



# **Yakima Railroad Area PCE Contamination**

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## **Groundwater Quality Monitoring Report, 2024**

By  
Matt Mohr

For the  
**Environmental Assessment Program**  
Washington State Department of Ecology  
Southwest Regional Office

Olympia, Washington

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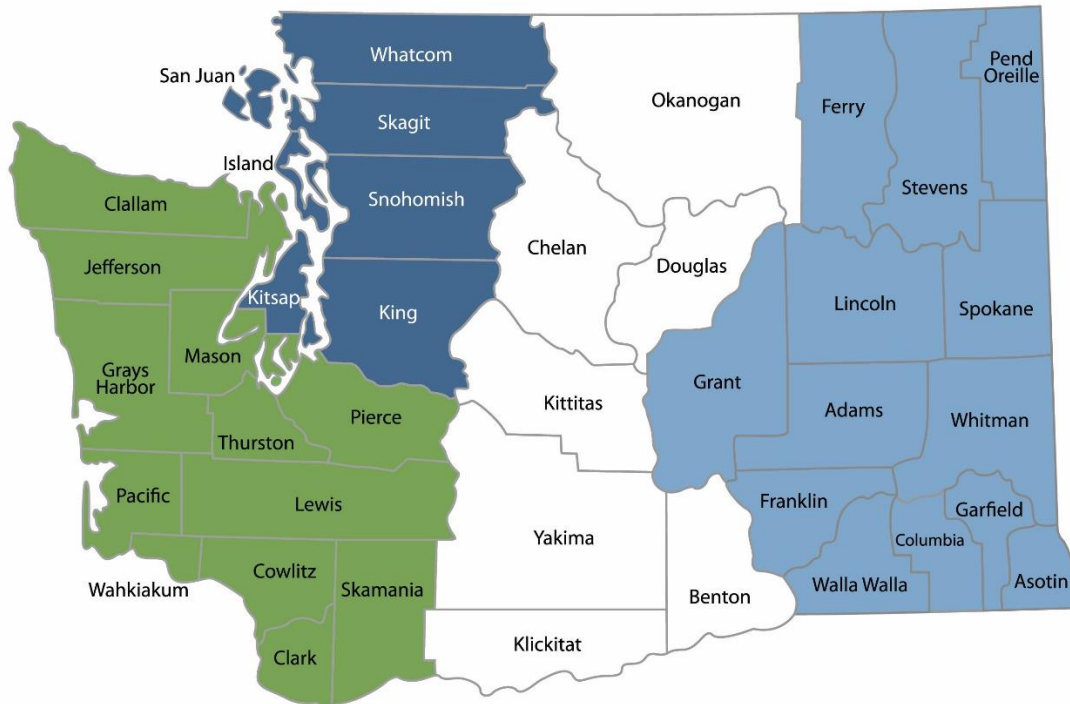
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DEPARTMENT OF  
**ECOLOGY**  
State of Washington

# Table of Contents

<b>Publication Information</b> .....	<b>i</b>
<b>Contact Information</b> .....	<b>i</b>
<b>Department of Ecology’s Regional Offices</b> .....	<b>ii</b>
<b>Table of Contents</b> .....	<b>1</b>
<b>List of Figures and Tables</b> .....	<b>2</b>
<b>Abstract</b> .....	<b>3</b>
<b>Introduction</b> .....	<b>4</b>
Background .....	4
Physical Setting .....	6
<b>Methods</b> .....	<b>7</b>
Groundwater Sampling.....	7
Analysis .....	9
Field Observations .....	9
Analytical Results .....	11
<b>Discussion by Source Area</b> .....	<b>14</b>
Goodwill - City of Yakima .....	14
Nu-Way Cleaners .....	16
Southgate Laundry.....	18
Washington Central Railroad Roundhouse (WCRR) .....	20
Cameron Yakima .....	22
Frank Wear Cleaners.....	26
YRRA Remedial Investigation Wells .....	31
<b>Summary</b> .....	<b>34</b>
Conclusions .....	37
Existing Cleanup Sites .....	37
Remedial Investigation Wells.....	38
Contaminant Impacts to Deep Water-Bearing Zones.....	38
<b>Recommendations</b> .....	<b>39</b>
<b>References</b> .....	<b>40</b>
<b>Glossary, Acronyms, and Abbreviations</b> .....	<b>41</b>
<b>Appendices</b> .....	<b>43</b>
Appendix A. Well Construction Details and Field Measurement Data.....	43
Appendix B. Quality Assurance Review .....	43
Appendix C. Project Results, December 1997 – October 2024 .....	43

# List of Figures and Tables

	Page
Figure 1. Yakima Railroad Area (YRRA) Project Location Map, Yakima, WA. ....	5
Figure 2. YRRA Groundwater Monitoring Locations.....	8
Figure 3. Goodwill — City of Yakima Well Locations and cVOC Results (µg/L), 2024. ....	15
Figure 4. Nu-Way Cleaners Well Locations and cVOC Results (µg/L), 2024. ....	17
Figure 5. Southgate Laundry Well Locations and cVOC Results (µg/L), 2024. ....	19
Figure 6. Washington Central Railroad Roundhouse Well Locations and cVOC Results (µg/L), 2024.....	21
Figure 7. Cameron Yakima Well Locations and cVOC Results (µg/L), 2024.....	25
Figure 8. Frank Wear Cleaners Well Locations and cVOC Results (µg/L), 2024, 1 of 2. ....	27
Figure 9. Frank Wear Cleaners Well Locations and cVOC Results (µg/L), 2024, 2 of 2. ....	28
Figure 10. YRRA Remedial Investigation Well Locations and cVOC Results (µg/L), 2024. ....	33
Figure 11. Shallow Zone Maximum PCE Concentrations by site, 2024. ....	36
Table 1. Summary of YRRA Stable Field Measurements, 2024. ....	10
Table 2. Analytical Results for 2024.....	13
Table 3. Summary of 2024 Cleanup Level Exceedances. ....	35

# Abstract

The Washington State Department of Ecology (Ecology) collected samples from the Yakima Railroad Area (YRRA) during April and October 2024 as part of an ongoing semi-annual sampling program. The YRRA is located along a railroad corridor which covers approximately six-square-miles in the cities of Yakima and Union Gap.

Groundwater in the YRRA is impacted by tetrachloroethene (PCE) contamination from multiple sources. Cleanup activities in the project area began in 1991, and sampling results indicate effective reduction in PCE concentrations at select source area sites. Of the 38 wells sampled in 2024, 17 had PCE concentrations higher than (not meeting) the Model Toxics Control Act (MTCA) cleanup level of 5 µg/L. PCE concentrations exceeding (greater than) the cleanup level within the YRRA ranged from 5.18 µg/L to 18,200 µg/L.

The elevated PCE concentrations occurred in shallow wells at four source areas: Cameron Yakima, Frank Wear Cleaners, Goodwill City of Yakima, and Washington Central Railroad. Two of the westernmost shallow Remedial Investigation (RI) wells also had elevated PCE concentrations. The source of contamination for the RI wells has not been identified.

PCE concentrations higher than the 5 µg/L cleanup level were also detected in the deeper Washington Central Railroad Roundhouse wells, ranging from 10.7 µg/L to 19.0 µg/L. PCE concentrations in these wells indicate the contaminant plume vertically extends into the lower confined water-bearing zone in this portion of the YRRA.

The 2024 groundwater data confirm continued impact from PCE and associated contaminants in groundwater throughout the YRRA project area. While concentrations have decreased at some identified source areas, high PCE concentrations remain in the central portion of the YRRA.

# Introduction

## Background

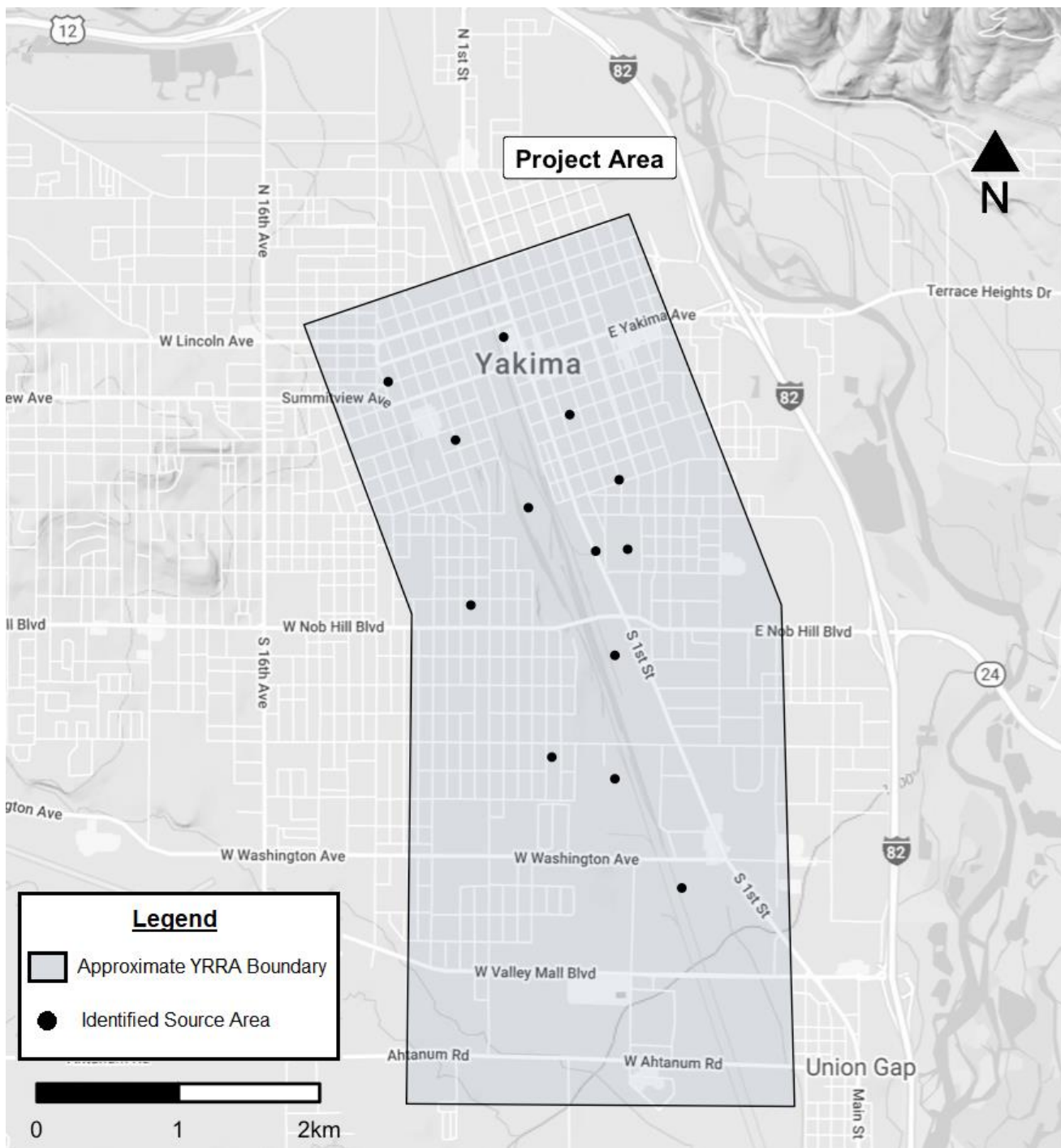
Tetrachloroethene (PCE) contaminated soil and groundwater was discovered along the railroad corridor in Yakima in the 1980s following routine inspections of industrial facilities (Secor 1998). The U.S. Environmental Protection Agency (EPA) referred the findings to Ecology. After numerous soil and groundwater investigations, Ecology established the YRRA to begin site cleanup.

The YRRA spans approximately six square miles of industrial, commercial, and residential property along the railroad corridor in the cities of Yakima and Union Gap (Figure 1). Within the project area, there are 13 commercial and industrial facilities identified by Ecology as potential PCE sources. These sources include machine shops, dry cleaners, a carbon regeneration facility, and a former pesticide formulation plant.

Cleanup activities were conducted at many of the source facilities in the 1990s. A remedial investigation (RI) of the YRRA was conducted in 1998 (Secor 1998). Between 1999 and 2012, routine sampling occurred at 59 monitoring wells to characterize PCE concentrations in the YRRA groundwater. Groundwater analytical results from this period indicated that PCE concentrations were the highest near known sources; however, PCE was present in portions of the shallow aquifer where there are no known sources.

Ecology's Environmental Assessment Program (EAP) assumed responsibility for the area-wide monitoring program in 2013. Initial monitoring activities conducted by Ecology included regular monitoring at a subset of 36 wells in the YRRA. Ten monitoring wells from the Frank Wear Cleaners site were added to the YRRA in 2017, and two wells in the northern extent of the project area were removed. The single Fifth-Wheel Truck Repair monitoring well included in the monitoring plan was decommissioned following the site receiving an opinion letter of No Further Action (NFA) from Ecology in 2023 (Ecology 2023).

The 2024 monitoring activities provide groundwater analytical data to Ecology's Toxics Cleanup Program (TCP) for evaluation of remedial actions taken at the YRRA under the Model Toxics Control Act (MTCA). TCP may also use the data to identify additional impacted areas within the YRRA that require further source investigation and remedial action.



**Figure 1. Yakima Railroad Area (YRRA) Project Location Map, Yakima, WA.**

## Physical Setting

The YRRA is located within the Yakima River floodplain and is mostly underlain by unconsolidated terrace deposits and Quaternary-age alluvium. The terrace deposits generally occur at the surface away from the Yakima River, and beneath alluvium near the river. The terrace deposits consist of coarse gravels interspersed with discontinuous layers of silt, clay, sand, and cemented gravel. This unit averages 90 feet (ft) in thickness and ranges up to 350 ft (USGS 2009). The alluvium consists of unconsolidated silt, sand, gravel, and cobble, and averages 20 ft thickness, ranging up to 120 ft (USGS 2009). In some areas of the YRRA, these unconsolidated Quaternary-age deposits are overlain by up to 20 ft of artificial fill material. Under these deposits, there are consolidated Tertiary-age continental sediments of the Upper Ellensburg Formation.

Groundwater monitoring activities in the YRRA focus on the upper portion of the shallow, unconfined aquifer located within the unconsolidated sands and gravels. Near the Yakima River, this portion of the aquifer is highly permeable; however, the aquifer has reduced permeability in the northern and western portions of the project due to fine-grained material and cemented gravels. The RI/Feasibility Study identified both shallow and deep water-bearing zones of the aquifer because of this variable permeability within the YRRA (Secor 1998). There appears to be hydraulic connectivity between the shallow and deep zones in the southern portion of the project area. The shallow and deep zones appear to be hydraulically separated near the northern extent of the study area.

Groundwater depths within the YRRA range from approximately 3 ft to 30 ft below ground surface (bgs) depending on local topography, precipitation, and seasonal irrigation.

Groundwater depths are greater to the north and lesser to the south. The Yakima Valley, an agricultural area, is heavily irrigated by surface water from nearby rivers between late March and early October. This irrigation causes the water table to fluctuate between 1 ft and 12 ft seasonally, with a deeper water table in the spring, and a shallower water table in the fall.

Groundwater flow in the shallow water-bearing zone is characterized as flow towards the southeast, with an approximate horizontal gradient of 0.005 ft/ft throughout the YRRA. The deep water-bearing zone is estimated to flow primarily to the southeast, with an approximate gradient of 0.004 ft/ft. The vertical gradient across the YRRA is generally downward, and ranges between -0.278 ft/ft in the northern portion of the project area, and -0.005 ft/ft in the southern extent (Secor 1998).

# Methods

## Groundwater Sampling

Ecology's Environmental Assessment Program samples groundwater twice a year in the YRRA, typically in April and October, to assess variability in contamination due to seasonal groundwater level fluctuations.

In 2013, Ecology started sampling a subset of 36 wells in the project area. Ecology excluded wells that reported either low concentrations or no detection of chlorinated volatile organic compounds (cVOCs) during prior sampling events. The cVOC compounds in the project area include PCE and its metabolic breakdown products trichloroethene (TCE), cis-1-2-dichloroethene (DCE), and vinyl chloride (VC).

In 2015, the monitoring intervals of the 36 selected wells were adjusted to improve cost-effectiveness. The frequency of sampling at each well was determined by PCE concentration, seasonal pattern, and temporal trend. Seven wells reported higher PCE concentrations in the spring, 13 wells had higher PCE concentrations in the fall, and there was no apparent seasonal pattern in the remaining wells.

In 2017, 10 wells were added to the monitoring network when the Frank Wear Cleaners site was added to the north end of the project area. Currently, these 10 wells are sampled semi-annually. Monitoring frequency for the Frank Wear Cleaners wells may be adjusted if seasonal patterns or trends can be established. Three wells were also removed from the monitoring program: 1) well NMW-2 at the Nu-Way Cleaners site was decommissioned in 2016, 2) well ATMW-4 at the Agri-Tech site has not been sampled since 2017 due to difficulty locating the well, and 3) well 5WMW-2 was decommissioned in 2023 when the Fifth-Whell site received an NFA opinion letter. The relative locations of the 43 remaining wells in the monitoring program are shown in Figure 2.

In 2024, Ecology sampled 38 of the 43 wells in the monitoring network. Of the wells sampled, 29 are associated with six known source areas for contamination: Goodwill - City of Yakima (Goodwill), Nu-Way Cleaners (Nu-Way), Southgate Laundry (Southgate), Cameron Yakima (Cameron), the Washington Central Railroad Roundhouse (WCRR), and Frank Wear Cleaners (Frank Wear). Wells at these six areas are monitored to evaluate the long-term effectiveness of site-specific remedial activities.

The remaining sampled wells were installed during the Remedial Investigation (RI) and are in the western and southern extent of the YRRA. Analytical data collected from these wells may help to identify areas of further groundwater contamination within the project area that require additional source investigation and remedial action.

Construction details for the sampled wells are provided in Appendix A (Table A-1).

Ecology sampled these wells in accordance with Ecology's Standard Operating Procedures (SOPs) EAP052 (Ecology 2023) and EAP078 (Ecology 2024), and the site-specific Quality Assurance Project Plan (Marti 2013).



**Figure 2. YRRA Groundwater Monitoring Locations**

## Analysis

Groundwater samples were submitted to Ecology's Manchester Environmental Laboratory (MEL) for analysis of volatile organic compounds (VOCs) by a modification of EPA SW-846 Method 8260C.

## Field Observations

Prior to purging groundwater, Ecology measured depth-to-water in each of the 38 monitoring wells. Groundwater field parameters were recorded during purging and samples were collected following parameter stabilization. Final temperature, pH, dissolved oxygen, oxidation-reduction potential (ORP), and specific conductance measurements are listed in Table A-2 in Appendix A.

In 2024, depth-to-water measurements in the spring ranged from about 40.34 ft bgs at the northern end of the YRRA project area to about 10.54 ft bgs at the southern end of the area. In the fall, depth-to-water measurements ranged from about 28.75 ft bgs in the north to 5.58 ft bgs in the south. This seasonal increase in groundwater levels from spring to fall primarily occurs due to irrigation over the summer months.

The overall flow directions for the shallow groundwater appears to be southeast towards the Yakima River. The flow direction in the deep water-bearing zone is difficult to determine due to the limited number of measurements during both sampling events; however, the flow direction has been described as towards the southeast by previous investigations (Kane 2011).

Table 1 summarizes field measurement data for 2024, which were within expected ranges. Dissolved oxygen concentrations in most of the sampled wells had measurements that ranged from about 1 mg/L to 13 mg/L, indicating aerobic conditions in both the shallow and deep wells. Dissolved oxygen concentrations in three of the Frank Wear wells (FWMW-10, FWMW-16, and FWMW-20) and two Washington Central Railroad Roundhouse wells (RMW-3D, RMW-3I) were below 1 mg/L during 2024. Dissolved oxygen concentrations below 1 mg/L indicate an anaerobic environment in groundwater.

**Table 1. Summary of YRRA Stable Field Measurements, 2024.**

Parameter	Number of Observations	Minimum	Maximum	25 <sup>th</sup> Percentile	Median	75 <sup>th</sup> Percentile
Temperature (°C)	51	14.77	19.16	15.82	16.41	16.90
pH (Std Units)	51	6.47	7.98	6.73	6.84	7.19
Conductivity (µS/cm@25°C)	51	159	748	300	348	387
Dissolved Oxygen (mg/L)	51	0.16	13.1	4.40	6.54	7.35
Oxidation Reduction Potential (mV)	51	-67.6	181.4	115.4	124.4	136.3

°C: Degrees celsius

Std Units: Standard unit of pH measurement

µS/Cm: Microsievrts per centimeter

mg/L: Milligrams per liter

mV: Millivolts

## Analytical Results

PCE was detected in 37 of the 38 sampled monitoring wells. Detected PCE concentrations ranged from 1.38 µg/L to 18,200 µg/L throughout the 2024 monitoring period. The 2024 analytical results for PCE and the metabolic breakdown products TCE, DCE, and VC are presented in Table 2.

In April 2024, ten monitoring wells reported PCE concentrations exceeding the 5 µg/L cleanup level. These samples were collected at five Frank Wear wells (FWMW-4, FWMW-10, FWMW-16, FWMW-20, FWMW-24), three Cameron wells (CYIMW103S, CYIMW107S, CYIMW113S), one Goodwill well (GMW-2), and one Remedial Investigation well (RI-4S). Concentrations ranged from an estimated 5.62J µg/L to 18,200 µg/L.

In October 2024, 13 monitoring wells reported PCE concentrations exceeding the 5 µg/L cleanup level. These samples were collected at five Frank Wear wells (FWMW-10, FWMW-16, FWMW-18, FWMW-20, FWMW-24), three Roundhouse wells (RMW-3D, RMW-3I, RMW-3S), three Cameron wells (CYIMW102S, CYIMW103S, CYIMW112S), one Goodwill well (GMW-2), and one Remedial Investigation well (RI-6S). PCE concentrations in these wells ranged from 5.18 µg/L to 17,000 µg/L.

Sample collection and handling bias and overall analytical precision was assessed by collecting field quality control samples consisting of field duplicates, equipment blanks, and transport blank samples. Appendix B presents the Quality Assurance data for the 2024 monitoring period (Tables 3 through 6).

Parent and field duplicate sample concentrations were used to calculate relative percent differences (RPDs), which ranged between 0.5% and 15.7%. All calculated RPDs from the 2024 duplicate samples were below the acceptance criteria value of 30% for parent and duplicate sample concentrations.

PCE was detected in both equipment blank samples collected in April 2024 at an estimated 0.42J µg/L and 1.01 µg/L, respectively. The equipment blanks were collected prior to and following sample collection from the Frank Wear wells with the highest PCE concentrations (FWMW-10, FWMW-20). Analytical results from the first equipment blank indicate that contamination may have occurred prior to sampling the high concentration wells at Frank Wear; therefore, all samples with concentrations less than 5 times the blank sample concentrations are qualified with a “UJ” flag due to the equipment blank contamination. A transport blank from April 2024 reported a tentatively estimated PCE concentration of 0.42NJ µg/L, and as a result all samples with concentrations less than 5 times the detected blank concentration are qualified with a “UJ” flag. All estimated detections below reporting limits include a “J” flag, however, numerous April 2024 samples are “J” qualified due to exceedance of laboratory QC criteria.

PCE was detected in both equipment blank samples collected in October 2024 at an estimated 0.16J µg/L and 0.55J µg/L, respectively. Again, the equipment blanks were collected prior to and following sample collection from the Frank Wear wells with the highest PCE concentrations (FWMW-10, FWMW-20). Analytical results from the earlier equipment blank indicate that

contamination may have occurred prior to sampling the high concentration wells at Frank Wear; therefore, all samples with concentrations less than 5 times the detected blank sample concentrations are qualified with a “UJ” flag due to the equipment blank contamination. The two transport blanks reported estimated PCE concentrations of 0.18J µg/L and 0.19J µg/L, respectively, and as a result all samples with concentrations less than 5 times the detected blank concentration are qualified with a “UJ” flag.

Data from April and October 2024 are considered usable as qualified. Appendix B contains additional details about project quality assurance.

Historical groundwater data for the YRRA monitoring program wells are available in Appendix C (Tables 7 through 52). Historical project data are also presented in the Appendix C timeseries plots (Figures 1 through 51) which depict contaminant concentrations in individual wells throughout the monitoring program.

The following section, Discussion by Source Area, presents a summary of the 2024 results by the six contaminant source areas.

**Table 2. Analytical Results for 2024**

Well	April PCE	April TCE	April DCE	April VC	Oct. PCE	Oct. TCE	Oct. DCE	Oct. VC
CYIMW102S	–	–	–	–	<u>6.25</u>	<b>0.34J</b>	<b>0.29J</b>	0.2U
CYIMW103D	<b>3.48J</b>	<b>0.43J</b>	<b>0.39NJ</b>	0.2U	–	–	–	–
CYIMW103S	<u>10.9J</u>	<b>0.99J</b>	<b>0.54J</b>	0.2U	<u>6.04</u>	<b>0.37J</b>	<b>0.34NJ</b>	0.2 U
CYIMW106S	–	–	–	–	<b>4.36</b>	<b>0.18J</b>	1U	0.2U
CYIMW107S	<u>5.62J</u>	<b>0.54J</b>	<b>0.42NJ</b>	0.2U	<b>4.3</b>	<b>0.18J</b>	1U	0.2U
CYIMW108S	–	–	–	–	<b>2.75</b>	1U	1U	0.2U
CYIMW111S	–	–	–	–	<b>3.79</b>	<b>0.18J</b>	<b>0.25J</b>	0.2U
CYIMW112S	–	–	–	–	<u>9.39</u>	<b>0.51J</b>	<b>0.37J</b>	0.2U
CYIMW113D	<b>4.01J</b>	<b>0.41J</b>	<b>0.37NJ</b>	0.2U	–	–	–	–
CYIMW113S	<u>13.4J</u>	<b>0.98J</b>	<b>0.49J</b>	0.2U	–	–	–	–
FWMW-10	<u>12400</u>	<u>165</u>	<u>68.1</u>	<u>32.1</u>	<u>4260</u>	<u>87.3J</u>	<u>33.3</u>	<u>13.2</u>
FWMW-16	<u>61.1</u>	<u>7.38</u>	<u>91.4</u>	<u>20.9</u>	<u>53.5</u>	<u>6.06</u>	<u>76.2</u>	<u>9.03</u>
FWMW-17	<b>0.62UJ</b>	1U	1U	0.2U	<b>0.37UJ</b>	1U	1U	0.2U
FWMW-18	1.4U	<b>0.43NJ</b>	<b>0.35J</b>	0.2U	<u>5.18</u>	<b>1.33</b>	<b>0.37J</b>	0.2U
FWMW-19	<b>0.55UJ</b>	1U	1U	0.2U	<b>0.31UJ</b>	1U	1U	0.2U
FWMW-20	<u>18200</u>	<u>370</u>	<u>184</u>	<u>19.4</u>	<u>17000</u>	<u>401J</u>	<u>191</u>	<u>35.1</u>
FWMW-24	<b>46.8</b>	<b>1.69</b>	<b>1.24</b>	0.2U	<u>54.3</u>	<b>1.14</b>	<b>0.82J</b>	0.2U
FWMW-4	<u>211J</u>	<b>2.2</b>	<b>2.03</b>	0.2U	<b>4.78</b>	<b>0.11J</b>	<b>0.3NJ</b>	0.2U
FWMW-5	<b>3.93</b>	<b>1.46</b>	<b>1.67</b>	<b>0.15J</b>	<b>3.63</b>	<b>0.61J</b>	<b>0.53J</b>	0.2U
FWMW-6	1.53U	<b>0.37J</b>	<b>0.41NJ</b>	0.2U	<b>2.14</b>	<b>0.22J</b>	<b>0.5J</b>	0.2U
GMW-1	<b>3.52</b>	<b>0.36J</b>	1U	0.2U	–	–	–	–
GMW-2	<u>19.8</u>	<b>0.33J</b>	1U	0.2U	<u>9.89</u>	<b>0.08J</b>	1U	0.2U
GMW-4	1.91U	<b>0.32NJ</b>	1U	0.2U	–	–	–	–
NMW-1	<b>2.46</b>	1U	1U	0.2U	–	–	–	–
RMW-3D	–	–	–	–	<u>10.7</u>	<b>3.78</b>	<b>1.4</b>	0.2U
RMW-3I	–	–	–	–	<u>19</u>	<b>2.23</b>	<b>1.05</b>	0.2U
RMW-3S	–	–	–	–	<u>14.6</u>	<b>0.74J</b>	<b>0.51J</b>	0.2U
SGMW-2	–	–	–	–	<b>1.38</b>	1U	1U	0.2U
SGMW-3	–	–	–	–	<b>1.79</b>	1U	1U	0.2U
RI-3S	<b>0.55UJ</b>	1U	1U	0.2U	–	–	–	–
RI-4D	<b>3.98</b>	1U	1U	0.2U	–	–	–	–
RI-4S	<u>21.5</u>	1U	1U	0.2U	–	–	–	–
RI-5D	<b>2.62</b>	1U	1U	0.2U	–	–	–	–
RI-5S	<b>3.72J</b>	1U	1U	0.2U	–	–	–	–
RI-6S	–	–	–	–	<u>8.98</u>	1U	1U	0.2U
RI-9S	–	–	–	–	<b>1.42</b>	<b>0.09J</b>	1U	0.2U
RI-10S	<b>2.19</b>	<b>0.39J</b>	1U	0.2U	–	–	–	–
RI-11S	–	–	–	–	<b>0.9UJ</b>	1U	1U	0.2U

PCE: Tetrachloroethene; TCE: Trichloroethene; DCE: cis-1,2-dichloroethene; VC: Vinyl chloride; Results in µg/L.

**Bold:** Analyte was detected.

**Bold and Underlined:** Analyte was detected at concentration above cleanup level.

U: Analyte was not detected at or above the reported value.

J: Analyte was positively identified. The associated numerical result is an estimate.

B: Analyte detected in sample and transport blank.

–: Not sampled.

## Discussion by Source Area

Four of the six source areas sampled in the YRRA had PCE concentrations higher than the 5 µg/L cleanup level in at least one well. The sources areas were Cameron, Frank Wear, Goodwill, and the WCRR. Groundwater samples collected at the two remaining source areas — Nu-Way and Southgate Laundry — have not reported concentrations of PCE above the 5 µg/L cleanup level in many years. Two RI wells (RI-4S and RI-6S) with PCE concentrations above the cleanup level are in the western extent of the study area and currently have no known source area.

### Goodwill - City of Yakima

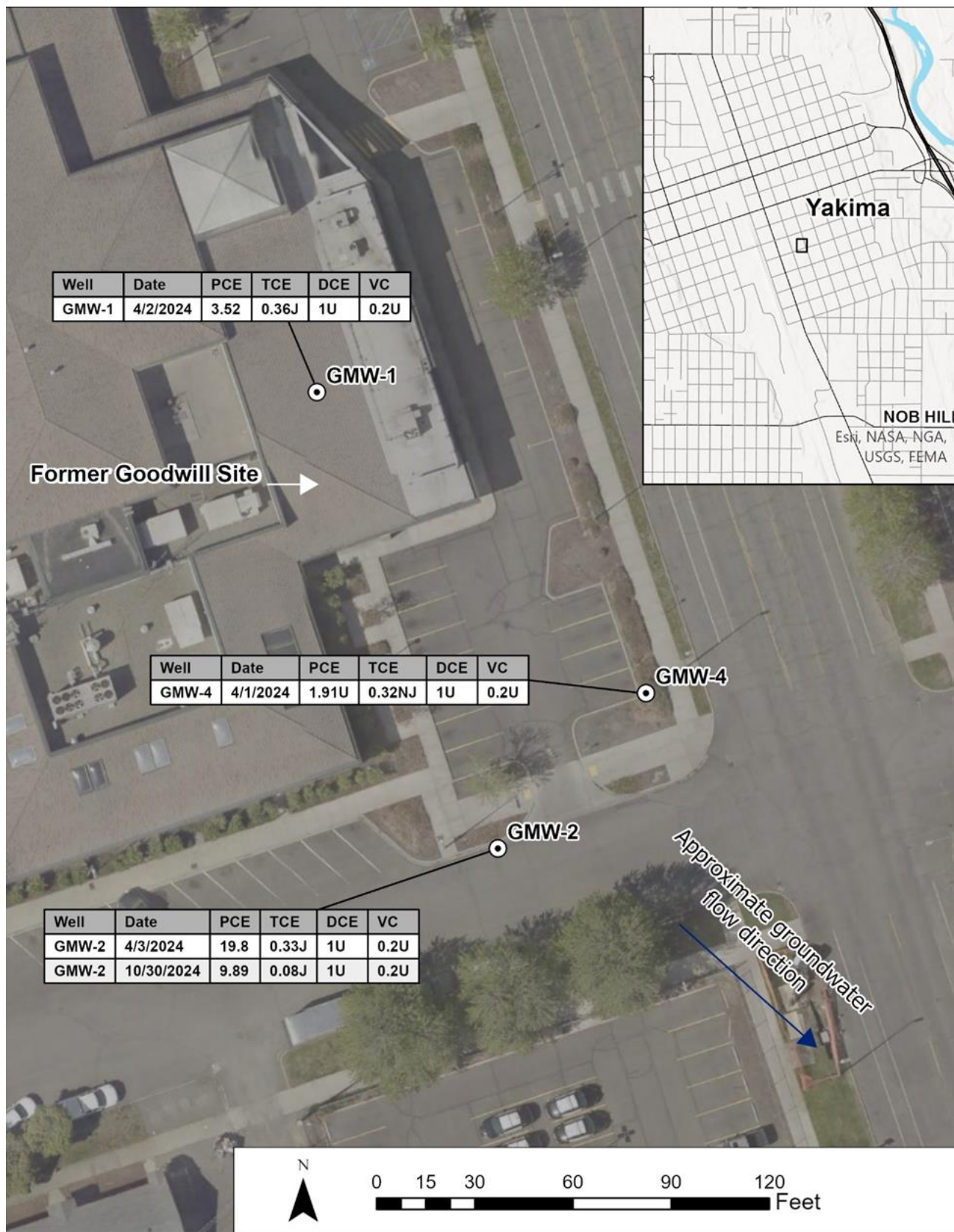
The Goodwill - City of Yakima site is in the northern portion of the YRRA. This site is the present location of the City of Yakima Police station and Justice Center (Figure 2). Contaminated soil was removed at this site in 1995 (Huntingdon Engineering 1995).

In 2024, PCE and TCE were the only chlorinated solvents detected in groundwater samples collected at this site (Figure 3). The PCE metabolic breakdown products DCE and VC were not detected above the reporting limits.

During both monitoring events in 2024, PCE was detected in downgradient well GMW-2. In April and October, PCE was detected above the 5 µg/L cleanup level at concentrations of 19.8 µg/L and 9.89 µg/L, respectively.

Wells GMW-1 and GMW-4 are sampled annually in the spring. During April, PCE was detected in GMW-1 at a concentration of 3.52 µg/L, while PCE was not detected in GMW-4.

PCE concentrations in GMW-2 have generally decreased since 2018, when PCE was detected at an estimated 24J µg/L. However, the samples collected during the 2024 reporting period suggest a continued increase in PCE concentrations, beginning in 2023. Since 2009, PCE concentrations in GMW-1 and GMW-4 have generally been below the 5 µg/L cleanup level, with exception for outlier detections in GMW-1 during 2018 and April 2023 (Appendix C Tables 7 to 9, Figures 1 to 3).



**Figure 3. Goodwill — City of Yakima Well Locations and cVOC Results ( $\mu\text{g/L}$ ), 2024.**

## Nu-Way Cleaners

The Nu-Way Cleaners site sits approximately 0.5 miles southeast of the Goodwill site (Figure 2). PCE source removal activities occurred at this site in 1996 (Enviros 1996).

During April samples were collected from NMW-1. PCE was detected below the 5 µg/L cleanup level at a concentration of 2.46 µg/L (Figure 4). The remaining target analytes were not detected above reporting limits in these samples.

Monitoring well NMW-3 was inaccessible in April due to a parked vehicle since the well is in a parking lot. Well NMW-2 was removed from the YRRA monitoring program and decommissioned in 2016.

Since regular monitoring began at this site in 1997, PCE concentrations in samples collected from the three monitoring wells have generally been below the 5 µg/L cleanup level (Appendix C Tables 10 to 12, Figures 4 to 6). Downgradient PCE concentrations at this site have been consistent with upgradient concentrations of PCE, indicating that this site no longer represents a significant source of PCE to the YRRA plume.



**Figure 4. Nu-Way Cleaners Well Locations and cVOC Results ( $\mu\text{g/L}$ ), 2024.**

## Southgate Laundry

The Southgate Laundry site sits approximately 0.5 miles west of the railroad tracks along Nob Hill Road (Figure 2). Interim remedial activities at this site took place in 1997 and consisted of contaminated soil removal (Maxim Technologies 1998).

During October, PCE was the only contaminant detected at this site (Figure 5). PCE concentrations in downgradient wells SGMW-2 and SGMW-3 were reported at 1.38 µg/L and 1.79 µg/L, respectively, below the cleanup level of 5 µg/L. Upgradient well SGMW-1 was not accessible and could not be sampled.

The historic results for upgradient well SGMW-1 indicate PCE concentrations consistently below the cleanup level of 5 µg/L (Figure C-7). Until 2005, PCE concentrations in downgradient wells SGMW-2 and SGMW-3 were often higher than the cleanup level (Appendix C Figures 8 to 9), ranging from 2 µg/L to 29 µg/L (Appendix C Tables 13 to 15). Samples collected from 2006 onward reported concentrations of PCE below the cleanup level, ranging from below 1 µg/L to 4.5 µg/L, indicating successful PCE reduction from source-removal activities.

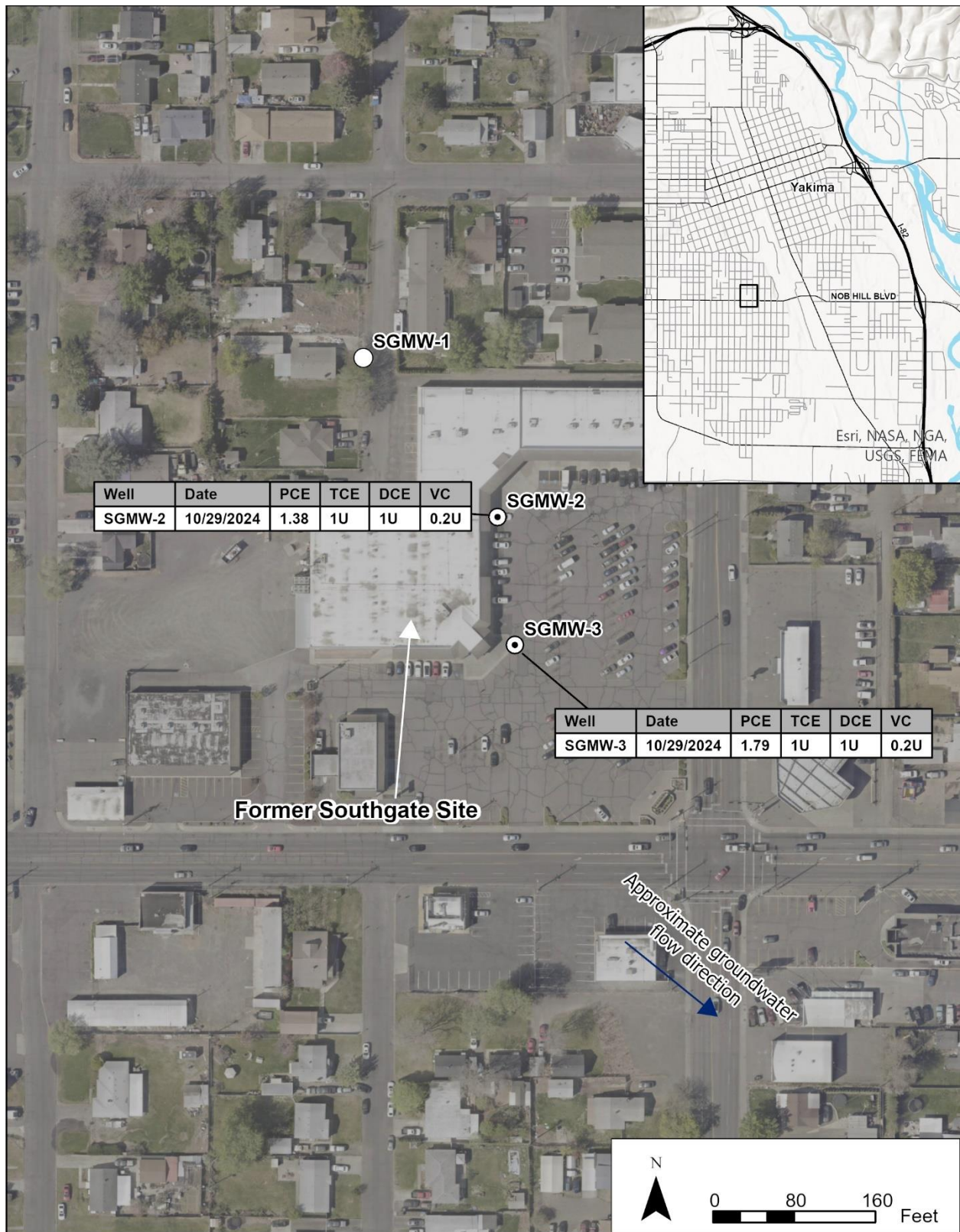


Figure 5. Southgate Laundry Well Locations and cVOC Results ( $\mu\text{g/L}$ ), 2024.

## Washington Central Railroad Roundhouse (WCRR)

The WCRR site is in the central portion of the study area along the railroad tracks (Figure 2). There is no record of remedial activities conducted at this site to reduce PCE contamination. The three WCRR wells are installed in a cluster with completion depths of approximately 30 ft bgs (WDOE-3S), 58 ft bgs (WDOE-3I), and 100 ft bgs (WDOE-3D) (Figure 6). Analytical results from these wells indicate continued elevation of PCE concentrations and associated metabolic breakdown products (Appendix C Tables 16 to 18), demonstrating that the WCRR site represents a significant source of groundwater contamination.

### Shallow Well WDOE-3S

During October, PCE was detected above the cleanup level in RMW-3S at a concentration of 14.6 µg/L. TCE and DCE were detected as estimated concentrations below the 1 µg/L reporting limit. VC was not detected in this well. Except for October 2006, PCE concentrations in RMW-3S have consistently been above the 5 µg/L cleanup level since monitoring began in 1999 (Appendix C Figure 10).

### Deep Wells WDOE-3I and WDOE-3D

During October, PCE was detected in wells RMW-3I and RMW-3D at concentrations of 19 µg/L and 10.7 µg/L, respectively. PCE concentrations were higher than (exceeded) the 5 µg/L cleanup level in both wells. TCE was detected in RMW-3I and RMW-3D at concentrations of 2.23 µg/L and 3.78 µg/L, respectively. In both wells, the TCE concentrations were below the 5 µg/L cleanup level.

DCE was detected in RMW-3I and RMW-3D at concentrations of 1.05 µg/L and 1.4 µg/L, respectively, far below the 70 µg/L cleanup level. VC was not detected in RMW-3I or RMW-3D.

PCE concentrations at RMW-3I have been above the 5 µg/L cleanup level during fall sampling events but have historically been below the cleanup level during spring sampling (Figure 11). PCE concentrations in RMW-3D have consistently been above the 5 µg/L cleanup level during both spring and fall sampling events since monitoring began, with the exception of June 2000 (Figure 12).

Increasing TCE concentrations in RMW-3I were observed during 2009-2014, reaching a local maximum of 15 µg/L in October 2014 (Appendix C Figure 11). From 2014 through 2023, TCE concentrations in wells RMW-3I and RMW-3D have not been detected at concentrations above the 5 µg/L cleanup level (Appendix C Table 17 and 18).

Contaminant concentrations in wells RMW-3I and RMW-3D indicate that the vertical extent of the plume reaches the deep-water-bearing zone in this portion of the YRRA. The data indicate that the WCRR facility continues to represent a significant source of groundwater contamination, including both the shallow and deeper portions of the aquifer system.



**Figure 6. Washington Central Railroad Roundhouse Well Locations and cVOC Results ( $\mu\text{g/L}$ ), 2024.**

## Cameron Yakima

The Cameron Yakima site occupies the central portion of the YRRA, approximately 0.5 miles southeast (downgradient) of the WCRR wells along the west side of the railroad tracks (Figure 2). Site remedial activities consisting of soil excavation occurred between 1999 and 2000 (Creative Environmental Technologies, Inc. 2000).

During 2024, Ecology collected groundwater samples from 10 wells on the Cameron site. PCE was detected in all 10 wells at concentrations ranging from 2.75 µg/L in CYIMW108S during October to an estimated 13.4J µg/L in CYIMW113S during April (Figure 7). Historical groundwater analytical results for the Cameron monitoring wells are presented in Appendix C, Tables 21 to 32 and Figures 16 to 27.

TCE was detected in 9 of the 10 wells, and DCE was detected in eight wells. These PCE degradation products were detected below the applicable reporting limits and fall within the range of historical data collected at the Cameron site since 1997.

VC has not been detected in groundwater samples collected at the Cameron site since sampling began in 1997.

### Wells CYIMW106S and CYIMW107S

Upgradient wells CYIMW106S and CYIMW107S are in the northern portion of the Cameron site (Figure 6).

During October, PCE was detected in CYIMW106S at a concentration of 4.36 µg/L, below the cleanup level. TCE was detected at an estimated concentration below the reporting limit of 1 µg/L. DCE and VC were not detected in CYIMW106S.

PCE concentrations in CYIMW107S ranged between an estimated 5.62J µg/L during April, above the 5 µg/L cleanup level, to 4.3 µg/L during October. TCE concentrations in CYIMW107S ranged from estimated concentrations of 0.54J µg/L in April and 0.18J µg/L in October. DCE was tentatively identified at an estimated concentration of 0.42NJ µg/L during April and was not detected during October. VC was not detected above reporting limits during both the April and October sampling events.

PCE concentrations have been decreasing in these wells following the cleanup actions but have not consistently decreased below the cleanup level (Appendix C Figures 19 to 20). Past PCE concentrations were consistently higher in the fall than in the spring for CYIMW106S. The last time this well was sampled in the spring was in 2014. No apparent seasonal trend is indicated by analytical results from CYIMW107S. Continued elevation in PCE concentrations in these upgradient wells may indicate continued groundwater contamination from upgradient sources at the Cameron site.

### Wells CYIMW102S, CYIMW103S, and CYIMW103D

Wells CYIMW102S, CYIMW103S, and CYIMW103D are located in the northwest portion of the Cameron site (downgradient of CYIMW106S). Two of these are shallow wells (CYIMW102S, CYIMW103S) and one deeper well (CYIMW103D) (Figure 6).

During 2024, PCE concentrations in the two shallow wells ranged from 6.04 µg/L in CYIMW103S during October, to an estimated 10.9J µg/L in CYIMW103S during April. PCE in both shallow wells are consistently above the 5 µg/L cleanup level but have decreased substantially in the years following soil removal activities (Appendix C Figures 16 and 17). In September 1999, prior to soil removal, these wells had some of the highest PCE concentrations in the pre-Frank Wear Cleaners period of the YRRA, at approximately 72 µg/L (CYIMW102S) and 139 µg/L (CYIMW103S). Although PCE concentrations continue to exceed the cleanup level in these two shallow wells, PCE in groundwater has decreased substantially since monitoring began.

PCE was detected at an estimated concentration of 3.48J µg/L in deep well CYIMW103D during April. PCE concentrations from this well have consistently been below the 5 µg/L cleanup level (Appendix C Figure 18).

Concentrations of metabolites TCE and DCE in these wells were estimated concentrations below the 1 µg/L reporting limits throughout the monitoring period. VC was not detected above reporting limits in samples collected in the spring or fall.

### **Wells CYIMW108S and CYIMW111S**

Wells CYIMW108S and CYIMW111S are located in the northeast corner of the site, downgradient from CYIMW106S and CYIMW107S (Figure 6). PCE concentrations in these wells were below the 5 µg/L cleanup level during October. PCE detections ranged between concentrations of 2.75 µg/L and 3.79 µg/L at CYIMW108S and CYIW111S, respectively.

These two wells typically contain lower PCE concentrations than other Cameron monitoring wells. The maximum PCE concentration in these wells was reported as an estimated 9.4J µg/L during August 1998 (Appendix C Figure 21) and has ranged between an estimated 0.13J µg/L and 5.9 µg/L following source removal in 2000.

PCE concentrations in CYIMW111S (Appendix C Figure 24) reached a maximum of an estimated 9.4J µg/L prior to source removal activities and have since typically been below the 5 µg/L cleanup level. Occasional exceedances of the cleanup level have occurred, with the most recent exceedance concentration of 5.5 µg/L reported from October 2009.

Limited detections of PCE in these wells have exceeded the cleanup level since source removal activities were completed. TCE and DCE were detected in CYIMW111S at estimated concentrations below the reporting limit and were non-detect in CYIMW108S. VC was not detected in either well during October.

### **Wells CYIMW112S, CYIMW113S, and CYIMW114S**

Downgradient wells CYIMW112S, CYIMW113S, and CYIMW114S (Appendix C Figures 25, 26 and 28) in the southeast corner of the property (Figure 6). Samples were collected at CYIMW112S and CYIMW113S during 2024, while CYIMW114S is on an odd-year sampling basis and will be sampled in 2025. PCE concentrations at CYIMW112S and CYIMW113S ranged between 9.39 µg/L and an estimated 13.4J µg/L, respectively, above the 5 µg/L cleanup level. TCE and DCE were detected at estimated concentrations below the reporting limit in both wells. VC was not detected in samples collected from these wells during the reporting period.

Historical exceedances of the PCE cleanup level in these wells have occurred frequently following source removal. PCE concentrations in these wells decreased gradually following the cleanup activities in 2000 but increased in 2009 and have since remained near or above the 5 µg/L cleanup level. The elevated PCE concentrations along the downgradient boundary of the site indicate possible off-site migration of the contaminant plume.

### **Deep well CYIMW113D**

Downgradient well CYIMW113D is a deep well paired with shallow well CYIMW113S. PCE was detected at an estimated concentration of 4.01 µg/L, below the 5 µg/L cleanup level. The only historical PCE detection exceeding the cleanup level following source removal occurred during June 2011, with a concentration of 6.1 µg/L (Appendix C Figure 27). TCE and DCE were detected at estimated concentrations below the reporting limit and VC was not detected in the sample collected from this well in 2024.

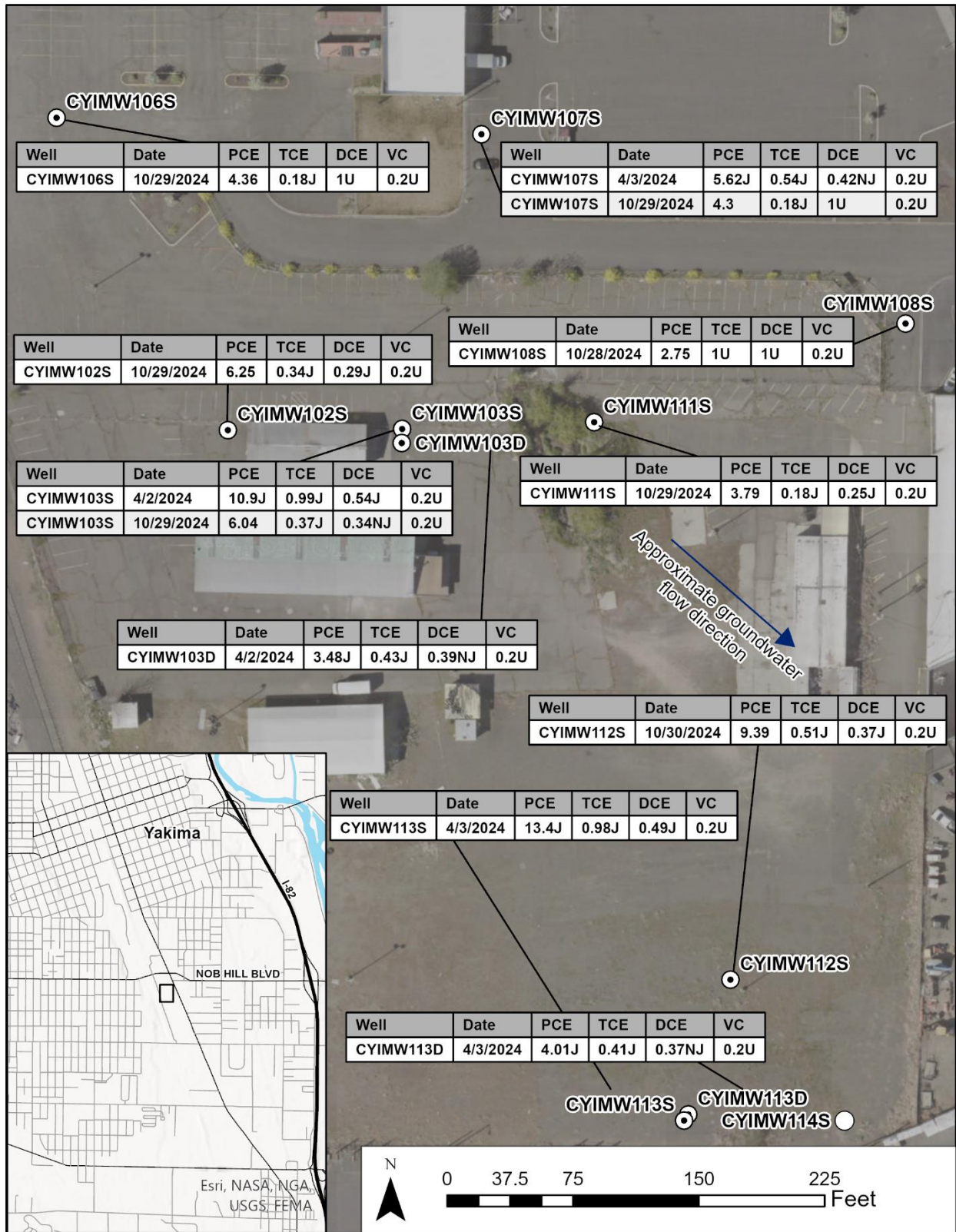


Figure 7. Cameron Yakima Well Locations and cVOC Results (µg/L), 2024.

## Frank Wear Cleaners

The Frank Wear Cleaners site is located at the northern end of the YRRA project area, approximately 0.7 miles upgradient from the WCRR wells (Figure 2). In 2017, the Frank Wear site was added to the YRRA monitoring program.

This site was formerly occupied by a dry-cleaning facility which historically violated dangerous waste regulations and was identified as a PCE source to the YRRA in 1991. Site soils and groundwater were discovered to be highly contaminated with PCE in 1995 (Maxim Technologies 1996). Initial cleanup activities began in 1995 and consisted of the following: (1) contaminated soil removal, (2) removal of the Frank Wear building in 2001, (3) soil vapor extraction (SVE) system installation in 2012, and (4) installation of a groundwater recirculation system (GRS) in 2014. The GRS was shut down in 2016 due to financial constraints, however the SVE unit remains operational.

Ecology collected groundwater samples from 10 of the 24 wells at the Frank Wear site in 2024. Seven of these wells are shallow with completion depths of 35 ft bgs, and three wells are deep with completion depths of 92-93 ft bgs (Figure 8, Figure 9).

PCE was detected in each of the sampled wells throughout the reporting period, however blank contamination may be responsible for low level detections. PCE concentrations ranged from 2.14 µg/L to 18,200 µg/L. TCE was detected in eight wells at estimated concentrations ranging from an estimated 0.11J µg/L to 401J µg/L. DCE was also detected in eight wells at concentrations ranging from a tentatively identified estimate of 0.3NJ µg/L to 191 µg/L. VC was detected in four wells at concentrations ranging from an estimated 0.15J µg/L to 35.1 µg/L (Appendix C Tables 34 through 43).

### Shallow well FWMW-16 and deep well FWMW-17

Shallow well FWMW-16 and deep well FWMW-17 are in the northwest corner of the Frank Wear site (Figure 8).

PCE and the metabolic breakdown products TCE, DCE, and VC were detected in samples collected from FWMW-16 throughout the reporting period. PCE concentrations ranged from 53.5 µg/L in October to 61.1 µg/L in April, far above the 5 µg/L cleanup level. TCE concentrations ranged from 6.06 µg/L to 7.38 µg/L, exceeding the cleanup level of 5 µg/L. DCE concentrations ranged from 76.2 µg/L to 91.1 µg/L, above the 70 µg/L cleanup level. VC ranged from estimated concentrations of 9.03 µg/L to 20.9 µg/L, far exceeding the 0.2 µg/L cleanup level. Maximum concentrations were all detected during the April sample event.

PCE concentrations in FWMW-17 were below the 1 µg/L reporting level. PCE detected during both sample events are associated with PCE detections in the equipment and trip blanks. Because the detections are less than 5 times the blank results they have been qualified with "UJ". PCE breakdown products TCE, DCE, and VC were not detected above reporting limits in samples collected at this well throughout the reporting period.

PCE concentrations in FWMW-16 reached a maximum of 100 µg/L in the spring of 2015 during SVE and GRS operation and had declined significantly until the 2022-2023 sampling period (Appendix C Figure 37). TCE and VC concentrations in FWMW-16 have typically been above

their respective cleanup levels since 2016. Recent DCE concentrations in FWMW-16 are the first detected above the 70 µg/L cleanup limit since concentrations began increasing in 2016 (Appendix C Figure 38).

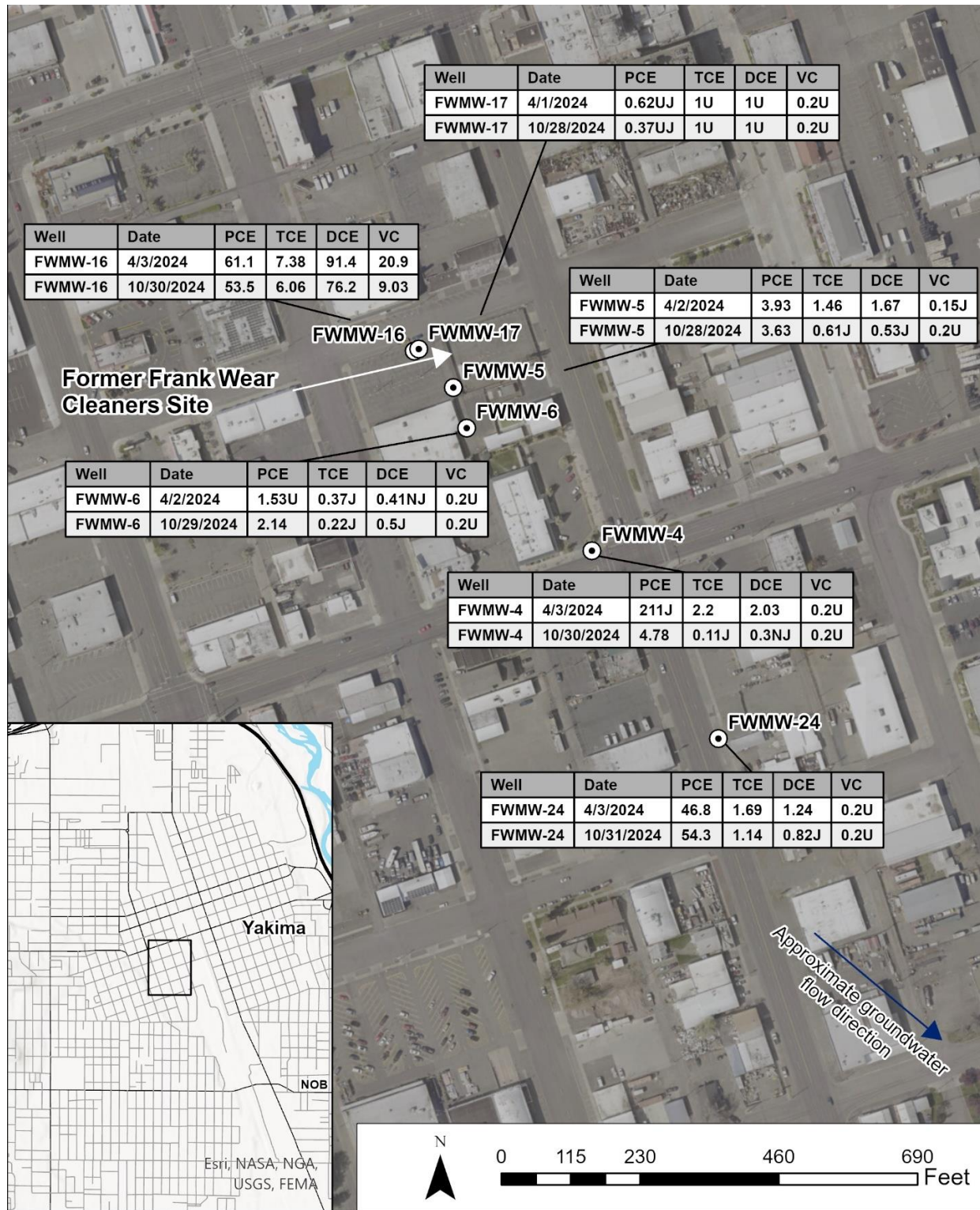


Figure 8. Frank Wear Cleaners Well Locations and cVOC Results (µg/L), 2024, 1 of 2.



**Figure 9. Frank Wear Cleaners Well Locations and cVOC Results ( $\mu\text{g/L}$ ), 2024, 2 of 2.**

## Shallow well FWMW-5 and FWMW-6

Wells FWMW-5 and FWMW-6 are slightly downgradient from FWMW-16 (Figure 8).

PCE concentrations in FWMW-5 ranged between 3.63 µg/L in October to 3.93 µg/L in April, below the 5 µg/L cleanup level. TCE and DCE were detected at concentrations near the reporting limit of 1 µg/L, below the respective cleanup levels of 5 µg/L and 70 µg/L. VC was detected in FWMW-5 during April at an estimated concentration below the reporting limit.

PCE concentrations in FWMW-6 ranged from non-detect in April to 2.14 µg/L in October, below the 5 µg/L cleanup level. TCE and DCE were detected as estimated concentrations below the reporting limit. VC was not detected at this well throughout 2024.

Historical exceedances of metabolic breakdown products TCE, DCE, and VC occurred until 2017 in FWMW-6 and until 2019 in FWMW-5 (Appendix C Tables 36 and 37). Results for these metabolites from these dates onward have been either non-detect or below their respective cleanup levels. Monitoring data show a spike in contaminant concentrations during 2014 in both FWMW-5 (Appendix C Figures 31 and 32) and FWMW-6 (Appendix C Figures 33 and 34), which may have resulted from GRS operation.

## Deep Well FWMW-19 and Shallow Well FWMW-20

Deep well FWMW-19 and shallow well FWMW-20 are in the parking lot to the south of the former dry-cleaning facility (Figure 9). FWMW-20 has consistently reported elevated concentrations of PCE and metabolic breakdown products that exceed the applicable cleanup levels (Appendix C Figures 39 and 40). The 2024 concentrations were the highest reported in the YRRA and represent a continued increase of PCE concentrations ongoing since 2016.

PCE concentrations in FWMW-20 were far above the 5 µg/L cleanup level, ranging between 17,000 µg/L and 18,200 µg/L in October and April, respectively. TCE concentrations ranged from 370 µg/L to an estimated 401J µg/L during April and October, respectively, far above the cleanup level. DCE concentrations ranged from 184 µg/L to 191 µg/L in April and October, respectively, far exceeding (greater than) the 70 µg/L cleanup level. VC concentrations ranged from 19.4 µg/L to 35.1 µg/L during April and October, respectively, far above the 0.2 µg/L cleanup level.

FWMW-19 is completed in the deeper aquifer and has reported PCE concentrations below the cleanup level since Ecology began sampling the site in 2012 (Appendix C Table 43). PCE concentrations at this well range between estimates of 0.31UJ µg/L and 0.55UJ µg/L during October and April respectively. Although, both results were associated with positive detections in transport blanks. The metabolic breakdown products TCE, DCE, and VC were not detected above reporting limits in samples collected from FWMW-19.

## Wells FWMW-4 and FWMW-24

Wells FWMW-4 and FWMW-24 are in the southeastern portion of the site and are located approximately 265 ft and 640 ft downgradient from the former dry-cleaning facility, respectively (Figure 8).

PCE concentrations at FWMW-4 ranged from 4.78 µg/L to an estimated 211J µg/L, above the 5 µg/L cleanup level in the spring (Appendix C Figure 29). TCE concentrations ranged from an estimated 0.11J µg/L to 2.2 µg/L, below the 5 µg/L cleanup level during both sampling events. DCE concentrations ranged from a tentatively identified and estimated 0.3NJ µg/L to 2.03 µg/L, below the 70 µg/L cleanup level. Maximum concentrations were all detected during the April sample event. VC was not detected in this well throughout 2024 (Appendix C Figure 30).

FWMW-24 is the furthest downgradient well at the Frank Wear site. PCE concentrations at FWMW-24 ranged from 46.8 µg/L to 54.3 µg/L during April and October, respectively, far above the 5 µg/L cleanup level (Appendix C Figure 41). TCE concentrations were slightly above the reporting limit, but below the 5 µg/L cleanup level. DCE concentrations were near the reporting limit, below the 70 µg/L cleanup level. VC was not detected during the sampling period (Appendix C Figure 42).

## **Wells FWMW-10 and FWMW-18**

Wells FWMW-10 and FWMW-18 are situated along the north wall of the daycare which exists near the former dry-cleaning facility (Figure 9).

PCE and metabolic breakdown products concentrations at FWMW-10 are consistently among the highest at the Frank Wear site (Appendix C Table 37, Figure 35 and 36). PCE concentrations in well FWMW-10 exceeded the 5 µg/L cleanup level during both sampling events, ranging from 4,260 µg/L to 12,400 µg/L. TCE concentrations also exceeded the 5 µg/L cleanup level during both sampling events, ranging from an estimated 87.3J µg/L to 165 µg/L. DCE concentrations ranged from 33.3 µg/L to 68.1 µg/L, below the 70 µg/L cleanup level. VC concentrations ranged from 13.2 µg/L to 32.1 µg/L, far above the cleanup level. Maximum concentrations were all detected during the April sample event.

FWMW-18 is completed in the deeper water bearing zone and typically contains PCE concentrations below the 5 µg/L cleanup limit (Appendix C Table 42). PCE concentrations in this well ranged between non-detectable to 5.18 µg/L during April and October, respectively, above the 5 µg/L cleanup level in the fall. TCE concentrations in this well were reported near the 1 µg/L reporting limit, below cleanup levels. DCE was detected at estimated concentrations below the reporting limit. VC was not detected in FWMW-18 throughout the reporting period.

Contaminant concentrations have decreased from historic highs at the Frank Wear site, which appears to be the result of remediation system operation. Prior to Ecology taking over sampling activities at Frank Wear, consultants from Hart Crowser described evidence for PCE mobilization from the soil matrix in addition to reducing conditions in the site groundwater (Hart Crowser 2015). These conditions may enhance reductive de-chlorination of cVOCs in groundwater and soil beneath the site.

While groundwater quality has improved significantly at the site following remedial action, high concentrations of PCE, TCE, and VC persist in both the shallow onsite wells and the downgradient off-site wells. Concentrations of cVOCs in site groundwater continue to exceed the applicable cleanup levels and have been trending upwards in some Frank Wear wells. The recent PCE and degradation product increases may be influenced by the shutdown of the GRS. Monitoring data indicate that the PCE plume continues beyond the boundary of the site's

monitoring network, suggesting that the full extent of groundwater contamination from the Frank Wear site is not fully delineated.

## **YRRA Remedial Investigation Wells**

The Remedial Investigation monitoring wells are located throughout the YRRA. Ecology installed RI wells to delineate PCE contamination in groundwater away from known source areas. The RI wells were installed as shallow and deep pairs to characterize groundwater in the lower and upper water-bearing zones. Nine wells that are located along the western and southern edges were sampled in 2024 (Figure 2).

PCE was detected in all nine RI wells. PCE concentrations were above the 5 µg/L cleanup level in samples collected from wells RI-4S and RI-6S. Concentrations ranged from an estimated 0.55JB µg/L in RI-3S to 21.5 µg/L in RI-4S (Figure 10).

### **Well RI-3S**

RI-3S is the farthest upgradient RI well currently sampled in the YRRA (Figure 10).

PCE was detected in this well at an estimated concentration below the reporting limit of 1 µg/L. This sample was associated with a PCE detection in a transport blank. TCE, DCE, and VC were not detected in this well.

PCE concentrations have remained below the 5 µg/L cleanup level in this well since monitoring began in 1999 (Appendix C Figure 43). Since PCE is not naturally occurring, PCE detections at this well indicate that a low-level source of PCE is contaminating the shallow aquifer at the upgradient end of the YRRA study area.

### **Wells RI-4S and RI-4D**

RI-4S and RI-4D are paired shallow and deep wells located along the western boundary of the YRRA (Figure 10).

PCE concentrations in RI-4S continue to be the highest of the RI wells and are consistently above the 5 µg/L cleanup level (Appendix C Table 45, Figure 44). PCE concentrations in RI-4D, the deeper of the two wells, have never exceeded the cleanup level (Appendix C Table 46, Figure 45). During April, PCE concentrations in RI-4S and RI-4D were 21.5 µg/L and 3.98 µg/L, respectively.

TCE, DCE, and VC were not detected in samples collected at RI-4S and RI-4D during April.

Concentrations of cVOCs have increased in RI-4S and RI-4D since 2021 (Appendix C Figures 44 and 45). The source of PCE contamination in these wells has not been identified. Data from these wells suggest that the western extent of the YRRA PCE plume is not fully delineated.

### **Wells RI-5S and RI-5D**

Wells RI-5S and RI-5D are in a residential area, approximately 0.7 miles southeast (downgradient) of RI-4S and RI-4D (Figure 10).

PCE concentrations at RI-5S and RI-5D ranged from an estimated 3.72 µg/L to 2.62 µg/L in April, respectively, below the 5 µg/L cleanup level. There were no detections of TCE, DCE, or VC above reporting limits at these wells throughout the reporting period.

Concentrations in both wells began to generally increase in 2009 and continued until 2017 with high concentrations of 4.2 µg/L (RI-5S) and 1.8 µg/L (RI-5D). Since 2017, PCE concentrations in RI-5S have ranged from 1.3 µg/L to 4.0 µg/L (Appendix C Figure 46). In RI-5D, following a slight decrease in 2019, PCE concentrations have fluctuated between 1.3 µg/L and 2.6 µg/L (Appendix C Figure 47). These wells are in a residential area, which suggests that the low PCE levels likely originate from an upgradient source.

## **Well RI-6S**

RI-6S is in the southeast portion of the YRRA project area (Figure 10).

PCE concentrations at RI-6S ranged from an estimated 7 µg/L to 9.38 µg/L in October 2022 and 2023 respectively, above the 5 µg/L cleanup level. PCE concentrations at this location have a seasonal pattern and are typically higher in the fall (Appendix C Figure 48). TCE, DCE, and VC were not detected above reporting limits in this well throughout the reporting period. There is no known source for the contamination in this well, indicating the need for better groundwater characterization in this portion of the YRRA.

## **Wells RI-9S, RI-10S, and RI-11S**

Wells RI-9S, RI-10S, and RI-11S are located at the southern boundary of the YRRA study area and are the farthest downgradient wells being sampled (Figure 10).

PCE concentrations in these wells ranged from estimated concentrations below the reporting limit in RI-11S to 2.19 µg/L in RI-10S in October and April respectively, below the 5 µg/L cleanup level (Appendix C Figures 49 to 51). TCE was detected at estimated concentrations below the reporting limit in RI-9S and RI-10S. DCE and VC were not detected above reporting limits in these wells throughout the reporting period.

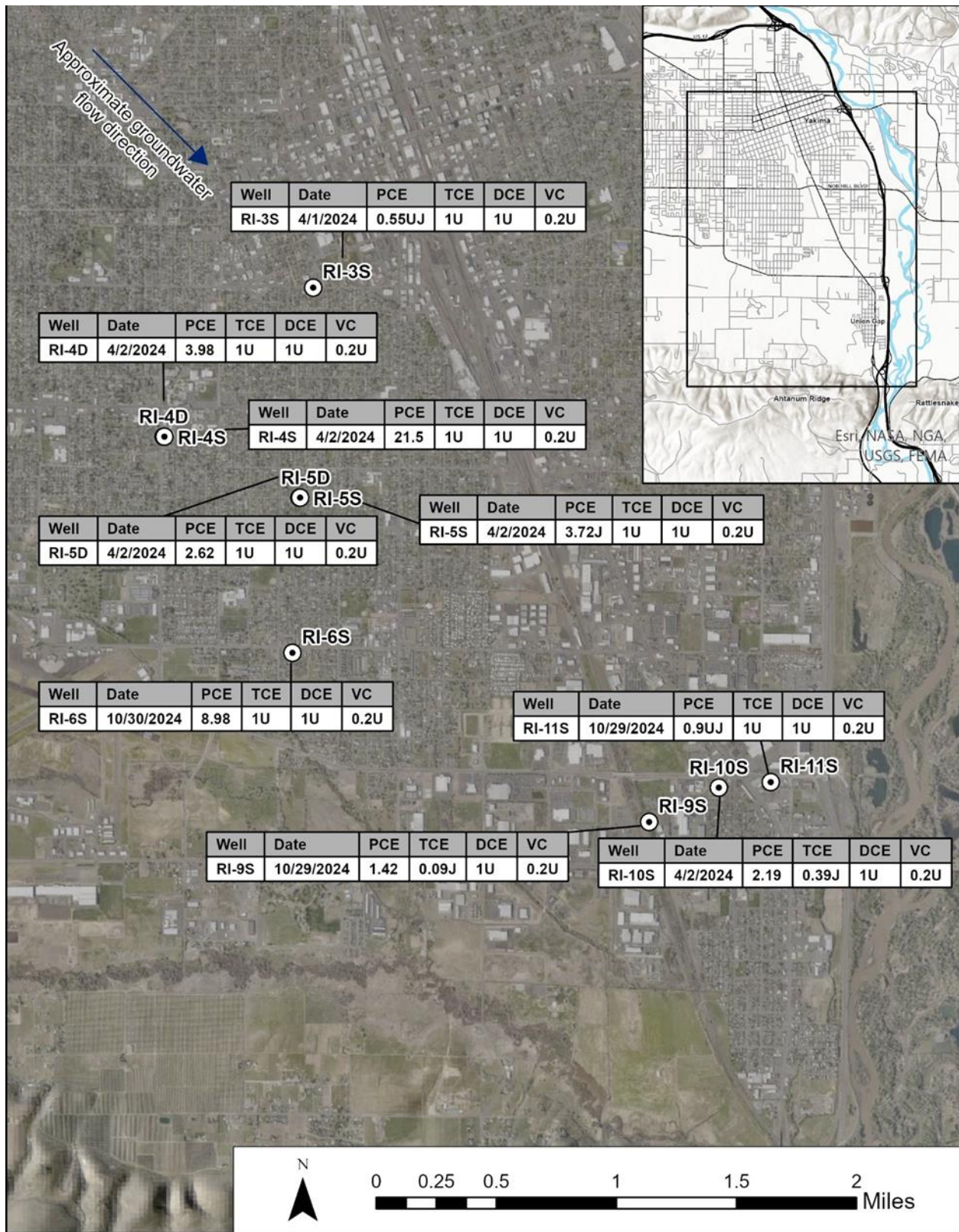


Figure 10. YRRA Remedial Investigation Well Locations and cVOC Results (µg/L), 2024.

# Summary

Thirty-eight wells were sampled in the YRRA in 2024. Seventeen of those sampled (45%) had PCE concentrations above the MTCA Method A cleanup level of 5 µg/L. Wells with PCE concentrations above the cleanup level were located at four established sites: Frank Wear Cleaners, Washington Central Railroad Roundhouse (WCRR), Goodwill-City of Yakima, and Cameron Yakima. Detections of PCE above cleanup levels at two Remedial Investigation wells (RI-4S and RI-6S) represent unknown contaminant sources along the western edge of the study area.

Table 3 summarizes the maximum annual PCE concentrations at each site. PCE exceedances generally occur in wells that are screened in the shallow water-bearing zone, with completion depths ranging from 26 to 40 ft below ground surface (bgs). The maximum PCE concentrations in these wells ranged from 5.62 µg/L to 18,200 µg/L in 2024.

The Frank Wear Cleaners site was added to the monitoring program in 2017 and has the highest concentrations of PCE, TCE, DCE, and VC in the YRRA. This site is a significant source of cVOC contamination in groundwater across the study area.

At the WCRR site, PCE, TCE, DCE, and VC have been consistently detected. Contamination is present in all three wells (shallow, intermediate, and deep), indicating that the vertical extent of the plume reaches the deep-water-bearing zone in this portion of the YRRA. PCE concentrations at this site exceeded the cleanup level in all wells sampled in 2024.

At the Cameron Yakima site, PCE concentrations exceeded the cleanup level in five wells. PCE breakdown products were observed at concentrations below the MTCA cleanup levels.

The Goodwill site reported PCE concentrations exceeding the cleanup level in one well in 2024. PCE breakdown products were not detected above reporting limits in samples collected during the reporting period.

Monitoring data from the Frank Wear, WCRR, Goodwill, and Cameron wells confirm that PCE continues to impact shallow groundwater in the central portion of the YRRA. It is not apparent whether the contaminant plumes are separate or co-mingled.

**Table 3. Summary of 2024 Cleanup Level Exceedances.**

Site	Well	April PCE	April TCE	April DCE	April VC	Oct. PCE	Oct. TCE	Oct. DCE	Oct. VC
Cameron	CYIMW102S	–	–	–	–	<u>6.25</u>	<u>0.34J</u>	<u>0.29J</u>	0.2U
	CYIMW103S	<u>10.9J</u>	<u>0.99J</u>	<u>0.54J</u>	0.2U	<u>6.04</u>	<u>0.37J</u>	<u>0.34NJ</u>	0.2U
	CYIMW107S	<u>5.62J</u>	<u>0.54J</u>	<u>0.42NJ</u>	0.2U	–	–	–	–
	CYIMW112S	–	–	–	–	<u>9.39</u>	<u>0.51J</u>	<u>0.37J</u>	0.2U
	CYIMW113S	<u>13.4J</u>	<u>0.98J</u>	<u>0.49J</u>	0.2U	–	–	–	–
Frank Wear	FWMW-4	<u>211J</u>	<u>2.2</u>	<u>2.03</u>	0.2U	–	–	–	–
	FWMW-10	<u>12400</u>	<u>165</u>	<u>68.1</u>	<u>32.1</u>	<u>4260</u>	<u>87.3J</u>	<u>33.3</u>	<u>13.2</u>
	FWMW-16	<u>61.1</u>	<u>7.38</u>	<u>91.4</u>	<u>20.9</u>	<u>53.5</u>	<u>6.06</u>	<u>76.2</u>	<u>9.03</u>
	FWMW-18	–	–	–	–	<u>5.18</u>	<u>1.33</u>	<u>0.37J</u>	0.2U
	FWMW-20	<u>18200</u>	<u>370</u>	<u>184</u>	<u>19.4</u>	<u>17000</u>	<u>401J</u>	<u>191</u>	<u>35.1</u>
	FWMW-24	<u>46.8</u>	<u>1.69</u>	<u>1.24</u>	0.2U	<u>54.3</u>	<u>1.14</u>	<u>0.82J</u>	0.2U
Goodwill	GMW-2	<u>19.8</u>	<u>0.33J</u>	1U	0.2U	<u>9.89</u>	<u>0.08J</u>	1U	0.2U
Roundhouse	RMW-3D	–	–	–	–	<u>10.7</u>	<u>3.78</u>	<u>1.4</u>	0.2U
	RMW-3I	–	–	–	–	<u>19</u>	<u>2.23</u>	<u>1.05</u>	0.2U
	RMW-3S	–	–	–	–	<u>14.6</u>	<u>0.74J</u>	<u>0.51J</u>	0.2U
RI Wells	RI-4S	<u>21.5</u>	1U	1U	0.2U	–	–	–	–
	RI-6S	–	–	–	–	<u>8.98</u>	1U	1U	0.2U
<b>Cleanup Level (µg/L)</b>		<b>5</b>	<b>5</b>	<b>70</b>	<b>0.2</b>	<b>5</b>	<b>5</b>	<b>70</b>	<b>0.2</b>

DCE: Dichloroethene

PCE: Tetrachloroethene

TCE: Trichloroethene

µg/L: Micrograms per liter

VC: Vinyl Chloride

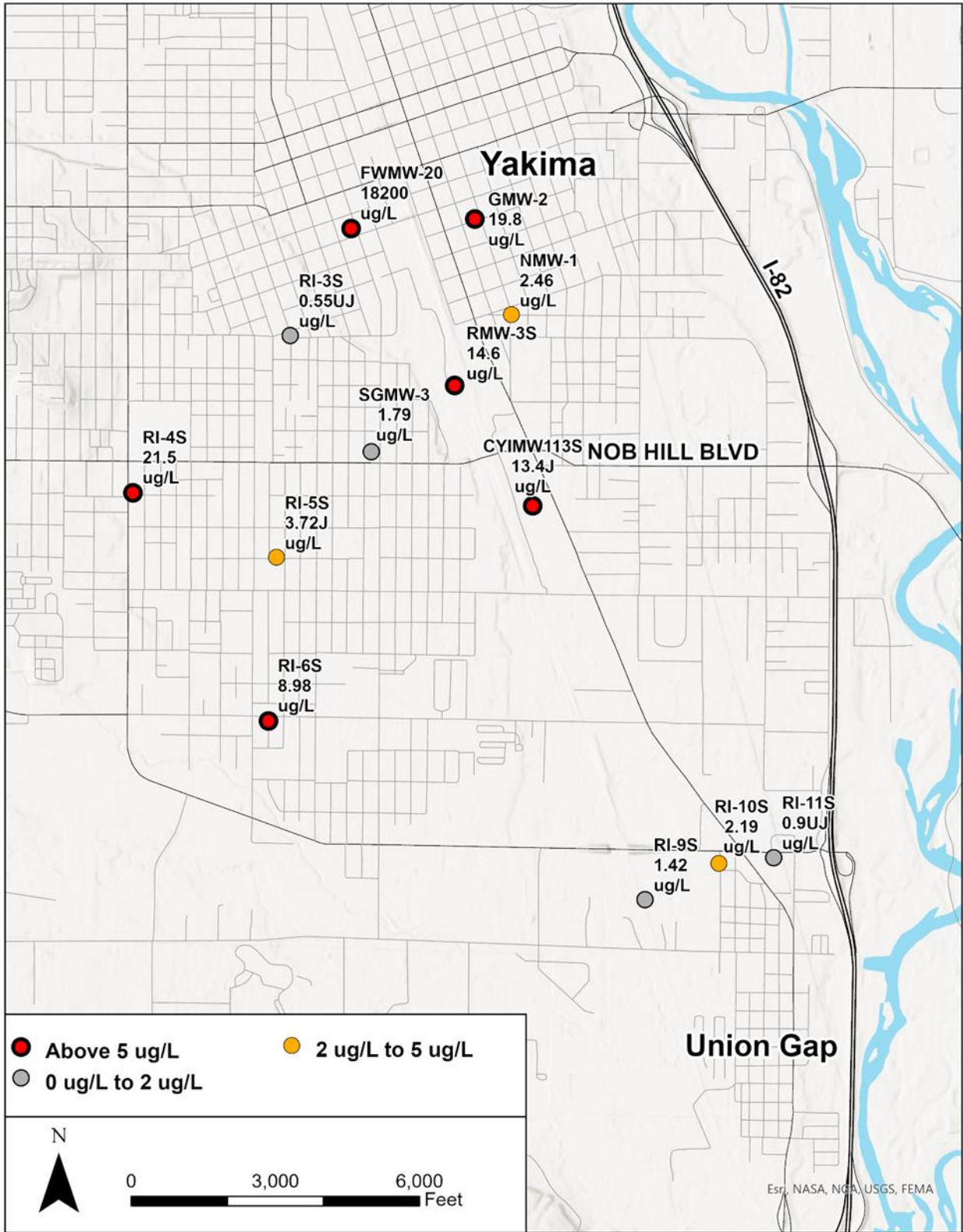


Figure 11. Shallow Zone Maximum PCE Concentrations by site, 2024.

## Conclusions

Dissolved tetrachloroethene (PCE) continues to exceed cleanup levels in the shallow, unconfined aquifer throughout the Yakima Railroad Area (YRRA) project area. Remediation performed at individual sites appears to have reduced contaminant concentrations in groundwater at many of the identified source areas; however, many areas still contain contaminant concentrations higher than (exceed) the established MTCA cleanup levels. Results from 2024 indicate a continued elevation in wells exceeding the cleanup levels.

Historically 59 wells were sampled as part of the long-term YRRA monitoring program.

- Beginning in 2013, Ecology selected a subset of 36 wells for continued monitoring. Wells were removed from the active monitoring program if they consistently contained low or non-detectable concentrations of cVOC, primarily PCE.
- In 2017, 10 wells from the Frank Wear site were added to the YRRA monitoring program. Two wells were discontinued at this time: (1) a well at the Nu-Way site that was decommissioned in 2016 and (2) a well at Agri-Tech, a former pesticide production facility, which could no longer be located.
- In 2023, The Fifth-Wheel Truck Repair site received a NFA opinion letter and the last well at the site was decommissioned.

In 2024, Ecology collected groundwater samples from 38 of the 43 wells remaining in the monitoring network. The selected subset of wells provides data to evaluate groundwater conditions throughout the YRRA project area.

## Existing Cleanup Sites

The six source areas of the YRRA represent both varied levels of remedial action and contaminant migration behavior.

- Cameron Yakima, Frank Wear Cleaners, Goodwill, Nu-Way Cleaners, and Southgate Laundry – have undergone remedial action to address PCE contamination. Remediation at these sites appears to have reduced the impact of PCE contamination in groundwater or eliminated sources entirely.
- Nu-Way Cleaners, and Southgate Laundry – have consistently reported PCE concentrations below the 5 µg/L cleanup level in recent years. The last instance of PCE concentrations above the cleanup level at Southgate Laundry occurred in 2005. PCE has not been above the cleanup level at Nu-Way since June 2011.
- Washington Central Railroad Roundhouse (WCRR) – has no record of any direct remedial action. The three wells at this site are installed as a well cluster with varying depths. PCE concentrations in the WCRR shallow and deep wells indicate a vertical component to the contaminant plume that extends to the deep water-bearing zone in this portion of the YRRA. PCE metabolic breakdown products, including TCE and DCE, are also typically present in concentrations that exceed the cleanup level. The WCRR site continues to act as a significant source of cVOC groundwater contamination that includes the deeper portions of the aquifer system.

- The Frank Wear Cleaners site was added to the YRRA monitoring program in 2017 and represents the largest source of cVOC contamination to the project area. Ecology sampled groundwater in 10 of the 24 site wells, seven shallow wells and three deep wells. In-situ remediation activities at the site appear to have reduced contamination; however, this site continues to contain the highest levels of cVOCs in the project area. PCE metabolic breakdown products are detected at concentrations above their respective cleanup levels. Elevated cVOC concentrations in the shallow onsite and downgradient off-site wells indicate that the contaminant plume beyond the monitoring well network is not fully delineated. cVOC concentrations in the deep wells were detected at concentrations near or below the reporting limit, suggesting limited vertical migration.

The 2024 monitoring data demonstrate that the highest contaminant concentrations continue to occur in the central portion of the YRRA, at Frank Wear Cleaners, WCRR, Goodwill, and Cameron Yakima. While remedial activities have occurred at three of these locations, the full extent of the contaminant plume is still poorly delineated. Further investigation is necessary at these four sites to delineate the full extent of the PCE plumes and to determine whether the plumes have comeingled.

## Remedial Investigation Wells

Nine of the 29 RI wells (RI-3S, RI-4D, RI-4S, RI-5D, RI-5S, RI-6S, RI-9S, RI-10S, and RI-11S) are currently sampled as part of the monitoring program. These wells are located primarily along the western and southern boundaries of the YRRA.

- In seven of the nine wells PCE was detected at concentrations below the MTCA cleanup level during the 2024 reporting period. Because PCE is not naturally occurring, the low concentrations detected in these wells indicate low-level sources of PCE exist and are contributing to the contamination in the YRRA.
- Wells RI-4S and RI-6S, located on the western edge of the YRRA, consistently report PCE concentrations above the 5 µg/L cleanup level. The source of PCE contamination in these wells is still unknown and requires further remedial investigation.

## Contaminant Impacts to Deep Water-Bearing Zones

Nine of the 38 wells sampled in the YRRA during 2024 are screened in the deeper water-bearing zone (50 -120 ft bgs). Three deep wells (RMW-3I, RMW-3D, and FWMW-18) contained PCE concentrations that are higher than (exceed) the 5 µg/L MTCA cleanup level.

The remaining six deep wells consistently report cVOC concentrations below the applicable cleanup levels and have remained relatively stable throughout the 1997-2024 monitoring period. Two of these wells are located at the Frank Wear Cleaners site, two wells are part of the Remedial Investigation network, located along the western extent of the YRRA, and two wells are located at the Cameron Yakima site.

# Recommendations

The continued presence of cVOC concentrations in groundwater throughout the Yakima Railroad Area originates from both identified and unidentified sources. Cleanup activities and investigations in the project area continue to address groundwater contamination.

Based on data from the 2024 monitoring activities, the following recommendations are provided:

- Conduct further remedial investigation at three sites to fully delineate the lateral and vertical extent of the contaminant plume: (1) Frank Wear Cleaners, (2) Cameron Yakima, and (3) Washington Central Railroad Roundhouse.
- Determine sources of PCE contamination along the western edge of the project area near Remedial Investigation wells RI-4S/D and RI-6S.
- Study the water-level data over an entire year to identify seasonal variations in approximate groundwater flow direction over the YRRA. Spatial or temporal variation of the hydrologic gradient may provide evidence for contaminant transport from areas beyond the current project area.
- Remove wells that are consistently below the cleanup level from the sampling schedule, which may improve the cost-effectiveness of the project. These wells are located at the following sites: (1) Nu-Way Cleaners (NMW-3), and (2) Southgate Laundry (SGMW-1, SGMW-3).
- Evaluate the Frank Wear Cleaners site for seasonal trends in PCE concentrations. Strong seasonal variation may warrant reduction of sampling frequency to an annual basis, with samples collected during the highest expected concentrations.
- Continue monitoring of wells within the project area to assess seasonal fluctuations and recent increases of PCE concentrations.

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# Glossary, Acronyms, and Abbreviations

## *Glossary*

**Analyte:** Water quality constituent being measured (parameter).

**Conductivity:** A measure of water's ability to conduct an electrical current. Conductivity is related to the concentration and charge of dissolved ions in water.

**Contaminant plume:** A mass of pollutants moving through groundwater originating from a contaminant source.

**Dissolved oxygen:** A measure of the amount of oxygen dissolved in water.

**Groundwater:** Water in the subsurface that saturates the rocks and sediment in which it occurs. The upper surface of groundwater saturation is commonly termed the water table.

**Metabolic breakdown products:** The process of degradation resulting from bacterial metabolism of PCE which initiates a series of reductions, starting with PCE and ending with VC.

**Method Detection Limit:** This definition for detection was first formally advanced in 40CFR 136, October 26, 1984 edition. MDL is defined there as the minimum concentration of an analyte that, in a given matrix and with a specific method, has a 99% probability of being identified, and reported to be greater than zero. (Federal Register, October 26, 1984).

**Oxidation-Reduction Potential:** A measure of the oxidizing or reducing potential of water. Values greater than 0 indicate oxidizing conditions. Values less than zero indicate reducing conditions.

**Parameter:** Water quality constituent being measured (analyte). A physical, chemical, or biological property whose values determine environmental characteristics or behavior.

**pH:** A measure of the acidity or alkalinity of water. A low pH value (0 to 7) indicates that an acidic condition is present, while a high pH (7 to 14) indicates a basic or alkaline condition. A pH of 7 is considered to be neutral. Since the pH scale is logarithmic, a water sample with a pH of 8 is ten times more basic than one with a pH of 7.

**Reporting limit:** The minimum value of the calibration range. Analyte detections between the method detection limit and the reporting limit are reported as having estimated concentrations.

**Specific conductance:** A measure of water's ability to conduct an electrical current. Specific conductance is related to the concentration and charge of dissolved ions in water.

**Unconfined aquifer:** An aquifer containing water that is not under pressure; the water level in a well is the same as the water table outside the well.

**Volatile:** A compound which easily transitions from liquid to gas at a given temperature is considered volatile.

## ***Acronyms and Abbreviations***

bgs	Below ground surface
Cameron	Cameron Yakima site
cVOC	Chlorinated volatile organic compounds
DCE	Cis-1,2-dichloroethene
EAP	Environmental Assessment Program
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management database
EPA	U.S. Environmental Protection Agency
Frank Wear	Frank Wear Cleaners site
Goodwill	Goodwill - City of Yakima site
GRS	Groundwater recirculation system
MEL	Manchester Environmental Laboratory
MTCA	Model Toxics Control Act
MW	Monitoring well
NFA	No further action
Nu-Way	Nu-Way Cleaners site
ORP	Oxidation-reduction potential
PCE	Tetrachloroethene
PVC	Polyvinyl chloride
RI	Remedial investigation
RPD	Relative percent difference
SOP	Standard operating procedure
Southgate	Southgate Laundry site
SVE	Soil vapor extraction
TCE	Trichloroethene
TCP	Toxics cleanup program
USGS	U.S. Geological Survey
VC	Vinyl chloride
VOC	Volatile Organic Compounds
YRRA	Yakima Railroad Area (the project area)

## ***Units of Measurement***

°C	degrees centigrade
ft	feet
ft/ft	feet per feet, a measure of gradient
mg/L	milligrams per liter
mV	millivolts
Std. Units	standard units
µg/L	micrograms per liter (parts per billion)
uS/cm	microsiemens per centimeter, a unit of conductivity

# Appendices

The following Appendices are linked to this report at  
<https://apps.ecology.wa.gov/publications/SummaryPages/2603008.html>.

Appendix A. Well Construction Details and Field Measurement Data

Appendix B. Quality Assurance Review

Appendix C. Project Results, December 1997 – October 2024