a significant change in groundwater quality due to a possible release shall be made by comparing the reported data from each monitoring event against the detection monitoring criteria described above and shown in Table 7-11. This alternative statistical approach is based on the Double Quantification Rule, and a detection of a VOC(s) above the detection monitoring criteria would trigger follow-up action. Reported concentrations above these criteria shall be considered possible indications of a release, subject to verification re-sampling and/or an ASD by CWM (as allowed by Permit and discussed further below).

Results of all analyses, including semiannual analyses, verification analyses, and Appendix IX analyses, shall be submitted to the Department within 45 calendar days after the Facility's receipt of the analytical laboratory's quality-assured data report. In no case shall the period between the last date of sampling and the date of submission to the Department of analytical results exceed 90 calendar days unless a written extension is granted by the Department. The Facility shall document when the analytical laboratory's quality-assured data reports are received. The report submitted to the Department will contain laboratory quality-assured results reported down to the method detection limit (MDL) for the RCRA program (e.g., VOCs), and the reporting limit (RL) as specified in Tables 7-11 and 7-12. The MDL results are for informational purposes and will be discussed in the reports for each sampling event.

## 4.2 Verification Procedures for Detection Monitoring Program

If routine groundwater monitoring results indicate a concentration above the groundwater detection monitoring criteria or indicate the presence of previously undetected constituents for the relevant monitoring program, the Facility will notify the Department within 7 calendar days after receiving the analytical laboratory's quality-assured data report. If warranted, the notification will include the Facility's plan to perform verification resampling.

The procedure for verification sampling consists of the following:

- Collect two samples from the affected well(s) within 30 days after receiving the analytical laboratory's quality-assured data report that indicates an exceedance and analyze for the VOC(s) that were above the applicable criteria.
- If neither verification sample confirms the presence of the specific VOC(s) above the applicable criteria, then the detection monitoring program will be resumed with no further action and DEQ will be notified to that detection monitoring is being resumed; or
- If one or both verification samples confirm the presence of VOCs above the applicable criteria, then DEQ will be notified in writing of this finding within 7 days after receipt of the analytical laboratory's quality-assured data report confirming that the applicable criteria have been exceeded. The activities in the "Confirmed Concentration" section below will then be followed.

In no case shall the period between the date of the determination of an exceedance and the date of the submission to the Department of the analytical results for verification sampling performed in this section exceed 135 calendar days unless a written extension is granted by the DEQ.

CWM may elect to forego verification sampling for the detection monitoring program, and follow the procedures described in the "Confirmed Concentration" section below.

### 4.3 Initial Procedures for a Confirmed Concentration Above the Detection Monitoring Criteria

If a concentration above the detection monitoring criteria is confirmed, then one sample be collected from the affected monitoring well(s) and analyzed for the constituents identified in 40 CFR Part 264 Appendix IX (Table 7-7 and 7-13). This sample must be collected within 30 calendar days after receipt of the analytical data confirming the exceedance of the detection monitoring criteria in this plan. If a constituent that is not listed in Table 7-1 (Detection Monitoring Program) is detected above the reporting limit in the Appendix IX sample, then a second sample may be collected and analyzed within 30 calendar days to confirm the presence of the additional constituent(s). If the Facility chooses not to resample, then the Permittee shall report the concentrations of the additional constituents detected above the applicable detection monitoring criteria to the Department within 7 calendar days after receipt of the analytical laboratory's quality-assured data report for the samples collected under this section.

If the second sampling and analysis is elected to be collected and confirms the presence of new constituents above the applicable criteria, the Facility will report the concentrations of these detected constituents to the Department within 7 calendar days after receipt of the analytical laboratory's quality-assured data report for the second analysis.

Within 90 calendar days after receipt of the analytical laboratory's quality-assured data report for Appendix IX constituents required in this section, the Facility will submit either of the following:

- An application for a permit modification to establish a compliance monitoring program, for the affected monitoring well(s), as specified in 40 CFR 264.98(g)(4), or, if any hazardous constituents are above the groundwater concentration limits, to initiate a corrective action program, as specified in this plan unless the Permittee has submitted a notice of intent under 40 CFR 264.98(g)(4)(iv) to revise the groundwater concentration limits or,
- A report demonstrating that a source other than a regulated unit or the past practice units caused the contamination, or that the detection is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation in the groundwater; and in addition, when required by 40 CFR 264.98(h), an application for a permit modification to make any appropriate changes to the detection monitoring program.

### 4.4 Appendix IX Constituent List

If Appendix IX sampling is required through the process described above or a compliance monitoring program, the Appendix IX constituents are listed in Table 7-7 (40 CFR Part 264 Appendix IX) and 7-13.

The federal regulations allow Appendix IX sampling to be conducted for a subset of the constituents listed in 40 CFR Part 264 Appendix IX. CWMNW has developed groundwater concentration limits for all constituents listed in Appendix IX of 40 CFR §264 that have available published toxicity information (CH2M HILL, 2007c). Consequently, the constituents to be analyzed for Appendix IX sampling activities will be those listed in Table 7-7 and 7-13, which have available agency-derived toxicity factors and, therefore, have groundwater concentration limits as developed by CH2M HILL (2007c).

### 4.5 Demonstration of Source Other Than a Release

The Facility may prepare a report (e.g., alternative source demonstration) demonstrating that a source other than a regulated unit or the past practice units caused the contamination, or that the detection is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation in the groundwater.

When required by 40 CFR 264.98(h), an application for a permit modification to make any appropriate changes to the detection monitoring program.

If the Department agrees with the findings of the report, then the detection monitoring program will resume for the effected monitoring well(s) and constituent(s). After an ASD has been accepted by the Department for an affected monitoring well, the Facility will work in consultation with the Department if monitoring results (e.g., VOC detections) that triggered the ASD reoccur in the same monitoring well. In these instances, verification resampling and conducting additional investigation may not be necessary.

If the Department determines that a report submitted in this section fails to identify a source of contamination other than a regulated unit or past practice unit, or that the detection is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation in the ground water, then the Facility will within 60 days of the Department's determination submit an application for a permit modification to establish a compliance monitoring program, as specified in 40 CFR 264.98(g)4, or, if any hazardous constituents are above the groundwater concentration limits, to initiate corrective action unless the Facility has submitted a notice of intent under 40 CFR 264.98(g)(4)(iv) to revise the groundwater concentration limits.

## 4.6 Compliance Monitoring Program

In case a compliance monitoring program becomes necessary in the future, the results of analyses will be compared to the groundwater concentration limits specified in Table 7-7. The groundwater concentration limits for compliance monitoring include alternate concentration limits (ACLs) developed under 40 CFR §264.94 for VOCs and other constituents listed in Appendix IX of 40 CFR §264 that have available published toxicity information (CH2M HILL, 2007c). If compliance monitoring program becomes necessary in the future, the ACLs will be reviewed and updated based on new toxicity information that may be available since 2007, where applicable for each Appendix IX constituent.

If a compliance monitoring program becomes necessary, required constituents and monitoring locations will be included as a revision to this Plan. As required by DEQ and EPA Region X, one percent of the aqueous solubility limit for each constituent is the adopted groundwater concentration limit for compliance monitoring except where this value exceeds the ACL determined in CH2M HILL (2007c). Where one percent of the aqueous solubility limit for a constituent exceeds the ACL, the ACL will be used as the groundwater concentration limit. For constituents where the determined ACL or one percent of aqueous solubility is less than the RL, the adopted groundwater concentration limit is the RL.

### 4.6.1 Compliance Sampling and Analysis

#### 4.6.1.1 Sampling Schedule

If required, semiannual compliance sampling events will be started and finished in the months of March through May, and September through November, respectively, during each calendar year. The Facility will notify the Department within five (5) working days prior to the sampling event.

If a compliance monitoring becomes necessary, the Facility will annually analyze the groundwater sampled from the compliance monitoring well with the highest total VOC concentration during the previous sampling event for all 40 CFR 264, Appendix IX constituents. Annual sampling shall occur upon the commencement of compliance monitoring and every year thereafter during the compliance period.

If any Appendix IX constituents in the annual event are detected above the applicable detection monitoring criteria and these constituents are not already designated for compliance monitoring, the Facility may resample within 30 calendar days after receipt of the analytical laboratory's quality-assured data report. If the second (resample) analysis confirms the presence of new constituents above the applicable detection monitoring criteria, the Facility shall report the concentrations of these detected constituents to the Department within 7 calendar days after receipt of the analytical laboratory's quality-assured data report for the second (resample) analysis.

If the Facility chooses not to resample, then the Facility will report the concentrations of the additional constituents detected above the applicable detection monitoring criteria to the Department within 7 calendar days after receipt of the analytical laboratory's quality-assured data report for the initial Appendix IX samples collected in the annual event.

The Facility will add any newly identified Appendix IX constituents in the annual event to this Plan, if the concentration is above the applicable detection monitoring criteria and submit the revised Plan (or portions of Plan, e.g., summary table) to the Department for inclusion into the Permit. For any new Appendix IX constituents without a groundwater concentration limit in Table 7-7, the Facility will develop a groundwater concentration limit modifying the Permit in accordance with 40 CFR 270.42.

#### 4.6.1.2 Reporting

Results of all analyses, including semiannual analyses, annual analyses, verification analyses, and Appendix IX analyses, shall be submitted to the Department within 45 calendar days after receipt of the analytical laboratory's quality-assured data report. In no case shall the period between the last date of sampling and the date of submission to the Department of analytical results exceed 90 calendar days unless the Department approves a longer time period. The Facility will document when the analytical laboratory's quality-assured data reports are received. The report submitted to the Department shall contain laboratory quality-assured results reported down to the method detection limit (MDL), and the reporting limit (RL). The MDL results are for informational purposes and will be discussed in the reports for each sampling event.

Semiannual groundwater monitoring reports shall also include the information listed in the "Reporting" section below.

The Facility will enter all monitoring, testing, and quality-assured analytical data obtained in this section in the operating record.

### 4.6.2 Verification Procedures for Compliance Monitoring Program

The following procedures will be followed if a compliance monitoring program becomes necessary. Upon a determination of hazardous constituents in any monitoring well exceeding the groundwater concentration limits as specified in Table 7-7, the Facility will:

- Notify the Department of this finding in writing, within 7 calendar days after receipt of the analytical laboratory's quality-assured data report [40 CFR 264.99(h)1]; and,

- Within 30 calendar days after this finding, collect two verification samples from any affected monitoring well(s), and reanalyze the samples for all constituents that exceeded the concentration limits. In no case shall the period between the date of the initial determination of the hazard constituent above the concentration limit and the date of the submission to the Department of the analytical results for the sampling exceed 135 calendar days unless a written extension is granted by the Department.

The Facility may elect to forgo verification sampling activities described above and instead make a demonstration of a source other than a release as described below.

If the analytical laboratory's quality-assured data results from the analyses show that the verification samples do not confirm the detection of hazardous constituents above the concentration limits, the Facility will resume compliance monitoring. No additional action under is needed and the Facility will notify the Department in writing that the compliance monitoring program is being resumed.

However, if one or both verification samples confirm the detection of constituents above the concentration limits, the Facility will follow the requirements of the "Source Other Than a Release" below.

### 4.6.3 Demonstration of Source Other Than a Release

The Facility will notify the Department in writing within 7 calendar days of determining that the groundwater concentration limit has been exceeded at any compliance monitoring well as determined in the "Verification Section" above, as appropriate. The notification shall indicate which concentration limits have been exceeded. [40 CFR 264.99(h)(1)] The Permittee shall also follow the requirements specified in the "Corrective Action" section below, as appropriate.

Alternatively, the Facility may submit to the Department a report demonstrating that a source other than a regulated unit or past practice unit caused the exceedance, or that the exceedance is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation in the groundwater; and in addition, when required or as provided by 40 CFR 264.99(i), an application for a permit modification to make any appropriate changes to the compliance monitoring program including changes to the groundwater concentration limits for which there was an exceedance. If the Facility has performed verification sampling, then the report shall be submitted within 90 calendar days after the receipt of the analytical laboratory's quality-assured data report. If the Permittee has elected to forgo verification sampling, the report shall then be submitted within 90 calendar days after the receipt of the analytical laboratory's quality-assured data report for the samples collected under the compliance monitoring program.

If the Department determines that a report submitted in accordance with this section fails to identify a source of contamination other than a regulated unit or past practice unit, or that the exceedance is an artifact caused by an error in sampling, analysis, or statistical evaluation or natural variation in the groundwater or that any application for a permit modification to make changes to the groundwater concentration limits for which there was an exceedance has been denied, then the Facility will follow the requirements in the "Corrective Action Process" section if the groundwater concentration limit(s) as specified in in the Compliance Monitoring Program section is exceeded.

## 4.7 Corrective Action Process

Upon exceedance of the groundwater concentration limit(s), as determined under the process in the "Compliance Monitoring Program" section, the Facility will send a written request to the Department's Eastern Region Environmental Cleanup Manager requesting a meeting. The written request shall be sent within 15 calendar days after the notification date in the demonstration of "Source Other Than A Release" section above or the determination of the Department. The written request will also contain the following information:

- Description of release with information known to date,
- Description of the Facility's obligation to notify the Environmental Cleanup Manager about the release, and
- Description of the Facility's duty to initiate corrective action if any groundwater concentration limit(s) is exceeded.

The Facility shall meet with the Department's Eastern Region Environmental Cleanup Program within 45 calendar days after the date on the written notification unless the Department approves a longer time period. Such a meeting is intended to initiate the development of a corrective action written agreement for the Facility.

### 4.7.1 Corrective Action Agreement

The Facility will enter into a written agreement with the Department's Eastern Region Environmental Cleanup Program within 180 calendar days after the date on the written notification noted in this section. The agreement shall provide that any corrective action be implemented under OAR 340-122. The agreement shall also provide that in the event of disagreement between the Facility and Department regarding whether any action under the agreement is consistent with or exceeds 40 CFR 264.90 to 264.101, the Facility and Department shall make a good faith effort to resolve the dispute by taking the following actions: a) discussing the dispute between the Facility's Environmental Manager and the Department's Project Manager, b) if necessary, referring the dispute for resolution to the Permittee's Facility Manager and the Department's Cleanup Manager; and c) if necessary, providing each other their respective positions in writing and referring the dispute for resolution by the Department's Eastern Region Administrator, in consultation with the Facility's Market Area Manager.

The agreement entered into shall be processed as a Class 3 Permit modification and shall be considered an enforceable Condition of the Permit.

### 4.7.2 Revision to Corrective Action Agreement

During the course of the corrective action agreement, the Department may determine it necessary to revise the agreement or corrective action activities conducted under the agreement. Changes to the agreement, or corrective action activities conducted under the agreement that are implemented after the effective date of the Permit may require a modification to the Permit. The Facility shall notify the Department Manager in writing at least 30 days prior to any planned changes to the agreement or corrective action activities conducted under the agreement. Upon notification by the Facility, the Department Manager will determine whether or not a Permit modification will be needed. If a Permit modification is needed, the Manager shall so notify the Facility, and upon receipt of such notice, the Facility shall proceed with a Permit modification in accordance with the procedures set forth in 40 CFR 270.41 and 270.42, incorporated by reference under OAR 340-100-0002 and as modified by OAR -105-0041 and OAR 340-106-0005. In accordance with 40 CFR 270.42(e), as incorporated by reference under OAR 340-100-0002, the Facility may seek, and the Department Manager may grant, temporary authorization to implement changes to the agreement or corrective action activities conducted under the agreement prior to the final approval of a Permit Modification.

#### 4.7.2.1 Compliance With Agreement Revision

The agreement or corrective action activities conducted under the agreement may be modified at any time under the Department's Environmental Cleanup Program authority pursuant to the agreement, provided the Facility complies with the requirements of the "Corrective Action Agreement" section. The Department's Environmental Cleanup Program authority to implement changes to the agreement, or corrective action activities conducted under the agreement, shall not be restricted or hindered by any requirements to modify the Permit. Changes approved under the Department's Environmental Cleanup program authority and implemented by the Permittee shall not be a violation of any condition of the Permit or any requirement to modify the Permit provided the Facility complies with the requirements of the "Corrective Action Agreement" section.

The requirement to modify the Permit to accommodate changes in the agreement or corrective action conducted under the agreement shall not be in any way interpreted or deemed to replace, supersede, supplant, modify, or amend the Permittee's right to dispute resolution under the agreement.

### 4.7.3 Return to Compliance Monitoring

If, after the conclusion or stabilization of corrective action activities, either the Permittee or the Department determines that the Facility should return to a compliance monitoring program, the Permittee must submit a permit modification request to institute a renewed compliance monitoring program under the Permit.

For any specific compliance monitoring program that has demonstrated an exceedance of the groundwater concentration limit(s), as determined under the process in this plan, the Facility will continue with that specific groundwater compliance monitoring program as specified in this plan until there is a written agreement for corrective action in effect. Unless the corrective action written agreement provides otherwise, the Facility shall continue the groundwater compliance monitoring program as set forth in the "Compliance Monitoring Program" section after the corrective action agreement is in place.

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| **ORGANIC CONSTITUENTS** | | | | | |
| Acenaphthene | 83-32-9 | Tox | IX | 0.0424 | 1,825 |
| Acetone | 67-64-1 | Tox | IX | 10,000 | 27,400 |
| Acetophenone | 98-86-2 | Tox | VIII, IX | 61 | 3,040 |
| Acetonitrile | 75-05-8 | Tox | VIII, IX | 5,150 | 515 |
| Acrolein | 107-02-8 | Tox | VIII, IX | 2.1 | 0.2100 |
| Acrylonitrile | 107-13-1 | C, Tox | VIII, IX | 1.915 | 0.1915 |
| Aldrin | 309-00-2 | C, Tox | VIII, IX | 0.0018 | 0.0167 |
| Allyl Chloride | 107-05-1 | Tox | VIII, IX | 36 | 9,125 |
| Aniline | 62-53-3 | C, Tox | VIII, IX | 0.01** | 49.8051 |
| Anthracene | 120-12-7 | Tox | IX | 0.01** | 9,125 |
| Aramite | 140-57-8 | C, Tox | VIII, IX | 0.001 | 11.3556 |
| Benzene | 71-43-2 | C, Tox | VIII, IX | 17.5 | 25 |
| Benzo[a]anthracene | 56-55-3 | C | VIII, IX | 0.01** | 0.3889 |
| Benzo[b]fluoranthene | 205-99-2 | C | VIII, IX | 0.01** | 0.3889 |
| Benzo[k]fluoranthene | 207-08-9 | C | VIII, IX | 0.01** | 3.8889 |
| Benzo[a]pyrene | 50-32-8 | C | VIII, IX | 0.01** | 10 |
| Benzyl Alcohol | 100-51-6 | Tox | IX | 429 | 54,750 |
| Bis(2-Chloroethyl) Ether | 111-44-4 | C | VIII, IX | 0.5006 | 0.0501 |
| Bis(2-Chloro-1-Methylethyl) Ether | 108-60-1 | C | VIII, IX | 0.0129 | 0.0013 |
| Bis(2-ethylhexyl) Phthalate (DEHP) | 117-81-7 | C, Tox | VIII, IX | 0.01** | 20.2778 |
| Bromodichloromethane | 75-27-4 | C, Tox | IX | 67.4 | 400 |
| Bromoform | 75-25-2 | C, Tox | VIII, IX | 31 | 400 |
| Bromomethane | 75-83-9 | Tox | VIII, IX | 152 | 43.3500 |
| Butyl Benzyl Phthalate | 85-68-7 | Tox | VIII, IX | 0.0269 | 36,500 |
| Carbon Disulfide | 75-15-0 | Tox | VIII, IX | 11.9 | 5,214.2857 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| Carbon Tetrachloride | 56-23-5 | C, Tox | VIII, IX | 7.93 | 25 |
| Chlordane | 57-74-9 | C, Tox | VIII, IX | 0.00056 | 10 |
| Chloroaniline, p- (4-Chloroaniline) | 106-47-8 | Tox | VIII, IX | 53 | 730 |
| Chlorobenzene | 18-90-7 | Tox | VIII, IX | 4.72 | 500 |
| Chlorobenzilate | 510-15-6 | C, Tox | VIII, IX | 0.10 | 1.0514 |
| Chlorodibromomethane (Dibromochloromethane) | 124-48-1 | C, Tox | IX | 26 | 400 |
| Chloroethane | 75-0-3 | C, Tox | IX | 57 | 19.75 |
| Chloroform | 67-66-3 | C, Tox | VIII, IX | 79.2 | 400 |
| Chloromethane | 74-87-3 | C, Tox | VIII, IX | 64.5 | 11.40 |
| Chloronaphthalene, 2- (beta-Chloronaphthalene) | 91-58-7 | Tox | VIII, IX | 0.12 | 2,435 |
| Chlorophenol, 2- | 95-57-8 | Tox | VIII, IX | 220 | 152 |
| Chloroprene (2-Chloro-1,3-Butadiene) | 126-99-8 | Tox | VIII, IX | 220 | 71.5 |
| Chrysene | 218-01-9 | C | VIII, IX | 0.01** | 38.8890 |
| Cresol, o-(2-Methylphenol) | 95-48-7 | Tox | IX | 260 | 9,125 |
| Cresol, m- (3-Methylphenol) | 108-39-4 | Tox | IX | 180 | 9,125 |
| Cresol, p- (4-Methylphenol) | 106-44-5 | Tox | IX | 180 | 915 |
| DDD | 72-54-8 | C | VIII, IX | 0.0009 | 1.1829 |
| DDE | 72-55-9 | C | VIII, IX | 0.0012 | 0.835 |
| DDT | 50-29-3 | C, Tox | VIII, IX | 0.00025 | 0.835 |
| Diallate | 2303-16-4 | C | VIII, IX | 0.14 | 4.6539 |
| Dibenz[a,h]anthracene | 53-70-3 | C | VIII, IX | 0.01** | 0.0389 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| Dibenzofuran | 132-64-9 | Tox | IX | 0.031 | 61 |
| Dibromo-3-Chloropropane, 1,2- (DBCP) | 96-12-8 | C, Tox | VIII, IX | 10.0* | 1.0 |
| Dibromoethane, 1,2- (Ethylene Dibromide, EDB) | 106-93-4 | C,Tox | VIII, IX | 2.5 | 0.25 |
| Dichlorobenzene, 1,2- (o-Dichlorobenzene) | 95-50-1 | Tox | VIII, IX | 1.56 | 3,000 |
| Dichlorobenzene, 1,3- (m-Dichlorobenzene) | 541-73-1 | Tox | VIII, IX | 1.56 | 72.5 |
| Dichlorobenzene, 1,4- (p-Dichlorobenzene) | 106-46-7 | C,Tox | VIII, IX | 0.74 | 375 |
| Dichlorobenzidine, 3,3- | 91-94-1 | C | VIII, IX | 0.05** | 0.6309 |
| Dichlorodifluoromethane | 75-71-8 | Tox | VIII, IX | 2.8 | 1,970 |
| Dichloroethane, 1,1- | 75-34-3 | Tox | VIII, IX | 50.6 | 3,990 |
| Dichloroethane, 1,2- | 107-6-2 | C, Tox | VIII, IX | 85.2 | 25 |
| Dichloroethene, 1,1- | 75-35-4 | Tox | VIII, IX | 22.5 | 35 |
| Dichloroethene, cis-1,2 | 156-59-2 | Tox | --- | 35 | 350 |
| Dichloroethene, trans-1,2 | 156-60-5 | Tox | VIII, IX | 63 | 500 |
| Dichlorophenol, 2,4- | 120-83-2 | Tox | VIII, IX | 45 | 547.5 |
| Dichlorophenoxyacetic Acid, 2,4- (2,4-D) | 94-75-7 | Tox | VIII, IX | 4 | 350 |
| Dichloropropane, 1,2- | 78-87-5 | C, Tox | VIII, IX | 28 | 25 |
| Dichloropropane, cis-1,3- | 10061-1-5 | C, Tox | IX | 18.25 | 1.825 |
| Dichloropropane, trans-1,3- | 10061-2-6 | C,Tox | IX | 18.25 | 1.825 |
| Dieldrin | 60-57-1 | C, Tox | VIII, IX | 0.00195 | 0.0177 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| Diethyl Phthalate | 84-66-2 | Tox | VIII, IX | 10.80 | 146,000 |
| Dimethoate | 60-51-5 | Tox | VIII, IX | 238 | 36.5 |
| Dimethylbenzidine, 3,3'- | 119-93-7 | C | VIII, IX | 1.2343 | 0.1234 |
| Dimethylphenethylamine, alpha, alpha- | 122-09-8 | Tox | VIII, IX | 180 | 182.5 |
| Dimethylphenol, 2,4- | 105-67-9 | Tox | VIII, IX | 78.7 | 3,650 |
| Dimethyl Phthalate | 131-11-3 | Tox | VIII, IX | 42.9 | 1,825,000 |
| Di-n-Butyl Phthalate (Dibutyl Phthalate) | 84-74-2 | Tox | VIII, IX | 0.112 | 18,250 |
| Di-n-Octyl Phthalate | 117-84-0 | Tox | VIII, IX | 0.01** | 7,300 |
| Dinitrobenzene, 1,3- | 99-65-0 | Tox | IX | 4.69 | 18.25 |
| Dinitro-o-Cresol, 4,6- (4,6-Dinitro-2-methylphenol) | 534-52-1 | Tox | VIII, IX | 1.28 | 18.25 |
| Dinitrophenol, 2,4- | 51-28-5 | Tox | VIII, IX | 27.9 | 365 |
| Dinitrotoluene, 2,4- | 121-14-2 | Tox | VIII, IX | 2.70 | 365 |
| Dinitrotoluene, 2-6- | 606-20-2 | Tox | VIII, IX | 1.82 | 182.5 |
| Dinoseb | 88-85-7 | Tox | VIII, IX | 0.52 | 35 |
| Dioxane, 1,4- | 123-91-1 | C | VIII, IX | 52* | 5.2 |
| Diphenylamine | 122-39-4 | Tox | VIII, IX | 0.53 | 4,565 |
| Disulfoton | 298-04-4 | Tox | VIII, IX | 0.163 | 7.3 |
| Endrin | 72-20-8 | Tox | VIII, IX | 0.0025 | 10 |
| Ethylbenzene | 100-41-4 | Tox | IX | 1.69 | 3,500 |
| Ethyl Methacrylate | 97-63-2 | Tox | VIII, IX | 0.20 | 2,740 |
| Fluoranthene | 206-44-0 | Tox | VIII, IX | 0.01** | 7,300 |
| Fluorene | 86-73-7 | Tox | IX | 0.0198 | 1,215 |
| HCH alpha (alpha-BHC) | 319-84-6 | C, Tox | IX | 0.05** | 0.0451 |
| HCH beta (beta-HCH) | 319-85-7 | C, Tox | IX | 0.05** | 0.1577 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| HCH gamma (gamma-BHC, Lindane) | 58-89-9 | C, Tox | VIII, IX | 0.068 | 1.0 |
| Heptachlor | 76-44-8 | C, Tox | VIII, IX | 0.0018 | 0.25 |
| Heptachlor Epoxide | 1024-57-3 | C, Tox | VIII, IX | 0.002 | 1.0 |
| Hexachlorobenzene | 118-74-1 | C, Tox | VIII, IX | 0.062 | 5.0 |
| Hexachlorobutadiene | 87-68-3 | C, Tox | VIII, IX | 0.0323 | 55 |
| Hexachlorocyclopentadiene | 77-47-4 | Tox | VIII, IX | 0.018 | 250 |
| Hexachloroethane | 67-72-1 | C, Tox | VIII, IX | 0.50 | 20.2778 |
| Hexachlorophene | 70-30-4 | Tox | VIII, IX | 1.40 | 55 |
| Indeno [1,2,3-cd] pyrene | 193-39-5 | C | VIII, IX | 0.01** | 0.3889 |
| Isobutyl Alcohol (Isobutanol) | 78-83-1 | Tox | VIII, IX | 850 | 9,125 |
| Isophorone | 78-59-1 | C,Tox | IX | 120 | 289.8304 |
| Kepone | 143-50-0 | C, Tox | VIII, IX | 0.3549 | 0.0355 |
| Methacrylonitrile | 126-98-7 | Tox | VIII, IX | 52 | 5.2 |
| Methoxychlor | 72-43-5 | Tox | VIII, IX | 0.00045 | 200 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | Tox | VIII, IX | 2200 | 34,840 |
| Methyl Methacrylate | 80-62-6 | Tox | VIII, IX | 141 | 7,100 |
| Methyl Parathion | 298-00-0 | Tox | VIII, IX | 0.55 | 4565 |
| Methyl-2-Pentanone, 4- | 108-10-1 | Tox | IX | 190 | 9,950 |
| Methylene Bromide (Dibromomethane) | 74-95-3 | Tox | VIII, IX | 117 | 304 |
| Methylene Chloride | 75-09-2 | C, Tox | VIII, IX | 130 | 25 |
| Naphthalene | 91-20-3 | Tox | VIII, IX | 0.31 | 31 |
| Nitroaniline, 2-Methyl-5- (5-Nitro-o-toluidine) | 99-55-8 | C | VIII, IX | 86.0269 | 8.6027 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| Nitroaniline, 2- (o-Nitroaniline) | 88-74-4 | Tox | IX | 12.6 | 550 |
| Nitroaniline, 3- (m-Nitroaniline) | 99-09-2 | C, Tox | IX | 8.90 | 13.5185 |
| Nitroaniline, 4- (p-Nitroaniline) | 100-01-6 | C, Tox | VIII, IX | 8.0 | 13.5185 |
| Nitrobenzene | 98-95-3 | Tox | VIII, IX | 20.9 | 17 |
| Nitrophenol, 4-(p-Nitrophenol) | 100-02-7 | Tox | VIII, IX | 0.0804 | 1,460 |
| N-Nitrosodi-n-butylamine | 924-16-3 | C | VIII, IX | 0.1030 | 0.0103 |
| N-Nitroso di-n-propylamine | 621-64-7 | C | VIII, IX | 0.4056 | 0.0406 |
| N-Nitrosodiethylamine | 55-18-5 | C | VIII, IX | 0.0189 | 0.0019 |
| N-Nitrosodimethylamine | 62-75-9 | C, Tox | VIII, IX | 0.0557 | 0.0056 |
| N-Nitrosodiphenylamine | 86-30-6 | C, Tox | IX | 0.351 | 57.9365 |
| N-Nitroso-N-methylethylamine (N-Nitrosomethylethylamine) | 10595-95-6 | C | VIII, IX | 0.1290 | 0.0129 |
| N-Nitrosopyrrolidine | 930-55-2 | C | VIII, IX | 1.3519 | 0.1352 |
| Parathion | 56-38-2 | Tox | VIII, IX | 0.103 | 1,095 |
| PCB Aroclor 1016 | 12674-11-2 | C, Tox | IX | 0.007 | 2.5 |
| PCB Aroclor 1221 | 11104-28-2 | C, Tox | IX | 0.007 | 2.5 |
| PCB Aroclor 1232 | 11141-16-5 | C, Tox | IX | 0.007 | 2.5 |
| PCB Aroclor 1242 | 53469-21-9 | C, Tox | IX | 0.007 | 2.5 |
| PCB Aroclor 1248 | 12672-29-6 | C, Tox | IX | 0.007 | 2.5 |
| PCB Aroclor 1254 | 11097-69-1 | C, Tox | IX | 0.007 | 2.5 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| PCB Aroclor 1260 | 11096-82-5 | C, Tox | IX | 0.007 | 2.5 |
| Pentachlorobenzene | 608-93-5 | Tox | VIII, IX | 2.40 | 146 |
| Pentachloronitrobenzen e | 82-68-8 | Tox | VIII, IX | 0.05** | 1.0919 |
| Pentachlorophenol | 87-86-5 | C, Tox | VIII, IX | 19.5 | 5 |
| Phenol | 108-95-2 | Tox | VIII, IX | 828 | 54,750 |
| Phenylenediamine, p- (4-Phenylenediamine) | 106-50-3 | Tox | IX | 380 | 34,675 |
| Phorate | 298-02-2 | Tox | VIII, IX | 0.50 | 36.5 |
| Pronamide | 23950-58-5 | Tox | VIII, IX | 0.15 | 13,690 |
| Pyrene | 129-00-0 | Tox | IX | 0.01** | 915 |
| Pyridine | 110-86-1 | Tox | VIII, IX | 1,825 | 182.5 |
| Silvex; 2-(2,4,5-Trichlorophenoxy) Propionic Acid | 93-72-1 | Tox | VIII, IX | 1.40 | 1,460 |
| Styrene | 100-42-5 | Tox | IX | 3.10 | 500 |
| T, 2,4,5- (2,4,5-Trichlorophenoxyacetic Acid) | 93-76-5 | Tox | VIII, IX | 2.20 | 1,825 |
| TCDD 2,3,7,8- (Dioxin) | 1746-01-6 | C | VIII, IX | 0.000193 | 0.0002 |
| Tetrachlorobenzene, 1,2,4,5- | 95-94-3 | Tox | VIII, IX | 0.003 | 55 |
| Tetrachloroethane, 1,1,1,2- | 630-20-6 | C, Tox | VIII, IX | 22.0914 | 2.2091 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | C, Tox | VIII, IX | 2.83* | 0.283 |
| Tetrachloroethene | 127-18-4 | C, Tox | VIII, IX | 2 | 25 |
| Tetrachlorophenol, 2,3,4,6- | 58-90-2 | Tox | VIII, IX | 10 | 5,475 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| Tetraethyl Dithiopyrophosphate (Sulfotepp) | 3689-24-5 | Tox | VIII, IX | 0.25 | 91.5 |
| Toluene | 108-88-3 | Tox | VIII, IX | 5.26 | 5,000 |
| Toluidine, o-(2-Methylaniline) | 95-53-4 | C | VIII, IX | 11.8287 | 1.1829 |
| Toxaphene | 8001-35-2 | C | VIII, IX | 0.0074 | 15 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | Tox | VIII, IX | 3 | 350 |
| Trichloroethane, 1,1,1- | 71-55-6 | Tox | VIII, IX | 13.3 | 1,000 |
| Trichloroethane, 1,1,2- | 79-0-5 | C, Tox | VIII, IX | 44.2 | 25 |
| Trichloroethene | 79-1-6 | C, Tox | VIII, IX | 11 | 25 |
| Trichlorofluoromethane | 75-69-4 | Tox | VIII, IX | 11 | 6,441 |
| Trichlorophenol, 2,4,5- | 95-95-4 | Tox | VIII, IX | 12 | 250 |
| Trichlorophenol, 2,4,6- | 88-06-2 | C, Tox | VIII, IX | 8 | 18.25 |
| Trichloropropane, 1,2,3- | 96-18-4 | C, Tox | VIII, IX | 0.0818 | 0.0082 |
| Trinitrobenzene, 1,3,5- (sym-trinitrobenzene) | 99-35-4 | Tox | VIII, IX | 3.50 | 5,475 |
| Vinyl Acetate | 108-05-4 | Tox | IX | 200 | 2,060 |
| Vinyl Chloride | 75-1-4 | C, Tox | VIII, IX | 27.6 | 10 |
| Xylenes | 1330-20-7 | Tox | IX | 1.10 | 50,000 |
| **INORGANIC CONSTITUENTS** | | | | | |
| Antimony | 7440-36-0 | Tox | VIII, IX | 300 | 30 |
| Arsenic | 7440-38-2 | C, Tox | VIII, IX | 500 | 50 |
| Barium | 7440-39-3 | Tox | VIII, IX | 100,000 | 10,000 |
| Beryllium | 7440-41-7 | Tox | VIII, IX | 200 | 20 |
| Cadmium | 7440-43-9 | Tox | VIII, IX | 250 | 25 |
| Chromium VI | 18540-29-9 | Tox | IX | 5,000 | 500 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|
| Cobalt | 7440-48-4 | Tox | IX | 36,500 | 3,650 |
| Copper | 7440-50-8 | Tox | IX | 65,000 | 6,500 |
| Cyanide (free) | 57-12-5 | Tox | IX | 10,000 | 1,000 |
| Lead | 7439-92-1 | Tox | VIII, IX | 750 | 75 |
| Mercury | 7487-94-7 | Tox | VIII, IX | 100 | 10 |
| Nickel | 7440-02-0 | Tox | VIII, IX | 36,500 | 3,650 |
| Selenium | 7782-49-2 | Tox | VIII, IX | 2,500 | 250 |
| Silver | 7440-22-4 | Tox | VIII, IX | 9,125 | 913 |
| Thallium | 7440-28-0 | Tox | VIII, IX | 100 | 10 |
| Tin | 7440-31-5 | Tox | IX | 1,000,000 | 109,500 |
| Vanadium | 7440-62-2 | Tox | IX | 1,825 | 183 |
| Zinc | 7440-66-6 | Tox | IX | 547,500 | 54,750 |

**Table 7-7**
**Appendix IX Constituent List and Groundwater Concentration Limits**

| Hazardous Constituent | CAS[1] Number | Risk Category[2] | RCRA Listing[3] | Groundwater Concentration Limit[4] (mg/L) | Risk-Based Concentration for Cumulative Risk Evaluation[5] (mg/L) |
|---|---|---|---|---|---|

Notes:

[1]CAS = Chemical Abstract Services

[2] C = Carcinogenic; Tox = Noncarcinogenic (i.e., systemic toxicant)

[3]RCRA Listing: VIII = 40 CFR Part 261, Appendix VIII; IX = 40 CFR Part 264, Appendix IX; --- = not listed in Appendix VIII or Appendix IX

[4]These groundwater concentration limits for organic hazardous constituents are based on one percent of the aqueous solubility limit for each hazardous constituent and are used as alternate concentration limits (ACLs) under 40 CFR 264.98. Where one percent of the aqueous solubility limit for a hazardous constituent exceeds the ACL (without the 10 percent safety factor) as determined in *Demonstration Report: Development of Sitewide Alternate Concentration Limits in Groundwater* (CH2M HILL, 2007c), the determined ACL is used (shown with an asterisk * in the table). Also, where one percent of the aqueous solubility limit for a hazardous constituent is less than the reporting limit for the hazardous constituent, the reporting limit is used (shown with two asterisks** in the table). The groundwater concentration limits for inorganic hazardous constituents are the ACLs (without the 10 percent safety factor and capped at one million parts per million where necessary).

[5]The risk-based concentrations for the Selah Member are based on the RBC for carcinogenic and non-carcinogenic ACLs, whichever is the lower concentration limit, times the 10 percent safety factor. These values will be used, if compliance monitoring becomes necessary, to assess the cumulative risk posed by detected constituents in groundwater. The values are not artificially capped because doing so would bias the cumulative risk calculation and not allow an accurate evaluation of cumulative risk to be completed.

**TABLE 7-7 Constituent List & Groundwater Concentration Limits**

# 5 PURGING AND SAMPLING PROCEDURES

Proper sampling procedures are important and fundamental aspects of an effective groundwater-monitoring program. Site-specific sampling procedures are discussed below.

## 5.1 Site-Specific Purging and Sampling Methodology

The Facility's purging and sampling methodology is a site-specific low-flow sampling procedure that is used at each monitoring well where groundwater samples are collected. The general design of the site-specific low-flow methodology, and the field procedures that comprise this purging and sampling method are presented below. The theory, methodology and specific details regarding the development of the site-specific methodology are included in Appendix B.

All new or replacement groundwater sampling pumps shall be dedicated bladder pumps unless the Department approves use of another type of pump or sampling device in writing. The Department's approval for alternative sampling equipment shall not be considered a permit modification.

### 5.1.1 General Design and Overview

The sampling methodology for the Facility's monitoring wells consists of the following elements:

- Static water levels are first measured at monitoring wells and piezometers listed in Table 7-2 during a routine monitoring event. Static water levels are measured again before purging begins as part of sampling the Facility's monitoring wells. The static water level is recorded on the Field Information Form (FIF). A FIF is contained in Appendix A.
- Groundwater purging and sampling are conducted using dedicated bladder pumps. Purging continues until 90 percent or more of the water that is purged during a 10-minute period consists of water derived from the formation/sandpack. Once this criterion is met, the well is immediately sampled.
- If the well is too low-yielding to meet the drawdown criterion described in Table 7-8 and Appendix B, then purging is allowed to continue until the water level reaches a pre-determined depth above the pump (tabulated in Appendix B, Table 7-14). The depth at which purging stops for low-yielding wells depends on the amount of screen submergence prior to purging. Specifically, for low-yielding wells where the initial (static) water level is 10 ft or more above the top of the screen, purging stops once the water level is 1 ft above the screen, or earlier if deemed appropriate by the sampling team. For low-yielding wells with less initial screen submergence, purging is allowed to continue until the water level is lowered no more than halfway from the initial (static) water level to the pump intake. Once purging stops at a low-yielding well, the VOC samples shall be collected from that well within the next 48 hours. If the volume of water in the low-yielding well is too low to allow for collection of additional analytes (Appendix IX constituents, or other analytes), then the VOC samples shall be collected, and the sampling team shall return at a later time during the sampling event (as convenient) to collect the remaining samples. If a sample cannot be collected without exceeding the water level criteria shown in Appendix Table 7-14 during a sampling event and sampling at a depth below the water level criteria is required, the sampling team must

document this on the FIF and the deviation from the site-specific sampling method must be explained in the semiannual report for the event.

- Field parameter measurements are recorded on the FIF. Where possible, the purging process continues until field parameters have stabilized. However, if one or more field parameters have not yet stabilized before the drawdown criterion is met, or if the water level drops to the pre-determined depth tabulated in Appendix B, Table 7-14, then the well is sampled before the field parameters stabilize.

A more detailed discussion of the design and implementation of the site-specific sampling methodology is included in Appendix B.

## 5.2 Other Site-Specific Details

The following additional site-specific sampling details are discussed below:

- Use of FIFs
- Field parameter anomalies
- Purge water disposal

### 5.2.1 Field Information Forms

A site-specific FIF has been prepared for groundwater monitoring activities at this Facility. The form consists of two pages (see Appendix A). The first page includes standard well purging and sampling information. The second page is a form that has been specifically developed for the sampling needs at the Facility. In particular, this second page provides space to document whether water level recovery is sufficient to allow for sampling; and to record and track other purging and sample collection information.

### 5.2.2 Field Parameter Anomalies

Historical ranges of field parameters have been recorded during prior sampling events at the Facility's wells (Table 7-9). During purging, the sampling team shall use the historical ranges as a guide to help identify whether field parameter readings for pH, specific conductance, and temperature are within expected ranges or are anomalous. If an anomaly is observed, this shall be noted on the FIF and identified in the semiannual groundwater monitoring report. Table 7-9 will be updated as new or replacement wells are added to the detection monitoring program.

### 5.2.3 Purge Water Disposal

During purging and sampling, purge water is placed in a 55-gallon drum or similar storage container. The purge water is then transferred to the onsite wastewater treatment facility for treatment and disposal.

**Table 7-8** Chemical Waste Management of the Northwest, Inc.

**Feet of Allowed Water Level Decline Every 5 Minutes or Every 10 Minutes:** Standalone Document No. 7 Groundwater Monitoring Plan

**Low-Flow Sampling With Formation Water Requirement = 90%**

Last modified September 2011

| | | | During a 5-Minute Interval | | | | During a 10-Minute Interval | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Allowable Drawdown (feet) During a 5-Minute Interval | | | | Allowable Drawdown (feet) During a 10-Minute Interval | | |
| Purge Rate (gpm) | Purge Rate (ml/min) | Purge Rate (ounces/min) | Total Volume Pumped During a 5-Minute Interval (Gallons) | Well Diameter 2 inches | Well Diameter 4 inches | Well Diameter 5 inches | Total Volume Pumped During a 10-Minute Interval (Gallons) | Well Diameter 2 inches | Well Diameter 4 inches | Well Diameter 5 inches |
| 0.01 | 37.9 | 1.28 | 0.05 | 0.03 | 0.01 | 0.005 | 0.1 | 0.06 | 0.02 | 0.01 |
| 0.02 | 75.7 | 2.56 | 0.1 | 0.06 | 0.015 | 0.010 | 0.2 | 0.12 | 0.03 | 0.02 |
| 0.03 | 113.6 | 3.84 | 0.15 | 0.09 | 0.02 | 0.015 | 0.3 | 0.18 | 0.05 | 0.03 |
| 0.04 | 151.4 | 5.12 | 0.2 | 0.12 | 0.03 | 0.020 | 0.4 | 0.25 | 0.06 | 0.04 |
| 0.05 | 189.3 | 6.4 | 0.25 | 0.15 | 0.04 | 0.025 | 0.5 | 0.31 | 0.08 | 0.05 |
| 0.06 | 227.1 | 7.68 | 0.3 | 0.18 | 0.045 | 0.030 | 0.6 | 0.37 | 0.09 | 0.06 |
| 0.07 | 265.0 | 8.96 | 0.35 | 0.21 | 0.05 | 0.035 | 0.7 | 0.43 | 0.11 | 0.07 |
| 0.08 | 302.8 | 10.24 | 0.4 | 0.25 | 0.06 | 0.040 | 0.8 | 0.49 | 0.12 | 0.08 |
| 0.09 | 340.7 | 11.52 | 0.45 | 0.28 | 0.07 | 0.045 | 0.9 | 0.55 | 0.14 | 0.09 |
| 0.1 | 378.5 | 12.8 | 0.5 | 0.31 | 0.08 | 0.050 | 1 | 0.61 | 0.15 | 0.10 |
| 0.2 | 757.1 | 25.6 | 1 | 0.61 | 0.15 | 0.100 | 2 | 1.23 | 0.31 | 0.20 |
| 0.3 | 1135.6 | 38.4 | 1.5 | 0.92 | 0.23 | 0.145 | 3 | 1.84 | 0.46 | 0.29 |
| 0.4 | 1514.2 | 51.2 | 2 | 1.23 | 0.31 | 0.195 | 4 | 2.45 | 0.61 | 0.39 |
| 0.5 | 1892.7 | 64 | 2.5 | 1.53 | 0.38 | 0.245 | 5 | 3.06 | 0.77 | 0.49 |
| 0.6 | 2271.2 | 76.8 | 3 | 1.84 | 0.46 | 0.295 | 6 | 3.68 | 0.92 | 0.59 |
| 0.7 | 2649.8 | 89.6 | 3.5 | 2.14 | 0.54 | 0.345 | 7 | 4.29 | 1.07 | 0.69 |
| 0.8 | 3028.3 | 102.4 | 4 | 2.45 | 0.61 | 0.390 | 8 | 4.9 | 1.23 | 0.78 |
| 0.9 | 3406.9 | 115.2 | 4.5 | 2.76 | 0.69 | 0.440 | 9 | 5.51 | 1.38 | 0.88 |
| 1.0 | 3785.4 | 128.0 | 5 | 3.06 | 0.77 | 0.490 | 10 | 6.13 | 1.53 | 0.98 |

**Notes:**

gpm = gallons per minute mL = milliliters min = minute

1 gallon = 128 ounces = 3785.412 milliliters

Water level meters are measured to the nearest 100th of a foot

**TABLE 7-8 Feet of Allowed Water Level Decline Every 5 Min/10 Min**

**Table 7-9**

**Historical Well Sampling Data Summary**
**Chemical Waste Management of the Northwest, Inc.**
**Groundwater Monitoring Plan**

| Well Information | | | | | Historical Data | | |
|---|---|---|---|---|---|---|---|
| **Well ID Number** | **Monitoring Program** | **Location Monitored** | **Well Depth[1]** | **Elevation At TOC** | **Temperature (degC)[2]** | **pH (pH Units)[2]** | **Specific Conductance (umhos/cm)[2]** |
| | | | | | | | |
| 3P-1 | RCRA | WMA-1 | 222.1 | 1025.84 | 14.1 - 19.2 | 6.56 - 8.43 | 230 - 314 |
| 3R-1 | RCRA | WMA-1 | 183.6 | 1010.9 | 14.1 - 20.4 | 7.12 - 8.07 | 199 - 318 |
| 3Ta-1 | RCRA/TSCA | WMA-1 | 238.3 | 1029.9 | 12.2 - 19.2 | 7.24 - 8.67 | 206 - 369 |
| 4H-1 | RCRA/TSCA | WMA-2 | 199.7 | 1021.43 | 13.4 - 20.2 | 6.16 - 8.30 | 151 - 382 |
| 5A-1 | RCRA | WMA-1 | 208.17 | 1017.04 | 14.3 - 18.7 | 6.87 - 8.63 | 227 - 338 |
| 5L-1 | RCRA/TSCA | WMA-1 | 211.71 | 1002.39 | 12.0 - 19.0 | 7.35 - 8.63 | 217 - 345 |
| 5M-1 | RCRA/TSCA | WMA-1 | 229.69 | 1021.38 | 15.4 - 21.7 | 7.41 - 8.30 | 237 - 340 |
| 5N-1 | RCRA/TSCA | WMA-1 | 234.9 | 1031.72 | 14.1 - 21.6 | 7.24 - 8.73 | 236 - 355 |
| 5P-1 | RCRA/TSCA | WMA-1 | 227.89 | 1025.56 | 14.8 - 20.3 | 7.00 - 8.22 | 230 - 335 |
| 5Q-1 | RCRA/TSCA | WMA-1 | 233.01 | 1035.65 | 13.8 - 19.3 | 6.94 - 7.96 | 158 - 395 |
| 6C-9 | RCRA | WMA-1 | 207.9 | 1018.66 | 13.8 - 18.2 | 6.84 - 8.27 | 240 - 360 |
| 7A-1 | RCRA/TSCA | WMA-2 | 152.46 | 990.47 | 14.5 - 17.3 | 6.79 - 8.34 | 204 - 376 |
| 7B-1 | RCRA/TSCA | WMA-2 | 169.01 | 1003.59 | 14.7 - 17.5 | 7.14 - 9.61 | 282 - 430 |
| 7C-1 | RCRA/TSCA | WMA-2 | 190.45 | 1018.13 | 13.8 - 17.6 | 6.72 - 8.18 | 217 - 391 |
| 7D-1 | RCRA/TSCA | WMA-2 | 198.6 | 1022.18 | 14.4 - 17.6 | 7.09 - 7.83 | 255 - 380 |

Notes:

degC = degrees Celsius; mumhos/cm = micromhos per centimeter; TOC = top of casing RCRA = Resource Conservation and Recovery Act

[1] Measured from the top of the well casing to the bottom of the sump.
[2] The range of parameter values are representative of the typical range observed at the well but are not intended to be an exhaustive representation of all values measured since the well was constructed.

**TABLE 7-9 Historical Well Sampling Data Summary**

# 6 LABORATORY ANALYSIS PLAN

This section describes the procedures for completing successful laboratory analyses of the samples that are collected from the site.

## 6.1 Analytical Laboratory

The analytical laboratories which have been approved by CWMNW for the groundwater monitoring program include but are not limited to:

**Primary Laboratory:**
Eurofins TestAmerica (Eurofins) Laboratories (Denver)
4955 Yarrow Street
Arvada, CO 80002
(303) 421-6611

**Subcontract Laboratory for Eurofins Denver (PFAS Analysis)**:
Eurofins, Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
(916) 373-5600

Samples collected at the CWMNW Facility will be sent to the Denver lab unless otherwise requested by CWMNW.

## 6.2 Program Quality Assurance / Quality Control Procedures

Trip blanks, equipment blanks, and field blanks provide quality assurance/quality control measures for the groundwater monitoring program at the Facility. The following blanks will be collected:

- **Trip Blanks.** One trip blank will be included in each cooler shipped to the lab that contains VOC samples. The sample designation will be TB-##, starting with TB-01 for the first trip blank. Trip blanks will be analyzed for VOCs only.
- **Field Blanks.** For each groundwater sampling day, at least one field blank sample will be collected for the first 10 (or less) groundwater samples. If more than 10 samples are collected in a single day, an additional field blank sample will be collected for each subsequent 10 groundwater wells samples. The field blank will be prepared in the field (at the sampling site) using laboratory-supplied bottles and laboratory-supplied high-pressure liquid chromatography (HPLC) organic-free water. Field blanks for PFAS samples will consist of a field reagent blank of PFAS-free deionized water (DI) mixed with the preservative at the lab. The preserved DI water will be poured into an empty plastic bottle in the field. The sample designation will be FB-##, starting with FB-01 for the first field blank. Field blanks will be analyzed for VOCs only.
- **Equipment Blanks.** These samples will be collected from non-dedicated and non-disposable sampling equipment that is lowered into a well. One blank will be collected for each piece of non-dedicated equipment that is used during the sampling event. The equipment blank will be prepared in the field (at the sampling site) using laboratory-

supplied bottles and laboratory-supplied HPLC organic-free water. The equipment blanks will be collected by pouring the laboratory-supplied water into or over the non-dedicated and non-disposable equipment (after it has been properly decontaminated), then pouring the sample into the equipment blank sample bottles. The sample designation will be EB-##, starting with EB-01 for the first equipment blank. Each equipment blank will be analyzed for the same constituents as those being analyzed in samples collected from the well where the non-dedicated and non-disposable equipment is used. Preservation and filtering requirements for the equipment blank sample will also be the same as for the parent sample collected from the well where the non-dedicated and non-disposable equipment is used.

- **Quality Assurance Duplicate.** One duplicate sample will be collected and submitted for analysis for every 10 samples collected in the field. Duplicate samples will be collected using laboratory-supplied bottles. The sample designation will be DUP-##, starting with DUP-01 for the first duplicate sample. Each duplicate sample will be analyzed for the same constituents as the parent sample. Preservation and filtering requirements for the duplicate sample will also be the same as for the parent sample.

## 6.3 Laboratory Quality Control Procedures

The quality assurance program for the analytical laboratory, Eurofins Laboratories (Denver) is described in their Quality Management Plan (QMP) and their Laboratory Quality Manual (LQM), which are available from CWM upon request. The QMP and LQM describe mechanisms the laboratory employs to ensure that the reported data meet or exceed all applicable EPA and State requirements. These documents describe the laboratory's experience, its organizational structure, and procedures in place to ensure quality of the analytical data. The QMP and LQM outline the sample preparation, analysis, and reporting procedures used by the laboratory. The laboratory is responsible for the implementation of, and adherence to, the quality assurance and quality control requirements outlined in these QA manuals.

Internal system and performance audits are conducted periodically to ensure adherence by all laboratory departments to the QMP, LQM, and standard operating procedures (SOPs) for each analytical method. External audits are conducted by accrediting agencies or states. These reports are transmitted to department managers for review and response. Corrective measures must be taken for findings or deficiencies that are found in an internal or external audit.

Data Quality Reviews (DQR), or equivalent, are requests submitted to the laboratory to formally review results that differ from historical results, or results that exceed certain permit requirements or quality control criteria. The laboratory prepares a formal written response to each DQR explaining the discrepancy. The DQR is the first line of investigation following an inquiry of a potentially anomalous result.

## 6.4 Analytical Methods

Table 7-10 presents the analytical methods to be used by the laboratory for each of the parameters analyzed for in the various monitoring programs conducted at the Facility. The methods listed in Table 7-10 are EPA-approved and are fully described in the laboratory’s standard operating procedure documents.

Table 7-10
Laboratory Analytical Methods

| **Chemical Constituent** | **Method Description** | **Reference Method [a, b]** |
|---|---|---|
| **DETECTION MONITORING** | | |
| VOCs | Purge & Trap GC/MS | 8260B or equivalent |
| | | |
| **COMPLIANCE MONITORING** | | |
| VOCs | Purge & Trap GC/MS | 8260B or equivalent |
| **TSCA MONITORING** | | |
| PCBs | GC | 8082 or equivalent |
| **APPENDIX IX MONITORING** | | |
| VOCs | Purge & Trap GC/MS | 8260B or equivalent |
| Semi-VOCs | GC/MS with Continuous Liquid-Liquid Extraction | 8270C or equivalent |
| Chlorinated Herbicides | GC | 8151A or equivalent |
| Organochlorinated Pesticides | GC | 8081A or equivalent |
| PCBs | GC | 8082 or equivalent |
| Dioxins/Furans | HRGC/LRMS | 8280A or equivalent |
| Dissolved Metals | ICP | 6010B or equivalent |
| Mercury | Manual Cold-Vapor | 7470A or equivalent |
| Total Sulfide | Acid-Soluble and Acid-Insoluble Sulfides: Distillation/Titration | 9030B/9034 or equivalent |
| Total Cyanide | Automated Colorimetric with Offline Distillation | 9012A or equivalent |
| **NON -REGULATED SUBSTANCES MONITORING** | | |
| PFAS | Isotope Dilution LC/MS/MS or equivalent | 537.1 (modified) or 1633 or equivalent |

Notes:

GC = gas chromatography; GC/MS = gas chromatography/mass spectrometry; LC /MS/MS= liquid chromatography tandem mass spectrometry; HRGC/LRMS = high resolution gas chromatography/low resolution mass spectrometry

ICP = inductively coupled plasma; PCBs = polychlorinated biphenyls; VOCs = volatile organic compounds; PFAS = per- and polyfluoroalkyl substances

[a] Reference: U.S. EPA, 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846*, 3rd Edition, and its updates. Analytical methods provided in this Plan may be substituted provided that the alternate methods are approved for use by the DEQ.

[b] Reference: U.S. EPA, 2020. *Method 537.1 Determination of Selected Per- and Polyflourinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS). U.S. Environmental Protection Agency, Washington, DC, April 2020.* The modified 537.1 used by the contract analytical laboratory method allows for analysis of additional PFAS compounds for non-potable water and solid matrices. Method 1633 is currently in draft form.

**TABLE 7-10 Laboratory Analytical Methods**

# 7 DATA QUALITY REVIEW, REPORTING AND RECORD-KEEPING

Prior to submitting a monitoring report to DEQ, several data evaluation, reporting, and record-keeping tasks will be implemented. The following sections describe the evaluation, reporting and record-keeping procedures that are followed upon receipt of the laboratory's analytical report.

## 7.1 Data Quality Review

Each analytical report received from the laboratory will undergo two levels of data quality evaluation: initial QA/QC checks, and qualitative data evaluation. These data quality evaluation procedures are described below.

### 7.1.1 Initial QA/QC Checks

Before the data are subjected to statistical analysis, the quality control information accompanying the data report from the laboratory will be examined. Relevant quality control data include measures of accuracy (percent recovery), precision (relative percent difference, RPD), and sample contamination (blank determinations). A brief summary of these relevant quality control data follows. A more complete description is contained in the laboratory's Quality Management Plan (QMP).

Accuracy defines the relationship between the laboratory's measurement of a sample's concentration and the "true", but unknown concentration of the sample. Because the "true" concentration is unknown, accuracy must be measured indirectly by determining the percent recovery of a sample "spiked" with a known amount of select analytes. This sample, which is called the matrix spike (MS), is analyzed under the same conditions as the groundwater sample and its concentration is determined. Because the MS has a known concentration, it's percent recovery can be calculated. Control criteria for percent recovery are taken from regulatory method requirements.

Precision is the assessment of the variability that can be expected in data that result from the analytical procedures employed. Precision is a measure of the reproducibility that is estimated through duplicate measurements of a matrix spike. Two matrix spike samples are prepared as described above, a MS and a matrix spike duplicate (MSD). Both spikes are analyzed along with the environmental sample and the "relative percent difference" (RPD) between the two spikes is determined. Control criteria for RPD are taken from regulatory method requirements.

The potential for sample contamination is assessed by measurements of "blank" samples. Blanks are samples of ultra-pure (HPLC) laboratory water that are not spiked with analytes and are carried through the field sampling and laboratory environments. These samples are known as "field," "trip," and "equipment" blanks. It is assumed that any constituents that occur in the field or laboratory that might add to the concentration of the constituent reported in the environmental sample will be picked up by the blank samples and measured. If any of the constituents of interest are found in the blank samples, it is an indication of potential contamination of the environmental sample.

### 7.1.2 Qualitative Data Evaluation

Following the initial QA/QC checks, the laboratory data will undergo a second level of review by comparing new results with historical data to identify (and if necessary flag) visual outliers or other anomalous data. If a clearly anomalous result is found, a DQR will be initiated with the laboratory to ascertain if laboratory error is involved, and field information will be checked for anomalous occurrences or observations that might help to explain an outlier result.

## 7.2 Data Presentation and Reporting

The results of field and laboratory analyses performed for groundwater samples collected under this Plan and the Part B Permit will be reported to DEQ. Laboratory data will be presented on laboratory transmittal sheets and will include the following information:

- Sample identification number and date of analysis:
- Analytical results for the regulated and unregulated sample parameters, as well as results for QA/QC duplicates and test blanks, reported to the Method Detection Limits (MDLs) and to the RLs, which are equivalent numerically to Practical Quantification Limits (PQLs). RLs for detection monitoring constituents are listed in Table 7-11. Target RLs for non-regulated PFAS constituents are listed in Table 7-12. RLs for the complete list of Appendix IX constituents are listed in Table 7-13:
- Description of analytical procedures and QA/QC protocol; and
- Chain-of-custody form.

Monitoring data will be submitted in semiannual reports that summarize the detection (and if necessary, in the future compliance monitoring) activities that took place during the sampling event. The report will provide the following information:

- A summary of field activities, including the FIFs, the dates of field activities, significant field sampling issues that occurred during the event, and associated corrective actions that were taken. This will include the identity of wells associated with blind duplicate samples, equipment blanks, trip blanks, and field blanks:
- A discussion of groundwater elevations, flow directions, and estimated flow velocities. This information will be presented in the second semiannual monitoring report for each calendar year. This information will include summary tables of the depth to groundwater and corresponding groundwater elevations; graphs of potentiometric levels versus time for monitoring wells with available historical data included in the Phase 1 or long-term optimized program, as applicable; contour maps of groundwater elevations in the Selah Level 1 and Level 2 water-bearing zones for the second (Fall) semiannual water level measurement event; a summary table showing groundwater velocity calculations for Selah Level 1 and Selah Level 2 during the Fall event; and a written review of the adequacy of the groundwater monitoring system relative to observed groundwater flow directions beneath each WMA;
- Summary tables of the analytical results of the detection monitoring program. Concentrations between the RL and MDL will be flagged with a “J” qualifier and identified in the report as estimated values:
- Significant QA/QC issues that were reported by the analytical laboratory, including any corrective action taken:
- Exceedances (if any) of the detection monitoring criteria:
- Exceedances (if any) of groundwater concentration limits that are associated with possible future compliance monitoring programs at the Facility:
- Time-trend graphs of specific conductance, including identifying potentially anomalous measurements:
- Time-trend graphs of VOC concentrations detected above the RL (in the second [Fall] semiannual monitoring report); and

- Recommendations for additional field activities, if any.

As part of the reporting process, analytical results will also be submitted electronically in a format acceptable to DEQ. Other details regarding the reporting requirements (for example, submittal deadlines) are provided in the" Reporting" section of this plan.

## 7.3 Data Record-Keeping Requirements

The laboratory maintains a complete set of records for all samples received for a minimum period of five years as per ORELAP requirements. Laboratory records may be in a paper (logbook) or electronic format such as those maintained in the laboratory information management system (LIMS). The contents include records of sample receipt and acceptance, testing, electronic instrument files, reporting, and sample disposal such that the quality control and testing results may be reconstructed and reviewed upon request. The laboratory will have a record's retention and security policy for access to records. Electronic records will be backed up, stored and remain accessible for the required retention period.

**Table 7-11**
**Reporting Limits for Detection Monitoring Program Groundwater Samples**

| Volatile Organic Constituents (EPA method 8260B) | Reporting Limit (µg/L) | TSCA Constituents (EPA Method 8082) | Reporting Limit (µg/L) |
|---|---|---|---|
| Acetone | 10 | Aroclor 1016 | 1 |
| Benzene | 1 | Aroclor 1221 | 1 |
| Bromodichloromethane | 1 | Aroclor 1232 | 1 |
| Bromoform | 1 | Aroclor 1242 | 1 |
| Bromomethane | 2 | Aroclor 1248 | 1 |
| Carbon disulfide | 1 | Aroclor 1254 | 1 |
| Carbon tetrachloride | 1 | Aroclor 1260 | 1 |
| Chlorobenzene | 1 | | |
| Chlorodibromomethane | 1 | | |
| Chloroethane | 2 | | |
| Chloroform | 1 | | |
| Chloromethane | 2 | | |
| Dichlorobenzene, 1,2- | 1 | | |
| Dichlorobenzene, 1,4- | 1 | | |
| Dichlorodifluoromethane | 2 | | |
| Dichloroethane, 1,1- | 1 | | |
| Dichloroethane, 1,2- | 1 | | |
| Dichloroethene, 1,1- | 1 | | |
| Dichloroethene, cis-1,2- | 1 | | |
| Dichloroethene, trans-1,2- | 1 | | |
| Dichloropropane, 1,2- | 1 | | |
| Dichloropropene, cis-1,3- | 1 | | |
| Dichloropropene, trans-1,3- | 1 | | |
| Dioxane, 1,4- | 20 | | |
| Ethyl benzene | 1 | | |
| Hexachlorobutadiene | 1 | | |
| MEK (2-butanone) | 5 | | |
| Methyl-2-pentanone, 4- | 5 | | |
| Methylene chloride | 5 | | |
| Naphthalene | 1 | | |
| Styrene | 1 | | |
| Tetrachloroethane, 1,1,2,2- | 1 | | |
| Tetrachloroethene | 1 | | |
| Toluene | 1 | | |
| Trichlorobenzene, 1,2,4- | 1 | | |
| Trichloroethane, 1,1,1- | 1 | | |
| Trichloroethane, 1,1,2- | 1 | | |
| Trichloroethene | 1 | | |
| Trichlorofluoromethane | 2 | | |
| Vinyl chloride | 1 | | |
| Xylenes (total) | 2 | | |

Notes:
RCRA = Resource Conservation and Recovery Act; TSCA = Toxic Substances Control Act
µg/L = micrograms per liter

[1] Reporting limits shown in this table assume that no sample dilution is necessary. Actual reporting limits may be higher if dilution is necessary or if blank contamination is detected. Reporting limits shown in this table may change based upon the laboratory's annual verification of method detection limits and assessment of precision and bias.

**TABLE 7-11 Reporting Limits for Regulated Groundwater Samples**

**Table 7-12**
**Reporting Limits for Non-Regulated Groundwater Samples**

| PFAS Constituents by EPA Method 537.1 (modified)[1] or 1633 | Target Reporting Limit (ng/L)[2] |
|---|---|
| 10:2 FTS | 2 |
| 4:2 FTS | 2 |
| 6:2 FTS | 5 |
| 8:2 FTS | 2 |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2 |
| F-53B Major | 2 |
| F-53B Minor | 2 |
| HFPO-DA (GenX) | 4 |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSSA) | 5 |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSSA)) | 5 |
| Perfluorobutanesulfonic acid (PFBS) | 2 |
| Perfluorobutanoic acid (PFBA) | 5 |
| Perfluorodecanesulfonic acid (PFDS) | 2 |
| Perfluorodecanoic acid (PFDA) | 2 |
| Perfluorododecanesulfonic acid (PFDoS) | 2 |
| Perfluorododecanoic acid (PFDoA) | 2 |
| Perfluoroheptanesulfonic Acid (PFHpS) | 2 |
| Perfluoroheptanoic acid (PFHpA) | 2 |
| Perfluorohexanesulfonic acid (PFHxS) | 2 |
| Perfluorohexanoic acid (PFHxA) | 2 |
| Perfluoro-n-hexadecanoic acid (PFHxDA) | 2 |
| Perfluoro-n-octadecanoic acid (PFODA) | 2 |
| Perfluorononanesulfonic acid (PFNS) | 2 |
| Perfluorononanoic acid (PFNA) | 2 |
| Perfluorooctanesulfonamide (FOSA) | 2 |
| Perfluorooctanesulfonic acid (PFOS) | 2 |
| Perfluorooctanoic acid (PFOA) | 2 |
| Perfluoropentanesulfonic acid (PFPeS) | 2 |
| Perfluoropentanoic acid (PFPeA) | 2 |
| Perfluorotetradecanoic acid (PFTeA) | 2 |
| Perfluorotridecanoic acid (PFTriA) | 2 |
| Perfluoroundecanoic acid (PFUnA) | 2 |

Notes:
ng/L = nanograms per liter; PFAS = Per- and Polyflourinated Alkyl Substances

[1]Method 537.1 Determination of Selected Per- and Polyflourinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS). U.S. Environmental Protection Agency, Washington, DC, April 2020. The modified 537.1 used by the contract analytical laboratory method allows for analysis of additional PFAS.
[2] Reporting limits shown in this table assume that no sample dilution is necessary. Actual reporting limits may be higher if dilution is necessary or if blank contamination is detected. Reporting limits shown in this table may change based upon the laboratory's annual verification of method detection limits and assessment of precision and bias.

**TABLE 7-12 Reporting Limits for Non-Regulated Groundwater Samples**

**Table 7-13 Full Appendix IX List of Constituents**
Chemical Waste Management of the Northwest, Inc. Arlington, Oregon

| METHOD # | TEST DESCRIPTION | Units | Reporting Limit |
|---|---|---|---|
| 8260B | Acetone | ug/L | 10 |
| 8260B | Acetonitrile | ug/L | 20 |
| 8260B | Acrolein | ug/L | 20 |
| 8260B | Acrylonitrile | ug/L | 20 |
| 8260B | Benzene | ug/L | 1 |
| 8260B | Bromodichloromethane | ug/L | 1 |
| 8260B | Bromoform | ug/L | 1 |
| 8260B | Bromomethane | ug/L | 2 |
| 8260B | Carbon disulfife | ug/L | 1 |
| 8260B | Carbon tetrachloride | ug/L | 1 |
| 8260B | Chlorobenzene | ug/L | 1 |
| 8260B | Chloroprene | ug/L | 1 |
| 8260B | Dibromochloromethane | ug/L | 1 |
| 8260B | Chloroethane | ug/L | 2 |
| 8260B | Chloroform | ug/L | 1 |
| 8260B | Chloromethane | ug/L | 2 |
| 8260B | Allyl chloride | ug/L | 2 |
| 8260B | Dibromomethane | ug/L | 1 |
| 8260B | 1,2-Dichlorobenzene | ug/L | 1 |
| 8260B | 1,4-Dichlorobenzene | ug/L | 1 |
| 8260B | trans-1,4-Dichloro-2-butene | ug/L | 1 |
| 8260B | Dichlorodifluoromethane | ug/L | 2 |
| 8260B | 1,1-Dichloroethane | ug/L | 1 |
| 8260B | 1,2-Dichloroethane | ug/L | 1 |
| 8260B | 1,1-Dichloroethene | ug/L | 1 |
| 8260B | cis-1,2-Dichloroethene | ug/L | 1 |
| 8260B | trans-1,2-Dichloroethene | ug/L | 1 |
| 8260B | 1,2-Dichloropropane | ug/L | 1 |
| 8260B | cis-1,3-Dichloropropene | ug/L | 1 |
| 8260B | trans-1,3-Dichloropropene | ug/L | 1 |
| 8260SIM | 1,4-Dioxane (8260SIM) | ug/L | 20 |
| 8260B | Ethylbenzene | ug/L | 1 |
| 8260B | Ethyl methacrylate | ug/L | 1 |
| 8260B | Trichlorofluoromethane | ug/L | 2 |
| 8260B | Hexachlorobutadiene | ug/L | 1 |
| 8260B | 2-Hexanone | ug/L | 5 |
| 8260B | Iodomethane | ug/L | 1 |
| 8260B | Isobutyl alcohol | ug/L | 50 |
| 8260B | Methacrylonitrile | ug/L | 10 |
| 8260B | Methylene chloride | ug/L | 5 |
| 8260B | Methyl methacrylate | ug/L | 4 |
| 8260B | 4-Methyl-2-pentanone | ug/L | 5 |
| 8260B | Naphthalene | ug/L | 1 |
| 8260B | Propionitrile | ug/L | 10 |
| 8260B | Styrene | ug/L | 1 |
| 8260B | 1,1,1,2-Tetrachloroethane | ug/L | 1 |
| 8260B | 1,1,2,2-Tetrachloroethane | ug/L | 1 |
| 8260B | Tetrachloroethene | ug/L | 1 |
| 8260B | Toluene | ug/L | 1 |
| 8260B | 1,2,4-Trichlorobenzene | ug/L | 1 |
| 8260B | 1,1,1-Trichloroethane | ug/L | 1 |
| 8260B | 1,1,2-Trichloroethane | ug/L | 1 |
| 8260B | Trichloroethene | ug/L | 1 |
| 8260B | 1,2,3-Trichloropropane | ug/L | 1 |
| 8260B | Vinyl acetate | ug/L | 2 |
| 8260B | Vinyl chloride | ug/L | 1 |
| 8260B | Xylenes (total) | ug/L | 2 |
| 8260B | 1,2-Dibromo-3-chloropropane (DBCP) | ug/L | 2 |
| 8260B | 1,2-Dibromoethane (EDB) | ug/L | 1 |
| 8260B | 2-Butanone (MEK) | ug/L | 5 |

**Table 7-13 Full Appendix IX List of Constituents**

Chemical Waste Management of the Northwest, Inc. Arlington, Oregon

| | | | |
|---|---|---|---|
| 8270C | Acenaphthene | ug/L | 10 |
| 8270C | Acenaphthylene | ug/L | 10 |
| 8270C | Acetophenone | ug/L | 10 |
| 8270C | 2-Acetylaminofluorene | ug/L | 100 |
| 8270C | 4-Aminobiphenyl | ug/L | 50 |
| 8270C | Aniline | ug/L | 10 |
| 8270C | Anthracene | ug/L | 10 |
| 8270C | Benzo(a)anthracene | ug/L | 10 |
| 8270C | Benzo(b)fluoranthene | ug/L | 10 |
| 8270C | Benzo(k)fluoranthene | ug/L | 10 |
| 8270C | Benzo(ghi)perylene | ug/L | 10 |
| 8270C | Benzo(a)pyrene | ug/L | 10 |
| 8270C | Benzyl alcohol | ug/L | 10 |
| 8270C | bis(2-Chloroethoxy)methane | ug/L | 10 |
| 8270C | bis(2-Chloroethyl) ether | ug/L | 10 |
| 8270C | bis(2-Ethylhexyl) phthalate | ug/L | 10 |
| 8270C | 4-Bromophenyl phenyl ether | ug/L | 10 |
| 8270C | Butyl benzyl phthalate | ug/L | 10 |
| 8270C | 4-Chloroaniline | ug/L | 10 |
| 8270C | 4-Chloro-3-methylphenol | ug/L | 10 |
| 8270C | 2-Chloronaphthalene | ug/L | 10 |
| 8270C | 2-Chlorophenol | ug/L | 10 |
| 8270C | 4-Chlorophenyl phenyl ether | ug/L | 10 |

## TABLE 7-13 List of Appendix IX Constituents

**Table 7-13 Full Appendix IX List of Constituents (continued)**
Chemical Waste Management of the Northwest, Inc. Arlington, Oregon

| METHOD # | TEST DESCRIPTION | Units | Reporting Limit |
|---|---|---|---|
| 8270C | Chrysene | ug/L | 10 |
| 8270C | Diallate | ug/L | 20 |
| 8270C | Dibenz(a,h)anthracene | ug/L | 10 |
| 8270C | Dibenzofuran | ug/L | 10 |
| 8270C | Di-n-butyl phthalate | ug/L | 10 |
| 8270C | 1,2-Dichlorobenzene | ug/L | 10 |
| 8270C | 1,3-Dichlorobenzene | ug/L | 10 |
| 8270C | 1,4-Dichlorobenzene | ug/L | 10 |
| 8270C | 3,3'-Dichlorobenzidine | ug/L | 50 |
| 8270C | 2,4-Dichlorophenol | ug/L | 10 |
| 8270C | 2,6-Dichlorophenol | ug/L | 10 |
| 8270C | Diethyl phthalate | ug/L | 10 |
| 8270C | Thionazin | ug/L | 10 |
| 8270C | Dimethoate | ug/L | 20 |
| 8270C | 4-Dimethylaminoazobenzene | ug/L | 20 |
| 8270C | 7,12-Dimethylbenz(a)anthracene | ug/L | 20 |
| 8270C | 3,3'-Dimethylbenzidine | ug/L | 20 |
| 8270C | 2,4-Dimethylphenol | ug/L | 10 |
| 8270C | Dimethyl phthalate | ug/L | 10 |
| 8270C | Di-n-octyl phthalate | ug/L | 10 |
| 8270C | 1,3-Dinitrobenzene | ug/L | 10 |
| 8270C | 4,6-Dinitro-2-methylphenol | ug/L | 50 |
| 8270C | 2,4-Dinitrophenol | ug/L | 50 |
| 8270C | 2,4-Dinitrotoluene | ug/L | 10 |
| 8270C | 2,6-Dinitrotoluene | ug/L | 10 |
| 8270C | Diphenylamine | ug/L | 10 |
| 8270C | Disulfoton | ug/L | 50 |
| 8270C | Ethyl methanesulfonate | ug/L | 10 |
| 8270C | Famphur | ug/L | 200 |
| 8270C | Fluoranthene | ug/L | 10 |
| 8270C | Fluorene | ug/L | 10 |
| 8270C | Hexachlorobenzene | ug/L | 10 |
| 8270C | Hexachlorobutadiene | ug/L | 10 |
| 8270C | Hexachlorocyclopentadiene | ug/L | 50 |
| 8270C | Hexachloroethane | ug/L | 10 |
| 8270C | Hexachlorophene | ug/L | 1000 |
| 8270C | Hexachloropropene | ug/L | 100 |
| 8270C | Indeno(1,2,3-cd)pyrene | ug/L | 10 |
| 8270C | Isodrin | ug/L | 10 |
| 8270C | Isophorone | ug/L | 10 |
| 8270C | Isosafrole | ug/L | 20 |
| 8270C | Methapyrilene | ug/L | 50 |
| 8270C | o-Toluidine | ug/L | 10 |
| 8270C | 3-Methylcholanthrene | ug/L | 20 |
| 8270C | Methyl methanesulfonate | ug/L | 10 |
| 8270C | 2-Methylnaphthalene | ug/L | 10 |
| 8270C | Methyl parathion | ug/L | 50 |
| 8270C | 2-Methylphenol | ug/L | 10 |
| 8270C | 3-Methylphenol | ug/L | 10 |
| 8270C | 4-Methylphenol | ug/L | 10 |
| 8270C | Naphthalene | ug/L | 10 |
| 8270C | 1,4-Naphthoquinone | ug/L | 50 |
| 8270C | 1-Naphthylamine | ug/L | 10 |
| 8270C | 2-Naphthylamine | ug/L | 10 |
| 8270C | 2-Nitroaniline | ug/L | 50 |
| 8270C | 3-Nitroaniline | ug/L | 50 |
| 8270C | 4-Nitroaniline | ug/L | 50 |
| 8270C | Nitrobenzene | ug/L | 10 |
| 8270C | 2-Nitrophenol | ug/L | 10 |
| 8270C | 4-Nitrophenol | ug/L | 50 |

**Table 7-13 Full Appendix IX List of Constituents (continued)**
Chemical Waste Management of the Northwest, Inc. Arlington, Oregon

| METHOD # | TEST DESCRIPTION | Units | Reporting Limit |
|---|---|---|---|
| 8270C | 4-Nitroquinoline-1-oxide | ug/L | 100 |
| 8270C | N-Nitrosodi-n-butylamine | ug/L | 10 |
| 8270C | N-Nitrosodiethylamine | ug/L | 10 |
| 8270C | N-Nitrosodimethylamine | ug/L | 10 |
| 8270C | N-Nitrosodi-n-propylamine | ug/L | 10 |
| 8270C | N-Nitrosodiphenylamine | ug/L | 10 |
| 8270C | N-Nitrosomethylethylamine | ug/L | 10 |
| 8270C | N-Nitrosomorpholine | ug/L | 10 |
| 8270C | N-Nitrosopiperidine | ug/L | 10 |
| 8270C | N-Nitrosopyrrolidine | ug/L | 10 |
| 8270C | 5-Nitro-o-toluidine | ug/L | 20 |
| 8270C | Parathion | ug/L | 50 |
| 8270C | Pentachlorobenzene | ug/L | 10 |
| 8270C | Pentachloroethane | ug/L | 50 |
| 8270C | Pentachloronitrobenzene | ug/L | 50 |
| 8270C | Pentachlorophenol | ug/L | 50 |
| 8270C | Phenacetin | ug/L | 20 |
| 8270C | Phenanthrene | ug/L | 10 |
| 8270C | Phenol | ug/L | 10 |
| 8270C | Phorate | ug/L | 50 |
| 8270C | 2-Picoline | ug/L | 20 |
| 8270C | Pronamide | ug/L | 20 |
| 8270C | Pyrene | ug/L | 10 |
| 8270C | Pyridine | ug/L | 20 |
| 8270C | Safrole | ug/L | 50 |
| 8270C | 1,2,4,5-Tetrachlorobenzene | ug/L | 10 |
| 8270C | 2,3,4,6-Tetrachlorophenol | ug/L | 50 |
| 8270C | Sulfotepp | ug/L | 50 |
| 8270C | 1,2,4-Trichlorobenzene | ug/L | 10 |
| 8270C | 2,4,5-Trichlorophenol | ug/L | 10 |
| 8270C | 2,4,6-Trichlorophenol | ug/L | 10 |
| 8270C | O,O,O-Triethyl phosphorothioate | ug/L | 50 |
| 8270C | 1,3,5-Trinitrobenzene | ug/L | 50 |
| 8270C | Chlorobenzilate | ug/L | 10 |
| 8270C | a,a-Dimethylphenethylamine | ug/L | 50 |
| 8270C | Aramite | ug/L | 20 |
| 8270C | 4-Phenylenediamine | ug/L | 100 |
| 8270C | 2,2'-oxybis(1-Chloropropane) | ug/L | 10 |
| 8081A | Aldrin | ug/L | 0.05 |
| 8081A | alpha-BHC | ug/L | 0.05 |
| 8270C | 1,2,4,5-Tetrachlorobenzene | ug/L | 10 |
| 8270C | 2,3,4,6-Tetrachlorophenol | ug/L | 50 |
| 8270C | Sulfotepp | ug/L | 50 |
| 8270C | 1,2,4-Trichlorobenzene | ug/L | 10 |
| 8270C | 2,4,5-Trichlorophenol | ug/L | 10 |
| 8270C | 2,4,6-Trichlorophenol | ug/L | 10 |
| 8270C | O,O,O-Triethyl phosphorothioate | ug/L | 50 |
| 8270C | 1,3,5-Trinitrobenzene | ug/L | 50 |
| 8270C | Chlorobenzilate | ug/L | 10 |
| 8270C | a,a-Dimethylphenethylamine | ug/L | 50 |
| 8270C | Aramite | ug/L | 20 |
| 8270C | 4-Phenylenediamine | ug/L | 100 |
| 8270C | 2,2'-oxybis(1-Chloropropane) | ug/L | 10 |
| 8081A | Aldrin | ug/L | 0.05 |
| 8081A | alpha-BHC | ug/L | 0.05 |
| 8081A | beta-BHC | ug/L | 0.05 |
| 8081A | delta-BHC | ug/L | 0.05 |
| 8081A | gamma-BHC (Lindane) | ug/L | 0.05 |
| 8081A | Chlordane (technical) | ug/L | 0.5 |
| 8081A | 4,4'-DDD | ug/L | 0.05 |

**Table 7-13 Full Appendix IX List of Constituents (continued)**
Chemical Waste Management of the Northwest, Inc. Arlington, Oregon

| METHOD # | TEST DESCRIPTION | Units | Reporting Limit |
|---|---|---|---|
| 8081A | 4,4'-DDE | ug/L | 0.05 |
| 8081A | 4,4'-DDT | ug/L | 0.05 |
| 8081A | Diallate | ug/L | 1 |
| 8081A | Dieldrin | ug/L | 0.05 |
| 8081A | Endosulfan I | ug/L | 0.05 |
| 8081A | Endosulfan II | ug/L | 0.05 |
| 8081A | Endosulfan sulfate | ug/L | 0.05 |
| 8081A | Endrin | ug/L | 0.05 |
| 8081A | Endrin aldehyde | ug/L | 0.05 |
| 8081A | Heptachlor | ug/L | 0.05 |
| 8081A | Heptachlor epoxide | ug/L | 0.05 |
| 8081A | Isodrin | ug/L | 0.1 |
| 8081A | Kepone | ug/L | 1 |
| 8081A | Methoxychlor | ug/L | 0.1 |
| 8081A | Toxaphene | ug/L | 5 |
| 8081A | Chlorobenzilate | ug/L | 0.1 |
| 8082 | Aroclor 1016 | ug/L | 1 |
| 8082 | Aroclor 1221 | ug/L | 1 |
| 8082 | Aroclor 1232 | ug/L | 1 |
| 8082 | Aroclor 1242 | ug/L | 1 |
| 8082 | Aroclor 1248 | ug/L | 1 |
| 8082 | Aroclor 1254 | ug/L | 1 |
| 8082 | Aroclor 1260 | ug/L | 1 |
| 9030B/9034 | Total Sulfide | mg/L | 4 |
| 8151A | 2,4-D | ug/L | 4 |
| 8151A | Dinoseb | ug/L | 0.6 |
| 8151A | 2,4,5-TP (Silvex) | ug/L | 1 |
| 8151A | 2,4,5-T | ug/L | 1 |
| 6010B | Arsenic, Dissolved | ug/L | 10 |
| 6010B | Cadmium, Dissolved | ug/L | 5 |
| 6010B | Chromium, Dissolved | ug/L | 10 |
| 6010B | Copper, Dissolved | ug/L | 10 |
| 6010B | Antimony, Dissolved | ug/L | 10 |
| 6010B | Barium, Dissolved | ug/L | 10 |
| 6010B | Beryllium, Dissolved | ug/L | 5 |
| 6010B | Cobalt, Dissolved | ug/L | 10 |
| 6010B | Lead, Dissolved | ug/L | 3 |
| 7470A | Mercury, Dissolved | ug/L | 0.2 |
| 6010B | Silver, Dissolved | ug/L | 10 |
| 6010B | Thallium, Dissolved | ug/L | 10 |
| 6010B | Tin, Dissolved | ug/L | 100 |
| 6010B | Vanadium, Dissolved | ug/L | 10 |
| 6010B | Zinc, Dissolved | ug/L | 20 |
| 6010B | Nickel, Dissolved | ug/L | 40 |
| 6010B | Selenium, Dissolved | ug/L | 5 |
| 8280A | Total TCDF | ng/L | |
| 8280A | Total PeCDF | ng/L | |
| 8280A | Total HxCDF | ng/L | |
| 8280A | Total TCDD | ng/L | |
| 8280A | 2,3,7,8-TCDD | ng/L | |
| 8280A | Total PeCDD | ng/L | |
| 8280A | Total HxCDD | ng/L | |
| 9010A | Total Cyanide | mg/L | 0.01 |
| 6020 | Selenium, Dissolved | ug/L | 5 |

**Table 7-13 Full Appendix IX List of Constituents (continued)**

Chemical Waste Management of the Northwest, Inc. Arlington, Oregon

| METHOD # | TEST DESCRIPTION | Units | Reporting Limit |
|---|---|---|---|

**Notes:**

mg/L = milligrams per liter
µg/L = micrograms per liter
ng/L = nanograms per liter

[a] Reporting limits shown in this table assume that no sample dilution is necessary. Actual reporting limits may be higher if dilution is necessary or if blank contamination is detected. Reporting limits shown in this table may change based upon the laboratory's annual verification of method detection limits and assessment of precision and bias. For dioxin and furans the reporting limits are determined from the lowest concentration used to calibrate each congener.

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# APPENDIX A

E MANAGEMENT

## Well Condition Summary Form

': ______________________________ Well/Piezometer Name: ______________

:or: ______________________________ Evaluation Date: ____________________

| | Y | |
|---|---|---|
| vell's location appropriately shown on a facility map? | | |
| vell adequately flagged if hard to find? | | |
| vell elevation information inscribed at or on the well correct? | | |
| vell:<br>❑ flush with surface?<br>❑ above ground? | | |
| vell free of physical damage? | | |
| vell labeled on the inside? | | |
| vell labeled on the outside? | | |
| he well have protective posts, if necessary? | | |
| ove ground wells have weep holes at the base of the protective casing? | | |
| he area around the well appear clean? | | |
| casing secure (attempt to move along two perpendicular axes)? | | |
| surface seal void of differential erosion around and under the base? | | |
| surface seal free of cracks that might affect the integrity of the seal? | | |
| surface seal sloped to prevent ponding around the well? | | |
| vell free from standing or ponded water? | | |
| vell locked to prevent unauthorized access? | | |
| protective casing cap void of large gaps which would breach security? | | |
| ocking cap free of rust? | | |
| a survey mark on the riser/wellhead assembly cap? | | |
| riser cap vented? | | |
| nnular space free of animal/insect nests? | | |
| nnular space appropriately filled with filtering material? | | |
| mp, can it be lifted a few inches? (do not test prior to sampling) | | |
| vell free of kinks or bends? | | |

IENTS: ____________________________________________________________

______________________________________________________________________

______________________________________________________________________

Example Well Condition Summary Form

# FIELD INFORMATION FORM

WASTE MANAGEMENT

Site Name:

Site No.: Sample Point: Sample ID

**This Waste Management Field Information Form is Required**
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

| PURGE DATE (MM DD YY) | PURGE TIME (2400 Hr Clock) | ELAPSED HRS (hrs:min) | WATER VOL IN CASING (Gallons) | ACTUAL VOL PURGED (Gallons) | WELL VOLs PURGED |
|---|---|---|---|---|---|

*Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark changes, record field data, below.*

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: Y or N

Filter Device: Y or N 0.45 µ or µ (circle or fill in)

Purging Device — A- Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Sampling Device

X-Other:

Filter Type: A-In-line Disposable, B-Pressure, C-Vacuum, X-Other

Sample Tube Type: A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other:

WELL DATA

Well Elevation (at TOC) (ft/msl)

Depth to Water (DTW) (from TOC) (ft)

Groundwater Elevation (site datum, from TOC) (ft/msl)

Total Well Depth (from TOC) (ft)

Stick Up (from ground elevation) (ft)

Casing ID (in)

Casing Material

*Note: Total Well Depth, Stick Up, Casing Id, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and Groundwater Elevation must be current.*

STABILIZATION DATA (Optional)

| Sample Time (2400 Hr Clock) | Rate/Unit | pH (std) | Conductance (SC/EC) (µmhos/cm @ 25 °C) | Temp. (°C) | Turbidity (ntu) | D.O. (mg/L - ppm) | eH/ORP (mV) | DTW (ft) |
|---|---|---|---|---|---|---|---|---|
| | | 1st | 1st | | | | | |
| | | 2nd | 2nd | | | | | |
| | | 3rd | 3rd | | | | | |
| | | 4th | 4th | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Suggested range for 3 consec. readings or note Permit/State requirements: | | +/- 0.2 | +/- 3% | -- | -- | +/- 10% | +/- 25 mV | Stabilize |

**Stabilization Data Fields are Optional** *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form*

FIELD DATA

| SAMPLE DATE (MM DD YY) | pH (std) | CONDUCTANCE (umhos/cm @ 25°C) | TEMP. (°C) | TURBIDITY (ntu) | DO (mg/L-ppm) | eH/ORP (mV) | Other: Units |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

**Final Field Readings are required** *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.*

FIELD COMMENTS

**Sample Appearance:** Odor: Color: Other:

**Weather Conditions** (required daily, or as conditions change): Direction/Speed: Outlook: Precipitation: Y or N

**Specific Comments (including purge/well volume calculations if required):**

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

| Date | Name | Signature | Company |
|---|---|---|---|
| ___/___/___ | | | |
| ___/___/___ | | | |

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Example Field Information Form

**Sample Collection/Laboratory Analytical Program**

**Site Name:** **Site Number:**
**Well ID:** **Date:**

**Monitoring Program:** ___RCRA Detection ___RCRA Semi-Annual Compliance
___RCRA Annual Compliance ___TSCA Program

**Sampling Guidance**
Controller Settings (in-out-psi-ml/min)
Initial Flow: Low Flow:
Depth to top of screen (ft bmp):
Maximum DTW (ft bmp) for adequate sample volume:
One purge volume (tubing + pump bladder):

| Sample ID/Time | Number of Sample Containers | Volume of Each Container | Bottle Type | Preservative | Field Filtered? | Analytes |
|---|---|---|---|---|---|---|
| | | | | | | |
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**Shipping Method:** **Laboratory:**
NAPL observed during purging or sampling?
Depth to water before purging?
Depth to water at end of purging or beginning of sampling?
Depth to water at end of sampling?
Comments/Exceptions to Groundwater Monitoring Plan:

___________________ ___________________ ________________ ______
___________________ ___________________ ________________ __/__/__
**Sampler's Name** **Sampler's Signature** **Company** **Date**

Example Sample Collection / Lab Analytical Program Form

# APPENDIX B

## Appendix B Site Specific Low Flow Sampling

### Site-Specific Purging and Sampling Methodology

A drawdown criteria matrix was developed for field staff to look-up maximum allowed rates of drawdown given the purge rate, well diameter, and water level monitoring frequency. The drawdown criteria are shown in Table 7-8 for purge rates ranging from 0.01 gallons per minute (gpm) to 1 gpm; well diameters of 2, 4, and 5 inches; and water level measurement frequencies of 5 and 10 minutes. For each purge rate, each well diameter, and the two different measurement frequencies, the drawdown criteria were derived by the following methodology:

- Calculating the total volume of water purged during a given time interval (5 or 10 minutes);
- Calculating 10 percent of the total purge volume. The 10 percent volume is the maximum amount of water during that time interval that is allowed to consist of resident water inside the well casing (i.e., not derived from the formation/sandpack);
- Dividing the 10 percent volume by the horizontal area of the water column inside the well casing to determine the vertical amount of the water column that comprises the 10 percent volume. This water column height equals the maximum amount of water level decline (during a 5- or 10-minute time increment) for which no more than 10 percent of the purged water is comprised of resident water inside the well casing.

By drawing down the water column by no more than this incremental amount during the 5-minute or 10-minute time increment, the site-specific low-flow methodology is designed to provide (1) no more than 10 percent of the purge water from inside the well casing and (2) at least 90 percent of the purge water from the formation/sandpack.

An example of this calculation is shown below for a purge rate of 0.1 gpm, a 10-minute interval between water level measurements, and a 4-inch well diameter:

$V_{purge}$ = Volume purged every 10 minutes = 0.1 gpm * 10 minutes = 1 gallon

$V_{max\text{-}casing}$ = Maximum allowed volume of water from casing during a 10-minute interval
= 10% * 1 gallon = 0.1 gallons
= 0.1 gallons * (12*12*12 $inches^3$ / $ft^3$) / (7.481 gallons/$ft^3$)
= 23.10 $inches^3$

A = Horizontal area of water column inside well
= $\pi * d^2 / 4 = \pi * (4 \text{ inches})^2 / 4 = (3.14159 * 4) \text{ inches}^2$
= 12.5664 $inches^2$

H = maximum allowed water level decline during a 10-minute interval
= $V_{max\text{-}casing}$ / A
= 23.10 $inches^3$ / 12.5664 $inches^2$
= 1.838 inches
= 0.153 ft, or 0.15 ft when rounding to the nearest $1/100^{th}$ of a foot

Similarly, for a 5-minute interval instead of a 10-minute interval, the purge-rate of 0.1 gpm would result in a maximum allowed drawdown of 0.0765 ft for a 4-inch-diameter well. Because water levels are measured to the nearest 0.01 ft, the calculated drawdown criterion value of 0.0765 ft is rounded to 0.08 ft for the purposes of applying Table 7-8 in the field.

In the case where the formation is too low-yielding to allow the drawdown criteria to be achieved, purging is allowed to continue until the water level is no lower than 1 ft above the well screen (for wells with at least 10 ft of screen submergence prior to purging) or no lower than halfway from the initial (static) water level to the pump intake (for wells with less than 10 ft of screen submergence prior to purging). Table 7-14 identifies these values as the target depth for stopping purging. For low-yielding wells, these purge depths result in a sufficient volume of water being present in the well to allow VOC samples to be collected (Table 7-14). The "maximum depth to water" that still provides sufficient sample volume is below the depth at which purging shall stop. These "maximum" depths have been calculated from the well diameter, the purge tube diameter, the depth of the pump, and the "sampling volume" that is necessary to evacuate one purge-tube volume, evacuate one bladder volume, fill sample containers, collect a final set of field parameters, and provide additional volume to ensure that these activities can be completed. For low-yielding wells, the sampling team shall remove one purge volume of water before collecting the necessary samples. The depth-to-water criteria shall be updated in the future as needed (for example, when new pumps are installed, or when pumps are serviced and their intake depths change).

The target depths for stopping purging (listed in Table 7-14) were developed to serve as guidelines for how long to continue purging wells that are low-yielding (i.e., cannot be successfully low-flow sampled). For wells that can be low-flow sampled, the sampling team shall attempt to conduct the site-specific low-flow sampling procedure while maintaining the water level above the target depth listed in Table 7-14. However, at some wells, this procedure may be feasible only when the water level is lowered below the target depth listed in Table 7-14. In such cases, preference shall be given to conducting low-flow sampling, rather than stopping the purging process and returning later to the well to collect samples.

### Field Procedures

The site-specific low-flow sampling method consists of the following field procedures:

- The well shall initially be purged at a rate targeted to be 0.1 gpm (approximately 0.4 liters per minute [L/min]). Purging at this rate shall continue until the amount of drawdown in the well is similar to the amount that has occurred historically when low-flow sampling efforts were successful. Select field parameters (pH, temperature, specific conductance, dissolved oxygen [DO], oxidation-reduction potential [ORP], depth to water, total gallons purged, and purge rate) shall be measured once during initial evacuation of one purge volume and several times thereafter as described below.

- As the water level approaches the target low-flow water level achieved during previous successful low-flow sampling events, the purge rate shall be reduced, and purging shall continue until the water level meets the drawdown criterion listed in Table 7-14 (for the purge rate and diameter of the well being sampled). The depth-to-water (along with the other field parameters) shall be recorded at least once every five minutes during this period and at the end of this period. Once the drawdown criterion is achieved, the sample shall be collected.
- If the drawdown criterion cannot be achieved at the well, then the sampling team is allowed to purge the water level down to a pre-determined depth as discussed below. Table 7-14 identifies the depth by which purging shall stop (although purging may stop at a higher water level if deemed appropriate by the sampling team). VOC samples then shall be collected within 48 hours of stopping the purging process. The sampling process shall begin by first evacuating one purge volume of water; VOC sampling shall proceed as soon as this purge volume has been evacuated. If the volume of water in the well is too low to allow for collection of additional analytes (PCBs, Appendix IX constituents, or other analytes), then the samples for VOCs shall be collected and the sampling team shall return at a later time during the sampling event (as convenient) to collect the remaining samples. If multiple sampling periods are required to collect the additional analytes, then one purge volume shall again be evacuated before collecting the additional analytes.
- If a sample cannot be collected without exceeding the pre-determined depth shown in Table 7-14 during a sampling event and sampling at a depth below the water level is required, the sampling team must document this on the FIF and explained in the semiannual monitoring report for the event.

Field parameter measurements that are conducted during purging and sampling shall be recorded on the FIFs. Where possible, the purging process shall continue until field parameters have stabilized (stabilization targets are included on the FIFs). However, the field parameter measurements shall not be used to evaluate stabilization of water quality or to guide decisions regarding the timing of sample collection. Instead, if one or more field parameters have not yet stabilized before the drawdown criterion have been achieved, or if the water level has dropped to the level described in the previous paragraph, then purging shall stop and the well shall be sampled. Field parameters shall also be measured prior to, or at the conclusion of, the sample collection process.

**Sample Preservation, Shipment, and Chain-of-Custody Procedures**

Once a sample is collected, it will remain in the custody of the field personnel who collected the sample, or other authorized personnel, until it is shipped to the laboratory. When such a person transfers sample possession to subsequent custodians, he or she will sign and date the chain-of-custody form (COC). Signed and dated custody seals will be placed on coolers before shipment. When the samples are received at the laboratory, the custody seal on the shipping container will be broken and the condition of the samples recorded by the laboratory custodian. COC records will be included in the analytical report prepared by the laboratory. Copies of the COC records will be retained in the project file.

The sample containers will be prepared and provided by the analytical laboratory. Samples will be preserved consistent with analytical method requirements and laboratory recommendations.

The type and size of container used for each analysis and the type of preservative added, if any, will be recorded on the FIF.

Samples will be shipped or delivered by hand to the contract laboratory after completion of each monitoring event. Due to shipping limitations in eastern Oregon, samples are not shipped each day during a monitoring event. The samples are maintained under custody of the field personnel until the completion of each monitoring event.

Packaging and shipment general procedures are as follows:

- Preserve and transport sample containers on ice (or a suitable equivalent) in a sealed, insulated cooler.
- Separate glass bottles in the shipping container with shock-absorbent packaging material to prevent breakage.
- Place a laboratory-supplied trip blank in each cooler containing samples for VOC analysis.

**Table 7-14**
**Depth-To-Water Criteria For Sampling**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Well I.D. | Monitoring Program | Required Analytes (Excluding PCBs, Appx. IX) | Well Diam. (in.) | Well Casing Area ($in.^2$) | Well Casing Area ($ft.^2$) | Purge Tube Outer Diam. (in.) | Purge Tube Inner Diam. (in.) | Purge Tube Inner Radius (in.) | Purge Tube Area ($in.^2$) | Purge Tube Area ($ft.^2$) | Fall 2015 Depth to Static Water (ft.) [a] | Top of Screen Depth (ft.) [a] | Screen Submergence Prior to Purging (ft.) | Well Depth (feet) [a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3G-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 162.10 | 175.05 | 12.95 | 185.05 |
| 3P-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 193.20 | 207.10 | 13.90 | 222.10 |
| 3R-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 167.43 | 172.80 | 5.37 | 183.60 |
| 3Ta-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 223.93 | 228.30 | 4.37 | 238.30 |
| 4H-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 170.90 | 184.50 | 13.60 | 199.70 |
| 5A-1 | Detection | VOCs | 5 | 19.63 | 0.136 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 180.98 | 180.96 | -0.02 | 208.17 |
| 5L-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.25 | 0.17 | 0.085 | 0.0227 | 0.0002 | 188.62 | 186.71 | -1.91 | 211.71 |
| 5M-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 210.35 | 209.02 | -1.33 | 229.69 |
| 5N-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 223.31 | 215.11 | -8.20 | 234.90 |
| 5P-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 198.29 | 202.70 | 4.41 | 227.89 |
| 5Q-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 216.62 | 214.52 | -2.10 | 233.01 |
| 6C-9 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 171.10 | 187.90 | 16.80 | 207.90 |
| 7A-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 125.24 | 142.19 | 16.95 | 152.46 |
| 7B-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 145.24 | 158.77 | 13.53 | 169.01 |
| 7C-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 165.84 | 180.26 | 14.42 | 190.45 |
| 7D-1 | Detection | VOCs | 4 | 12.57 | 0.087 | 0.375 | 0.25 | 0.125 | 0.0491 | 0.0003 | 173.02 | 188.23 | 15.21 | 198.60 |

| Well I.D. | Pump Type | Pump Intake Depth (ft.) [a,b] | Pump Submergence Prior to Purging (ft) | Purge Tube Volume (gallons) | Pump Bladder Volume (gallons) | Flow-Through Cell Volume (gallons) | Total (One) Purge Volume (gallons) | Total (One) Purge Volume (liters) | Sampling Volume (gallons) [c] | Sampling Volume + One Purge Volume (gallons) | Sampling Volume + One Purge Volume (liters) | Eq. Water Column Height In Well (ft.) | Eq. Water Height In Well If Purge Tube Partially Full (ft) [a] [e] | Target Max DTW for Sampling (ft.) [a, d] | Is Target Max DTW Below Top of Screen? | Is Static Water at Least 10 ft. Above Top of Screen? | Target DTW for Stopping Purging of Low-Yield Wells [a, e, f] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3G-1 | WW | 180.05 | 17.95 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 3P-1 | WW | 214.60 | 21.40 | 0.55 | 0.11 | 0.00 | 0.66 | 2.5 | 0.33 | 0.99 | 3.8 | 1.52 | 2.19 | 213.08 | Yes | Yes | 208.10 |
| 3R-1 | WW | 177.80 | 10.37 | 0.46 | 0.11 | 0.00 | 0.57 | 2.2 | 0.33 | 0.90 | 3.5 | 1.38 | 1.91 | 176.42 | Yes | No | 172.62 |
| 3Ta-1 | WW | 233.30 | 9.37 | 0.60 | 0.11 | 0.00 | 0.71 | 2.7 | 0.33 | 1.04 | 4.0 | 1.59 | 2.34 | 231.71 | Yes | No | 228.62 |
| 4H-1 | WW | 192.00 | 21.10 | 0.49 | 0.11 | 0.00 | 0.60 | 2.3 | 0.33 | 0.93 | 3.6 | 0.00 | 0.00 | 192.00 | Yes | Yes | 185.50 |
| 5A-1 | WW | 194.20 | 13.22 | 0.50 | 0.11 | 0.00 | 0.61 | 2.4 | 0.33 | 0.94 | 3.6 | 0.92 | 1.30 | 193.28 | Yes | No | 187.59 |
| 5L-1 | WW | 199.20 | 10.58 | 0.24 | 0.11 | 0.00 | 0.35 | 1.4 | 0.33 | 0.68 | 2.6 | 1.04 | 1.24 | 198.16 | Yes | No | 193.91 |
| 5M-1 | WW | 219.02 | 8.67 | 0.56 | 0.11 | 0.00 | 0.67 | 2.6 | 0.33 | 1.00 | 3.8 | 1.53 | 2.22 | 217.49 | Yes | No | 214.69 |
| 5N-1 | WW | 233.00 | 9.69 | 0.60 | 0.11 | 0.00 | 0.71 | 2.7 | 0.33 | 1.04 | 4.0 | 1.59 | 2.34 | 231.41 | Yes | No | 228.16 |
| 5P-1 | WW | 215.00 | 16.71 | 0.55 | 0.11 | 0.00 | 0.66 | 2.5 | 0.33 | 0.99 | 3.8 | 1.52 | 2.19 | 213.48 | Yes | No | 206.65 |
| 5Q-1 | WW | 223.00 | 6.38 | 0.57 | 0.11 | 0.00 | 0.68 | 2.6 | 0.33 | 1.01 | 3.9 | 1.55 | 2.25 | 221.45 | Yes | No | 219.81 |
| 6C-9 | WW | 197.90 | 26.80 | 0.51 | 0.11 | 0.00 | 0.62 | 2.4 | 0.33 | 0.95 | 3.6 | 1.46 | 2.07 | 196.44 | Yes | Yes | 188.90 |
| 7A-1 | WW | 147.19 | 21.95 | 0.38 | 0.11 | 0.00 | 0.49 | 1.9 | 0.33 | 0.82 | 3.2 | 1.26 | 1.67 | 145.93 | Yes | Yes | 143.19 |
| 7B-1 | WW | 163.77 | 18.53 | 0.42 | 0.11 | 0.00 | 0.53 | 2.1 | 0.33 | 0.86 | 3.3 | 1.32 | 1.79 | 162.45 | Yes | Yes | 159.77 |
| 7C-1 | WW | 185.26 | 19.42 | 0.48 | 0.11 | 0.00 | 0.59 | 2.3 | 0.33 | 0.92 | 3.5 | 1.41 | 1.98 | 183.85 | Yes | Yes | 181.26 |
| 7D-1 | WW | 193.23 | 20.21 | 0.50 | 0.11 | 0.00 | 0.61 | 2.4 | 0.33 | 0.94 | 3.6 | 1.44 | 2.04 | 191.79 | Yes | Yes | 189.23 |

ft = inches;  in = inches;  DTW = depth to water;  PCBs = polychlorinated biphenyls;  VOCs = volatile organic compounds;  WW = Well Wizard bladder pump

ND = Not Determined, 3G-1 details for purge criteria will be determined once the Well Wizard pumping system is installed and prior to incorporation into the groundwater detection monitoring program.

[a] Measured from the top of casing.
[b] Pump intake depths for Well Wizards are measured or are assumed to be in the middle of the screened portion of the well.
[c] The sampling volume accounts for container volumes, field parameter measurements, and incidental additional purged volumes.
[d] Calculated assuming that the purge tube is full.
[e] For the purposes of this calculation, a "low-yield" well is one where the drawdown criterion in the Groundwater Monitoring Plan cannot be achieved during low-flow purging.
[f] The Target DTW is 1 foot above the top of the screen for wells that have more than 10 feet of submergence prior to purging. For low-yielding wells with less than 10 feet of pre-purging screen submergence, the Target DTW is set at the mid-point between the static water level and the pump intake.

# APPENDIX C

**Appendix Table 7-15**
**Monitoring Well and Piezometer Inventory**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Location ID | Aquifer | Easting | Northing | Site Area | Use |
|---|---|---|---|---|---|
| A-2 | Selah Level 2 | 8263468.42 | 714011.17 | West of L-14 | P |
| C-2 | Selah Level 2 | 8264187.28 | 715720.88 | Northern Boundary | P |
| D-9 | Selah Level 1 | 8266106.95 | 714337.1 | Northeast of Ponds A&B | P |
| E-3 | L3 PR Flowtop | 8263575.36 | 715262.83 | North of Anticline | P |
| F-2 | Selah Level 2 | 8266048.01 | 715326.01 | North of Anticline | P |
| G-2 | Selah Level 2 | 8266127.52 | 712704.47 | L-12 | P |
| H-2 | Selah Level 2 | 8266139.61 | 711458.36 | Southeast of L-13 | P |
| | | | | | |
| J-2 | Selah Level 2 | 8263466.71 | 712256.68 | West of L-6 | P |
| K-1 | Selah Level 1 | 8264181.39 | 715712.29 | Northern Boundary | P |
| La-2 | Selah Level 2 | 8266135.26 | 713381.5 | L-12 | P |
| MW1-2 | Selah Level 2 | 8264694.07 | 711538.99 | Southwest of L-13 | P |
| U-1 | Selah Level 1 | 8263577.98 | 715707.38 | Northern Boundary | P |
| U-1A | Selah Level 1 | 8263570.15 | 715701.07 | Northern Boundary | P |
| U-2 | Selah Level 2 | 8263577.98 | 715707.38 | Northern Boundary | P |
| V-1 | Selah Level 1 | 8265658.46 | 711436.57 | South of L-13 | P |
| V-2 (V-9) | Selah Level 1 & 2 | 8265657.04 | 711427.01 | South of L-13 | P |
| Va-1 | Selah Level 1 | 8265656.61 | 711421.45 | South of L-13 | P |
| Va-1A | Selah Level 1 | 8265662.57 | 711426.1 | South of L-13 | P |
| Va-2 | Selah Level 2 | 8265662.57 | 711426.1 | South of L-13 | P |
| Vb-1 | Selah Level 1 | 8265647.52 | 711428.44 | South of L-13 | P |
| Vb-1A | Selah Level 1 | 8265647.52 | 711428.44 | South of L-13 | P |
| Vb-2 | Selah Level 2 | 8265647.52 | 711428.44 | South of L-13 | P |
| W1-1,2 (W-9) | Selah Level 2 | 8263114.77 | 715243.55 | North of Anticline | P |
| W3-9 | Selah Level 1 & 2 | 8262967.38 | 714829.94 | Anticline (West) | P |
| W4-2 | Selah Level 2 | 8263047.93 | 714306.08 | West of L-14 | P |
| W6-2 | Selah Level 2 | 8262045.24 | 714133.62 | West of L-14 | P |
| W9-1 | Selah Level 1 | 8263032.76 | 713160.82 | West of L-14 | P |
| W9-2 | Selah Level 2 | 8263032.76 | 713160.82 | West of L-14 | P |
| X-2 | Selah Level 2 | 8263481.3 | 712602.86 | West of L-1 | P |
| Y-9 | Selah Level 1 | 8264080.53 | 714843.09 | Anticline (West) | P |
| Z-9 | Selah Level 1 & 2 | 8263467.94 | 714930.62 | Anticline (West) | P |

**Appendix Table 7-15**
**Monitoring Well and Piezometer Inventory**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Location ID | Aquifer | Easting | Northing | Site Area | Use |
|---|---|---|---|---|---|
| 2A-2 | Selah Level 2 | 8264402.6 | 715043.2 | North of Anticline | P |
| 2B-2 | Selah Level 2 | 8264724.72 | 715031.73 | North of Anticline | P |
| 2C-9 | Selah Level 1 & 2 | 8263477.9 | 714603.25 | Thrust Fault | P |
| 2D-9 | Selah Level 1 & 2 | 8263482.02 | 714308.94 | L-14 | P |
| 2E-9 | Selah Level 1 & 2 | 8264077.75 | 715031.29 | North of Anticline | P |
| 2F-9 | Selah Level 1 & 2 | 8263793.16 | 715028.69 | North of Anticline | P |
| 2G-9 | Selah Level 1 & 2 | 8263477.43 | 714161.63 | L-14 | P |
| 2H-2 | Selah Level 2 | 8264231.15 | 715047.16 | North of Anticline | P |
| 2I-2 | Selah Level 2 | 8263904.32 | 714471.4 | Thrust Fault | P |
| 2Na-1 | Selah Level 1 | 8264648.44 | 714468.8 | Anticline (Central) | P |
| 2N-2 | Selah Level 2 | 8264678.83 | 714465.39 | Anticline (Central) | P |
| 2N-4 | L4 PR Interflow Zone | 8264680.72 | 714456.14 | Anticline (Central) | P |
| 2O-1 | Selah Level 1 | 8265728.62 | 714993.49 | Anticline (East) | P |
| 2O-2 | Selah Level 2 | 8265728.62 | 714993.49 | Anticline (East) | P |
| 2O-4 | L4 PR Interflow Zone | 8265732.3 | 714981.29 | Anticline (East) | P |
| 2Ra-1 | Selah Level 1 | 8264160.51 | 712745.1 | L-1 / L-3 | P |
| 2S-1 | Selah Level 1 | 8263689.85 | 711892.18 | Southwest of L-6 | P |
| 2S-2 | Selah Level 2 | 8263689.85 | 711892.18 | Southwest of L-6 | P |
| 2T-1 | Selah Level 1 | 8264166.01 | 711686.18 | South of L-6 | P |
| 2T-2 | Selah Level 2 | 8264166.01 | 711686.18 | South of L-6 | P |
| 2Ua-1 | Selah Level 1 | 8266132.81 | 712177.95 | L-13 | P |
| 2U-2 | Selah Level 2 | 8266133.98 | 712168.56 | L-13 | P |
| 2U-3 | L3 PR Flowtop | 8266133.85 | 712154.49 | L-13 | P |
| 2U-4 | L4 PR Interflow Zone | 8266135.01 | 712158.65 | L-13 | P |
| 2V-1 | Selah Level 1 | 8265043.25 | 713084.27 | L-9 / L-10 | P |
| 2V-2 | Selah Level 2 | 8265043.25 | 713084.27 | L-9 / L-10 | P |
| 2Vb-1 | Selah Level 1 | 8265035.42 | 713079.27 | L-9 / L-10 | P |
| 2Vb-1A | Selah Clay Layer | 8265035.42 | 713079.27 | L-9 / L-10 | P |
| 2Vb-2 | Selah Level 2 | 8265035.42 | 713079.27 | L-9 / L-10 | P |
| 2Wa-1 | Selah Level 1 | 8265398.81 | 714177.28 | North of Ponds A&B | P |
| 2W-1 | Selah Level 1 | 8265399 | 714203 | North of Ponds A&B | P |
| 2W-2 | Selah Level 2 | 8265398.63 | 714203.3 | North of Ponds A&B | P |
| 2W-3 | L3 PR Flowtop | 8265399.47 | 714212.72 | North of Ponds A&B | P |

**Appendix Table 7-15**
**Monitoring Well and Piezometer Inventory**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Location ID | Aquifer | Easting | Northing | Site Area | Use |
|---|---|---|---|---|---|
| 2X-1 | Selah Level 1 | 8265124.28 | 711463.38 | South of L-13 | P |
| 2X-2 | Selah Level 2 | 8265124.28 | 711463.38 | South of L-13 | P |
| 2Y-4 | L4 PR Interflow Zone | 8265590.54 | 710739 | Alkali Canyon Rd | P |
| 3B-1 | Selah Level 1 | 8263657.58 | 714166.47 | Background | P |
| 3B-2 | Selah Level 1 | 8263657.58 | 714166.47 | Background | P |
| 3E-2 | Selah Level 2 | 8265151.91 | 714563.03 | Anticline (East) | P |
| 3F-2 | Selah Level 2 | 8264096.86 | 714311.92 | Anticline (West) | P |
| 3G-1 | Selah Level 1 | 8264947.14 | 714300.29 | Northwest of Ponds A&B | MW |
| 3G-2 | Selah Level 2 | 8264947.47 | 714310.85 | Northwest of Ponds A&B | P |
| 3H-1 | Selah Level 1 | 8265469.54 | 714386.23 | North of Ponds A&B | P |
| 3H-2 | Selah Level 2 | 8265470.6 | 714396.38 | North of Ponds A&B | P |
| 3I-1 | Selah Level 1 | 8265611.36 | 714614.22 | Anticline (East) | P |
| 3I-2 | Selah Level 2 | 8265610.45 | 714624.44 | Anticline (East) | P |
| 3J-1 | Selah Level 1 | 8265639.57 | 713970.21 | Ponds A&B | P |
| 3J-2 | Selah Level 2 | 8265640.93 | 713980.92 | Ponds A&B | P |
| 3Ka-1 | Selah Level 1 | 8265481.89 | 713113.53 | L-9 / L-10 | P |
| 3Ka-2 | Selah Level 2 | 8265466.88 | 713115.28 | L-9 / L-10 | P |
| 3Kb-1 | Selah Level 1 | 8265511.18 | 713085.54 | L-9 / L-10 | P |
| 3Kb-2 | Selah Level 2 | 8265504.63 | 713074.89 | L-9 / L-10 | P |
| 3Kc-2 | Selah Level 2 | 8265484.61 | 713080.44 | L-9 / L-10 | P |
| 3M-1 | Selah Level 1 | 8264951 | 713776.95 | L-14, Ponds A&B | P |
| 3M-2 | Selah Level 2 | 8264951.31 | 713766.84 | L-14, Ponds A&B | P |
| 3O-1 | Selah Level 1 | 8263981.08 | 712213.62 | L-6 | P |
| 3O-2 | Selah Level 2 | 8263990.41 | 712212 | L-6 | P |
| 3P-1 | Selah Level 1 | 8264785.41 | 712209.42 | L-6 / L-7 | MW |
| 3P-2 | Selah Level 2 | 8264794.07 | 712211.09 | L-6 / L-7 | P |
| 3Q-1 | Selah Level 1 | 8265913.55 | 711698.46 | L-13 | P |
| 3Q-1A | Selah Clay Layer | 8265900.48 | 711699.89 | L-13 | P |
| 3Q-2 | Selah Level 2 | 8265906.11 | 711688.3 | L-13 | P |
| 3R-1 | Selah Level 1 | 8264256.48 | 712204.75 | L-6 | MW |
| 3S-1 | Selah Level 1 | 8265331.87 | 711649.76 | L-13 | P |
| 3S-2 | Selah Level 2 | 8265321.93 | 711649.23 | L-13 | P |
| 3T-1A | Selah Clay Layer | 8266099.23 | 711773.66 | L-13 | P |

**Appendix Table 7-15**
**Monitoring Well and Piezometer Inventory**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Location ID | Aquifer | Easting | Northing | Site Area | Use |
|---|---|---|---|---|---|
| 3T-2 | Selah Level 2 | 8266096.76 | 711783.71 | L-13 | P |
| 3Ta-1 | Selah Level 1 | 8266107.22 | 711780.29 | L-13 | MW |
| 3V-2 | Selah Level 2 | 8264349.12 | 713104.08 | L-14 | P |
| 3Y-2 | Selah Level 2 | 8265321.14 | 713083.81 | L-9 / L-10 | P |
| 4B-1 | Selah Level 1 | 8265015.07 | 712592.5 | L-7 / L-8 | P |
| 4Ba-2 | Selah Level 2 | 8265015.06 | 712581.78 | L-7 / L-8 | P |
| 4H-1 | Selah Level 1 | 8265225.41 | 714000.38 | L-14 | MW |
| 4H-2 | Selah Level 2 | 8265214.75 | 713999.85 | L-14 | P |
| 4Ja-1 | Selah Level 1 | 8265674.19 | 712855.32 | L-9 / L-12 | P |
| 4J-2 | Selah Level 2 | 8265662.98 | 712854.68 | L-9 / L-12 | P |
| 4K-2 | Selah Level 2 | 8265659.85 | 713352.84 | L-10 / L-12 | P |
| 4P-1 | Selah Level 1 | 8266115.12 | 713939.21 | East of Ponds A&B | P |
| 4Pa-2 | Selah Level 2 | 8266105.95 | 713933.82 | East of Ponds A&B | P |
| 5A-1 | Selah Level 1 | 8264574.73 | 712212.18 | L-6 | MW |
| 5A-2 | Selah Level 2 | 8264593.74 | 712190.02 | L-6 | P |
| 5B-1 | Selah Level 1 | 8265005.39 | 712395.18 | L-7 | P |
| 5B-2 | Selah Level 2 | 8264986.63 | 712321.89 | L-7 | P |
| 5D-1 | Selah Level 1 | 8264991.15 | 712805.2 | L-7/L-8/L-9 | P |
| 5D-2 | Selah Level 2 | 8264994.29 | 712825.81 | L-7/L-8/L-9 | P |
| 5G-1 | Selah Level 1 | 8264338.18 | 712536.04 | L-3 | P |
| 5I-1 | Selah Level 1 | 8264225.1 | 712568.48 | L-1 / L-3 | P |
| 5J-1 | Selah Level 1 | 8265613.13 | 712597.72 | L-8 / L-13 | P |
| 5J-2 | Selah Level 2 | 8265589.94 | 712596.08 | L-8 / L-13 | P |
| 5L-1 | Selah Level 1 | 8265469.62 | 711656.26 | L-13 | MW |
| 5L-2 | Selah Level 2 | 8265480.21 | 711655.68 | L-13 | P |
| 5M-1 | Selah Level 2 | 8265721.27 | 711689.41 | L-13 | MW |
| 5M-2 | Selah Level 2 | 8265719.81 | 711666.9 | L-13 | P |
| 5N-1 | Selah Level 1 | 8266133.57 | 711930 | L-13 | MW |
| 5N-2 | Selah Level 2 | 8266133.94 | 711938.57 | L-13 | P |
| 5O-1 | Selah Level 1 | 8265838.39 | 712657.32 | L-12 / L-13 | P |
| 5O-2 | Selah Level 2 | 8265827.97 | 712658.15 | L-12 / L-13 | P |
| 5P-1 | Selah Level 1 | 8266058.07 | 712673.72 | L-12 / L-13 | MW |
| 5P-2 | Selah Level 2 | 8266049.02 | 712686.52 | L-12 / L-13 | P |

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**Monitoring Well and Piezometer Inventory**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Location ID | Aquifer | Easting | Northing | Site Area | Use |
|---|---|---|---|---|---|
| 5Q-1 | Selah Level 1 | 8266138.51 | 712993.93 | L-12 | MW |
| 5Q-2 | Selah Level 2 | 8266139 | 713005.74 | L-12 | P |
| 5R-2 | Selah Level 2 | 8266137.78 | 713176.05 | L-12 | P |
| 5S-1 | Selah Level 1 | 8266134.93 | 713441.01 | L-12 | P |
| 5T-2 | Selah Level 2 | 8266036.17 | 713624.07 | L-12 | P |
| 5U-9 | Selah Level 1 | 8266018.49 | 714324.88 | Northeast of Ponds A&B | P |
| 5V-9 | Selah Level 1 | 8265809.45 | 714405.5 | Northeast of Ponds A&B | P |
| 6B-9 | Selah Level 1 & 2 | 8265465.28 | 713666.37 | Pond B, L-10 | P |
| 6C-9 | Selah Level 1 & 2 | 8265639 | 713801 | Pond B | MW |
| 6G-1 | Selah Level 1 | 8263511.11 | 713699.93 | West of L-14 | P |
| 6G-1A | Selah Level 1 | 8263511.76 | 713704.46 | West of L-14 | P |
| 6G-2 | Selah Level 2 | 8263512.21 | 713709.26 | West of L-14 | P |
| 6J-2 | Selah Level 2 | 8263481.4 | 713020.15 | Southwest of L-14 | P |
| 6K-2 | Selah Level 2 | 8264084.44 | 714960.38 | North of Anticline | P |
| 6L-1 | Selah Level 1 | 8263567.17 | 714701.1 | Anticline (West) | P |
| 7A-1 | Selah Level 1 | 8264024.77 | 713074.69 | L-14 | MW |
| 7A-2 | Selah Level 2 | 8264015.95 | 713076.45 | L-14 | P |
| 7B-1 | Selah Level 1 | 8264418.42 | 713091.15 | L-14 | MW |
| 7C-1 | Selah Level 1 | 8264745.81 | 713103.22 | L-14 | MW |
| 7C-2 | Selah Level 2 | 8264733.31 | 713102.18 | L-14 | P |
| 7D-1 | Selah Level 1 | 8264881.81 | 713082.85 | L-14 | MW |
| 7D-2 | Selah Level 2 | 8264870.37 | 713085.44 | L-14 | P |
| 7E-2 | Selah Level 2 | 8264530.24 | 712206.37 | L-14 | P |
| PRB Test Well | L4 PR Interflow Zone | 8264364 | 713104 | L-14 | P |
| 7E-1 | Selah Level 1 | 8264560.98 | 712235.08 | L-6/L-7 | MW |
| 7F-1 | Selah Level 1 | 8264971.13 | 712320.40 | L-6/L-7 | MW |
| 7G-1 | Selah Level 1 | 8264220.48 | 712227.33 | South of L-6 | MW |
| 7H-1 | Selah Level 1 | 8266162.89 | 712847.81 | East of L-12 | MW |
| 7I-1 | Selah Level 1 | 8266186.11 | 713158.05 | East of L-12 | MW |
| 7J-1 | Selah Level 1 | 8264977.71 | 714437.86 | East ofL-14 Cell 6 | MW |
| 7K-1 | Selah Level 1 | 8264639.97 | 715759.80 | East of Ponds P-C1 and C4 | MW |
| 7L-1 | Selah Level 1 | 8264632.36 | 715057.53 | East of Pond P-C1 | MW |
| 7M-1 | Selah Level 1 | 8262942.99 | 713351.29 | East of Pond P-D3 | MW |

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**Monitoring Well and Piezometer Inventory**
**Chemical Waste Management of the Northwest, Inc. (Arlington, Oregon)**

| Location ID | Aquifer | Easting | Northing | Site Area | Use |
|---|---|---|---|---|---|
| 7N-1 | Selah Level 1 | 8262612.04 | 715399.36 | North of Pond P-E4 | MW |
| 7O-1 | Selah Level 1 | 8263394.39 | 713351.29 | South of Pond P-D3 | MW |
| 7P-1 | Selah Level 1 | 8263694.96 | 716071.81 | North of Pond P-C4 | MW |
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Notes:
MW = monitoring well
P = piezometer
TBD = to be determined