SECOR
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DRAFT
REMEDIAL INVESTIGATION
YAKIMA RAILROAD AREA
YAKIMA, WASHINGTON

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EXECUTIVE SUMMARY

This draft Remedial Investigation (RI) has been prepared by SECOR International Incorporated (SECOR) on behalf of the Cameron Yakima Working Group (the Working Group) for the Yakima Railroad Area (YRRA) located in Yakima, Washington. The RI addresses the occurrence of perchloroethylene (PCE) in groundwater within the YRRA. The technical scope of work for this RI is in accordance with Consent Decree No. CY-96-3196-WFN (Consent Decree) entered into between the Washington State Department of Ecology (Ecology) and the Working Group on May 5, 1997. As defined in the Consent Decree, the RI report meets the requirements of the Model Toxics Control Act (MTCA), Chapter 173-340 Washington Administration Code (WAC).

The primary purpose of this RI is to determine the extent of PCE in groundwater within the YRRA. The RI report has been prepared in accordance with WAC 173-340-350 to collect, develop, and evaluate sufficient information regarding the YRRA to enable the evaluation and, if necessary, the selection of a cleanup action under WAC 173-340-360. This report describes the areal and temporal distribution of PCE in groundwater within the YRRA over the period from December 1997 to September 1998.

SITE DESCRIPTION

The YRRA, as defined by Ecology, consists of approximately six square miles of predominantly industrial and commercial property that parallels the railroad corridor on the east and north sides of the cities of Yakima and Union Gap, respectively. The YRRA is located within a broad, gently sloping plain located west of the Yakima River between topographic highs to the northwest and southeast. The ground surface slopes from the northwest to the southeast with a maximum elevation of 1,080 feet above mean sea level (msl) at Lincoln Avenue in Yakima to an elevation of less than 960 feet above msl near Ahtanum Road in Union Gap. Water supply wells are located within the YRRA. The majority of the shallow wells are located on the southern portion of the YRRA and are not in close proximity to wells sampled for this RI that are impacted by PCE.

BACKGROUND

A total of 105 groundwater monitoring wells have been installed within the YRRA for previous investigations conducted by others prior to this RI. A total of 69 of those wells have been sampled for this RI. The PCE data from the 105 monitoring wells and additional data from approximately 58 residential wells sampled by Ecology prior to this RI indicated that concentrations of PCE in groundwater occur in various areas of the YRRA. Based on the results of previous investigations, Ecology identified 13 subfacilities as potential sources of PCE to the shallow groundwater to be included in the groundwater sampling for this RI.

REGIONAL CONDITIONS

Surface water within the YRRA is controlled by a storm water system that captures and conveys surface water runoff within paved areas to the Yakima River. Storm water that occurs in unpaved areas typically infiltrates directly to the shallow groundwater. Irrigation affects the surface water hydrology from May to October by redirecting surface water from the Yakima River and the Naches River to lined channels that

are located throughout the YRRA. Leaking irrigation canals and land application of irrigation waters affect both the surface water and groundwater hydrology. The depth to groundwater is less during the irrigation period from late spring to early fall.

The regional Yakima Valley hydrogeology consists of a three-aquifer system. Water-bearing zones include: 1) the uppermost aquifer consisting of unconfined, relatively uninterrupted sand and gravel in the Yakima Valley Alluvium and Yakima Valley Terrace Deposits (commonly referred to as the Yakima Gravels); 2) an intermediate, lower aquifer consisting of confined coarse-grained interbeds in the Upper Ellensburg Formation; and 3) the lower-most aquifer consisting of confined fractured intervals in the Pomona Basalt. These aquifers, including confined and unconfined, are locally quite productive and capable of yielding hundreds of gallons per minute.

Regional groundwater flow in the Yakima Valley is predominantly from the surrounding upland regions into the valley, and eventually toward the Yakima River. In the vicinity of the Yakima River, where Yakima Gravels have fewer fine-grained materials and are more permeable, groundwater flow becomes subparallel to the river course and assumes a more southerly orientation. Artesian flow is commonly observed in wells completed a few hundred feet or more below ground surface (bgs). Artesian conditions are thought to be augmented by the synclinal structure of the basin.

REMEDIAL INVESTIGATION

The investigation conducted for this RI was done in accordance with the *Work Plan (Focused Remedial Investigation, YRRA)* prepared by SECOR and dated August 25, 1997 (Work Plan) and Technical Memoranda that document amendments to the Work Plan. The Work Plan and Technical Memoranda were approved by Ecology. In total, 14 locations within and adjacent to the YRRA were selected by Ecology, for installation of groundwater monitoring wells. Two wells were installed at each location: a shallow well up to a depth of approximately 40 feet bgs designated RI-__s; and a deeper well up to a depth of approximately 130 feet bgs designated RI-__d. At RI-13, a third (intermediate) well also was installed. This well was used for the pump test and not included with the quarterly sampling. In total, 28 single completion (one well per borehole) groundwater monitoring wells were installed during the RI activities: 14 shallow (less than 40 feet deep), 14 deep (from 120 to 130 feet deep, and one intermediate [90 feet deep]). At two of the groundwater monitoring well locations selected by Ecology, RI-4 and RI-13, wells were constructed of six-inch-diameter PVC casing to allow for placement of down-hole groundwater extraction pumps to conduct an aquifer test. Access for wells located on public property was obtained from the cities of Union Gap and Yakima and access for wells located on private property were obtained from the respective property owner.

Groundwater samples were collected by SECOR from 28 wells installed for this RI. Split samples were collected by SECOR from groundwater samples collected by Ecology at four subfacilities. Split samples were collected by SECOR from groundwater samples collected by subfacility consultants at six subfacilities. Groundwater samples at the remaining three subfacilities were collected by SECOR. In addition, groundwater samples were collected at other subfacility wells by subfacility consultants or Ecology. All groundwater samples collected by SECOR, Ecology, or subfacility consultants for this RI were analyzed for PCE by EPA Method 8010 in accordance with the Work Plan. Data summaries of the analyses conducted by Ecology and/or subfacility consultants were provided to SECOR by Ecology.

SITE CHARACTERISTICS

The results of the field investigation indicate that the YRRA is situated in an area underlain by fill material at the near surface that typically consists of reworked sands and gravels but may also include debris, organic soil, or fine-grained materials, which extend to depths of as much as 20 feet bgs. Sands and gravels of the Yakima Gravels underlie the fill and are at the surface in some areas.

Monitoring wells installed for the RI were either screened at the top of the first encountered water-bearing zone (referred to as the shallow water-bearing zone) or approximately 100 feet below the shallow water-bearing zone (referred to as the deep water-bearing zone). The designation of two water-bearing zones within the Yakima Gravels does not mean that the shallow and deep water-bearing zones are discrete. Observations during borehole drilling and/or static groundwater level data from the completed monitoring wells indicate that two separate water-bearing zones were encountered at some locations (monitoring well locations RI-1, RI-2, RI-4, and RI-6 located on the northern portion of the YRRA); however, in most areas within the YRRA, the top 100 feet of saturated material is interpreted to be composed of one water-bearing zone.

Aquifer tests were conducted at the RI-4 and RI-13 well pairs in early December 1997. The aquifer test locations were selected by Ecology to evaluate the aquifer conditions on the west (RI-4) and east (RI-13) sides of the YRRA. The purpose of these tests was to determine whether known impacts to the shallow aquifer units can reasonably be expected to affect a deeper aquifer, now or in the future. The aquifer tests were performed in accordance with procedures described in the Work Plan.

The evaluation of data developed from the aquifer tests suggests that the vertical communication between the shallow and deep water-bearing zones at the well pair RI-4 location is minimal. Evaluation of these test results indicates that there is vertical communication between the shallow and deep water-bearing zones at the RI-13 location which could allow contaminant migration from the shallow to deep water-bearing zones.

The depth of the shallow water-bearing zone potentiometric surface ranged from approximately three feet bgs at monitoring well RI-7s to approximately 30 feet bgs at RI-3s. In general, the depth to static groundwater was greatest in the north and least in the southern part of the YRRA. The shallow water-bearing zone appears to be unconfined based on the depth of saturated material encountered during drilling compared to the static groundwater levels measured after installation of the monitoring wells. The water levels fluctuated by as much as 12 feet in some of the wells from the non-irrigation to the irrigation seasons. The depth to water was shallower in the irrigation season.

The potentiometric surface maps for the shallow water-bearing zone indicate that the gradient and estimated direction of groundwater flow was consistently to the southeast across the YRRA during all four quarters of monitoring. Groundwater levels in the northern portion of the site are approximately 90 feet higher than groundwater levels in the southern end of the YRRA. This corresponds to an approximate gradient of 0.005 feet per foot across the YRRA. A slightly steeper gradient, 0.007 feet per foot, was typically measured for the wells located north of Pacific Avenue/Division Street (i.e., north of monitoring well RI-3s and the Nu-Way Cleaners Subfacility) than the area to the south.

The potentiometric surface maps for the deep water-bearing zone indicate that the gradient is less for this zone than the shallow water-bearing zone. Groundwater levels in the northern portion of the YRRA are approximately 70 feet higher than groundwater levels in the southern end of the YRRA. This corresponds to an approximate horizontal gradient of 0.004 feet per foot across the site. The horizontal gradient appears to be relatively consistent during the four quarters monitored during the RI.

SOURCE CHARACTERIZATION

Ecology has identified 13 subfacilities within the YRRA to be included in the sampling conducted for this RI as potential sources of PCE to the groundwater. The subfacilities identified by Ecology include dry-cleaning, pesticide manufacturing, parts machining, activated carbon recycling, wrecking yards, and maintenance facilities. The 13 subfacilities have documented evidence of PCE releases to the environment and are under Agreements and/or Orders with Ecology to provide data on groundwater levels and groundwater quality. A detailed review of the files provided by Ecology for each subfacility was completed for this RI. The 13 subfacilities are: Adeline, Agri-Tech/Yakima Steel, Burlington Northern Railroad Roundhouse (BNRR), Cameron Yakima, Fifth Wheel/Hahn Motors, Frank Wear Cleaners, Goodwill Industries, Nu-Way Cleaners, Paxton Sales, Southgate Laundry, U-Haul/Yakima Valley Spray, Westco Martinizing, and Woods Industries.

All of the subfacilities sampled for this RI had concentrations of PCE in groundwater above 5.0 µg/l except for Nu-Way Cleaners and Paxton Sales. The subfacilities that had concentrations of PCE above 5.0 µg/l in the on-site downgradient wells (as determined by the subfacility consultant) during this RI were: Adeline, Cameron Yakima, Frank Wear Cleaners, Goodwill Industries, and Southgate Laundry. Subfacilities with concentrations of PCE above 5.0 µg/l in the most upgradient well (as determined by the subfacility consultant) during this RI were: Cameron Yakima, Frank Wear Cleaners, U-Haul/Yakima Valley Spray, and Agri-Tech/Yakima Valley Steel.

RECEPTOR SURVEY

A receptor survey was completed within the YRRA and Area 1, (defined by Ecology south of the YRRA), to identify facilities or residences that use groundwater extracted from wells located in the YRRA for on-site use. The survey included tabulation and statistical analysis of valid responses to questionnaires mailed to addresses within the YRRA. The results of the survey indicate that 83 addresses of the 1,279 responses (6.5 percent of the valid responses) utilize groundwater recovered from wells located within the YRRA or Area 1 for on-site domestic, commercial, or industrial use.

Most of the shallow (less than 130 ft) water wells are located in the southern portion of the YRRA. None of the water wells located in the southern portion of the YRRA are located in close proximity to monitoring wells sampled for this RI with concentrations of PCE greater than 5.0 µg/l. There are approximately 15 water wells located in the central portion of the YRRA, along South First Street, which are shallow or of unknown depth. These water wells are located downgradient or in proximity to monitoring wells sampled for this RI which had concentrations of PCE greater than 5.0 µg/l in the shallow aquifer.

EXTENT OF PCE CONTAMINATION

The results of this RI show that the concentrations of PCE greater than 5.0 µg/l in the shallow water-bearing zone are localized near areas of known PCE releases. Based on the RI results, the concentrations of PCE in the groundwater of this shallow water-bearing zone appear to be limited to the respective subfacility property boundaries, with the exception of the central portion of the YRRA, near Frank Wear Cleaners, BNRR, U-Haul, and Cameron Yakima Subfacilities. There is some evidence that off-site migration of PCE in the shallow water-bearing zone may have occurred from the Adeline, BNRR, Cameron Yakima, Frank Wear Cleaners, Goodwill, and Southgate Subfacilities. Only one of the wells installed and sampled for this RI, well RI-4s, had concentrations of PCE above 5.0 µg/l.

The RI analytical results show that the deep water-bearing zone has not been impacted by PCE. Only one well sampled during this RI (20.0 µg/l from well MW-101d on the Cameron Yakima Subfacility) had concentrations of PCE above 5.0 µg/l. This only occurred in one of the four quarterly RI monitoring events (December 1997) in a sample collected by Ecology.

CONCLUSIONS

The results of this RI show that the concentrations of PCE greater than 5.0 µg/l are localized near areas of known releases. There may be evidence of possible off-site migration and potential commingling of the PCE concentrations in the central portion of the YRRA, which may include the Frank Wear Cleaners, BNRR, and Cameron Yakima Subfacilities.

Concentrations of PCE in groundwater samples collected from the shallow water-bearing zone at all of the subfacilities within the YRRA exceeded 5.0 µg/l during one or more quarterly monitoring rounds, with the exception of the Paxton Sales and Nu-Way Cleaners Subfacilities.

The RI analytical results show that the deep water-bearing zone has not been significantly impacted by PCE. None of the groundwater samples collected from the deep water-bearing zone exceeded the 5.0 µg/l PCE with the exception of one well (MW-101d) on the Cameron Yakima Subfacility which had PCE concentrations of 20 µg/l in one well for one quarter. Concentrations of PCE above the method reporting limit of 0.5 µg/l, but less than 5.0 µg/l, were detected all four quarters at subfacility wells BNRR-d and CYI 103-d and only one of the four quarters at wells RI-4d, RI-6d, and RI-7d.

The RI data indicate that there does not appear to be a region-wide groundwater plume of PCE concentrations above 5.0 µg/l in the YRRA. Rather, localized and isolated areas of PCE concentrations in the shallow water-bearing zone exist proximate to several subfacilities located in the YRRA.

1.0 INTRODUCTION

This draft Remedial Investigation (RI) has been prepared by SECOR International Incorporated (SECOR) on behalf of the Cameron Yakima Working Group (the Working Group) for the Yakima Railroad Area (YRRA) site located in Yakima, Washington (Figures 1 and 2). The RI addresses the occurrence of perchloroethylene (PCE) in groundwater within the YRRA. The RI technical scope of work is in accordance with the Consent Decree entered into between the Washington State Department of Ecology (Ecology) and the Working Group. As defined in the Consent Decree No. CY-96-3196-WFN (Consent Decree), the RI report meets the requirements of the MTCA Chapter 173-340 Washington Administration Code (WAC).

The scope of work completed for the RI is in accordance with the *Work Plan, Focused Remedial Investigation, Yakima Railroad Area, Yakima Washington* (Work Plan) dated August 25, 1997, prepared by SECOR and approved by Ecology on September 2, 1997, and as clarified by SECOR's Technical Memoranda approved by Ecology during the field work. A copy of the Work Plan, and subsequent Technical Memoranda which modified the Work Plan, are attached as Appendix A of this report.

1.1 PURPOSE

The primary purpose of this RI is to determine the extent of PCE in groundwater within the YRRA. The RI report has been prepared in accordance with WAC 173-340-350 to collect, develop, and evaluate sufficient information regarding the YRRA to evaluate, and if necessary, to select a cleanup action under WAC 173-340-360. This report describes the areal and temporal distribution of PCE in groundwater within the YRRA over the period from December 1997 to September 1998.

1.2 OBJECTIVES

The objectives of the RI, as stated by Ecology, are to: 1) evaluate the seasonal groundwater flow regime and provide additional aquifer characterization in the vicinity of the YRRA, 2) analyze groundwater samples from the designated zones of the aquifer for PCE, and 3) evaluate potential groundwater receptors in the YRRA.

1.3 RI RESPONSIBILITIES

This section summarized the RI responsibilities of the Working Group, Ecology, and the subfacilities for completion of the RI.

1.3.1 Working Group

The Working Group entered into a Consent Decree with Ecology on May 5, 1997 which requires the Working Group to complete an RI at the YRRA. SECOR was engaged by the Working Group to conduct the scope of work defined in Exhibit B of the Consent Decree. SECOR prepared a Work Plan to define the scope of work for the RI and provided subsequent Technical Memoranda to confirm in writing any amendments to the Work Plan approved by Ecology. The RI work was conducted by SECOR in accordance with the Work Plan. SECOR's RI field work responsibilities

included implementation of the RI activities defined in the Work Plan, except for activities conducted by Ecology and subfacility consultants, as described in this section. *de maximis, inc.*, was designated as the project coordinator for the Working Group, and was identified to oversee the implementation of the Consent Decree on behalf of the Working Group.

1.3.2 Ecology

As the regulatory agency overseeing the RI, Ecology defined and approved the scope of work in the Work Plan and subsequent amendments to the Work Plan provided by SECOR. The RI groundwater monitoring well locations, soil disposal facility, groundwater disposal, and subfacilities included in the RI sampling were selected by Ecology. Ecology also signed soil disposal manifests. Groundwater sampling and analysis was conducted at selected subfacilities by Ecology and results were provided to SECOR. Quarterly groundwater monitoring reports provided by various subfacility consultants were submitted to Ecology who in turn, forwarded the reports to SECOR for inclusion in the RI data-set. Historical subfacility information was provided by Ecology and reviewed by SECOR.

Ecology is responsible for review and approval of all RI work, including review and approval of the RI report. Public participation activities are also conducted by Ecology.

1.3.3 Subfacilities

The 13 subfacilities are not parties to the Consent Decree, but were required by Ecology to participate in the RI quarterly groundwater sampling program. Most of the 13 subfacilities are under separate Agreements or Orders with Ecology (Table 1). The quarterly sampling at each subfacility was coordinated by Ecology to coincide with the sampling schedule for this RI. It was the responsibility of the subfacility to provide SECOR access to the groundwater monitoring wells at the facility or split samples with SECOR, and provide analytical results to Ecology for all wells sampled during each quarterly event.

1.4 REPORT ORGANIZATION

This RI report provides the necessary components required by Chapter 173-340-350 WAC. Section 2.0 provides a summary of regional features and conditions. Section 3.0 provides an overview of background information for the YRRA. Section 4.0 discusses the regional environmental setting. Section 5.0 summarizes the site investigation conducted for this RI. Section 6.0 summarizes the results of the investigation and site characteristics. Source characterization is presented in Section 7.0. Section 8.0 evaluates the distribution of PCE in groundwater. Section 9.0 summarizes the results of the receptor survey. The conclusions are presented in Section 10.0.

2.0 SITE DESCRIPTION

2.1 GEOGRAPHIC LOCATION

The cities of Yakima and Union Gap are the commercial center of the Yakima River Valley, a major agricultural area in south-central Washington. The YRRA, as defined by Ecology, consists of approximately six square miles of predominantly industrial and commercial property that parallels the railroad corridor on the eastern and northern portions of the cities of Yakima and Union Gap, respectively (Figures 1 and 2). The four-mile-long railroad corridor trends diagonally from Lincoln Avenue in the northwest to Ahtanum Road in the southeast (Figure 2).

As shown in Figure 2, the YRRA is defined by West Lincoln Avenue to the north, South 10th Avenue to the west, Ahtanum Road to the south, and Rudkin Road, South 10th Street, and North Third Street to the east. The YRRA is located within the city limits of the city of Yakima in the northern portion and within the city of Union Gap in the southern portion.

Located within the YRRA are 13 subfacilities identified by Ecology as potential sources of PCE to groundwater (Table 1). The 13 subfacilities consist of operating businesses including dry-cleaners, pesticide manufacturing facilities, tooling facilities, maintenance facilities, activated carbon recycling facilities, wrecking yards, and manufacturing facilities. The locations of the subfacilities are shown on Figure 3.

2.2 TOPOGRAPHY, SURFACE DRAINAGE, SURFACE WATER PATTERNS

The YRRA is located within a broad, gently sloping plain located west of the Yakima River between topographic highs to the northwest and south. The ground surface slopes from the northwest to the southeast with maximum elevation of 1,080 feet above msl at Lincoln Avenue in Yakima to an elevation of less than 960 feet above msl near Ahtanum Road in Union Gap.

A significant portion of the YRRA is impermeable surface covered with buildings, asphaltic parking, or concrete paving, with the exception of landscaped areas, yards, and grass fields. Large unpaved fields within the area are currently used for agriculture or are undeveloped. There are some gravel surfaced parking areas and roadways.

Surface water within the YRRA is directed to a storm water conveyance system maintained by the city of Yakima and the city of Union Gap. The storm water is discharged directly to the Yakima River. Surface water directly recharges the shallow aquifer in areas where the surface is unpaved.

The YRRA is located approximately 2,500 feet west of the Yakima River, approximately 6,000 feet south of the Naches River, and approximately 500 feet northeast of Ahtanum Creek. The Yakima River is a Class A river (Chapter 173-201A WAC). The volume of the Yakima River depends on the time of year and irrigation levels, and gains approximately 25 percent of the total volume from groundwater recharge (Ecology 1993). The Naches River is a Class AA river. Ahtanum Creek is an unclassified small stream with year-around flow.

Irrigation canals are located throughout the YRRA. The irrigation canals are typically constructed of concrete-lined channels; however, leakage from the channels is common. Application of irrigation water occurs during the summer and early fall months (typically from May to October) and affects the regional surface water flow and groundwater levels within the YRRA. The locations of the irrigation canals are shown on the map provided by the city of Yakima in Packet 1 and are discussed in more detail in Sections 4.2 and 6.3.2.

There are extensive underground utilities throughout the YRRA. The utilities are relatively shallow, less than 20 feet below bgs, and consist of sewers, waterlines, storm drains, and cables (telephone and cable television). The underground piping may or may not be backfilled in a pipe bedding. The effects of underground utilities and groundwater flow and/or potential PCE migration pathways are discussed in greater detail in Section 6.1.2 of this report.

2.3 LAND USE

The YRRA includes the Central Business District, zoned CBD, located on the north end of the YRRA between Lincoln and Walnut Streets. The CBD support area (CBDS) is located south of the CBD and east of the railroad. Areas zoned R-1 (Single Family Residential), R-2 (Two-Family Residential), and R-3 (Multi-Family Residential) are located on the east and west sides of the YRRA. The central portion of the YRRA, along the railroad, is zoned M-1 (Light Industrial) and M-2 (Heavy Industrial). The southern portion of the YRRA is zoned SR (Suburban Residential).

2.4 WATER SUPPLY WELLS

Annual precipitation in the Yakima River Valley is approximately eight inches (US Department of Agriculture 1987), with more than half occurring during the winter months as snow. Potential evapotranspiration, determined using a modified Blaney-Criddle calculation (U.S. Department of Agriculture 1970), is approximately 38 inches annually. Consequently, crops require extensive irrigation. Most irrigation water is diverted surface water, but some is pumped groundwater. The main municipal water supply for the city of Yakima is surface water from the Naches River; however, some residences and small water purveyors rely on groundwater. Well locations within the YRRA and Area 1 are shown on the maps included in Figure 26. Well details are summarized in the Receptor Survey Report in Appendix C.

A review of existing permitted groundwater monitoring wells and/or other water wells located within the YRRA, one-half mile downgradient of the YRRA, and one-quarter mile from all other boundaries of the YRRA was completed for this RI. The well logs reviewed are included in Appendix B. The well logs reviewed for this RI indicated that there are approximately 70 monitoring wells at depths of less than 30 feet bgs located in the YRRA, in addition to the monitoring wells located at the subfacilities. These monitoring wells, as defined in Chapter 173-160 WAC, have been installed for collection of groundwater samples and not for groundwater extraction.

The results of the Washington Department of Natural Resources (DNR) well log review and the Receptor Survey (Section 9.0 of this report) have identified approximately 100 supply wells located within the YRRA and Area 1 which extract groundwater for industrial and/or domestic use. The depth of most of these supply wells is greater than 200 feet bgs. which is significantly below the water-bearing zones (less than 130 feet bgs) evaluated for this RI. Most of the shallow (less than 130 feet bgs) water wells are located in the southern portion of the YRRA. Additional information regarding groundwater use within the YRRA is discussed in Section 9.0 of this report and the Receptor Survey Report provided in Appendix C.

3.0 GENERAL BACKGROUND

This section provides a brief summary of the background of subsurface investigations conducted within the YRRA. The information provided here is summarized from other reports, as referenced.

3.1 PREVIOUS INVESTIGATIONS

The YRRA is a commercial and industrial corridor located along the Burlington Northern Railroad in Yakima and Union Gap, Washington (Figures 1 and 2). During routine inspections of industrial facilities located within the YRRA during the 1980s, the United States Environmental Protection Agency (USEPA) discovered concentrations of PCE in soil and groundwater samples collected from the area. According to Ecology files, PCE was first detected in groundwater samples collected at the Rainier Plastics facility near Nob Hill Road, in the central part of the YRRA.

In 1988, Black & Veatch Waste Management, Inc. conducted a preliminary investigation of the Cameron-Yakima Subfacility, also located in the central part of the YRRA (Figure 3), and identified elevated concentrations of PCE in soils. The USEPA detected soil containing concentrations of PCE at the Woods Industries Subfacility in the southern part of the YRRA and at a number of other facilities in the area that had managed PCE (including dry cleaners and auto repair shops). As a result, USEPA contracted with Ecology and Environment (E&E) to conduct a soil-gas survey to provide a screening level assessment of PCE in soil/groundwater throughout the YRRA.

The E&E report identified the following four subfacilities as potential sources of PCE: Nu-Way Cleaners, U-Haul, Cameron Yakima, and Woods Industries (Figure 3). E&E identified two additional soil-gas anomalies between the Cameron Yakima and Woods Industries Subfacilities, but identified no obvious sources. The E&E report identified soil-gas PCE concentrations ranging from 0.02 to 2 mg/m^3 near the Cameron Yakima Subfacility, up to 18 mg/m^3 upgradient of the subfacility near the U-Haul/Yakima Valley Spray Subfacility, and up to 4 mg/m^3 downgradient of the Cameron Yakima Subfacility, near the Woods Industries Subfacility.

In February 1991, Science Applications International Corporation (SAIC), under contract to Ecology, submitted recommendations to Ecology regarding the additional work required to identify PCE sources and to better determine the extent of PCE contamination in the YRRA. In the Fall of 1991, Ecology notified eight subfacilities (Cameron Yakima, Nu-Way Cleaners, Hahn Motor Company, Frank Wear Cleaners, Yakima County, Paxton Sales Corporation, U-Haul, and Briar Development) that they might be listed as Potentially Liable Persons (PLPs) for the YRRA under Chapter 70.105D RCW. Final PLP determinations were made by Ecology in 1991 for U-Haul/Yakima Valley Spray, Paxton Sales, Frank Wear Cleaners, Nu-Way Cleaners, Cameron Yakima, CMX Corporation, Yakima County, Briar Development, Hahn Motors/Fifth Wheel Shop, Burlington Northern Railroad, Westco Martinizing, and Agri-Tech/Yakima Steel Fabricators. Between mid-1992 and mid-1995, Ecology issued Enforcement and/or Agreed Orders to seven subfacilities to perform source control remediation. The subfacilities identified by Ecology within the YRRA, including those designated to be included in this RI, are listed on Table 1.

A total of 105 monitoring wells have been installed within the YRRA by others prior to this RI. Approximately 95 of the 105 monitoring wells are shallow wells screened in the upper 20 to 30 feet of the

aquifer. Fewer than ten of the 105 monitoring wells within the YRRA were installed deeper into the aquifer, based on the historical information reviewed. The maximum concentrations of PCE detected in groundwater at each subfacility prior to this RI are summarized on Table 2.

Of the 105 wells installed by others prior to this RI, 68 have been sampled for this investigation (Table 3). Quarterly sampling of groundwater monitoring wells installed for this RI has included sampling from the 13 subfacilities, either as samples or split samples collected by SECOR, data from groundwater samples collected by Ecology, or data from groundwater samples collected by subfacility consultants, as discussed in more detail in Section 5.0 of this report. The data from the existing groundwater monitoring wells located at each subfacility have been included with this report. A more detailed review of the historical background information for each subfacility included in the RI is provided in Section 7.0.

3.2 RI SUBFACILITY LOCATIONS

As noted in the above section, Ecology has identified 13 subfacilities located within the YRRA that have documented evidence of PCE contamination in soil and/or groundwater (Table 3). Some of these 13 subfacilities are currently under some type of Order/Decree with Ecology or USEPA are shown on Table 1. The 13 subfacilities are: Adeline, Agri-Tech/Yakima Steel, Burlington Northern Roundhouse, Cameron Yakima, Fifth Wheel/Hahn Motors, Frank Wear Cleaners, Goodwill Industries, Nu-Way Cleaners, Paxton Sales, Southgate Laundry, U-Haul/Yakima Valley Spray, Westco Martinizing, and Woods Industries. The location of the existing groundwater monitoring wells at each of the 13 subfacilities included in this RI, which were installed prior to this RI, are shown on the maps in Appendix D and summarized on Table 3.

Formation acts as a confined aquifer and is recharged by lateral and upward flow of groundwater from the Yakima Basalt (USGS 1986).

Pamona Basalt

The Pamona Basalt is a Subgroup of the Yakima Basalt that consists of up to 5,000 feet of basalt flows of the Columbia Plateau Flood Basalts. This unit occurs at depth within the YRRA and is not used as a groundwater source within the YRRA. The basalt is recharged from surface water, irrigation canals, and precipitation where it is exposed at the surface as anticlinal ridges (USGS 1986).

4.4 REGIONAL HYDROGEOLOGY

The Yakima Valley hydrogeology consists of a three-aquifer system (USGS 1986). Water-bearing zones include: 1) the uppermost aquifer consisting of unconfined, relatively uninterrupted sand and gravel in the Yakima Valley Alluvium and Yakima Valley Terrace Deposits (commonly referred to as the Yakima Gravels) to depths of 300 feet bgs; 2) an intermediate, lower aquifer consisting of confined coarse-grained interbeds in the Upper Ellensburg Formation to depths of up to 1,000 feet bgs; and 3) the lower-most aquifer consisting of confined fractured intervals in the Pomona Basalt to depths of 5,000 feet bgs. These aquifers, including confined and unconfined, are locally quite productive and capable of yielding hundreds of gallons per minute (USGS 1986).

The Yakima Gravels are extremely permeable in the vicinity of the Yakima River. The content of fine-grained material and cementation increases to the north, resulting in zones of decreased permeability within the YRRA. Groundwater is first encountered from 5 to 30 feet bgs, depending on topography and seasonal irrigation practices. The depth of groundwater fluctuates seasonally by as much as 12 feet. The water table is typically deeper in the spring and shallower in the summer and fall due to the recharge effect from irrigation. This is discussed in more detail in Section 6.3 of this report.

Groundwater flows predominantly from the surrounding upland regions into the valley, and eventually toward the Yakima River. In the vicinity of the Yakima River, where Yakima Gravels have fewer fine-grained materials and are more permeable, groundwater flow becomes subparallel to the river course and assumes a more southerly orientation. Artesian flow is commonly observed in wells completed a few hundred feet or more bgs. Artesian conditions are thought to be augmented by the synclinal structure of the basin.

4.0 ENVIRONMENTAL SETTING

This section provides a summary of regional conditions for the YRRA. The information summarized here has been obtained from published documentation, as noted.

4.1 CLIMATE

The YRRA is located within Yakima River Valley, in an arid to semi-arid region characterized by warm, dry summers and cold, moist winters. The average temperature is 68°F in the summer and 32°F in the winter. The average annual precipitation is approximately eight inches, with 46 percent occurring in November through January.

4.2 SURFACE WATER HYDROLOGY

Surface water within the YRRA is controlled by a storm water system that captures and conveys surface water runoff within paved areas to the Yakima River. Storm water that occurs in unpaved areas typically infiltrates directly to the shallow groundwater. Irrigation affects the surface water hydrology from May through October by redirecting surface water from the Yakima River and the Naches River to lined channels that are located throughout the YRRA. Leaking irrigation canals and land application of irrigation waters affect both the surface water and groundwater hydrology. A map provided by the city of Yakima showing the irrigation canal locations is included in Packet 1.

4.3 REGIONAL GEOLOGY

The YRRA is situated in the Ahtanum-Moxee Subbasin. The subbasin lies within a broad syncline bounded by east-west trending anticlinal ridges of basalt of the Yakima fold belt. These ridges include the Yakima Ridge to the north and the Ahtanum/Rattlesnake Ridges to the south. The Yakima River bisects these folded uplands at Selah Gap and Union Gap, respectively. Columbia River Basalts are exposed on the ridges and dip beneath the valley-filling sediments of the Ellensburg Formation and Yakima Gravels (Foxworthy 1962). The regional geology is summarized on Figure 4.

The uppermost member of the basaltic-bedrock is the Pomona basalt, which is the youngest member of the Columbia River basalt group. Overlying the basaltic-bedrock is the Upper Ellensburg Formation, which consists predominantly of volcaniclastic detritus of variable texture (gravel, sand, and fine-grained members), including mudflow and ash deposits from the ancestral Cascade Mountains. Overlying the Upper Ellensburg Formation are Yakima Gravel deposits, which consist of coarse-grained (sand and gravel) fluvial, alluvial, and preglacial flood deposits associated with the present and ancestral Yakima River and its tributaries. Manmade fill deposits have been placed in the valley during the construction of the railways and other construction activities.

The stratigraphic sequence in the Yakima River valley (from Bentley and Campbell 1983) is described, from younger to older, as:

Stratigraphic Unit	Approximate Depth	Geologic Age
Surface soil and fill	up to 20 feet	Recent
Yakima Valley Alluvium	up to 30 feet	Holocene
Yakima Valley Terrace Deposits	200 to 300 feet	Pleistocene
Upper Ellensburg Formation	200 to 1,500 feet	Late Miocene
Pomona Basalt	at 1,500 feet	Late Miocene

The stratigraphic units are described below.

Surface Soil and Fill

The surface soil and fill consists of discontinuous layers of silty gravel, gravely sands, organic soils, and calcic paleosols. Significant modifications to the surface over the historic development of Yakima and Union Gap have affected the extent, depth, and permeability of the surface soils.

Yakima Valley Alluvium

The Yakima Valley Alluvium consists of unconsolidated silts, sands, gravels, and cobbles deposited by rivers and streams. This unit occurs at or near the ground surface on the eastern side of the railroad right-of-way in the YRRA and extends to no more than 30 feet bgs. The alluvium is highly permeable and acts as an unconfined shallow water-bearing zone, which is directly recharged from precipitation and/or irrigation. The water level is typically eight to 12 feet bgs with a two to five-foot seasonal fluctuation (USGS 1986).

Yakima Valley Terrace Deposits

The Yakima Valley Terrace Deposits consist of gravels with minor clay, silt, and sand deposited by high-energy streams associated with glacial retreats and advances. The gravels can be stratified and indurated to a conglomerate with discontinuous layers of impermeable cemented gravels, caliche, and clay/silts. The gravels occur at the surface, west of the railroad right-of-way in the YRRA, and extend to depths of 200 to 300 feet bgs. The permeability of this unit varies considerably depending on induration and clay/silt content, but can be highly permeable. The Yakima Valley Terrace Deposits act as an unconfined water-bearing zone which is used for domestic, public, irrigation, and industrial water supply wells. The gravels are recharged by precipitation, irrigation, and upward leakage from the underlying Upper Ellensburg Formation (USGS 1986).

Upper Ellensburg Formation

The Upper Ellensburg Formation consists of semi-consolidated clay, silt, and sand with trace to minor amounts of gravel that were deposited as lahars and ashfall from volcanic activity (Foxworthy 1962). This unit occurs at depth within the YRRA, is more than 1,000 feet thick, and is interlayered with the underlying Pomona Basalt. The permeability within this unit is highly variable. The Upper Ellensburg

5.0 SITE INVESTIGATION

This section summarizes the site investigation conducted within the YRRA for this RI. The investigation was conducted in accordance with the Work Plan dated August 1997 prepared by SECOR and amendments documented in the Technical Memoranda approved by Ecology. The Work Plan and associated Technical Memoranda are attached in Appendix A for reference.

5.1 PRE-FIELD ACTIVITIES

Prior to installation of the RI groundwater monitoring wells, SECOR and Ecology conducted pre-field activities in accordance with the Work Plan. The pre-field activities included:

- Obtaining Access Agreements;
- Determining specific well placement at each location;
- Conducting underground utility locates; and
- Selecting potential waste disposal sites (Ecology).

Access for RI wells located on public land, easements, and/or rights-of-way was obtained from the cities of Yakima and/or Union Gap. Access for RI wells located on private properties was obtained from the respective property owners. Access for sampling and survey of existing wells located at each subfacility was coordinated by, and provided through Ecology. Utility locates were completed in accordance with the Work Plan at all well drilling locations.

Specific RI well locations were determined by Ecology and defined in the Work Plan. Exact well placement at each location was defined in the field based on access restrictions, above and below ground utilities, and on other location specific issues. RI wells were placed in accordance with the Work Plan with the following exceptions:

- RI-3
- RI -5
- RI -7
- RI -8
- RI-10

These well placements were moved to slightly different positions at each well location due to the presence of underground or aboveground utilities or other restrictions. The specific well placements are shown on the sketch maps in Appendix E.

5.2 GROUNDWATER WELL INSTALLATION PROGRAM

Well locations were defined by Ecology to characterize the aquifer properties and groundwater quality. Fourteen locations within the YRRA were selected by Ecology for installation of groundwater monitoring wells for the RI (Figure 3). Two wells were installed at each location (with the exception of RI-13, where three wells were installed [see Section 5.2.2]): a shallow well to a depth of approximately 30 to 50 feet bgs (designated RI-__s); and a deeper well to a depth of approximately 107 to 130 feet bgs

(designated RI-__d). The wells were located no more than 20 feet apart. The monitoring well construction details are summarized on Table 4 and well boring logs are included in Appendix F.

5.2.1 Soil Sampling and Lithologic Descriptions

The groundwater monitoring wells were installed for the RI using an air-rotary drilling that discharged the drilling spoils through a cyclone. The spoils discharged through the cyclone were observed by the field geologist to evaluate lithology during drilling. Depth-specific subsurface soil samples were not required to be collected as part of this investigation for laboratory analysis or lithologic description.

The field geologist made an evaluation of the lithologic changes observed in the spoils relative to depth of drilling using an annulus travel time calculated for each location. The range of lithologic descriptions of the soil are included in the Boring Logs in Appendix F. Lithologic descriptions were prepared in the field, by the geologist, in accordance with the Unified Soil Classification System.

The soils discharged through the cyclone were screened for volatile organic compounds (VOCs) using a photoionization detector (PID) at each well location. The field screen results are included in the boring logs, most of which did not indicate the presence of VOCs above the range of normal background levels. The high PID readings noted on RI-11d were caused by water interfering with the intake. Bulk samples were collected from the spoils for analysis by USEPA Method 8010 for VOCs for waste disposal characterization, as discussed in Section 5.4 of this report.

A review of available geologic and soils data was conducted to augment the field data collected from the groundwater well installation. The additional data sources reviewed to evaluate the subsurface soil conditions include: subfacility site investigation reports (as discussed in more detail in Section 7.0); groundwater resource well logs available at the DNR (Appendix B); published geologic and soils maps; and other published investigations.

5.2.2 Well Installation

The RI included installation of 28 single-completion two- to six-inch diameter groundwater monitoring wells at 14 locations within the YRRA. One well was installed in each borehole. The wells were installed under the direction of SECOR by Cascade Drilling of Woodinville, Washington. Drilling was performed from October to November 1997. One shallow and one deep well was installed at each location (Figure 3). The depths of the deeper wells were selected based on the depth of water in the shallow well, as defined in the Work Plan.

An additional well was installed at RI-13 to an intermediate depth of 90 feet. The well was designated well RI-13i. Well RI-13i only was used as the pumping well for the aquifer test at RI 13. This well was not part of the scope of work described in the Work Plan and groundwater samples for water quality analysis were not required to be collected at this well for the RI. Therefore, this report only references 28 wells installed for the purpose of quarterly sampling for this RI.

Wells at two of the groundwater monitoring well locations, RI-4s, RI-4d, RI-13i, and RI-13s (Figure 3), were constructed with six-inch diameter casing to allow for placement of down-hole groundwater extraction sumps for the aquifer tests, as discussed in Section 5.3 of this report.

Groundwater monitoring wells were installed and developed in accordance with the procedures described in the Work Plan, with the following exceptions:

- **RI-11d and RI-12d** - As required by in the Work Plan, these wells were installed as the water elevation in RI-13d was not at the same elevation as RI-13s.

- **RI-11d** - The Work Plan called for the deep monitoring wells to be screened in the bottom 10 feet of the well and to be set 100 feet below the seasonal low groundwater (assumed to be 5 feet below the water level encountered during drilling).

  At the borehole for RI-11d, groundwater was encountered at 12 feet bgs and the static water level was 13 feet bgs approximately 14 hours later. The planned total borehole was 118 feet (13 feet plus 5 feet, plus 100 feet, equals 118 feet bgs), with a screened interval planned between 108 and 118 feet bgs. However, the drill stem bit was damaged in the interval from 105 to 110 feet bgs, prohibiting advancement of the borehole an additional 8 to 10 feet to the target depth. The total depth of the borehole was between 107 and 108 feet.

- **RI-13s, 13i, and 13-d** - The depth to groundwater at RI-13 was approximately 16 feet bgs at the time of drilling. Sediments encountered were predominately sandy gravel that were more coarse-grained at depth. Below 60 feet bgs, the formation produced much more water per foot of drilling than at other well pair locations previously drilled. The interval from 70 to 80 feet bgs produced more than 1,200 gallons of water and the interval from 80 to 90 feet bgs produced more than 4,000 gallons of water. At 90 feet total borehole depth, all of the available capacity for water storage (5,800 gallons) was filled and drilling was stopped. The coarse-grained sediments logged, and the rate of water production during drilling, indicate that the transmissivity of the aquifer is very high below 60 feet bgs.

  Based on the high volume of water produced at depth and the lack of additional water storage capacity, it was decided to complete the well RI-13d at a depth of 90 feet bgs instead of the target depth of 121 feet bgs. It was believed that this modification to the proposed well design would not significantly compromise the usefulness of the data to be obtained from the planned aquifer test. Ecology evaluated this information and determined that a well completed to the required design depth of 121 feet bgs would be necessary.

A third well was installed at the RI-13 location to the required depth of 121 feet bgs and designated RI-13d. The well drilled to 90 feet bgs was re-designated RI-13i. The three RI-13 wells are screened as follows: well RI-13s from 26 to 41 feet bgs; well RI-13i (originally designated RI-13d and renamed RI-13i) from 80 to 90 feet bgs; and well RI-13d from 111 to 121 feet bgs.

SECOR provided Ecology with written documentation of the information stated above and confirmed that all well design modifications were approved by Ecology.

5.3 GROUNDWATER SAMPLING AND CHARACTERIZATION

The newly installed RI groundwater monitoring wells were surveyed by PLSA of Yakima, Washington, for horizontal and vertical elevations as described in the Work Plan. The survey data for top of well casing elevations relative to msl are included on Table 4. The elevations of the groundwater wells monitored at each of the subfacilities were provided by the subfacility consultants. The resulting groundwater elevations from the subfacilities were compared with the data set for the entire YRRA to evaluate if there were any anomalies with existing data. The groundwater well located at the Paxton Subfacility was inconsistent with the existing data set and was re-surveyed. All other subfacility well elevation data for the one well per subfacility sampled by SECOR appeared consistent with the YRRA data set and were used in the RI evaluation.

5.3.1 Groundwater Elevation Measurements

SECOR measured the 28 groundwater monitoring wells installed for this RI and a single well at each of the 13 subfacilities for groundwater elevations on December 1997, March 1998, June 1998, and September 1998. (The September 1998 monitoring round commenced the week of August 31, 1998, but this report refers to data collected in August as the September monitoring round). The results of the groundwater elevation measurements collected by SECOR are summarized on Table 5 (shallow wells) and 6 (deep wells). These data were used to develop the hydraulic gradient and head difference maps discussed in Section 6.0 of this report.

5.3.2 Groundwater Sampling and Analysis

Groundwater samples were collected on December 1997, March 1998, June 1998, and September 1998. The 28 RI wells were sampled by SECOR. Subfacility wells were sampled by SECOR, Ecology, or subfacility consultants as summarized on Table 3. Sampling methods, frequency, and analyses performed for each sample were specified in the Work Plan. The groundwater samples collected by SECOR in December 1997 were analyzed by Superior Analytical. All subsequent samples collected by SECOR were analyzed by North Creek Analytical.

Split samples were collected by SECOR from groundwater samples collected by Ecology or subfacility consultants at the selected subfacilities (Table 3). All groundwater samples were analyzed for PCE by USEPA Method 8010 in accordance with the Work Plan. The results of the RI well sample analyses are summarized on Table 7 (subfacilities), Table 8 (shallow water-bearing

zone), and Table 9 (deep water-bearing zone). The laboratory analytical results and chain-of-custody forms are included in Appendix G. The complete USEPA Method 8010 results have been included in Appendix G for information purposes only.

Groundwater samples were collected in accordance with the Work Plan, with the exception of the following:

- Woods Industries - The split sample for the June 1998 sampling event was not collected as the consultant for Woods Industries did not conduct the sampling as requested by Ecology.
- Goodwill Industries - The split sample collected in September 1998 was inadvertently not analyzed by the laboratory.
- Fifth Wheel/Hahn Motors - The Work Plan called for sampling to be conducted by the subfacility consultant. Due to sampling delays, Ecology requested that SECOR collect the groundwater sample from this subfacility for all four quarters.

5.3.3 Data Validation

SECOR reviewed the analytical results from the groundwater samples collected by SECOR for data validation and quality assurance/quality control (QA/QC) in accordance with the Work Plan. Laboratory analytical reports were not provided to SECOR by Ecology and/or the subfacility consultants for the samples collected at the subfacilities. Therefore, no QA/QC information or reporting limits were provided for review by SECOR of the subfacility groundwater data provided by others. There were no data qualifiers for the PCE results included on any of the laboratory reports for samples collected by SECOR. A "J" qualifier was noted by samples analyzed by Ecology for concentrations which were below the laboratory detection limit and were estimated. Laboratory detection limits were not provided by Ecology.

5.3.4 Aquifer Test

Aquifer tests were conducted at the RI-4 and RI-13 (Figure 3) well pair locations, in early December 1997, in accordance with the Ecology scope of work in the Consent Decree. The aquifer test well locations for this RI were selected by Ecology to evaluate the aquifer conditions on the west (RI-4) and east (RI-13) sides of the YRRA. The purpose of the aquifer test, as stated in the Consent Decree, was to "determine whether known impacts to the shallow aquifer units can reasonably be expected to affect a deeper aquifer, now or in the future."

The aquifer tests were performed in accordance with procedures described in the Work Plan and Technical Memoranda with the exception of the procedures identified below.

- The intermediate depth well (RI-13i) at location RI-13 was used as the pumped well and RI-13s and RI-13d were used as the observation wells.

- The Work Plan included step drawdown aquifer tests to estimate the approximate yield of the aquifer test pumping wells. The step drawdown tests were determined to be unnecessary based on observations during installation, development, and sampling of well RI-4d, and installation and development of well RI-13i. The field observations were used to estimate the yield at each pumping well. A pumping rate of five gallons per minute (gpm) at well RI-4d during sample purging indicated that this extraction rate would result in substantial drawdown. The high rate of water production during installation and development of the wells at RI-13 indicated that the water-bearing zone would yield water at a higher rate than the 10 foot screen section of well RI-13i could produce. A pumping rate of 30 gpm was selected for the constant discharge test at well RI-13i.

5.3.4.1 Aquifer Test at RI-4

The deep monitoring well, RI-4d, was used as the pumped well and the shallow monitoring well. RI-4s was used as the observation well for the aquifer test at RI-4 (Figure 3). Well RI-4s is located approximately 15 feet from well RI-4d (Appendix E). The screen intervals for wells RI-4s and RI-4d extend from 20 to 35 feet bgs and 106 to 116 feet bgs, respectively, which provides a vertical separation of 83.5 feet between the shallow and deep well screen mid-points (Appendix F). During installation of these wells, there was some evidence that there may be two separate water-bearing zones.

The pumping rate used for the aquifer test was 5 gpm for 18.5 hours (maximum drawdown 32.75 feet at well RI-4d), then 8 gpm for an additional 5.5 hours (maximum drawdown 51.61 feet at well RI-4d). The response at observation well RI-4s was 0.04 feet of drawdown after 22.3 hours of pumping. The evaluation of data developed from this aquifer test suggest that the vertical communication between the shallow and deep water-bearing zones at the well pair RI-4 location is not significant. A summary of the aquifer test water level drawdown data used for the evaluation is shown on Table 10.

Water quality data (Section 8.3) indicate that the shallow and deep water-bearing zones may have at least a limited connection at or upgradient of the RI-4 location. PCE was detected in the samples from RI-4s and from RI-4d during the December 1997 monitoring round. PCE concentrations were non-detect at well RI-4d during the March, June, and September 1998 monitoring rounds, i.e., no confirmation of the December 1997 detection in RI-4d.

5.3.4.2 Aquifer Test at RI-13

Well RI-13i (intermediate) was used as the pumped well. Wells RI-13s (shallow) and RI-13d (deep) were used as the observation wells for the aquifer test at RI-13 (Figure 3). Wells RI-13s and RI-13d are both located nine feet from well RI-13i (Appendix E). The screen interval for well RI-13s extends from 25.5 to 40.5; for RI-13d and the screen interval extends from 110.5 to 120 feet bgs. This constitutes a vertical separation of 52

and 30 feet between the shallow and deep well screen mid-points, respectively and the RI-13i screen mid-point.

The pumping rate used for the aquifer test was 30 gpm for the 24-hour constant discharge aquifer test at well RI-13i. A maximum drawdown 0.86 feet at well RI-13i was achieved 17.5 hours after the test started. A response at well RI-13s (0.03 foot) was measured approximately 166 minutes after the test started and the maximum drawdown at the observation well was 0.1 foot. 16 hours after the test started. A response at well RI-13d (0.03 feet) was measured approximately 25 minutes after the test started and the maximum drawdown at this observation well was 0.36 feet after 22 hours of pumping. A summary of the aquifer test water level drawdown data used for this evaluation is shown on Table 10.

Evaluation of these test results suggest that there is the potential for vertical communication between the shallow and deep water-bearing zones at the RI-13 location that could allow contaminant migration from the shallow to deep water-bearing zones in this area. However, PCE was not detected in groundwater samples from either zone at RI-13 during the RI.

5.4 WASTE DISPOSAL

Waste soil and water were generated during the installation of the 29 groundwater monitoring wells, development of the 29 groundwater monitoring wells, the aquifer pump test, and quarterly groundwater sampling of the 28 groundwater monitoring wells and 13 subfacility wells. The wastes were characterized in accordance with the Work Plan. Analytical results were reviewed by Ecology to determine allowable disposal options. Based on the analytical results, Ecology selected waste disposal locations described below:

Soils

A total of 6,856 tons of soils were loaded directly into drop boxes from the drilling cyclone, characterized for disposal, and transported to Terrace Heights Landfill and disposed of as a non-hazardous material. Waste disposal manifests were signed by Ecology as the generator. Waste disposal bills of lading tickets are included in Appendix H.

Wastewater

Wastewater generated from the aquifer test, decontamination, well development, and groundwater well sampling was disposed of directly to the irrigation canal owned and operated by Old Union Irrigation located on the east side of the YRRA or to the cities of Yakima or Union Gap storm drainage system as a non-hazardous material, as approved by Ecology. Discharge authorization letters are included in Appendix H.

5.5 AERIAL PHOTOGRAPH REVIEW

SECOR reviewed aerial photographs of the YRRA from 1977, 1990, and 1996 for comparison with historical data, field observations, and existing maps to interpret hydrogeologic factors. Aerial photographs were obtained from DNR for the entire YRRA. The review was conducted to evaluate the hydrologic features of significance (noted in other sources) which include the Yakima River, Naches River, Ahtanum Creek, and the irrigation canals. The photographs were selected for these years based on availability and historic operations within the YRRA. The photographs were reviewed to evaluate for large scale features, such as drainage channels, ponds, or rivers which could effect the hydrology of the YRRA. No significant deviations from the existing hydrologic features identified in other sources were noted in the historical aerial photographs reviewed.

5.6 ELECTRONIC DATABASE

SECOR has prepared an electronic database of the analytical results for PCE for the RI wells and subfacility wells. The PCE database includes analytical results of samples collected from the RI wells by SECOR, and from samples collected at the subfacilities by SECOR, Ecology, and subfacility consultants for the period of December 1997 to September 1998. The database includes water level measurements of the RI wells and subfacility wells measured by SECOR. The PCE database is contained in Microsoft Access database format and includes the data presented in this report. Linked with the electronic database are CAD versions (14 electronic files) of the RI figures, and RI boring logs included with this report. The database will be provided to Ecology on disk under separate cover.

6.0 SITE CHARACTERISTICS

6.1 SURFACE TOPOGRAPHY AND FEATURES

Physical features observed at the surface of the YRRA and shallow features that could affect groundwater flow are discussed in this section.

6.1.1 Topography

The YRRA is located in a broad, flat plain situated between topographic highs to the southwest (Ahtanum/Rattlesnake Ridge) and the northeast (Yakima Ridge) (Figure 4). The surface of the YRRA is relatively flat with a general slope to the south-southeast towards the Yakima River. Surface drainage patterns are controlled by paved surfaces, curbing, storm drains, and other urban features.

6.1.2 Underground Utilities

SECOR reviewed utility maps for the cities of Yakima and Union Gap. Based on review of these maps, underground utilities are located throughout the YRRA and include storm drains, sewer lines, water lines, cables, and other piping. The majority of the underground utilities are shallow (less than 20 feet bgs) and have little or no effect on the regional shallow groundwater drainage pattern. Sewer stubs and other subsurface utilities that enter private properties, specifically the 13 subfacilities, may have acted as a conduit for underground migration of surface releases of PCE. However, the subsurface soils are predominantly sands and gravels. The permeability of the native soil is likely high enough that shallow underground utility corridors would not act as preferential pathways for subsurface contaminant migration.

6.1.3 Surface Cover

Surface cover within the YRRA consists of impermeable surfaces (paved streets, buildings, and parking areas), and permeable surfaces (lawns, landscaping, unpaved parking and alley ways, and agricultural fields). The permeability of the surface cover locally affects potential recharge to groundwater from precipitation and irrigation and discharge from groundwater due to evapotranspiration.

6.2 SITE GEOLOGY

The geology of the YRRA has been interpreted based on the qualitative subsurface soil information collected in the field during installation of the RI monitoring wells, data on groundwater well logs available from agencies, subsurface data included in investigations conducted by others at the subfacilities, and other sources.

The YRRA is situated in an area underlain by fill composed of variable materials. The fill typically consists of reworked sands and gravels but may also include debris, organic soil, or fine-grained materials, which extend to depths of as much as 20 feet bgs. Sands and gravels of the Yakima Alluvium and Yakima

Terrace Deposits underlie the fill, and crop out at the surface in some areas. Gravels, sands, silts, and clays of the Upper Ellensburg Formation underlie the alluvial deposits and extend to depths of 500 feet or more within the YRRA.

The alluvial deposits of the Yakima Alluvium and Yakima Terrace Deposits consist of interlayered alluvial sediments that include gravels ranging in size from boulders to pebbles, coarse to fine sands, silty sands, silts, and clay layers within the YRRA. Layers of cemented gravels and/or caliche are interlayered with the gravels and sands. The permeability of the sands and gravels is very high in the YRRA with the exception of layers of cemented gravels, fine-grained silts or clays, and caliche, which act as aquitards segregating water-bearing zones. Based on the qualitative subsurface soil data available, only generalized schematic cross-sections have been developed. The cross-section locations are shown on Figure 5. A schematic representation of the subsurface geology in the YRRA is shown on Cross-Section A-A′ (north-south trending, Figure 6), Cross-Section B-B′ (east-west trending on the northern portion of the YRRA Figure 7), and Cross-Section C-C′ (east-west trending on the southern portion of the YRRA, Figure 8).

An aquitard of cemented gravel has been reported on boring logs prepared by others for wells located in the northern portion of the YRRA in the vicinity of RI-4 (Figure 3). The aquitard has been noted on well logs prepared by others and reviewed by SECOR at 50 feet bgs and from 10 to 20 feet thick. It appears that the impermeable layer has created two distinct water-bearing zones in the northern portion of the YRRA within the shallow aquifer. There are insufficient data to define the depths exactly, but it appears to be in the range of 50 to 75 feet bgs. A schematic representation of the subsurface geology of this area is shown on Cross-Section B-B′ (Figure 7).

The southern portion of the YRRA does not show evidence of an aquitard within the shallow (less than 50 feet bgs) soils. There may be localized areas of impermeable soils, but the southern portion of the YRRA does not show a distinct segregation of water-bearing zones, similar to what was noted in the northern portion of the YRRA. A schematic representation of the subsurface geology of the southern portion of the YRRA is shown on Cross-Section C-C′ (Figure 8).

6.3 SITE HYDROGEOLOGY

The characterization of groundwater conditions for the RI involved interpretation of groundwater level data and other information from the 28 RI monitoring wells and selected monitoring wells at the 13 subfacilities. Regional hydrogeologic information (Section 4.4 of this report) and data from these wells were used to generate a conceptual model of groundwater flow in the water-bearing zones targeted by the RI. Based on this conceptual model, groundwater quality data collected during the RI was interpreted to characterize the distribution of PCE in the YRRA and to identify areas where PCE concentrations in groundwater has the potential to impact possible groundwater users.

6.3.1 Hydrostatigraphic Units and Physical Characteristics

Saturated sediments in the Yakima Gravels were encountered underlying the YRRA during the RI field program. Monitoring wells installed for the RI were either screened at the top of the first encountered water-bearing zone (referred to as the shallow water-bearing zone) approximately

100 to 120 feet below the shallow water-bearing zone (referred to as the deep water-bearing zone). The designation of two water-bearing zones within the Yakima Gravels does not mean that the shallow and deep water-bearing zones are discrete. Observations during borehole drilling and/or static groundwater level data from the completed monitoring wells indicate that two separate water-bearing zones may have been encountered at some locations (monitoring well locations RI-1, RI-2, RI-4, and RI-6); however, in most areas within the YRRA, the upper portion of the Yakima Gravels (the top 120 feet of saturated material) are interpreted to be composed of one water-bearing zone.

Qualitative information on the physical characteristics of the water-bearing zones was obtained during the RI. The air rotary drilling method utilized to install the RI wells allows for identification of prolific water producing zones and zones that yield little or no water. For example, the apparent rate of groundwater production was high during drilling of monitoring wells RI-13i and RI-13d at the 70 to 75 feet bgs and 100 to 121 feet bgs intervals, respectively, compared to water production during drilling at most of the other monitoring wells. Observations recorded on the boring logs and records of water production during borehole drilling indicates that the Yakima Gravels are vertically and horizontally heterogenous (anisotropic) with respect to groundwater flow.

The depth of the shallow water-bearing zone potentiometric surface ranged from approximately three feet bgs at monitoring well RI-7s to approximately 30 feet bgs at RI-3s (Table 5). In general, the depth to static groundwater was greatest in the northern, and least in the southern part of the site. The shallow water-bearing zone appears to be unconfined based on the depth of saturated material encountered during drilling compared to the static groundwater levels measured after installation of the monitoring wells.

The following qualitative characterizations of the physical characteristics of the water-bearing zones were determined based on field observations during drilling and results of the aquifer tests at well pairs RI-4 and RI-13:

- The RI monitoring well locations in the shallow and deep water-bearing zones in the eastern and southern sides of the YRRA tended to yield more groundwater than RI monitoring wells located in the northern and western sides of the YRRA. For example, during aquifer tests, well RI-13i located on the east side of the YRRA, yielded 30 gpm with less than one foot of drawdown while well RI-4d, located on the west side of the YRRA, yielded 8 gpm with more than 50 feet of drawdown.

- The hydraulic conductivity of the deep water-bearing zone appeared to be higher than the shallow water-bearing zone based on water production during borehole drilling across each zone.

- The depth, areal extent, and physical characteristics of the lithologic unit that separates the shallow water-bearing zone from the deep water-bearing zone in the northern portion of the YRRA, was documented on logs of wells installed by others that were reviewed by SECOR.

6.3.2 Groundwater Flow Characteristics and Seasonal Variations

Potentiometric surface (water table) maps were prepared for the shallow and deep water-bearing zones for each quarter (December 1997, March 1998, June 1998, and September 1998) (Figures 9 through 16). The groundwater level elevations were contoured on these maps to assist estimating the horizontal potentiometric surface gradient and approximate direction of groundwater flow at the time of each monitoring round. Information from these maps was also used to assess seasonal variations in the shallow and deep water-bearing zones.

6.3.2.1 Shallow Water-Bearing Zone

The potentiometric surface maps for the shallow water-bearing zone indicate that the gradient and estimated direction of groundwater flow is consistently to the southeast across the YRRA during all four quarters of monitoring (Figures 9 through 12). Groundwater levels in the northern portion of the YRRA are approximately 90 feet higher than groundwater levels in the southern end of the YRRA (Figures 9 through 12). This corresponds to an approximate gradient of 0.005 feet per foot across the site. A slightly steeper gradient, 0.007 feet per foot, was typically measured for the wells located north of Pacific Avenue/Division Street (i.e., north of monitoring well RI-3s and the Nu-Way Cleaners Subfacility) than to the south.

The seasonal variation of groundwater levels averaged less than five feet for wells screened in the shallow water-bearing zone (Table 5). Groundwater levels at several wells located in the southern portion of the YRRA (wells RI-7, RI-8, RI-10, and RI-11) fluctuated less than one foot during the four quarters of monitoring. The limited groundwater fluctuation at these monitoring wells is interpreted to be due to the proximity of the wells to the groundwater discharge point for the Yakima area at Union Gap, located approximately one mile to the south. Groundwater flow from the Yakima area is funneled through Union Gap, which would act to moderate groundwater level fluctuations, analogous to a weir or dam on a stream. Groundwater levels at only two shallow water-bearing zone wells fluctuated more than 10 feet (11.76 feet at well RI-3 and 11.06 feet at the Southgate Subfacility well MW-3).

Recharge from irrigation is likely the primary factor responsible for the larger groundwater level fluctuations at these wells, although hydrogeologic conditions, such as the apparent presence of two discrete shallow water-bearing zones north of this area and only one shallow water-bearing unit south of this area, may also influence water level fluctuations in the northern portion of the YRRA. Typically, groundwater levels in the shallow water-bearing zone were lowest in March and highest in September for the shallow water-bearing zone. The three exceptions to this trend were: the highest water level at well RI-2 was measured during the June 1998 monitoring round, and the lowest water levels at wells BNRR WDOE-3s and Westco MW-2 were measured during the December 1997 monitoring round.

Seasonal irrigation in the Yakima Valley is interpreted to be responsible for the higher groundwater levels that were typically recorded during the June and September monitoring rounds as compared to the December and March monitoring rounds. Groundwater levels measured for the higher water levels due to the RI suggest that recharge from irrigation is primarily a regional phenomena, and is not caused by localized point sources of recharge within the YRRA. Point sources would result in localized "mounding" of groundwater, which would be reflected on the groundwater contour maps (Figures 9 through 12). Runoff in the spring would also contribute recharge to groundwater along reaches of streams and rivers in the Yakima Valley that lose water to the subsurface, resulting in higher groundwater levels in the late spring to early summer period.

Anthropical feaures, such as irrigation canals and buried utilities, could influence local groundwater flow conditions due to leakage, which would recharge groundwater or effect groundwater discharge from the structure. Comparison of the groundwater level data collected for the RI with the irrigation canal map in Packet 1 did not indicate that anthropical features have a localized regional influence on the shallow water-bearing zone. Review of the groundwater elevation did not identify any depth to water or gradient anomalies in proximity to anthropical features.

6.3.2.2 Deep Water-Bearing Zone

The potentiometric surface maps for the deep water-bearing zone indicate that the horizontal gradient is less for this zone than the shallow water-bearing zone. Groundwater levels in the northern portion of the YRRA are approximately 70 feet higher than groundwater levels in the southern end of the YRRA. This level corresponds to an approximate horizontal gradient of 0.004 feet per foot across the YRRA. The horizontal gradient appears to be relatively consistent during the four quarters monitored during the RI as shown on the gradient maps, Figures 13 through 16, and the seasonal variations on Tables 5 and 6.

The estimated direction of groundwater flow in the deep water-bearing zone was east-southeast in the northern portion of the site and southeast in the southern portion of the site (Figures 13 through 16). The easterly component to flow in the northern portion of the site (in the vicinity of wells RI-1d, RI-2d, and the Westco Subfacility) was more prevalent during the December 1997 and September 1998 monitoring rounds than the March and June 1997 monitoring rounds (Figures 13 through 16).

The seasonal variation of groundwater levels for wells screened in the deep water-bearing zone averaged slightly more than three feet (Table 6). Groundwater levels at six wells located in the southern portion of the YRRA fluctuated less than one foot (wells RI-6d through RI-9d, RI-11d and RI-12d). Groundwater levels at only two wells fluctuated more than seven feet (7.65 feet at well RI-2d and 8.79 feet at well RI-3d).

The timing of groundwater level fluctuations in the deep water-bearing zone was much more variable than fluctuations in the shallow water-bearing zone.

- Data from eight monitoring wells (RI-2d through RI-5d, RI-13d, RI-14d, BNRR-d, and CYI 103-d) were similar to fluctuations in most monitoring wells in the shallow water-bearing zone (i.e., groundwater levels were lowest during the March 1998 monitoring round and highest during the September 1998 monitoring round).

- Data from five monitoring wells indicated low groundwater levels in March or June 1998 and high groundwater levels in December (RI-8d through RI-12d).

- Monitoring well RI-7d was the only deep well where groundwater levels were highest in March 1998 and lowest in September 1998.

- Monitoring well RI-1d was the only deep well that had the lowest groundwater level in December and the highest groundwater level in June 1998.

The processes influencing seasonal water-level fluctuations in the deep water-bearing zone was evaluated during the RI. It is likely that the existence of an aquitard which segregates the shallow and deep water-bearing zones on the northern, but not on the southern portion of the YRRA, effects the recharge from surface irrigation. The restriction of horizontal flow caused by Ahtanum Ridge located south and downgradient from the YRRA, may effect the fluctuations in the deep water boring zone. The subsurface soils' relative permeabilities could also effect these measures.

6.3.2.3 Vertical Potentiometric Gradients

The difference in groundwater levels at the monitoring well pairs at each location was calculated and contoured for each quarter to illustrate areal variation of head differences and vertical groundwater gradients between the shallow and deep water-bearing zones across the YRRA (Figures 17 through 20 and Tables 11 and 12). The difference in groundwater levels (in feet msl between water-bearing zones [referred to as WBZ in the formula below]) is commonly referred to as "head." For example, the head difference for the well pair at RI-4 during the December 1997 monitoring round is calculated to be 0.65 feet:

(Groundwater Elevation Deep WBZ) - (Groundwater Elevation Shallow WBZ) =

Head Difference (feet)

(1,040.78 feet msl) - (1,040.13 feet msl) = 0.65 foot

Table 11 summarizes average head differences for shallow and deep water-bearing zone well pairs. Contour maps depicting head differences between water-bearing zones are used to assess the potential for communication between water-bearing zones or recharge/discharge areas, such as surface water bodies. Small differences in head suggest

that the water-bearing zones may be in communication and large differences in head may indicate the water-bearing zones are discrete. Head difference maps assist interpretation of the potential for vertical migration of contaminant plumes from the shallow water-bearing zone to the deep water-bearing zone (or the reverse).

Relatively large negative head differences between the shallow and deep water-bearing zones were present in the northern portion (wells RI-1, RI-2, and RI-3) and southwestern portion (wells RI-5 and RI-6) of the YRRA. The negative head difference indicates that the vertical gradient is downward, i.e., the potentiometric surface of the shallow water-bearing zone is higher than the potentiometric surface of the deeper water-bearing zone, which means that groundwater would move vertically downward if no aquitard was present.

The head differences at wells in the central (RI-4, RI-13, CYI 103) and southern portions of the YRRA (wells RI-7 through RI-11) were less than two feet. These low to moderate differences in head suggest that the shallow and deep water-bearing zones may be interconnected.

Another method for evaluating the potential communication between water-bearing zones is to calculate the vertical gradient between paired wells screened in each zone. The vertical gradient is generally calculated for the interval between the screen midpoints for the shallow and deep wells. For example, calculation of the average and seasonal vertical gradient at well pair RI-1 (Table 12) involves:

1) Calculate the depth in feet between the screen interval midpoint for each well at RI-1.

   RI-1s screened interval is 20 to 35 feet bgs and the mid-point is 27.5 feet bgs.

   RI-1d screened interval is 113 to 123 feet bgs and the mid-point is 118 feet bgs.

2) Calculate the distance in feet between well pair screen midpoints.

(RI - 1d mid-point) - (RI - 1s mid-point) = (118 feet bgs) - (27.5 feet bgs) = 90.50 feet

3) Calculate the vertical gradient for groundwater levels at the well pair (December 1997 Water Levels).

$$\frac{(\textit{Groundwater Level Deep WBZ}) - (\textit{Groundwater Level Shallow WBZ})}{(\textit{Distance Between Well Screen Mid-Points})}$$

$$\frac{(1{,}036.56\ \textit{feet}) - (1{,}061.67\ \textit{feet})}{90.5\ \textit{feet}} = -0.280\ \textit{feet/foot}$$

Table 12 summarizes the average and seasonal vertical gradients for each RI well pair within the YRRA for each quarter. The vertical gradient is relatively consistent over the year. The vertical gradient was based on the head difference for each of the four quarters of data. Similar to head differences, a negative vertical gradient indicates that the gradient is downward and a positive vertical gradient indicates that the gradient is upward. The data indicate that the vertical gradient at all of the RI well pairs was downward except at well pair RI-4, which was upward at 0.003 feet per foot. The downward gradients ranged from -0.005 feet per foot at well pair RI-9 to -0.278 feet per foot at well pair RI-1. The relatively high vertical gradients (greater than -0.04 feet per foot) at wells RI-1 through RI-3, RI-5, and RI-6 suggest that the shallow and deep water-bearing zones at these locations are not well connected compared to the other wells in the YRRA. There was very little (0.020 feet/foot) variations in the vertical gradients from quarterly events. The greatest variations occurred between the June and September events (Table 12), both of which were during the irrigation period.

7.0 SOURCE CHARACTERIZATION

Ecology has identified 13 subfacilities within the YRRA that are considered potential sources of PCE to the shallow groundwater system. The subfacilities have documented evidence of PCE releases to the environment and may be under Agreements and/or Orders with Ecology (Table 1). A detailed review of the file for each subfacility at Ecology has been completed for this RI and is summarized in Section 7.1.1. Independent verification of the subfacility information provided by Ecology was not required for this RI. The objective of this review was to characterize potential source areas identified by Ecology within the YRRA. The results of the review are summarized below.

SECOR has made every effort to review available Ecology files for each subfacility. Ecology was notified in advance of the review to assist in coordination of the files requested. If it appeared that documentation was missing or there were potential data gaps in a file, Ecology was notified to locate any potentially missing information. The summary provided below is based on the information which was included in the Ecology files reviewed.

Table 1 summarizes the subfacilities identified by Ecology including the 13 subfacilities designated to be included in the RI quarterly monitoring program. Table 3 identifies the quarterly monitoring wells sampling conducted for this RI; Figure 3 shows all of the subfacility locations within the YRRA. Table 13 summarizes the operational history, potential releases, and whether remediation was conducted. Detailed well location maps for each subfacility are included in Appendix D. Some of the files reviewed were not included with the 13 subfacilities identified by Ecology. The information for these other facilities within the YRRA were reviewed and a summary of relevant information is included for each facility in Section 7.1.2.

7.1 SUBFACILITY BACKGROUND DATA

7.1.1 Ecology Identified Subfacilities for RI Monitoring

7.1.1.1 Adeline Subfacility

The Adeline Subfacility, located at 16 North First Street (Figure 3), covers approximately two-thirds of a city block, near the southwest corner of East A Street and North First Street. The Adeline Subfacility consists of two buildings that are currently occupied by The Sports Tavern and The Way Station Mission. Historically, the Adeline Subfacility has been occupied by a dry-cleaner, hotel, café, taverns, and barber shop. The reports noted that the dry-cleaners utilized PCE in the cleaning process.

SECOR reviewed the following reports that were available in the Ecology files:

- Huntingdon Engineering & Environmental, Inc. *Phase I Environmental Site Assessment*. March 6, 1995.

- Huntingdon Engineering & Environmental, Inc. *Letter Report of Limited Phase II Environmental Site Assessment, Lots 13 Through 19, Block 10.* March 8, 1995.

- Maxim Technologies, Inc. *Independent Remedial Action Program (IRAP) Report of Phase II and Phase III Investigation and Remediation.* October 1996.

The following is a summary of information compiled from the review relating to the potential source and distribution of PCE at the Adeline Subfacility:

Huntingdon Engineering & Environmental, Inc. (Huntingdon): A Phase I Environmental Site Assessment (ESA) dated March 1995 was conducted at the subfacility. The results of the Phase I ESA identified a 750-gallon heating oil underground storage tank (UST) located at the rear of the Way Station building and one drywell in the parking lot north of the Way Station building. The Phase I ESA identified several auto dealerships, service stations, and dry-cleaners in the subfacility vicinity. The Phase I ESA concluded that a subsurface investigation would be necessary to identify potential impacts from on- and off-site sources at this subfacility.

Huntingdon conducted field activities as part of a Limited Phase II ESA. The field activities consisted of the collection of nine soil samples at depth of five-feet bgs from test pits excavated throughout the subfacility and the collection of one soil sample from 7 feet bgs in the excavation created from the removal of the heating oil UST for VOC analysis. The analytical results revealed PCE in soil samples at concentrations ranging from 0.014 to 0.203 mg/kg. The Limited Phase II ESA recommended additional sampling of the subsurface soil and groundwater.

Maxim Technologies, Inc. (Maxim): Additional subsurface investigation was conducted from March to September 1996. The additional subsurface investigation involved collection of 59 soil samples from 20 test pits excavated throughout the subfacility from depths of 4, 8, and 11 feet bgs for VOC analysis. The analytical results revealed PCE in soil samples at concentrations ranging from 0.011 to 0.059 mg/kg at depths up to 11 feet bgs. The analytical results identified PCE in the subsurface soils off-site along the western edge of the subfacility, but not in the middle of the property.

PCE contaminated soils were excavated from the southwest corner, and west central portion of the subfacility in 1996. A total of 103 tons of PCE contaminated soils were excavated from the southwest corner and the west central portion of the subfacility to a depth where concentrations of PCE in soil was below the MTCA cleanup level.

Maxim installed four groundwater monitoring wells (MW 1 through MW 4) on the four corners of the site in February 1996, subsequent to the soil removal. Two rounds of groundwater sampling were completed during March and July 1996, prior to the RI. Groundwater samples were analyzed for selected VOCs. Groundwater elevations ranged from 12 to 20 feet bgs, depending on seasonal variations. The analytical results of the

groundwater samples revealed PCE at concentrations of 3 µg/l from MW-3 (downgradient) during the July 1996 sampling event, and at concentrations of 16 and 24 µg/l from MW-4 (mid-facility) during the March and July 1996 sampling events, respectively.

Maxim concluded that the site soils and nearby soils to the west were sources for the PCE detected in the groundwater. Source control, as defined by Maxim, was completed to remove PCE contaminated soil. Maxim stated that the groundwater will be remediated naturally over time.

RI Results: Ecology has collected four quarters (December 1997-September 1998) of groundwater samples from the Adeline Subfacility (MW-1 through MW-4) for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the Ecology sampling has been provided for this RI and are included on Table 7. A split groundwater sample from MW-3 was collected by SECOR for analysis of PCE for each quarter. The collection of split samples from MW-3 was required by Ecology (see Table 7). MW-3 is the most downgradient well at the subfacility as defined by Maxim. The results of the split sample analysis are consistent with Ecology results. The results of the quarterly sampling and analysis reviewed by SECOR indicate that the maximum concentration of PCE in the groundwater at the subfacility was 59 µg/l in MW-4, located in the center of the property. A maximum concentration of PCE of 15.6 µg/l was detected in groundwater from MW-3, the downgradient well (Table 7).

7.1.1.2 Agri-Tech/Yakima Steel Fabricators Subfacility

The eight-acre Agri-Tech/Yakima Steel Fabricators Subfacility, located at 6 East Washington Avenue is situated approximately two miles south of the downtown area of the city of Yakima (Figure 3). The subfacility was reportedly undeveloped land until 1947 when Yakima Farmer's Supply (YFS) purchased the property and constructed a 10,000 square foot building on the northern portion of the property. A lime-sulfur pesticide formulating cooker plant was constructed on the site by YFS in 1960 and operated until 1971. A lime mixing pit was used on the site from the late 1960s until the early 1980s when it was filled and graded. ANCO Industrial Park purchased the site in 1978. The cooker building was demolished in the late 1970s or early 1980s. Yakima Steel Fabricators purchased the southern portion of the site in 1979 and constructed a building. Agri-Tech purchased the building and lot in 1989.

The primary waste constituents identified at the subfacility were reported to be lime sulfur pesticide which was mixed in a carrier oil. The residuals from the pesticide formulation were washed into a waste pit behind the cooker building. The pit reportedly overflowed into a drainage feature south of the pit. YFS would reportedly steam clean lime sulfur drums once a year. Residual material would drain into an UST that was reportedly pumped out on a regular basis. There was no specific reference to PCE use in the documentation reviewed.

SECOR reviewed the following report in Ecology's files:

- Maxim Technologies, Inc. *Remedial Investigation Work Plan - Site History Report, Agri-Tech/Yakima Steel Fabricators*. April 1997.

The following is a summary of the information compiled from the review relating to the source and distribution of PCE at this subfacility:

Maxim. The previous investigations at the subfacility were summarized as part of the Remedial Investigation Work Plan - Site History Report prepared by Maxim. Ecology installed one groundwater monitoring well (WDOE-6) to 17 feet bgs and one soil boring to five feet bgs in November 1992. Soil and groundwater samples were collected from the monitoring well and soil boring and analyzed for VOCs. The analytical results revealed PCE at concentrations of 2,200 µg/l in the soil and 420 µg/l in the groundwater.

PLSA Engineering (PLSA) excavated four test pits in May 1993 and collected six soil samples. Four soil samples were collected outside of the former lime mixing pit and two soil samples were collected in the former lime mixing pit and analyzed for VOCs. The analytical results revealed PCE at a concentration of 13 µg/l in the soil sample collected from a test pit excavated adjacent to the existing monitoring well installed by Ecology and PCE at concentrations of 7.2, 3.9, and 6.7 µg/l from soil samples collected from the test pits excavated outside of the former lime mixing pit.

PLSA and Ecology collected split groundwater samples from the four test pits in April 1993. Analysis of the samples for VOCs indicated PCE at concentration of 220 µg/l (PLSA) and 260 µg/l (Ecology) in the groundwater samples collected from a test pit excavated in the area of the former lime mixing pit.

RI Results: Agra Earth and Environmental (AGRA) has collected four quarters (December 1997-September 1998) of groundwater samples from the Agri-Tech/Yakima Steel Fabricators Subfacility (Wells MW-1 through MW-6) for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the AGRA and split sampling have been provided for this RI and are included on Table 7. A split groundwater sample was collected by SECOR from well MW-4 for analysis of PCE. MW-4 was the most downgradient well as defined by AGRA. The collection of split samples from well MW-4 was required by Ecology. The maximum concentrations of PCE in samples from WDOE-6, located in the center of the property, was 75.6 µg/l. The maximum concentration of PCE in the downgradient well, MW-4, was 4.7 µg/l (Table 7).

7.1.1.3 Burlington Northern Subfacility

The Burlington Northern Railroad Roundhouse (BNRR) Subfacility is located approximately 350 feet northwest of the U-Haul Subfacility's western boundary (Figure 3). The BNRR Subfacility has reportedly been used as a maintenance yard since the late 1800s. There was no specific reference to PCE use. The subfacility is shown on

Figure 3 and has no parcel or address number. There was no information in this file regarding where the wells were installed, previous sampling, or whether remediation had been conducted. On June 17, 1993, Ecology collected three soil/sediment samples from the BNRR Subfacility for analysis of VOCs. The analytical results revealed PCE at concentrations ranging from 0.9 to 4.0 µg/l. Additionally, concentrations of PCE were detected in groundwater samples collected from on-site monitoring wells by Ecology during a sampling episode in November 1992.

RI Results: Ecology has collected four quarters (December 1997-September 1998) of groundwater samples from the Burlington Northern Railroad Subfacility (WDOE-3i) for analysis for PCE (Table 3). The analytical results of the Ecology and split sampling have been provided for this RI and are included on Table 7. SECOR collected groundwater samples for the four quarters of sampling from monitoring wells screened in the shallow well (BNRR-s) and deep well (BNRR-d) water-bearing zones for analysis of PCE. The collection of groundwater samples from wells BNRR-s and BNRR-d was required by Ecology. The results of the quarterly sampling and analysis indicate that the maximum concentrations of PCE were 23.2 µg/l in samples from shallow well BNRR-s and 0.9 µg/l in the sample from deep well BNRR-d (Table 7).

7.1.1.4 Cameron Yakima, Inc. Subfacility

Cameron Yakima, Inc. (CYI) is located at 1414 South First Street (Figure 3). Activities at this subfacility involved recycling activated carbon filters that remove organic compounds from air and/or water. A majority of the saturated carbon was regenerated in high temperature furnaces and recycled. The subfacility operated in this use since 1953. Since 1979, the subfacility accepted carbon partially saturated with a wide variety of hazardous compounds. Several businesses have reportedly operated simultaneously at the subfacility. NORKEM Yakima, Inc. used a portion of the subfacility as an ammonia bottling facility until 1959. Tri-Tech Resources, Inc. used a portion of the subfacility for pyrolysis of automobile tires to carbon during the 1980s.

In 1983, CYI filed with USEPA Region 10 for interim status under the Resource Conservation and Recovery Act (RCRA). In 1987, USEPA granted CYI interim status retroactive to a permit application submittal dated May 1985. USEPA conducted an inspection of the CYI Subfacility on January 27, 1988. USEPA expressed concerns over the outdoor storage of 500, 55-gallon drums of activated carbon that had been used to filter PCE. USEPA conducted an inspection at a property located approximately 700 to 1,300 feet downgradient of CYI. Groundwater samples collected from monitoring wells installed in 1988 downgradient of the subfacility revealed PCE at concentrations of 15 to 16 µg/l. Additionally, groundwater samples were collected from two domestic wells downgradient of CYI. The analytical results revealed PCE at concentrations of 40 to 80 µg/l in groundwater. A USEPA Final Order on Consent was initiated that required CYI, which subsequently has been abandoned, to conduct an on-site field investigation of surface soil, surface water, and sediment in the storage lagoon for VOCs.

SECOR reviewed the following documents available in the Ecology files:

- Ecology and Environment, Inc. *Preliminary Assessment Report.* June 1988.
- Black & Veatch Waste Management, Inc. *Draft Field Investigation Report.* October 25, 1988.
- Delta Environmental Consultants, Inc. *Hydrogeologic Assessment.* November 9, 1989.
- Hart Crowser. *Preliminary Site Assessment, Cameron Yakima, Inc.* September 28, 1993.

The following is a summary of information relating to PCE at the CYI Subfacility:

Black & Veatch Waste Management (B&V). In early August 1988, B&V collected thirty soil samples from nine test pits located throughout the property, and one test pit located off-site south of the subfacility. Samples were collected from the first six inches bgs, three feet bgs, and between four and eight feet bgs. The analytical results of soil samples revealed the presence of PCE at concentrations ranging from non-detect to 170 µg/l. The highest concentration was detected in a soil sample collected from the east side of the "perk" (PCE) storage area at a depth of three feet bgs.

In August 1988, B&V collected two surface water samples and two sediment samples from the south end and one surface water sample from the north end of the drainage culvert in the New Shanno Ditch. PCE was not detected in any of the samples above the laboratory reporting limits.

Delta Environmental Consultants (Delta). Delta installed four soil borings that were completed as groundwater monitoring wells to a depth of 23 feet bgs on the subfacility in August, 1989. Groundwater samples were collected from each well on August 24, 1989. The analytical results revealed PCE at concentrations ranging from 7.8 to 960 µg/l. A duplicate sample of the groundwater sample with the highest concentration was also analyzed and revealed PCE at a concentration of 700 µg/l. The highest concentration of PCE was detected from the groundwater monitoring well installed southeast of the "carbon slurry pit" located along the southern boundary of the site.

Ecology and Environment (E&E). In June and July of 1989, E&E conducted a soil gas survey at the subfacility. The results of the E&E report identified 1 to 2 mg/m^3 soil gas PCE concentrations throughout the property. Higher soil gas readings were detected both upgradient and downgradient of the property at concentrations ranging from 4 to 18 mg/m^3.

Hart Crowser (HC). HC collected soil vapor samples from 39 soil vapor probe locations and the four pre-existing monitoring well locations on-site. Probe vapor samples were collected approximately two feet bgs and revealed PCE at concentrations ranging from non-detect to 26 mg/m^3. The highest concentrations were identified in the area of a "transfer tank" located near the southwest portion of the property.

HC excavated five test pits to a maximum depth of 4.5 feet bgs and advanced 10 hand auger borings to 1.5 to 4.0 feet bgs at the subfacility for collection of soil samples. The analytical results of soil samples collected from the test pits and hand augers revealed concentrations of PCE above the laboratory reporting limit in each sample with a maximum concentration of 720 mg/kg in a soil sample collected along the western portion of the property. The highest concentrations of PCE were detected in soil near the "carbon storage areas," located on the western portion of the property and in one location along the eastern portion of the property.

HC collected groundwater samples from the existing wells on June 16, 1993. The analytical results revealed PCE concentrations in groundwater samples from each well ranging from 2.0 to 120 $\mu g/l$. The highest concentrations of PCE were detected in the groundwater sample collected from the monitoring well located along the southwestern boundary of the property. HC concluded that PCE concentrations detected in the groundwater were consistent with regional background levels, with the exception of the PCE concentrations detected in the monitoring well located near the southwestern boundary of the subfacility.

RI Results: Ecology has collected four quarters (December 1997-September 1998) of groundwater samples from a number of groundwater monitoring wells at the CYI Subfacility (Table 3). The analytical results of the Ecology and split sampling have been provided for this RI and are included on Table 7. A map of the well locations is attached in Appendix D. A split sample was collected of the groundwater sample from well MW-103s (shallow water-bearing zone) and well MW-103d (deep water-bearing zone) by SECOR for the four quarters of sampling for analysis of PCE. The collection of split samples from these specific wells were defined by Ecology. The results of the split sample analyses are consistent with Ecology results. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater was 122 $\mu g/l$ in shallow well MW-4 and 20 $\mu g/l$ in deep well MW-101d, both located in the center of the property (Table 7).

7.1.1.5 Fifth Wheel Truck Repair/Hahn Motor Company Subfacility

The Fifth Wheel Subfacility includes the Fifth Wheel Truck Repair Shop located at 1201 South First Street, and the S&S Auto Body Shop located at 307 East Arlington Street (Figure 3), within a 14,000 square-foot building. The Fifth Wheel Subfacility is located adjacent to, and is owned by the same owners as Hahn Motor Company.

Fifth Wheel provides maintenance and repair services for large trucks and has occupied the space since 1948. Wastewater generated at the Fifth Wheel Subfacility drains into a subfloor oil/water separator, which is connected to the city sewer system. An interior catch basin was used to collect liquid wastes from the repair area prior to installation of an oil/water separator. The catch basin was removed in 1991. In addition, one drywell was previously located in the back parking lot of the Fifth Wheel building. The drywell was removed in 1991 and a new drywell was installed.

S&S Auto Body occupies the east half of the building with Fifth Wheel. S&S Auto Body provides auto body repair and painting services and has occupied the space since 1969. Two sump drains were formerly located inside the S&S Auto Body and one outside of the building. The sump drains were used by S&S Auto Body for the disposal of liquid waste and to collect runoff water from the roof of the building. Use of PCE was not specifically referenced in the documentation reviewed, but is common with these types of operations.

SECOR reviewed the following documents available in the Ecology file for the Fifth Wheel Truck Repair/Hahn Motor (Fifth Wheel) Subfacility:

- Earth Consultants, Inc. *Preliminary Integrity Assessment of Two Underground Storage Tanks and Three Industrial Waste Water Sumps, 1201 South First Street and 307 East Arlington Street*. October 25, 1989.
- PLSA Engineering & Surveying. *Engineering Report on Drywell Intermediate Cleanup for Fifth Wheel Truck Repair Premises*. February 1991.
- Huntingdon Engineering & Environmental Inc. *Remedial Investigation - Interim Report, Fifth Wheel Truck Repair Facility*. May 1995.
- Huntingdon Engineering & Environmental Inc. *Site History Report, Fifth Wheel Truck Repair Facility*. June 1995.
- Maxim Technologies, Inc. *Environmental Investigation and Remediation, Fifth Wheel Truck Repair Facility*. May 2, 1996.

The following is a summary of information relating to PCE at the subfacility:

Earth Consultants Inc. In May of 1989, Earth Consultants, Inc., conducted a subsurface study of the soil and groundwater beneath the Fifth Wheel Subfacility. The subsurface study included collection of a soil sample in the vicinity of the drywell located in the back parking lot at nine feet bgs. PCE was not detected in the soil sample analyzed from this depth. Depth to groundwater was measured at approximately 14 feet bgs. A groundwater sample was collected and analyzed for VOCs. The analytical result was non-detect (<5 µg/l) for PCE.

PLSA Engineering & Surveying. During late 1990 and early 1991, PLSA sampled soil from the drywell located in the back of the Fifth Wheel Subfacility. PCE was detected in the soil sample collected from the drywell at a concentration of 265 µg/l. Additionally, PLSA installed two groundwater monitoring wells (MW-4 and MW-5) along the west side of the building. Depth to groundwater was measured at approximately 25-feet bgs. A groundwater sample was collected from each well and analyzed for VOCs. The sample results were non-detect for PCE above the laboratory detection limits.

In April 1991, PLSA excavated the material from the drywell located behind the Fifth Wheel Subfacility. Approximately 120 cubic yards of total petroleum hydrocarbon (TPH) contaminated soil was removed from the excavation. The excavation was backfilled with clean granular fill. Prior to backfilling, a groundwater sample was collected from the excavation. The analytical result was non-detect for PCE above the laboratory reporting limit.

In November 1993, PLSA drilled one soil boring through the backfill adjacent to the drywell previously located in back of the Fifth Wheel Subfacility. Two soil samples were collected from the boring at a depth of approximately 14-feet bgs. One soil sample was collected from the drill cutting and the other soil sample was collected using a split spoon. The analytical results were non-detect for PCE above the laboratory reporting limit.

Huntingdon Engineering & Environmental Inc. Huntingdon conducted quarterly monitoring and additional soil sampling from February 1995 to April 1995. In February 1995, two groundwater monitoring wells (MW-1 and MW-2) were installed downgradient from the current monitoring wells (MW-3 and MW-4; previously identified as MW-4 and MW-5 installed by PLSA). One soil sample was collected from each monitoring well at depths of approximately 20-feet bgs. The analytical results from soil samples collected from MW-1 and MW-2 revealed PCE at concentrations of 0.16 mg/kg and 0.05 mg/kg, respectively. Groundwater samples were collected from each of the four monitoring wells in February 1995 and April 1995 and analyzed for VOCs. Depth to groundwater was measured at approximately 20-feet bgs. The analytical results for PCE were below MTCA Method A cleanup levels of 5 µg/l PCE. In April 1995, two test pits were excavated along the east side of the building. Three soil samples were collected from each test pit at depths of 5, 10, and 18-feet bgs. The analytical results were non-detect for PCE above the laboratory reporting limit. Sludge samples were collected from one sump inside of the S&S Auto Body building and one sump located outside of the S&S Auto Body building. The analytical results were non-detect for PCE above the laboratory reporting limits.

Maxim. Maxim conducted investigation, remediation, and monitoring activities at the Fifth Wheel Subfacility between February 1995 and February 1996. Groundwater samples were collected from each of the four existing monitoring wells six times during this period and analyzed for VOCs. Depth to groundwater was measured at between 14 and 22-feet bgs. The analytical results revealed PCE at concentrations ranging from 0.6 µg/l to 9.3 µg/l. with a mean concentration of 4.6 µg/l during each of the six sampling episodes. Between September 27 and October 2, 1995, each of the three sumps utilized by S&S

Auto Body were excavated. Sludge removed from the sumps was placed in overpack drums and disposed of off-site. Confirmation soil samples were collected from two feet below the base of each sump. The analytical results of the soil samples were non-detect for PCE above the laboratory reporting limits. Each sump was backfilled with concrete. Maxim reported the PCE concentrations in groundwater samples collected from groundwater monitoring wells located on the upgradient side of the site were similar to the PCE concentrations in the downgradient wells, which suggested a potential off-site source of PCE. Maxim's 1996 report recommended quarterly sampling for PCE be continued for two years in the 1996 report.

RI Results: SECOR has collected four quarters (December 1997-September 1998) of groundwater samples from the Fifth Wheel/Hahn Motors Subfacility (well MW-2) for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the SECOR sampling has been included with this RI and are included on Table 7. The collection of groundwater samples from well MW-2 was defined by Ecology. MW-2 is the most downgradient well at the subfacility as defined by Maxim. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater at well MW-2 (located downgradient of the Fifth Wheel and upgradient of the Hahn Motor property) was 9.8 µg/l (Table 7).

7.1.1.6 Frank Wear Cleaners Subfacility

The Frank Wear Subfacility, located at 106 South Third Avenue (Figure 3), has operated as a dry-cleaner since the early 1940s. Throughout the years, dry-cleaning fluid sludge has reportedly been disposed of behind the building onto the gravel covered parking lot. An inspection by Ecology in 1985 identified a "milky fluid" puddling behind the building. Ecology identified the material as 1, 1, 1-trichloroethane and not PCE. An inspection by Ecology in 1987 identified multiple dangerous waste violations. Soil samples were collected from the gravel parking lot behind the building by Ecology. The analytical results revealed high concentrations of PCE. Incorrect reporting by the laboratory did not allow these samples to be used for verification of contamination.

Three downgradient groundwater monitoring wells south and southeast of the subfacility were sampled by Ecology on August 22, 1988. The analytical results revealed concentrations of PCE at 1.3 µg/l in a groundwater sample collected from one of the groundwater monitoring wells.

SECOR reviewed the following reports available from the Ecology file for the Frank Wear Cleaners Subfacility:

- Science Applications International Corporation (SAIC). *Preliminary Assessment Report, Frank Wear Cleaners*. April 1989.
- AGRA Earth and Environmental (AGRA). *Site History, Frank Wear Cleaners*. December 1994.

- AGRA Earth and Environmental. *Soil Vapor Survey*. January 1995.
- Huntingdon Engineering and Environmental Inc. *Remedial Investigation - Interim Report*. May 1995.

The following is a summary of the information relating to PCE at the subfacility.

AGRA Earth and Environmental. AGRA conducted a soil vapor survey at the subfacility in January 1995. The results of the soil vapor survey identified two PCE hot spots along the north wall of the subfacility. Soil vapor concentrations were identified at 456 and 767 mg/m^3 at depths of 3.5 and 6.5 feet bgs, respectively.

Huntington Engineering and Environmental Inc. Huntingdon installed four groundwater monitoring wells at the subfacility in February 1995 to a depth of 35-feet bgs. Groundwater samples were collected from each of the four monitoring wells in February and April 1995. The analytical results revealed concentrations of PCE of 210 and 109 μg/l from the groundwater samples collected from the monitoring well located near the northwest corner of the property; 66 and 1,140 μg/l from the groundwater samples collected from the monitoring well located near the northeast corner of the property, 1.7 and 18 μg/l from the groundwater samples collected from the monitoring well located near the southeast corner of the property; and 150 and 5 μg/l from the groundwater samples collected from the monitoring well located near the southwest corner of the property.

Huntingdon collected three soil samples from beneath the interior floor drains at a depth of one-foot bgs. The analytical results revealed concentrations of PCE ranging from 0.14 to 0.62 mg/kg in the soil samples collected.

Huntingdon collected twenty-six soil samples from eleven test pits excavated at the subfacility in April 1995. Eighteen of the 26 soil samples were non-detect for PCE above the laboratory reporting limit. The analytical results for seven of the remaining eight soil samples revealed PCE concentrations ranging between 0.28 and 3.02 mg/kg. One soil sample collected from a test pit west of the building at a depth of seven feet bgs revealed a PCE concentration of 1,260 mg/kg. The soil contamination was reported to be limited in nature.

Huntingdon recommended the remediation of exterior soil at the subfacility with high concentrations of PCE; implementing a soil sampling plan to fully characterize soils beneath the building; and evaluation the PCE concentrations in the groundwater following the remaining rounds of quarterly sampling. There was no documentation in the file reviewed indicating that this was done.

RI Results: Environmental Economic Solutions Inc. (EES) collected one quarter (December 1997) and Sage Earth Sciences (Sage) collected three quarters (March 1998 - September 1998) of groundwater samples from the Frank Wear Cleaners Subfacility for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the EES, Sage, and split sampling have been provided for this RI and

are included on Table 7. A split sample was collected of the groundwater sample from MW-1 by SECOR for the four quarters of sampling for analysis of PCE. The collection of split samples from MW-1 was determined by Ecology. MW-1 designated as a down or cross-gradient well, depending on the time of year, as defined by Huntingdon. This well has historically been the well with the highest concentrations of PCE and appears to be located in close proximity to the potential source. The results of the split sample analyses collected by SECOR are consistent with Sage results. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater at the subfacility was 1,100 µg/l in MW-4 (downgradient well in April 1995) (Table 7).

7.1.1.7 Goodwill Industries Subfacility

The 0.86-acre Goodwill Industries Subfacility, located at 222 South Third Street (Figure 3), consisted of a retail store and training center for the physically challenged. The 19,250 square-foot retail store was constructed in the early 1940s and was demolished in October 1994, along with the entire block to be replaced by the Yakima Police Station and Legal Center. The subfacility has historically been used by several automobile dealerships between 1942 and 1964. A dry-cleaning machine was located in the retail store's laundry area between 1972 and 1989. A water vapor condensate drain from the dry-cleaning machine was located in the floor at the laundry area. A grated sump was located in the store's production area. A sump was located beneath a vehicle wash rack, when the subfacility was used as an automobile dealership.

SECOR reviewed the following reports available from in the Ecology file for the Goodwill:

- Huntingdon Chen-Northern, Inc. *Final Report Phase I Environmental Site Assessment and Cursory Asbestos Survey*. March 3, 1994.
- Huntingdon Engineering and Environmental, Inc. *Report of Phase II Environmental Site Assessment*. July 1994.
- Huntingdon Engineering and Environmental, Inc. *Phase III Environmental Remediation, Yakima Goodwill Industries Site*. February 1995.

The following is a summary of subsurface investigations relating to PCE, which have been conducted at the subfacility.

Huntingdon Engineering and Environmental, Inc. Huntingdon advanced three borings (CH-1, CH-2 and CH-3) in the area of the former dry-cleaning machine in 1994. CH-1 was advanced in the floor slab of the first floor CH-2 was advanced in the east basement wall of the boiler room and CH-3 was advanced in the floorslab of the basement storage room located near the southwest corner of the building. Soil samples were collected from each borehole and analyzed for PCE. PCE was not detected above the laboratory reporting limit in soil samples collected from CH-1 and CH-3. The analytical results for CH-2 revealed PCE at a concentration of 0.010 mg/kg.

Huntingdon installed two monitoring wells on-site (MW-1 through MW-4) and three monitoring wells off-site (LW-1, LW-3 and LW-4) in 1994: MW-1 north of the building; MW-2 south of the building; and LW-1, 3, and 4 in an alley extending along the western portion of the site. Groundwater samples were collected from each of the monitoring wells and analyzed for PCE. PCE was not detected above laboratory reporting limits in groundwater samples collected from LW-1, 3, and 4. The analytical results for groundwater samples collected from MW-1 and MW-2 revealed PCE at concentrations of 12 and 14 µg/l, respectively.

Huntingdon conducted soil remediation at this subfacility during the demolition of the Goodwill building in 1994. The remediation consisted of excavation and landfill disposal of soil with concentrations of PCE above the selected cleanup level. Soils were excavated from beneath the northeastern portion of the building to a depth of approximately 14 feet bgs. Soils samples collected during the excavation showed that PCE was present in the soils surrounding the sump in the former Goodwill production area. Groundwater was encountered at a depth of approximately 15 feet bgs.

RI Results: Ecology has collected four quarters (December 1997-September 1998) of groundwater samples from the Goodwill Industries Subfacility for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the Ecology and split sampling have been provided for this RI and are included on Table 7. A split was collected of the groundwater sample from well MW-2 by SECOR for the four quarters of sampling for analysis of PCE. The collection of split samples from well MW-2 was determined by Ecology. MW-2 is the most downgradient well as defined by Huntingdon. The results of the split sample analyses are consistent with Ecology results. The results of the quarterly sampling indicate that the maximum concentration of PCE in the groundwater was 99 µg/l in MW-4, located in the middle of the property (Table 7).

7.1.1.8 Nu-Way Cleaners Subfacility

Dry-cleaning businesses have operated at the Nu-Way Cleaners Subfacility located at 801 South Third Street (Figure 3), since the 1950s. Approximately 1,000-gallons of solvent were used in the dry cleaning machine each year. The floor surrounding the machine was reportedly washed down with a hose once a week. Water and spilled solvents drained into a floor drain that discharged to a gravel-bottom sump. A 750-gallon underground storage tank used to store dry-cleaning solvents is located on the north side of the building.

SECOR reviewed the following reports available in the Ecology files for the Nu-Way Subfacility:

- Ecology and Environment, Inc. *Site Inspection Report for Nu-Way Cleaners*. January 1990.
- Enviros. *Field Work Report, Nu-Way Cleaners*. June 30, 1995.

The following is a summary of information relating to PCE at the subfacility:

Ecology and Environment Inc. E&E collected one soil sample from a depth of six inches bgs from a park northwest of the subfacility to establish background contaminant levels and one sample from the sludge material present in the sump in March 1989. The analytical sample results revealed PCE at an estimated concentration of 35,000 µg/l in the sludge material collected from the sump. The concentration of PCE was below the reporting limit in the background sample.

Enviros. Enviros conducted a soil vapor assessment at the subfacility in June 1995. A total of twelve soil vapor samples were collected from throughout the property. The analytical results revealed PCE at concentrations ranging from 0.04 mg/m^3 in a vapor sample collected from the northwest corner of the property at a depth of 2.5 feet bgs, to 210 mg/m^3 in a vapor sample collected from the alley southeast of the property at a depth of 7.5 feet bgs.

Enviros excavated two test pits at the subfacility in June 1995. Test pits were excavated northwest and northeast of the building to a depth of nine feet bgs. Soil samples were collected from the bottom of each test pit. Soil samples were delivered to an Ecology project manager under chain-of-title for analytical analysis. The analytical results were not included in the file at Ecology reviewed for this RI.

Enviros advanced three soil borings at the subfacility in June 1995. The borings were advanced to a depth of 25-feet bgs and converted to groundwater monitoring wells. Groundwater samples were collected from each of the three monitoring wells. Samples were delivered to an Ecology project manager under chain-of-title for analytical analysis. The analytical results were not included in the file at Ecology reviewed for this RI.

RI Results: Ecology has collected four quarters (December 1997-September 1998) of groundwater samples from the Nu-Way Cleaners Subfacility for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the Ecology and split sampling have been provided for this RI and are summarized on Table 7. A split was collected of the groundwater sample from MW-2 by SECOR for the four quarters of sampling for analysis of PCE. The collection of split samples from MW-2 was determined by Ecology. MW-2 is the most downgradient well as defined by Enviros. The results of the split sample analyses are consistent with Ecology results. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater was 4.4 µg/l in MW-1 (upgradient well) (Table 7).

7.1.1.9 Paxton Sales Subfacility

The Paxton Sales Subfacility, located at 108 West Mead Avenue (Figure 3), has operated as a tooling and case-hardened steel parts business since 1969. The shop uses lathes with cutting (cooling) fluids to machine custom steel parts. From 1969 until 1984, the subfacility reportedly disposed of cyanide wastewater generated from the secondary rinse tank into an on-site drywell located in the loading dock area along the west side of the

building. Cutting solution wastes reportedly may have also been disposed of into the drywell. The subfacility used cutting oils since operations began, under the name of TrimSol, which contained halogenated hydrocarbons. A sample of the cutting solution reportedly revealed no detectable concentrations of PCE.

The following reports were reviewed in Ecology files:

- Ecology and Environment, Inc. *Preliminary Assessment Report for Paxton Sales Corporation*. June 9, 1988.
- Ecology and Environment, Inc. *Site Inspection Report for Paxton Sales Corporation*. November 1989.
- Landau Associates, Inc. *Site History Report, Paxton Sales Corporation*. December 12, 1994.
- Landau Associates, Inc. *Phase II Remedial Investigation, Paxton Sales Corporation*. May 25, 1995.
- Landau Associates, Inc. *Supplemental Data, Paxton Sales Corporation*. July 19, 1995.

The following is a summary of information relating to PCE at the Paxton Sales Subfacility:

Ecology and Environment Inc. In March 1989, E&E collected one sediment sample from the drywell on-site and groundwater samples from three domestic off-site wells. The domestic wells were re-sampled in June 1989. The analytical results revealed PCE at concentrations of 34,000 µg/l in the sediment. No concentrations of PCE were detected in any of the groundwater samples.

In 1992, Ecology recommended that Paxton clean out the drywell to remove accumulated sludge. Paxton removed approximately two feet of oily residue from the drywell, which was taken in five-gallon buckets to a hazardous waste collection station.

Landau and Associates (Landau): Between December 1994 and April 1995, Landau conducted a Phase II Remedial Investigation at the Paxton Subfacility. The Phase II investigation consisted of the installation of three soil borings completed as groundwater monitoring wells. Groundwater samples were collected from each of the three monitoring wells on January 23, 1995. The analytical results revealed PCE in each of the three groundwater samples collected at concentrations ranging from 1.7 to 3.1 µg/l.

A fourth groundwater monitoring well was installed at the Paxton Subfacility on June 15, 1995. Groundwater samples were collected from each of the four monitoring wells on June 22, 1995. The sample results revealed no concentrations of PCE above Ecology's advisory level of 4.0 µg/l in the groundwater.

RI Results: SECOR has collected four quarters (December 1997-September 1998) of groundwater samples from the Paxton Sales Subfacility for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the SECOR sampling have been included with this RI and are summarized on Table 7. The collection of groundwater samples from well MW-3 was determined by Ecology. MW-3 is the most upgradient well as defined by Landau. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE was 2.51 µg/l in samples from well MW-3 (Table 7).

7.1.1.10 Southgate Laundry Subfacility

The Southgate Laundry Subfacility, located at 1020 South Third Avenue (Figure 3), is one of several businesses that occupy the 4.5-acre Southgate Shopping Center parcel constructed in 1978. Chemical spills and releases have reportedly occurred at this subfacility. A five-to 10-gallon release of PCE occurred at the self-serve dry-cleaning machines in 1978. A 110 gallon tank containing PCE was reportedly located at the rear of the subfacility. The tank has reportedly been out of service since 1991. Dry-cleaning solvents currently are used in one-and two-gallon containers and stored on shelves behind the dry-cleaning machine.

Wastes generated per year at this subfacility include approximately 18 to 20 spent filters and approximately three gallons of wastewater separated from the reclaimed PCE. The spent filters are reportedly disposed of into the municipal trash containers. The wastewater separated from the reclaimed PCE is collected and disposed of in the city sewer system.

SECOR reviewed the following documents available in the Ecology files for the Southgate Laundry Subfacility:

- Maxim Technologies, Inc. *Yakima Railroad Area Remedial Investigation, Site History/Soil Vapor Assessment, Southgate Laundry*. July 1996.
- Maxim Technologies, Inc. *Yakima Railroad Area Remedial Investigation, Soil/Groundwater Investigation and Analysis, Southgate Laundry* February 1977.
- Maxim Technologies, Inc. *Yakima Railroad Area Remedial Investigation, Interim Action Soil Removal/Groundwater Investigation. Southgate Laundry*. January 1998.

The following is a summary of information relating to PCE at the subfacility:

Maxim Technologies Inc. On March 22, 1996 Maxim collected a total of 11 soil and 11 soil gas samples from beneath and adjacent to the Southgate Subfacility. The samples were collected at depths ranging from 0.5 to eight feet bgs. Six soil and six soil gas samples were collected from subfacility; three soil and three soil gas samples were

collected from the parking lot area outside of the subfacility; one soil and one soil gas sample was collected from the sidewalk east of the subfacility; and one soil and one soil gas sample was collected as background samples approximately 45 feet west of the subfacility.

The analytical results for the soil vapor samples revealed PCE at concentrations ranging from 1.33 to 923.41 mg/m^3. The vapor sample containing the highest concentration of PCE was collected under the concrete floor slab beneath the subfacility. The vapor samples containing the lowest concentrations of PCE were detected in the samples collected from the parking lot areas surrounding the subfacility.

The analytical results for the soil samples revealed PCE at concentrations ranging from 110 to 3,990 $\mu g/l$. The soil sample containing the highest concentration of PCE was collected from the middle of the subfacility, between two washing machines in the area of a former dry-cleaning machine. An additional area of high PCE concentrations was detected in a soil sample collected from an area where a former release had reportedly occurred. The soil samples containing the lowest PCE concentration were collected from the parking lot areas surrounding the building.

In April 1996, Maxim installed four groundwater monitoring wells (MW-1 through MW-4) at the Southgate Subfacility. Four rounds of groundwater sampling were completed during April 1996, July 1996, October 1996, and February 1997. The analytical results revealed PCE concentrations ranging from non-detect to 9.5 $\mu g/l$ in the upgradient well (MW-1). The analytical results revealed PCE in the three downgradient wells (MW-2, MW-3 and MW-4) at concentrations ranging from non-detect to 107 $\mu g/l$.

In August 1996, Maxim collected nine additional soil samples from hand auger points located off-site, adjacent to the Southgate Subfacility. The soil samples were collected at depths ranging from 0.5 to 3 feet bgs. The analytical results for the soil samples revealed PCE at concentrations ranging from non-detect to 179 $\mu g/l$. The soil sample containing the highest concentration of PCE was collected at a depth of 1.5 feet from the south adjacent property.

Between July 1997 and September 1997, Maxim conducted soil removal from two areas outside the Southgate Subfacility and two areas inside the Southgate building. One area of soil removal was located outside the back door of the Southgate building. This excavation measured approximately 25 feet by 8 feet and from 7 to 13 feet deep. The excavated soil was removed from the property. Eleven soil samples were collected from varying depths of the excavation. The sample results from the base of the excavation revealed PCE at concentrations ranging from non-detect at seven feet to 50 $\mu g/l$ at 13 feet. The second area of soil removal was located in the alley adjacent to the subfacility. This excavation measured approximately 10 feet by 8 feet and 4.5 feet deep. Two soil samples were collected from the excavation at depths of two and 4.5 feet. The sample results revealed PCE at concentrations of non-detect to 60 $\mu g/l$ at 2 and 4.5 feet, respectively. The excavated soil was placed back into the excavation at the second area excavation.

The two areas of soil removal located inside of the Southgate Subfacility building were determined by the highest concentrations from the previous investigation. The first area of soil removal was conducted from the dry-cleaners portion of the building. The excavation measures approximately seven feet by seven feet and four to 8.5 feet deep. Seven soil samples were collected from varying depths of the excavation. The sample results from the base of the excavation revealed PCE at concentrations ranging from 610 µg/l at five feet, 1,120 µg/l at four feet, and 1,010 at 8.5 feet. The second area of soil removal was conducted from the self service portion of the building. The excavation measured approximately seven feet by eight feet and from three to 8.5 feet deep. Eight soil samples were collected from varying depths of the excavation. The sample results from the base of the excavation revealed PCE at concentrations ranging from 650 and 850 µg/l at three feet and 290 µg/l at 8.5 feet.

RI Results: Maxim conducted one quarter (December 1977) and PLSA collected three quarters (March 1998-September 1998) of groundwater samples from the Southgate Laundry Subfacility for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the Maxim and PLSA sampling and the split samples have been provided for this RI and are included on Table 7. A split was collected of the groundwater sample from MW-3 by SECOR for the four quarters of sampling for analysis of PCE. The collection of split samples from MW-3 was determined by Ecology. MW-3 is the most downgradient well as defined by Maxim. The results of the split sample analyses are consistent with other results. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater was 67 µg/l in MW-3 (Table 7).

7.1.1.11 Westco Martinizing Subfacility

The Westco Martinizing Subfacility is located at 812 Summitview Avenue (Figure 3). Dry-cleaning operations began at the Westco Subfacility in 1953. In 1970, the Martinizing Dry-Cleaning franchise purchased the subfacility. In 1988, the original equipment was replaced with the equipment currently in use today. An inspection by Ecology identified improperly stored PCE in containers located near the rear of the subfacility. On January 13, 1995, an Agreed Order was signed between Ecology and Westco for the complete characterization of the subfacility.

The following reports were reviewed in the Ecology files:

- CH_2M Hill. *Transmittal of Site History and Schedule for Implementation of the Work Plan for the WESTCO One Hour Martinizing Facility*. March 30, 1995.
- CH_2M Hill. *Interim Action Report WESTCO Dry Cleaning Facility*. July 1996.
- CH_2M Hill. *Transmittal of Quarterly Groundwater Sampling Results (March 1997)*. April 8, 1997.

- CH_2M Hill. *Quarterly Groundwater Sampling Results (December 2, 1997)*. January 8, 1998.

The following is a summary of information relating to PCE at the subfacility:

CH_2M Hill. As summarized in CH_2M Hill's 1995 report, a soil gas survey was conducted at the subfacility in December 1993 by Tracer Research Corp. Twenty-two soil vapor samples were collected from eleven sampling locations. PCE was detected at concentrations ranging from 0.2 to 140 mg/m^3 throughout the property. The highest concentrations of PCE were detected on the south side of the building in the vicinity of the vent located near the rear door.

Twenty-two soil samples were collected from nine test pits in June 1994. Locations of the test pits corresponded to areas of detected concentrations of PCE identified during the soil gas survey. PCE was detected in 15 of the soil samples with concentrations ranging from 0.64 mg/kg to 13 mg/kg. The highest concentrations of PCE were detected below the former air discharge vent and in the top one foot of soil.

Four monitoring wells (MW-1, MW-2, MW-3, MW-5) were installed at the subfacility. Groundwater samples were collected from the initial three monitoring wells installed in September 29, 1993 and from all four of the monitoring wells on July 30, October 11, and December 12, 1995. The analytical results revealed PCE concentrations of 5.4 to 120 µg/l in the groundwater samples collected from the monitoring well located east of the building. PCE was not detected above the MCL or Ecology's advisory level in any of the three other monitoring wells.

Between March 20 and 24, 1996, a total of 103 tons of soil were excavated by CH_2M Hill from the southeast portion of the site. Soil samples were collected from the sidewalls and bottom of the excavation. The analytical results did not reveal concentrations of PCE above 0.5 mg/kg, with the exception of one sample collected from the southwest bottom of the excavation. PCE was detected in this sample at a concentration of 0.885 mg/kg.

Two USTs were identified near the southeast corner of the building. A sample was collected from the contents of the USTs and revealed PCE in the material in both USTs. The contents of the USTs were pumped out on June 6, 1996. The USTs were removed on June 7, 1996. Four soil samples were collected from the floor of the UST excavation. The analytical results did not reveal concentrations of PCE above the cleanup level of 0.5 mg/kg, with the exception of one soil sample collected from the northwest corner of the excavation. PCE was detected in this sample at a concentration of 1.47 mg/kg. On June 13, 1996, an additional 15.28 tons of soil were excavated from the UST cavity. Soil samples collected from the excavation did not reveal PCE above 0.5 mg/kg.

Six additional groundwater sampling rounds have been conducted at the site between May 1996 and September 1997. The analytical results did not reveal concentrations of PCE 5.0 µg/l in the groundwater samples collected from any of the monitoring wells, with the exception of the monitoring well installed east of the building. PCE was detected in the groundwater samples collected from this well at concentrations ranging from 4.59 to 14.4 µg/l.

RI Results: CH_2M Hill has collected four quarters (December 1997-September 1998) of groundwater samples from the Westco Martinizing Subfacility for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the CH_2M Hill and split sampling have been provided for this RI and are included on Table 7. A split was collected of the groundwater sample from well MW-2 by SECOR for the four quarters of sampling for analysis of PCE. The collection of split samples from well MW-2 were determined by Ecology. MW-2 is a cross-gradient well as defined by CH_2M Hill, but has historically shown the highest concentrations of PCE in groundwater. The results of the split sample analyses are consistent with CH_2M Hill results. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater was 66.8 µg/l in well MW-2 (Table 7).

7.1.1.12 Woods Industries Site/Crop King Subfacility

The four-acre Woods Industries/Crop King Site (Woods) Subfacility, located at 1 East King Street (Figure 3), consists of two areas formerly leased from BNRR to Woods Industries, who sublet a portion of the site to Akland Irrigation. The subfacility includes the Woods Industries/Crop King buildings, formerly used to formulate pesticides on the north part of the property, and the Akland Irrigation buildings, formerly used for the storage and retail sales of irrigation supplies on the south part of the property.

A brewery was built and operated on the property prior to 1936. The subfacility was leased in 1938 from the BNRR to Ritchie and Gilbert, which established a pesticide formulation and packaging plant in the existing buildings. Woods Industries purchased the formulation plant around 1952. Waste from this operation was reportedly dumped down a drain and eventually discharged to a sump located southwest of the Woods Industries building. Two discharge lagoons were located near the middle portion of the Akland Irrigation building area. The lagoons were reportedly used to collect and discharge liquids carried by a pipeline from the Woods Industries area. The lagoons were filled with surrounding soil and debris between 1973 and 1977. BNRR terminated the lease in May 1985.

The following reports were reviewed in the Ecology files:

- Morrison Knudsen Engineers. *Site Characterization Plan*. March 1986.
- Burlington Environmental, Inc. *Remedial Investigation Report, Woods Industries Site*. October 23, 1992.

The following is a summary of information relating to PCE at the subfacility:

Morrison Knudson Engineers (MKE). On November 11, 1985, USEPA conducted a site inspection of the Woods Subfacility. Surface soil samples were collected from five selected areas located throughout the property. The samples were split with MKE which accompanied USEPA during the site inspection. Based on the results of the site inspection and surface sampling, a Remedial Order was issued to the Woods Subfacility on December 16, 1985.

MKE conducted a site characterization of the Woods Subfacility in 1986. Burlington Environmental conducted a remedial investigation of the Woods Subfacility in 1991-92. Provided below is a discussion of the soil, remediation, surface water, and groundwater samples collected from the investigations.

A total of 122 soil samples were collected throughout the Woods Subfacility. PCE was not detected at a concentration greater than 1.0 mg/kg in any of the soil samples collected. The analytical results for 16 of the 122 soil samples revealed PCE at concentrations exceeding 0.005 mg/kg. The analytical results revealed PCE at a concentration of 0.25 mg/kg in a soil sample collected from the sump area.

The sump area located west of the Woods Industries building was excavated in 1987. The excavated material was placed in an on-site vault. Perforated drums were removed from the French drain area located west of the Woods Industries building. Soil samples were collected from the French drain area and analyzed for VOCs. The analytical results revealed PCE at concentrations ranging from 0.02 to 0.39 mg/kg from surface to one foot bgs and 0.024 to 0.7 mg/kg from two to four feet bgs. The analytical results from soil samples collected from below the high water level revealed PCE at concentrations ranging from 0.027 to 0.084 mg/kg.

A soil sample was collected from the vault area. The material sampled was believed to be excavated material from the sump west of the Woods Industries building, which was dropped during the loading of the vault. The sample results revealed PCE at a concentration of 0.3 mg/kg.

A solid waste/resin sample was collected from the lagoon area south of the Akland buildings. The analytical result revealed PCE at a concentration of 0.006 mg/kg. Additional soil samples were collected throughout the lagoon area. The analytical results revealed PCE at concentrations ranging from non-detect to 0.023 mg/kg.

Samples of standing water were collected from a sump south of the Akland building and analyzed for VOCs. The analytical results revealed PCE at concentrations ranging from non-detect to 0.014 mg/kg. It was unknown if the sample collected was groundwater.

Groundwater samples were collected from five monitoring wells installed in 1986. The analytical results revealed PCE at concentrations ranging from 0.025 to 0.037 mg/kg from the five groundwater samples collected. Groundwater samples were collected during a

sampling event in 1991 from the five previously installed monitoring wells and eight additional monitoring wells installed in 1991. The analytical results revealed PCE at concentrations ranging from 0.005 to 0.020 mg/kg.

Philips Environmental began grading and backfilling of the Woods Subfacility on September 5, 1995. Philips estimated that it would take approximately two years to complete the task. No additional information regarding the backfilling was available in the Ecology files reviewed.

RI Results: GeoEngineers has collected four quarters (December 1997-September 1998) of groundwater samples from the Woods Subfacility for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the GeoEngineers and split sampling have been provided for this RI and are included on Table 7. A split was collected of the groundwater sample from well W-8 by SECOR for the four quarters of sampling for analysis of PCE. The collection of split samples from well W-8 was determined by Ecology. The results of the split sample analyses are consistent with GeoEngineers' results. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater was 5.62 µg/l (Table 7).

7.1.1.13 U-Haul/Yakima Valley Spray Subfacility

The four-acre Yakima Valley Spray/U-Haul Subfacility located at 1108 South First Street (Figure 3) is currently owned by U-Haul and is used to store and service rental trucks. The subfacility was previously divided into three parcels and owned by Yakima Valley Spray Company, Shell Oil Company, The Webb Tractor and Equipment Company, and others. The parcels were combined in 1973 and sold to U-Haul in 1984. Previous uses of the subfacility have included farm machinery maintenance, auto wrecking yard, a bulk petroleum storage and distribution facility, and a formulation and distributor of pesticides, including the manufacturing of lime sulfur spray.

The following report was reviewed in the Ecology files:

- Remediation Technologies, Inc. (RETEC) *Remedial Investigation Report for the Yakima Valley Spray Company (U-Haul) Facility*. March 1995.

The following is a summary of information relating to PCE at the subfacility:

Remediation Technologies, Inc. (RETEC). As summarized in the RETEC report, the first investigation of the site was completed by EMCON, Inc. and included the excavation of five test pits, drilling two soil borings, and installation of three groundwater monitoring wells. Based on the results of the Preliminary Site Investigation, Ecology issued an Enforcement Order to U-Haul on December 16, 1991, to complete a Remedial Investigation and Feasibility Study. A remedial investigation and supplemental remedial investigation was conducted by RETEC beginning in November 1992. These investigations included a total of fifteen test pits, thirteen soil borings, and installation of nine groundwater monitoring wells.

Soil samples were collected from the soil borings and test pits at varying depths. Sample results revealed detectable concentrations of PCE in 14 soil sample locations throughout the northwest portion of the property. PCE was not detected above Ecology's advisory level in any of the fourteen soil samples with the exception of one soil sample collected at 0.3 feet bgs in a test pit excavated near the west central portion of the property. PCE was detected at 4.0 mg/kg at this location.

Groundwater samples were collected from eleven monitoring wells during four sampling rounds between November 1992 and August 1993. Groundwater samples were also collected from a monitoring well and two hydropunch locations during a February 1994 sampling event. Analytical results revealed PCE in twelve of the fourteen groundwater sampling locations, which exceeded the MCL of 5.0 µg/l in six locations.

No other documentation was included in the Ecology file reviewed.

RI Results: RETEC has collected four quarters (December 1997-September 1998) of groundwater samples from the U-Haul/Yakima Valley Spray Subfacility for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the RETEC and split sampling have been provided for this RI and are summarized on Table 7. A split sample was collected of the groundwater sample from YS-2 by SECOR for the four quarters of sampling for analysis of PCE. The collection of split samples from YS-2 was determined by Ecology. The results of the split sample analyses are consistent with RETEC results. The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater was 34 in MW-12, located in the central portion of the property, and 32 µg/l in YS-3 (upgradient well) (Table 7).

7.1.2 Other Subfacilities Within YRRA

SECOR reviewed files at Ecology of other subfacilities within the YRRA that were not specifically identified by Ecology as potential sources of PCE to the groundwater and included in the RI quarterly sampling. The files reviewed included the following facilities:

Briar Development Property - South First Street and East Washington Avenue
CMX Corporation Property - 206 West Mead Avenue
Crest Linen - 200-210 North First Street

The information reviewed in the files at Ecology indicates that Ecology has determined that these subfacilities do not represent potential sources of PCE to groundwater within the YRRA, based on the subfacilities studies completed at each facility, past remediation, and other data.

Subfacilities included in Table 1 which did not have files for review include:

Banks Property (formerly J.C. Penney site)
Elliot Tire Center

7.2 POTENTIAL PCE SOURCE SUMMARY

A number of potential and confirmed sources of PCE to groundwater have been identified by Ecology within the YRRA. These sources include dry-cleaning operations, pesticide manufacturing facilities, wrecking yards, activated carbon recycling, maintenance facilities, and manufacturing facilities. The analytical results of groundwater samples collected for this RI at each of the subfacilities is summarized on Table 7 and shown on Figures 21 through 25. The historical operation, potential releases, remediation history, and maximum PCE concentration detected in groundwater for this RI is summarized on Table 13. Historical data for the 13 subfacilities identified by Ecology reviewed for this RI indicates the following:

- All of the subfacilities sampled for this RI had concentrations of PCE in the groundwater of the shallow water-bearing zone above 5.0 µg/l, as determined from analytical results of groundwater samples collected during this RI, in one or more of the monitoring events (Tables 7 and 13), with the exception of:

Subfacility	Maximum Concentration of PCE (µg/l)
Nu-Way Cleaners	4.4
Paxton Sales	2.5

- The subfacilities sampled for this RI with concentrations of PCE in the groundwater of the shallow water-bearing zone above 5.0 µg/l, as determined from analytical results of groundwater samples collected during this RI, in the **most upgradient well** on the respective property (as defined by subfacility consultants in previous investigations) include:

Subfacility	Maximum Concentration of PCE (µg/l)
Agri-Tech/Yakima Steel	6.5
Cameron Yakima	19 J
Frank Wear Cleaners	110
U-Haul/Yakima Valley Spray	32

- The subfacilities sampled for this RI with concentrations of PCE in groundwater of the shallow water-bearing zone above 5.0 µg/l, as determined from analytical results of groundwater samples collected during this RI, in the **most downgradient well** on the respective property (as defined by subfacility consultants in previous investigations) include:

Subfacility	Maximum Concentration of PCE (µg/l)
Adeline	16
Cameron Yakima	9.5
Frank Wear Cleaners	1,100
Goodwill Industries	12
Southgate Laundry	67

- Subfacilities sampled for this RI within the groundwater of the shallow water-bearing zone of PCE concentrations of above 5.0 µg/l, but only one well was sampled at the subfac ility for this RI include:

Subfacility	Maximum Concentration of PCE (µg/l)
BNRR	23.2
Fifth Wheel/Hahn	9.8
Woods Industries	5.62

- The subfacility sampled for this RI where concentrations of PCE occurred in the groundwater of the shallow water-bearing zone above 5.0 µg/l in neither up or downgradient wells sampled for this RI on the property was:

Subfacility	Maximum Concentration of PCE (µg/l)
Westco	66.8

8.0 EXTENT OF PCE CONTAMINATION

Evaluation of the extent of PCE in groundwater within the YRRA was based on the four quarters of water quality data collected for the RI at the 28 RI monitoring wells and wells located at each subfacility. PCE concentrations for groundwater samples from the shallow and deep water-bearing zones collected during each of the four quarterly monitoring rounds for the subfacilities are summarized on Table 7. Concentrations for the shallow water-bearing zones are summarized on Table 8, and for the deep water-bearing zone on Table 9. The PCE concentrations for the RI wells and all subfacilities for each quarter are plotted on separate maps for the shallow (Figures 21 through 24) and deep water-bearing zones (Figure 25) for each quarterly monitoring event conducted for this RI.

8.1 EXTENT OF PCE IN THE SHALLOW WATER-BEARING ZONE

Figures 21 through 24 present PCE concentrations for the shallow water-bearing zone within the YRRA for each quarter. As can be seen on Figures 21 through 24, there does not appear to be a region-wide groundwater plume of PCE concentrations above 5.0 μg/l in the YRRA. Data presented on these figures indicate that the extent of PCE in the shallow water-bearing zone at concentrations exceeding 5.0 μg/l has been characterized in the YRRA and appears to be discontinuous and localized proximate to certain subfacilities that are identified on Figures 21 through 24.

Analytical results of groundwater samples collected from wells screened in the shallow water-bearing zone at all of the subfacilities located in the YRRA exceeded 5.0 μg/l PCE during one or more quarterly monitoring rounds, with the exception of the Nu-Way Cleaners and Paxton Subfacilities. The only RI well screened in the shallow water-bearing zone with concentrations of PCE above 5.0 μg/l was RI-4s, which had a maximum PCE concentration of 13 μg/l. The wells with concentrations of PCE above 5.0 μg/l were located on a subfacility.

Figures 21 through 24 show the subfacilities' PCE concentrations. The concentrations of PCE greater than 5.0 μg/l are highlighted on the figures. Separate symbols are shown on the figures for:

- subfacilities with concentrations of PCE $<$ 5.0 μg/l in all wells on the subfacility property;
- subfacilities with concentrations of PCE $\geq$ 5.0 μg/l in at least one well on the subfacility property; and
- subfacilities with concentrations of PCE $\geq$ 5.0 μg/l in the most downgradient well on the subfacility property as determined by the respective subfacility consultant.

There is some evidence that PCE may have migrated off-site at Frank Wear Cleaners, BNRR, and Cameron Yakima subfacilities, potentially forming a commingled PCE plume in the shallow water-bearing zone. As summarized in Section 7.2, five subfacilities (Adeline, Cameron Yakima, Frank Wear Cleaners, Goodwill Industries, and Southgate Laundry) have PCE concentrations above 5.0 μg/l in monitoring wells located at the downgradient side of the property, which may indicate the potential for PCE migration beyond the respective subfacility property. These subfacilities are located in the northern and central

portions of the YRRA (north of East Mead Avenue [Figure 2]). PCE was also detected above 5.0 µg/l in the shallow water-bearing zone, in other subfacilities. However, the extent of PCE in groundwater appears to be localized within the respective subfacility property.

PCE concentrations detected in the shallow water-bearing zone in the subfacility wells sampled for this RI in isolated areas in the northern and central portions of the YRRA (north of East Mead Avenue) ranged from non-detect to 1,100 µg/l (Frank Wear Cleaners). PCE concentrations in the shallow water-bearing zone were lower in the southern portion of the YRRA (south of East Mead Avenue) ranging from non-detect to 75.6 µg/l. PCE concentrations above 5.0 µg/l were detected in the shallow water-bearing zone at only one location (Agri-Tech/Yakima Valley Steel) in the southern portion of the YRRA. This PCE contamination was isolated and limited to the subfacility property. No YRRA RI monitoring well located south of the Agri-Tech/Yakima Valley Steel subfacility had concentrations of PCE exceeding 5.0 µg/l during this RI, indicating that the PCE impacted area is limited to isolated areas north of Agri-Tech/Yakima Valley Steel.

PCE concentrations varied seasonally somewhat, but did not indicate any patterns or trends between RI monitoring events during non-irrigation (December 1997 and March 1998) versus irrigation (June 1998 and September 1998) seasons. Two subfacilities did indicate seasonal effects where PCE concentrations increased from the non-irrigation to the irrigation seasons: Southgate Laundry (Well MW-3) increased from a range of 4 to 11 µg/l during non-irrigation to 34 to 67 µg/l; Westco well MW-2 increased from a range of 1 to 3 µg/l during non-irrigation to 6 to 67 µg/l during irrigation. These are likely due to localized conditions specific to these two subfacilities rather than any regional conditions in the YRRA.

8.2 EXTENT OF PCE IN THE DEEP WATER-BEARING ZONE

Figure 25 presents PCE concentrations for groundwater samples collected from the deep water-bearing zone within the YRRA for each quarter. None of the samples from the deep water-bearing zone wells exceeded 5.0 µg/l PCE, with the exception of the December 1997 groundwater sample collected from the Cameron Yakima Subfacility well 101-d (20.0 µg/l) in December 1997 from a groundwater sample collected by Ecology (Table 7). Concentrations of PCE above the method reporting limit of 0.5 µg/l, but less than 5.0 µg/l, were detected for all four quarters at subfacility well CYI 103-d, for three quarters at BNRR-d, and only for one of the four quarters at wells RI-4d, RI-6d, RI-7d, and RI-10-d. These results indicate that there are no significant PCE impacts to the deep water-bearing zone in the YRRA.

9.0 RECEPTOR SURVEY

A groundwater use receptor survey was completed for the YRRA to identify residential, commercial, and industrial facilities as potential users of groundwater in the YRRA. The receptor survey was inclusive of the YRRA and Area 1 and focused on facilities located within the YRRA and Area 1, as defined previously in this report and shown on Figure 3. An additional Area 2 was to potentially be included with the survey if the results of the RI field investigation indicated that Area 2 was downgradient of the YRRA and concentrations of PCE were detected above 1 μg/l in groundwater samples collected from the easternmost monitoring well (RI-14) in the YRRA. Neither of these conditions occurred and Area 2 was not included in the receptor survey, as approved by Ecology in August 1998 (Appendix A). The Receptor Survey Report of Findings, prepared by the SECOR subcontractor, Fitch & Marshall, dated March 31, 1998, is attached in Appendix C.

The survey was conducted by submitting questionnaires in both Spanish and English to a mailing list of businesses and residences within the YRRA and Area 1. The questionnaire used for the survey was reviewed and approved by Ecology. The mailing was followed up with telephone calls and site visits to confirm information and obtain clarification of responses to the questionnaires. A total of 1,279 responses determined as valid were received by Fitch & Marshall. Information was not obtained from 12 addresses contacted as discussed in the attached report.

The results of the survey were tabulated and are statistically analyzed in the attached report by Fitch & Marshall. Information on groundwater use, well construction details, and other specific information is provided in the report in Appendix C. The results of the survey indicate the following:

Survey Findings

- Eighty-three responses (6.5 percent of the valid response) use well water on-site for domestic, commercial, or industrial use.
  - 36 properties (43 percent) from water wells less than 130 feet bgs
  - 11 properties (13 percent) from water wells greater than 130 feet bgs
  - 36 properties (43 percent) from water wells of unknown depth
- Ninety-one responses (7.1 percent of the valid response) indicated that there was a water well on their property which is not currently in use.
- One hundred-five responses (8.2 percent of the valid responses) do not know whether or not there is a water well used on-site.
- Thirty-two (39 percent) of the properties that use well water depended entirely on well water.
- Twenty-eight properties (34 percent) of the properties that use well water responded that the well had been tested in the past year.

Water Use

The following summarizes the water uses of the properties within the YRRA and Area 1 which use well water. Note that some users may use water for more than one purpose.

- Forty-two users (51 percent) use water for drinking and domestic purposes;
- Forty-one users (49 percent) use water for irrigation;
- Ten users (12 percent) use water for food processing;
- Ten users (12 percent) use water for watering livestock;
- Seven users (8 percent) use water for heating;
- Nineteen users (23 percent) use water for other uses such as washing, refrigeration, photo developing and dewatering.

Well Locations

Of the 83 properties which reported using well water, 30 properties (36 percent) in the YRRA are located in the city of Yakima. The remaining 53 properties (67 percent) in the YRRA and/or Area 1 are located in the city of Union Gap.

A more detailed discussion of the receptor survey results is included in the Receptor Survey Report in Appendix C. The water well locations are shown on Figure 26 of the RI report.

Conclusions

The majority of the water wells which obtain water from a shallow depth (130 feet or less) are located on the southern end of the YRRA (Figure 26). Most of these shallow water wells are located in proximity to monitoring wells sampled for this RI where PCE concentrations were not detected in the shallow water-bearing zone.

There are a number of water wells located near the Frank Wear Cleaners subfacility where relatively high concentrations of PCE were detected for this RI in the shallow water-bearing zone. These water wells extract groundwater from the deep water-bearing zone; however, there were no monitoring wells screened in the deep water-bearing zone in proximity to these water wells. The results of groundwater samples collected from the deep water-bearing zone within the YRRA for this RI indicate that the deep water-bearing zone has not been significantly impacted with PCE.

There are a number of water wells located along South First Avenue (Figure 26) which are directly downgradient or in proximity to monitoring wells sampled for this RI, which have shown elevated concentrations of PCE. These water wells are shallow or of unknown depth. Based on these data, there is a possibility that these water wells may be affected by PCE concentrations in groundwater.

10.0 CONCLUSIONS

The following conclusions have been developed from the results of the YRRA RI investigation.

10.1 HYDROGEOLOGIC SYSTEM CHARACTERISTICS

The results of this RI show that the YRRA is underlain by alluvial sediments consisting of sands and gravels to depths of 200 to 300 feet bgs with discontinuous layers of silts, clays, or cemented gravels. The sediments are relatively permeable with the exception of the areas of fine grained materials or cementation which may act as an aquitard.

The regional hydrogeologic system consists of three distinct aquifers that extend to depths of over 1,500 feet bgs. The shallow, unconfined aquifer in the Yakima Gravels consists of alluvial sediments to depths of 200 to 300 feet bgs. This RI focused on the upper portion of the shallow aquifer to a maximum depth of 130 feet bgs.

Shallow and deep water-bearing zones in the YRRA have been identified in this report. Several lines of qualitative evidence indicate that the shallow and deep water-bearing zones are hydraulically separate in the northern portion of the YRRA and interconnected in the southern portion of the YRRA. The evidence includes:

- Geologic conditions reported on other well logs reviewed for this RI indicate that a well-defined zone of an impermeable cemented gravel is present in the north-northwest portion of the YRRA at depths of 30 to 50 feet bgs. The cemented gravel appears to act as an aquitard between the shallow and deep water-bearing zones within the regional shallow aquifer.

- Relatively large variations in the horizontal hydraulic gradient between the shallow and deep water-bearing zones in the northern portion of the YRRA, as compared to variations in the southern portion of the YRRA.

- The distribution of elevated concentrations of PCE in several isolated areas of the shallow water-bearing zone and lack of any significant concentrations of PCE in the deep water-bearing zone downgradient of potential source areas in the northern portion of the YRRA.

The data indicate that the vertical hydraulic gradient at all of the RI well pairs were downward except at well pair RI-4, which were upward at 0.003 feet per foot. The relatively high vertical gradients (greater than - 0.04 feet per foot) at several wells in the north and west perimeters of the YRRA also suggest that the shallow and deep water-bearing zones in these areas are not well connected. The vertical gradients were not significantly effected by seasonal variations.

Qualitative information and observations suggest that the shallow and deep water-bearing zones in the eastern and southern sides of the YRRA are more permeable and yield more groundwater than RI monitoring wells in the northern and western sides of the YRRA. The hydraulic conductivity of the deep water-bearing zone appears to be higher than the shallow water-bearing zone throughout the YRRA.

10.2 SHALLOW WATER-BEARING ZONE

The following conclusions have been developed from the results of this RI for the shallow water-bearing zone:

- The shallow water-bearing zone groundwater levels ranged from approximately three feet bgs to approximately 30 feet bgs. In general, the depth to static groundwater was greatest in the north and least in the southern part of the YRRA. The shallow water-bearing zone appears to be unconfined across the YRRA.

- The groundwater levels varied seasonally by as much as 12 feet, but varied by an average of less than five feet over all. Groundwater levels at 24 of the 27 wells screened in the shallow-water zone monitored for the RI were lowest in March and highest in September.

- Seasonal irrigation in the Yakima Valley is interpreted to be responsible for the higher groundwater levels that were typically recorded during the irrigation season in June and September 1998 monitoring rounds as opposed to the lower groundwater levels recorded during the non-irrigation season in December 1997 and March 1998 monitoring rounds. Seasonal variations ranged from 0.39 to 11.76 feet within the YRRA.

- The potentiometric surface maps for the shallow water-bearing zone indicate that the direction of groundwater flow is consistently to the southeast across the YRRA.

- The shallow water bearing zone has an approximate average gradient of 0.005 feet per foot across the YRRA. A slightly steeper gradient, 0.007 feet per foot, is present north of Pacific Avenue/Division Street than in the area to the south of Pacific Avenue/Division Street within the YRRA.

10.3 DEEP WATER-BEARING ZONE

The following conclusions have been developed from the results of this RI for the deep water-bearing zone:

- The seasonal variation of groundwater levels for wells screened in the deep water-bearing zone averaged slightly more than three feet. The timing of groundwater level fluctuations in the deep water-bearing zone was much more variable than fluctuations in the shallow water-bearing zone and only corresponded to irrigation periods in approximately half of the well pair locations.

- The estimated direction of groundwater flow in the deep water-bearing zone was east-southeast in the northern portion of the YRRA and southeast in the southern portion of the YRRA.

- The potentiometric surface maps for the deep water-bearing zone indicate that the gradient is less for this zone than the shallow water-bearing zone. The deep water-bearing zone approximate average horizontal gradient was 0.004 feet per foot across the YRRA. Seasonal variations in the horizontal gradient in the YRRA are insignificant.

10.4 PCE DISTRIBUTION IN THE SHALLOW WATER-BEARING ZONE

The analytical results of the groundwater sample collected from the shallow water-bearing zone showed the following:

- The RI data indicate that there does not appear to be a region-wide groundwater plume of PCE concentrations above 5.0 µg/l in the YRRA. Rather, localized isolated areas of PCE concentrations in the shallow water-bearing zone exist proximate to several subfacilities located in the YRRA, primarily north of East Mead Avenue.

- The results of this RI show that the concentrations of PCE greater than 5.0 µg/l are localized near areas of known releases. There may be evidence of possible off-site migration and potential commingling of the PCE concentrations in the central portion of the YRRA, which may include the Frank Wear Cleaners, BNRR, and Cameron Yakima Subfacilities.

- Concentrations of PCE in groundwater samples collected from the shallow water-bearing zone at all of the subfacilities within the YRRA exceeded 5.0 µg/l during one or more quarterly monitoring rounds, with the exception of the Paxton Sales and Nu-Way Cleaners Subfacilities.

- Only five of the 13 subfacilities sampled for this RI had concentrations of PCE above 5.0 µg/l in the shallow water-bearing zone on the most downgradient well (as determined by the subfacility consultant) on the respective property. These subfacilities are:

Subfacility	Maximum PCE Concentration in Downgradient Well (µg/l)
Adeline	16
Cameron Yakima	9.5
Frank Wear Cleaners	1,100
Goodwill Industries	11.9
Southgate Laundry	67

Of these five subfacilities, two have had concentrations of PCE greater than 5.0 µg/l in the most upgradient well (as determined by the subfacility consultant) on the respective property.

Subfacility	Maximum Concentration of PCE in Most Upgradient Well 5.0 µg/l
Cameron Yakima	19
Frank Wear Cleaners	110

Other subfacilities which had concentrations of PCE above 5.0 µg/l in upgradient wells sampled for this RI included U-Haul and Agri-Tech. However, the downgradient well at each subfacility had concentrations of PCE less than 5.0 µg/l. Determination of upgradient/downgradient wells at each subfacility were defined in previous reports prepared by each respective subfacility consultant.

- A maximum PCE concentration of 10.4 µg/l was detected in well RI-4, which is located west of the YRRA. There was no subfacility identified by Ecology for this RI within proximity of this location.

- Only one of the 28 wells (RI-4s) installed for this RI had concentrations of PCE above 5.0 µg/l. These results indicate that there is no region-wide groundwater plume of PCE in the YRRA.

10.5 PCE DISTRIBUTION IN THE DEEP WATER-BEARING ZONE

- The RI analytical results show that the deep water-bearing zone has not been significantly impacted by PCE. None of the groundwater samples collected from the deep water-bearing zone exceeded the 5 µg/l PCE with the exception of one well (MW-101d) on the Cameron Yakima Subfacility which had PCE concentrations of 20 µg/l in one well for one quarter. Concentrations of PCE above the method reporting limit of 0.5 µg/l, but less than 5 µg/l, were detected all four quarters at subfacility wells BNRR-d and CYI 103-d and only one of the four quarters at wells RI-4d, RI-6d, and RI-7d.

10.6 RECEPTOR SURVEY

- The results of the receptor survey conducted in the YRRA and Area 1 indicate that 83 or 6.2 percent of the 1,279 valid responses to the survey, used groundwater for industrial, commercial, or residential use. The groundwater used was reportedly obtained from water wells located within the boundaries of the YRRA and/or Area 1. Well water is used for domestic drinking water, irrigation, cleaning, and other uses. Approximately one-third of the well users have had the wells tested in the past year. The majority (67 percent) of the wells are located in Union Gap.

- The majority of the water wells which obtain water from a shallow depth (130 feet or less) are located on the southern end of the YRRA (Figure 26). Most of these shallow water wells are located in proximity to monitoring wells sampled for this RI where PCE concentrations were not detected in the shallow water-bearing zone.

- There are a number of water wells located near the Frank Wear Cleaners Subfacility where relatively high concentrations of PCE were detected for this RI in the shallow water-bearing zone. These water wells extract groundwater from the deep water-bearing zone; however, there were no monitoring wells screened in the deep water-bearing zone in close proximity to these water wells. The results of groundwater samples collected from the deep water-bearing zone within the YRRA for this RI indicate that the deep water-bearing zone has not been significantly impacted with PCE.

- There are a number of water wells located along South First Avenue (Figure 26) which are directly downgradient or in close proximity to monitoring wells sampled for this RI, which have shown elevated concentrations of PCE. These water wells are shallow or of unknown depth. Based on these data, there is a possibility that these water wells may be affected by PCE concentrations in groundwater.

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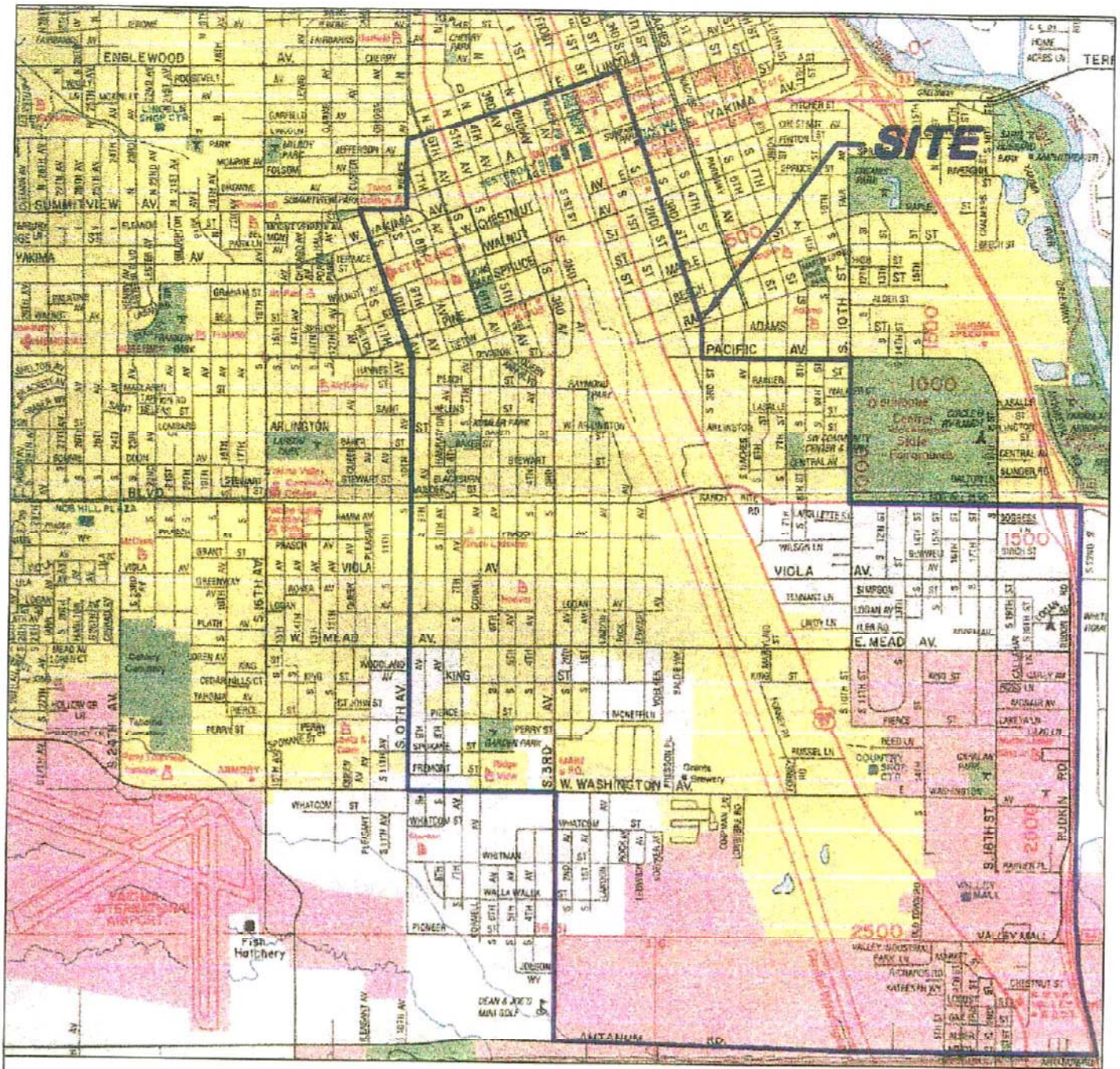
12.0 STANDARD LIMITATIONS

This report has been prepared by SECOR for the exclusive use of the Working Group for submission to Washington State Department of Ecology ("Ecology"), under a Master Service Agreement with the Working Group dated September 16, 1997. No other person may use or rely upon this report without the express written consent of SECOR and the Working Group.

The scope of work for this report was specified by Ecology in the Consent Decree, No. CY-96-3196-WFN, filed on May 7, 1997, in the U.S. District Court for the Eastern District of Washington in *State of Washington Department of Ecology v. Fairchild Semiconductor Corporation, et al.*, after negotiations with the Working Group. SECOR was retained by the Working Group after entry of the Consent Decree and therefore was not a party to the negotiations for, or in the determination of, the final scope of work. SECOR developed a work plan, which was subsequently approved by Ecology, to implement the scope of work specified in the Consent Decree. The data included in the report and the findings, observations, and conclusions expressed therein are limited by the aforementioned scope of work and the date of the report. This limitation also includes data received from third-party sources that were not verified by SECOR as to accuracy or completeness.

The conclusions and recommendations contained in the report are based on professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with the standard of care of SECOR's profession, which means generally accepted professional practices, in the same or similar localities, related to the nature of the work accomplished, at the time the services were performed. The report shall not be construed to offer legal opinions or representations.



YAKIMA, WASHINGTON; 1997

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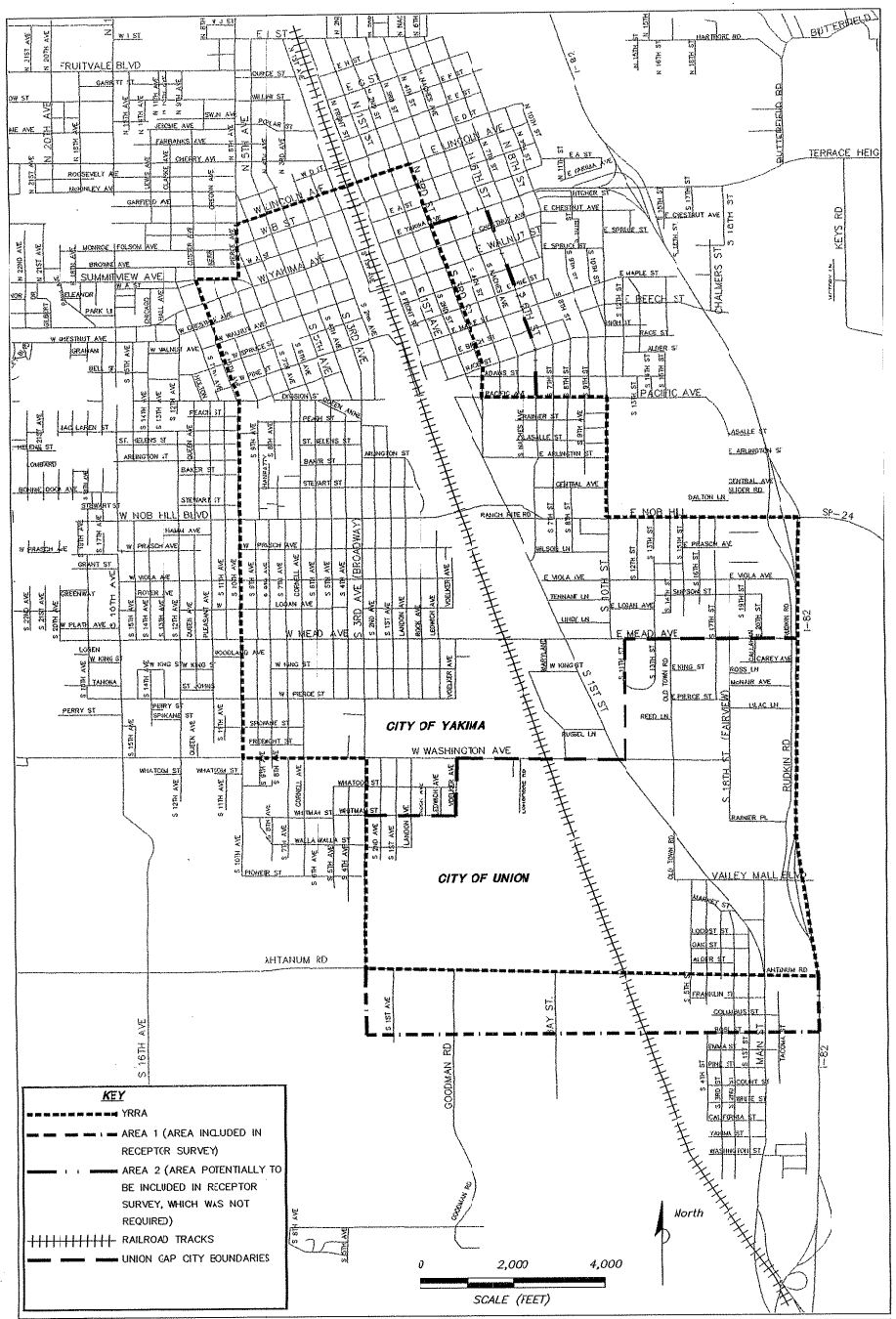
SITE VICINITY MAP

YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **1**

JOB#: **00378-001-02** APPR: DWN: **QDD** DATE: **12/11/98**

DWG: YAK00103M



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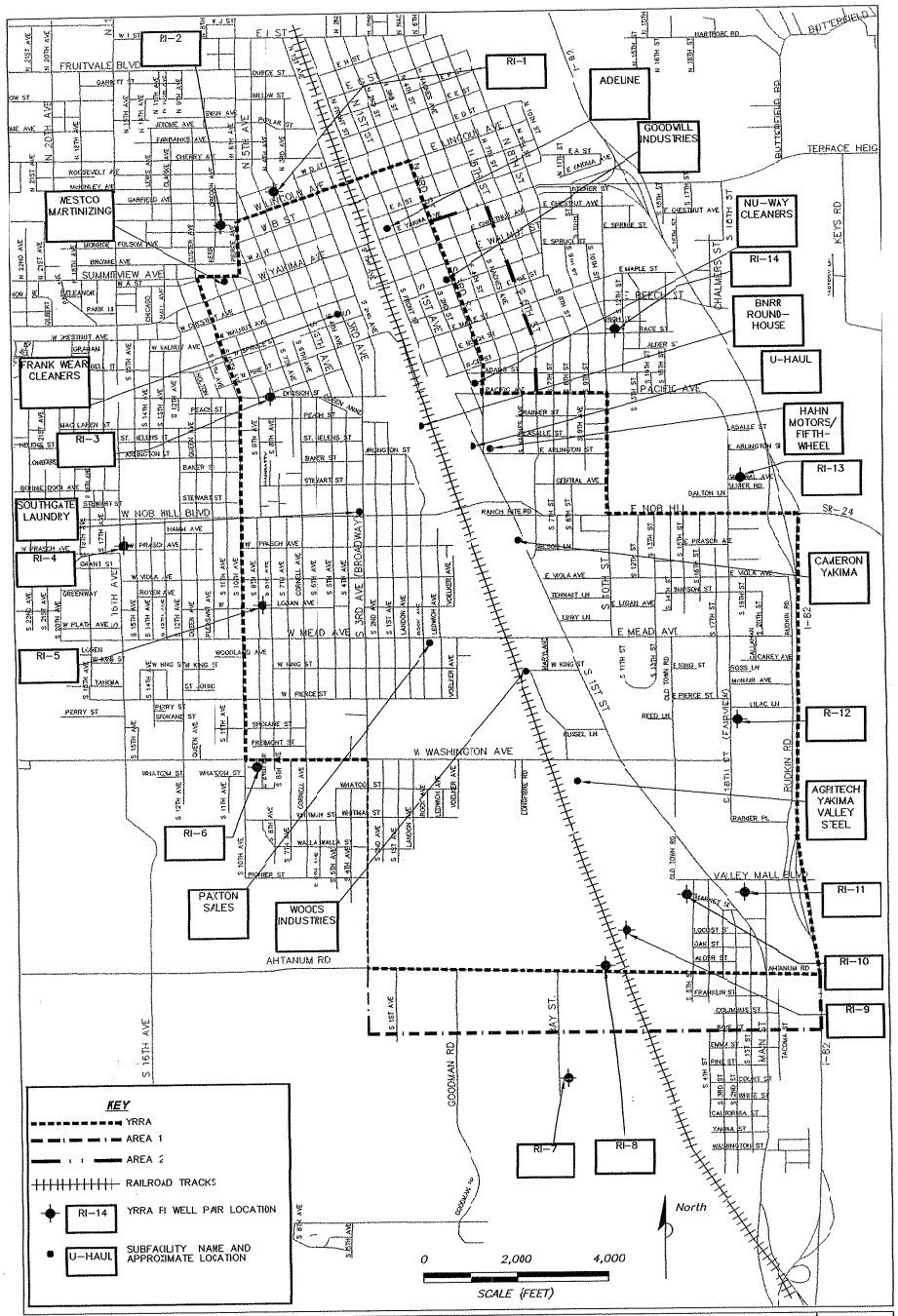
SITE LOCATION MAP

YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **2**

JOB#: 00378-001-01 APPR: DWN: QDD DATE: 11/30/98

DWG: BASEMAP.DWG



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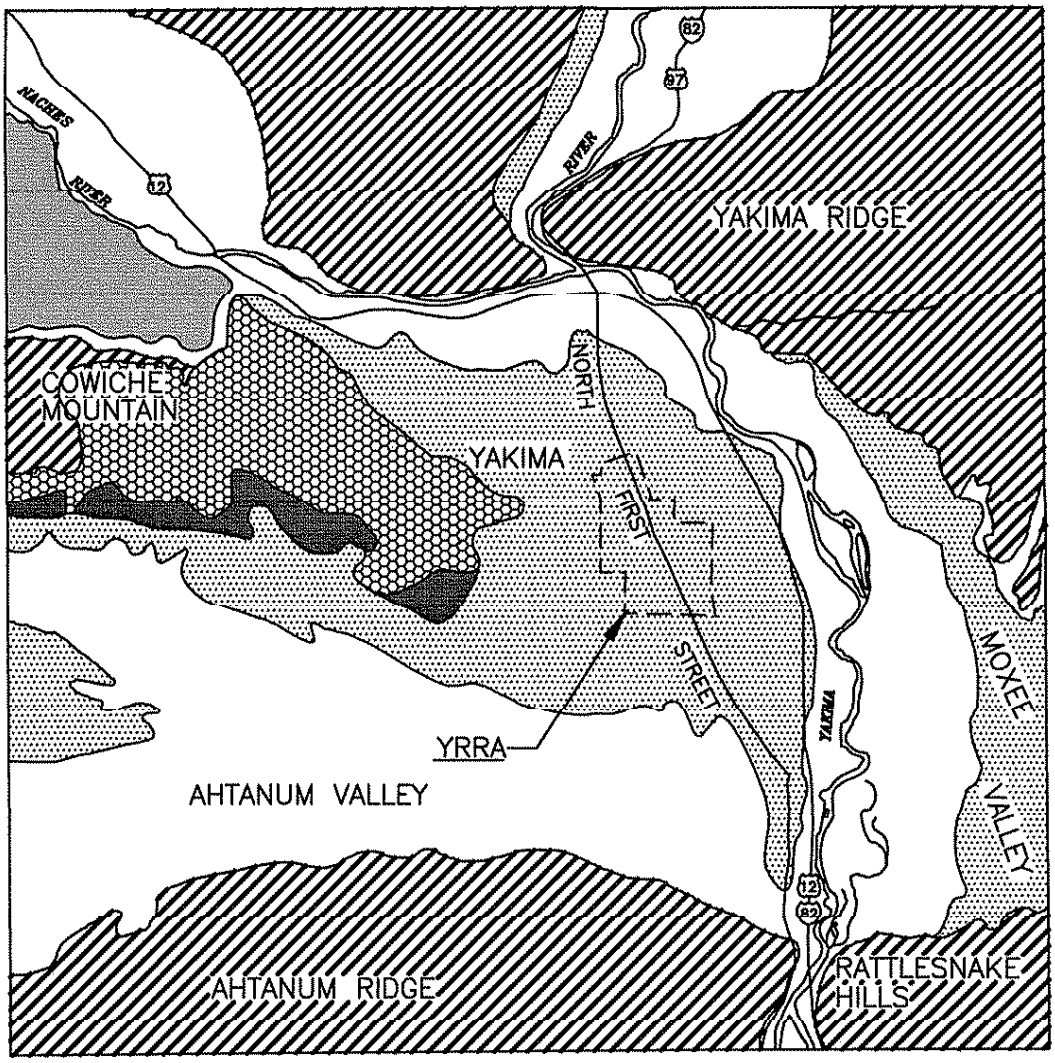
SUBFACILITIES AND RI WELL LOCATIONS

YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **3**

JOB#: 00378-001-02 APPR: DWN: QBD DATE: 12/11/91

DWG: YAKMAPF3.DWG



0 5,000 10,000

SCALE IN FEET

ALLUVIAL DEPOSITS

TERRACE DEPOSITS

EOLIAN DEPOSITS

TIETON ANDESITE

ELLENSBURG FORMATION

COLUMBIA RIVER BASALT GROUP AND ELLENSBURG FORMATION UNDIVIDED

BASE FROM U.S. GEOLOGICAL SURVEY
POMONA 1:24,000, 1974
SELAH 1:24,000, 1974
YAKIMA EAST 1:24,000, 1974
YAKIMA WEST 1:24,000, 1974

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REGIONAL GEOLOGIC MAP

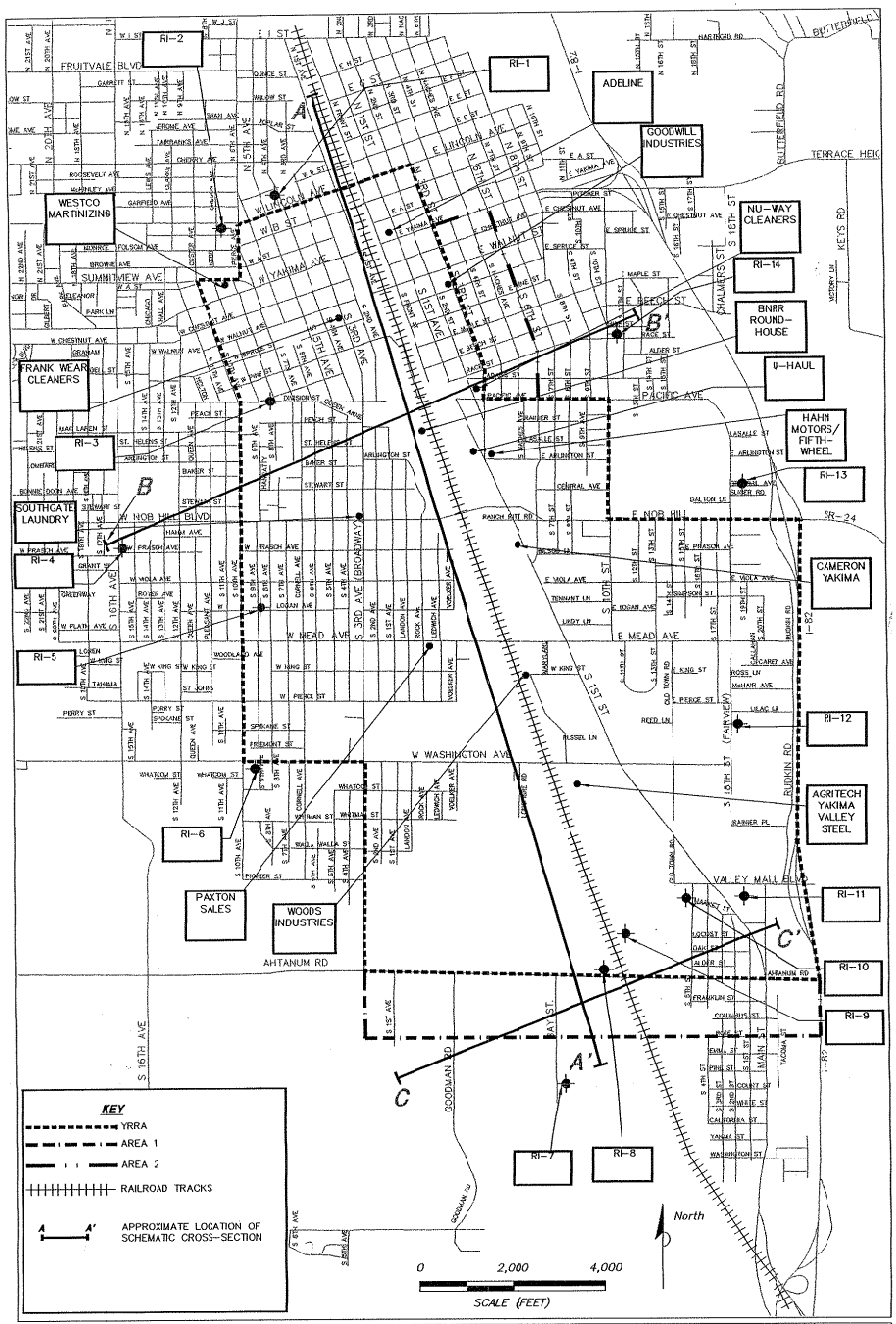
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE:

4

JOB#: **00378-001-02** APPR: DWN: **QDD** DATE: **12/11/98**

DWG: YRR01F5.DWG



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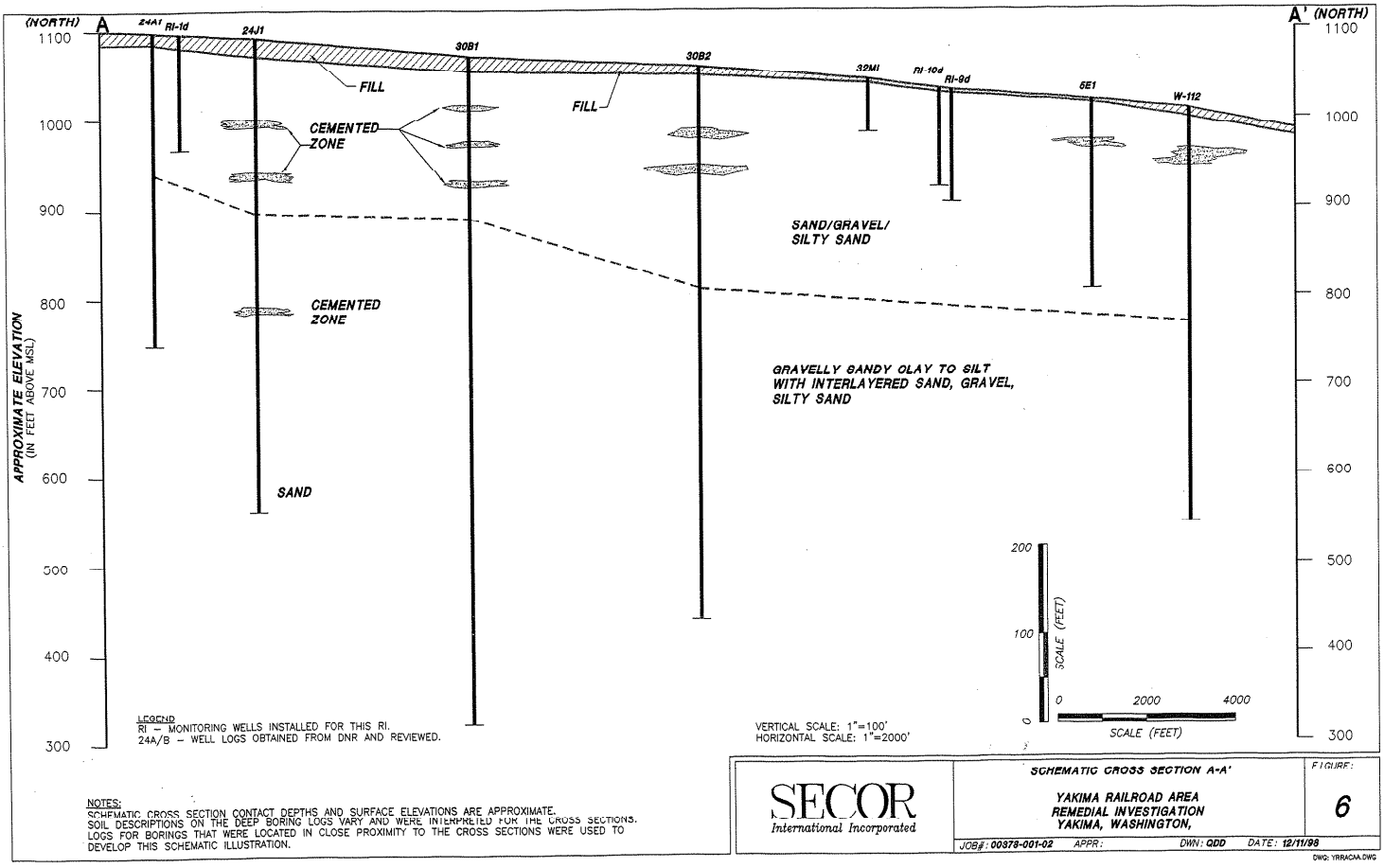
SCHEMATIC CROSS-SECTION LOCATION MAP
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **5**

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YAKMAPFS.DWG



LEGEND
RI – MONITORING WELLS INSTALLED FOR THIS RI.
24A/B – WELL LOGS OBTAINED FROM DNR AND REVIEWED.

VERTICAL SCALE: 1"=100'
HORIZONTAL SCALE: 1"=2000'

NOTES:
SCHEMATIC CROSS SECTION CONTACT DEPTHS AND SURFACE ELEVATIONS ARE APPROXIMATE.
SOIL DESCRIPTIONS ON THE DEEP BORING LOGS VARY AND WERE INTERPRETED FOR THE CROSS SECTIONS. LOGS FOR BORINGS THAT WERE LOCATED IN CLOSE PROXIMITY TO THE CROSS SECTIONS WERE USED TO DEVELOP THIS SCHEMATIC ILLUSTRATION.

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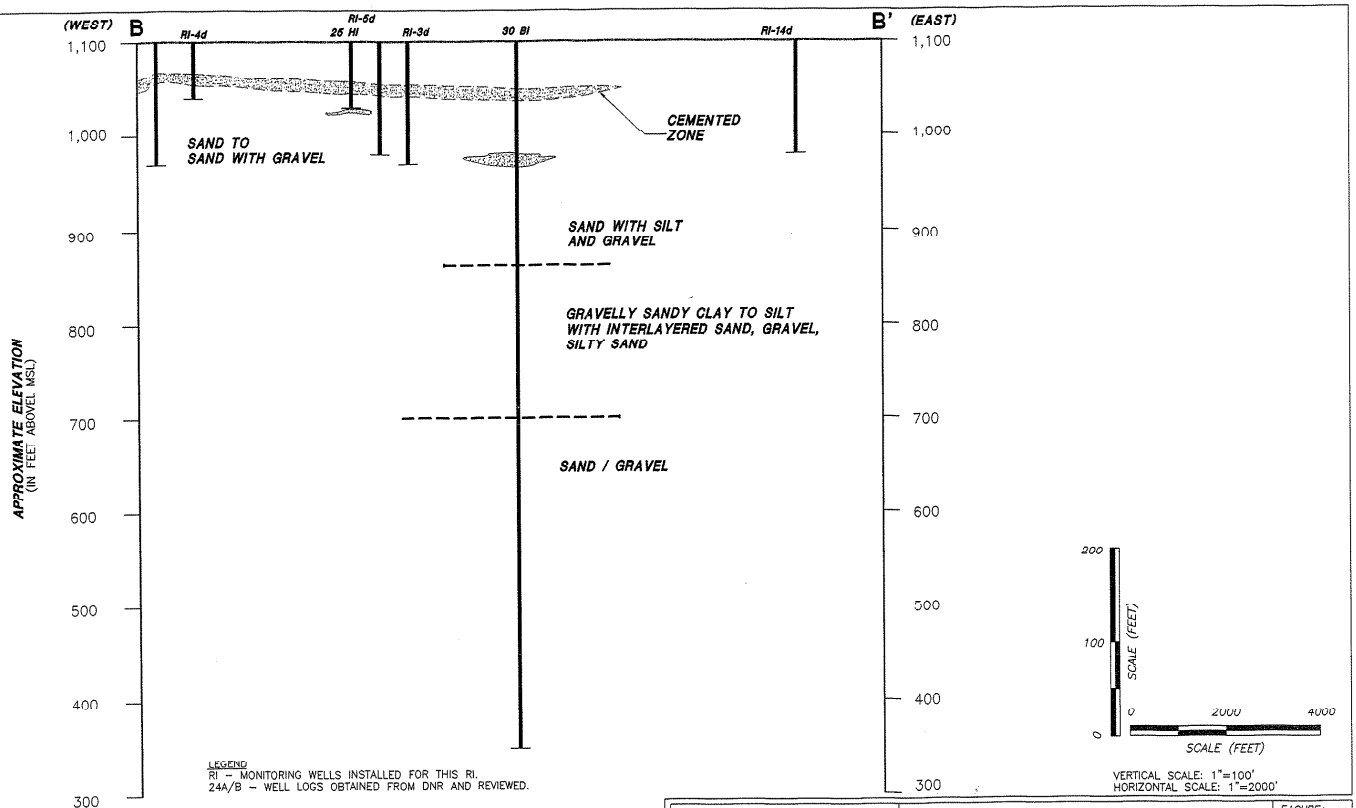
SCHEMATIC CROSS SECTION A-A'

YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON,

FIGURE: 6

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YRRACAA.DWG



NOTES:
SCHEMATIC CROSS SECTION CONTACT DEPTHS AND SURFACE ELEVATIONS ARE APPROXIMATE.
SOIL DESCRIPTIONS ON THE DEEP BORING LOGS VARY AND WERE INTERPRETED FOR THE CROSS SECTIONS.
LOGS FOR BORINGS THAT WERE LOCATED IN CLOSE PROXIMITY TO THE CROSS SECTIONS WERE USED TO DEVELOP THIS SCHEMATIC ILLUSTRATION.

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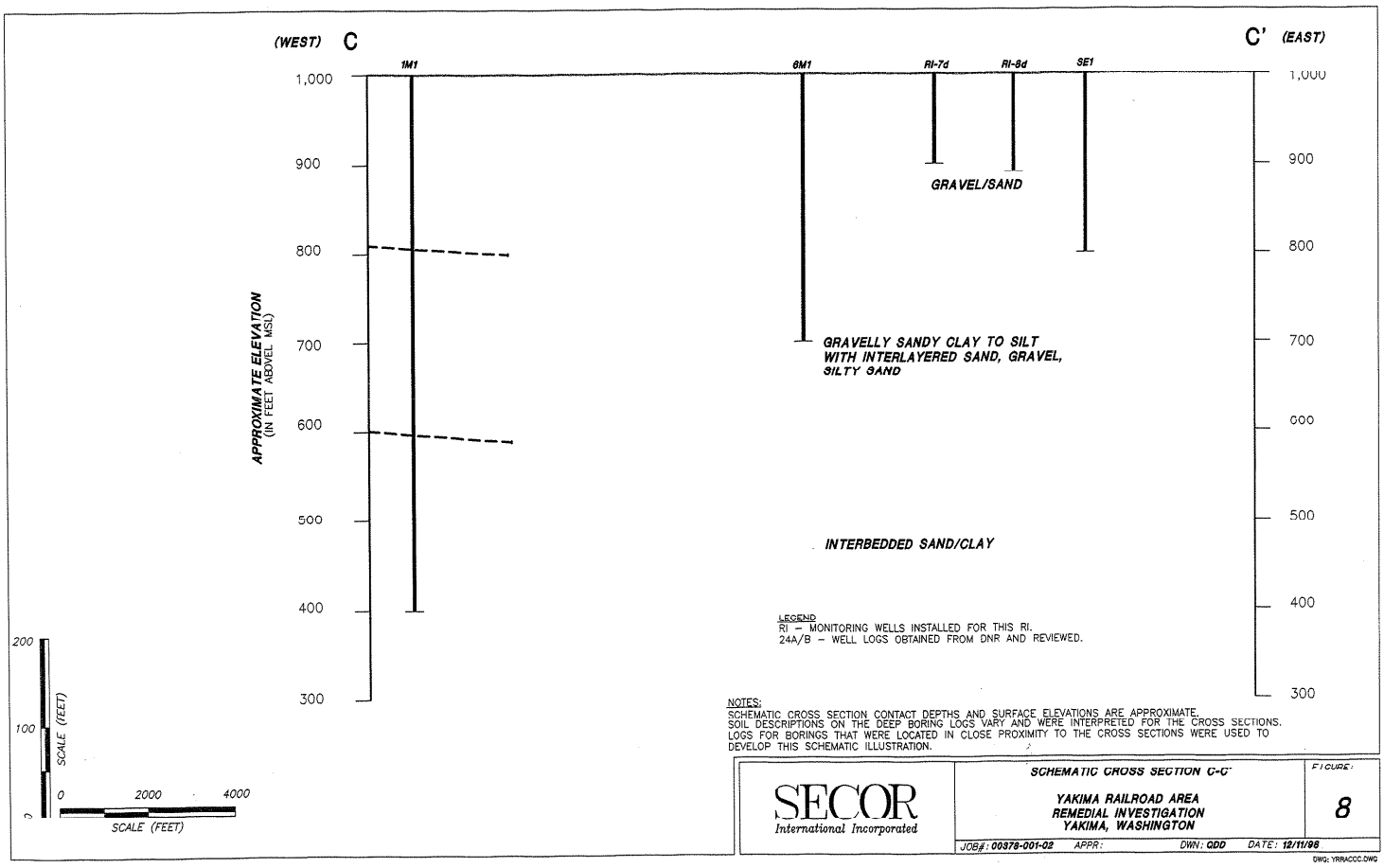
SCHEMATIC CROSS SECTION B-B'

YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: 7

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YRRACSB.DWG



NOTES:
SCHEMATIC CROSS SECTION CONTACT DEPTHS AND SURFACE ELEVATIONS ARE APPROXIMATE.
SOIL DESCRIPTIONS ON THE DEEP BORING LOGS VARY AND WERE INTERPRETED FOR THE CROSS SECTIONS.
LOGS FOR BORINGS THAT WERE LOCATED IN CLOSE PROXIMITY TO THE CROSS SECTIONS WERE USED TO DEVELOP THIS SCHEMATIC ILLUSTRATION.

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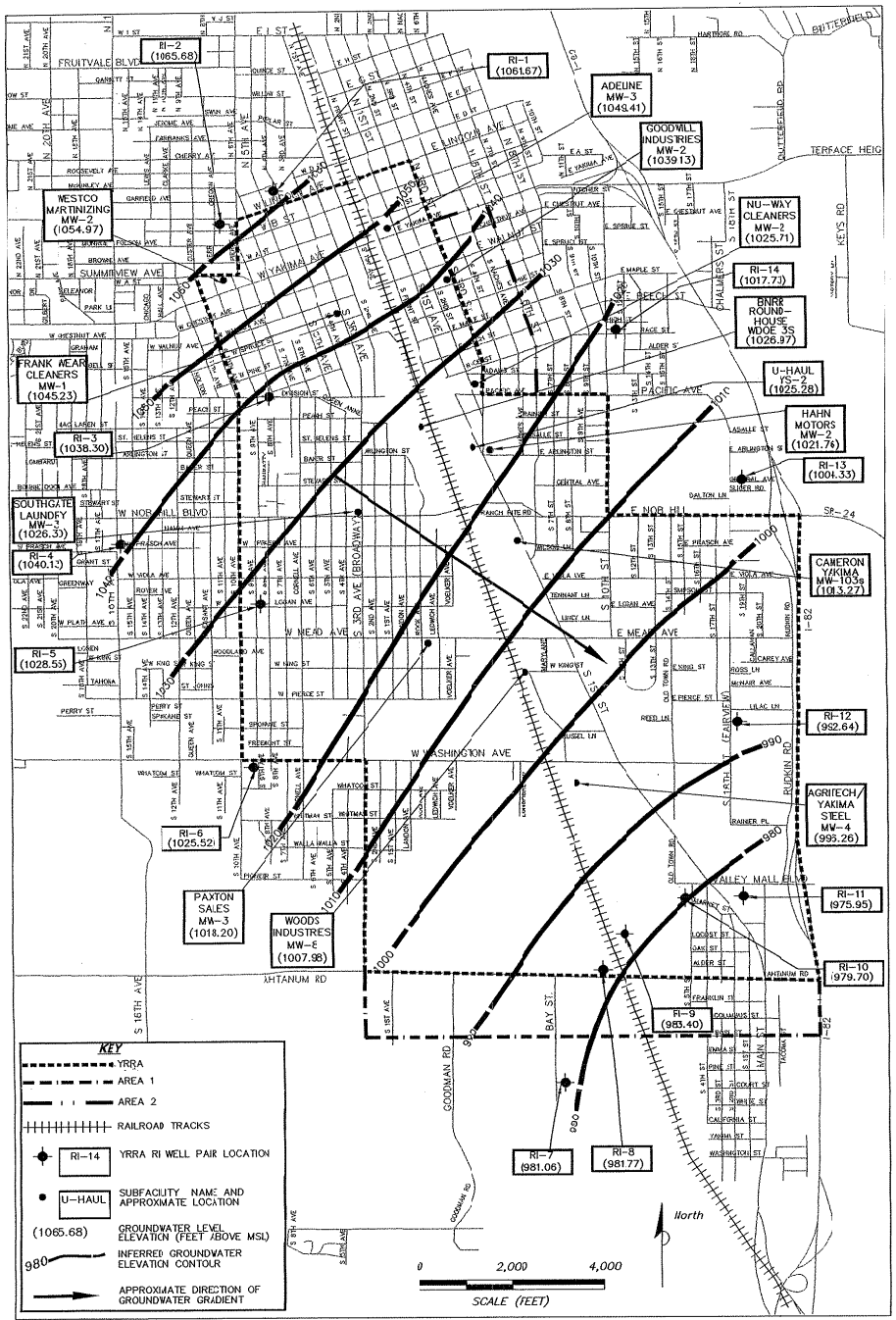
SCHEMATIC CROSS SECTION C-C'

YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: 8

JOB#: 00378-001-02 APPR: DWN: GDD DATE: 12/11/98

DWG: YRRACCC.DWG



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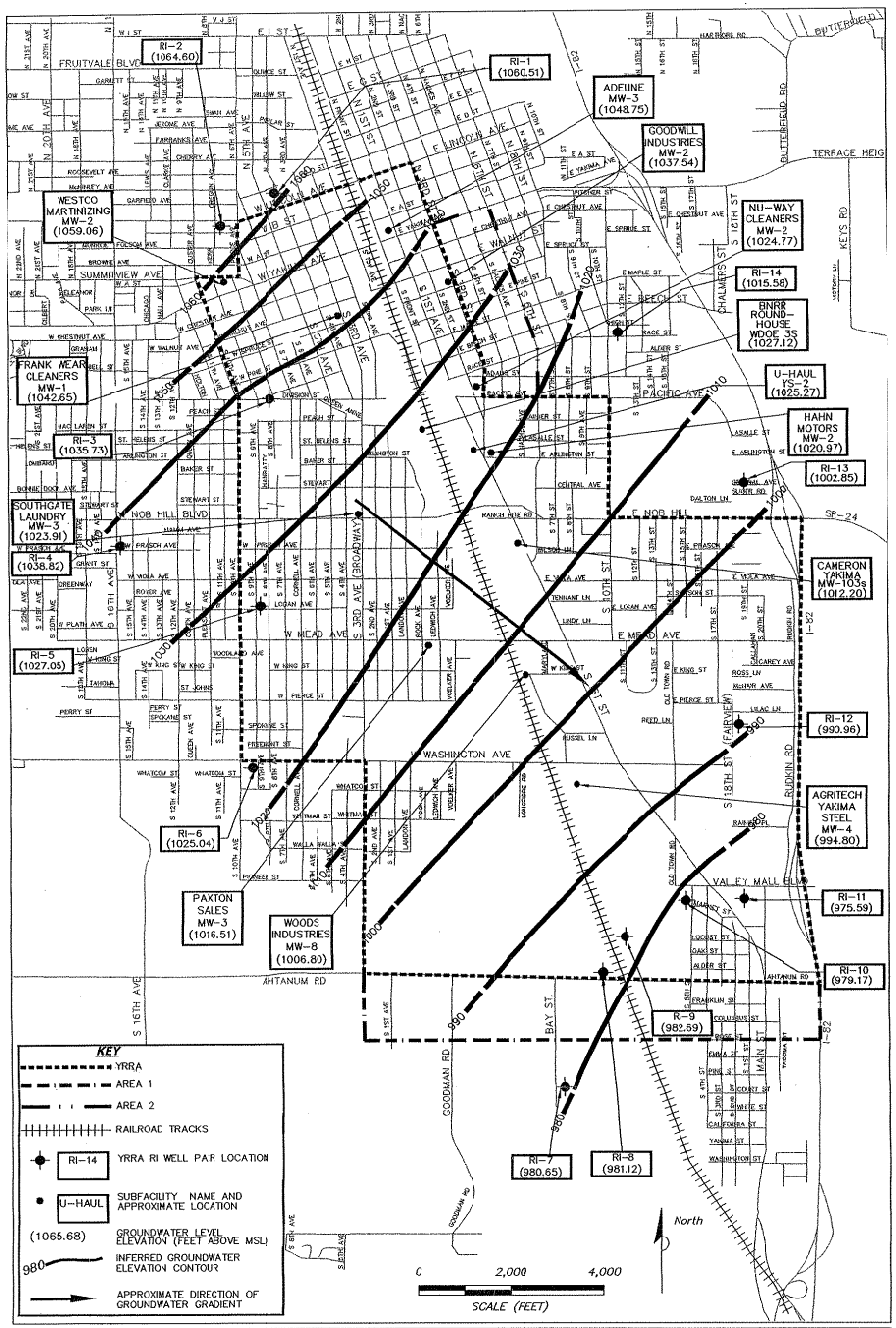
POTENTIOMETRIC SURFACE MAP
SHALLOW WATER-BEARING ZONE - DECEMBER 1997
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **9**

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YAKMAPS.DWG



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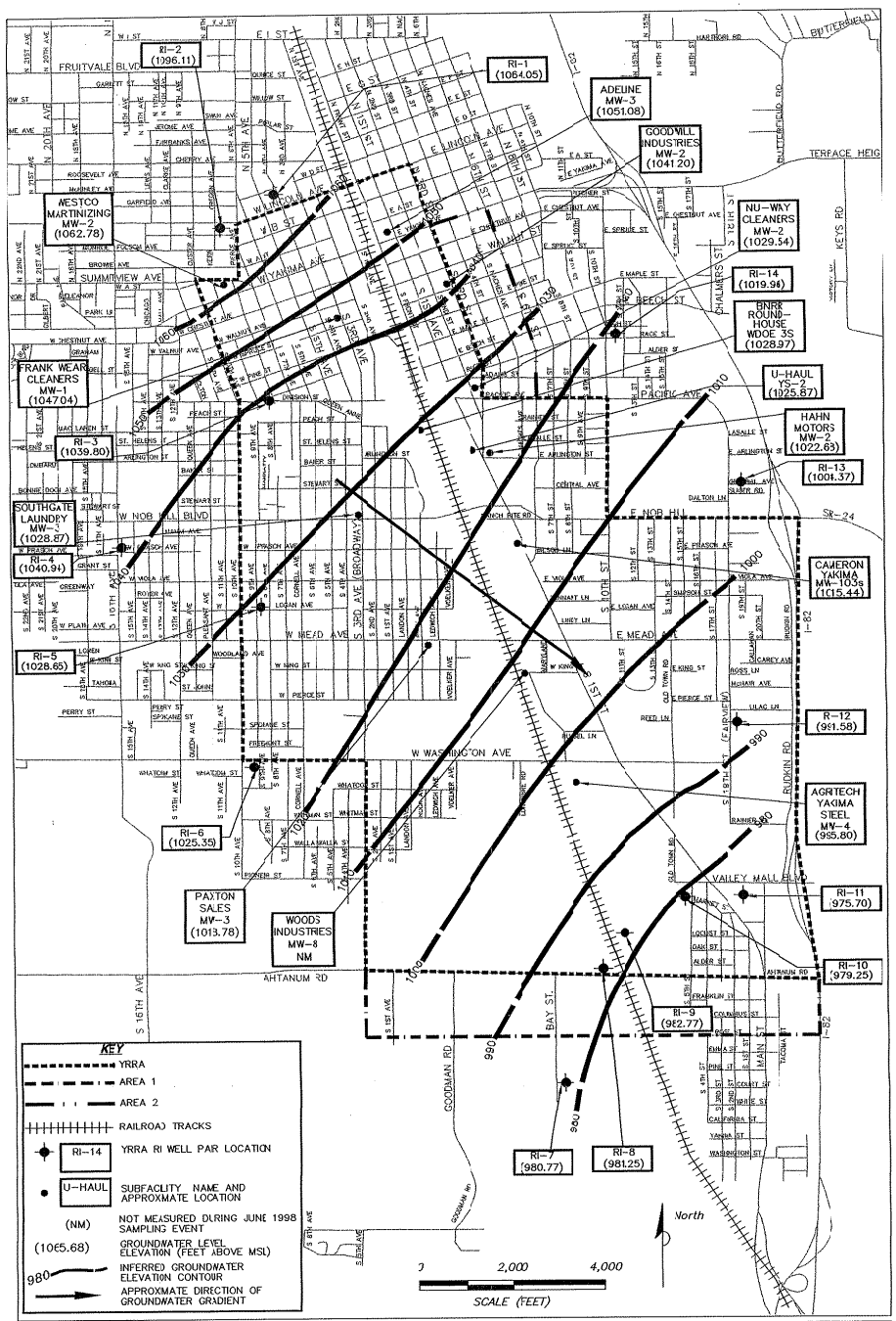
POTENTIOMETRIC SURFACE MAP
SHALLOW WATER-BEARING ZONE - MARCH 1998
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **10**

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YAKMAP7.DWG



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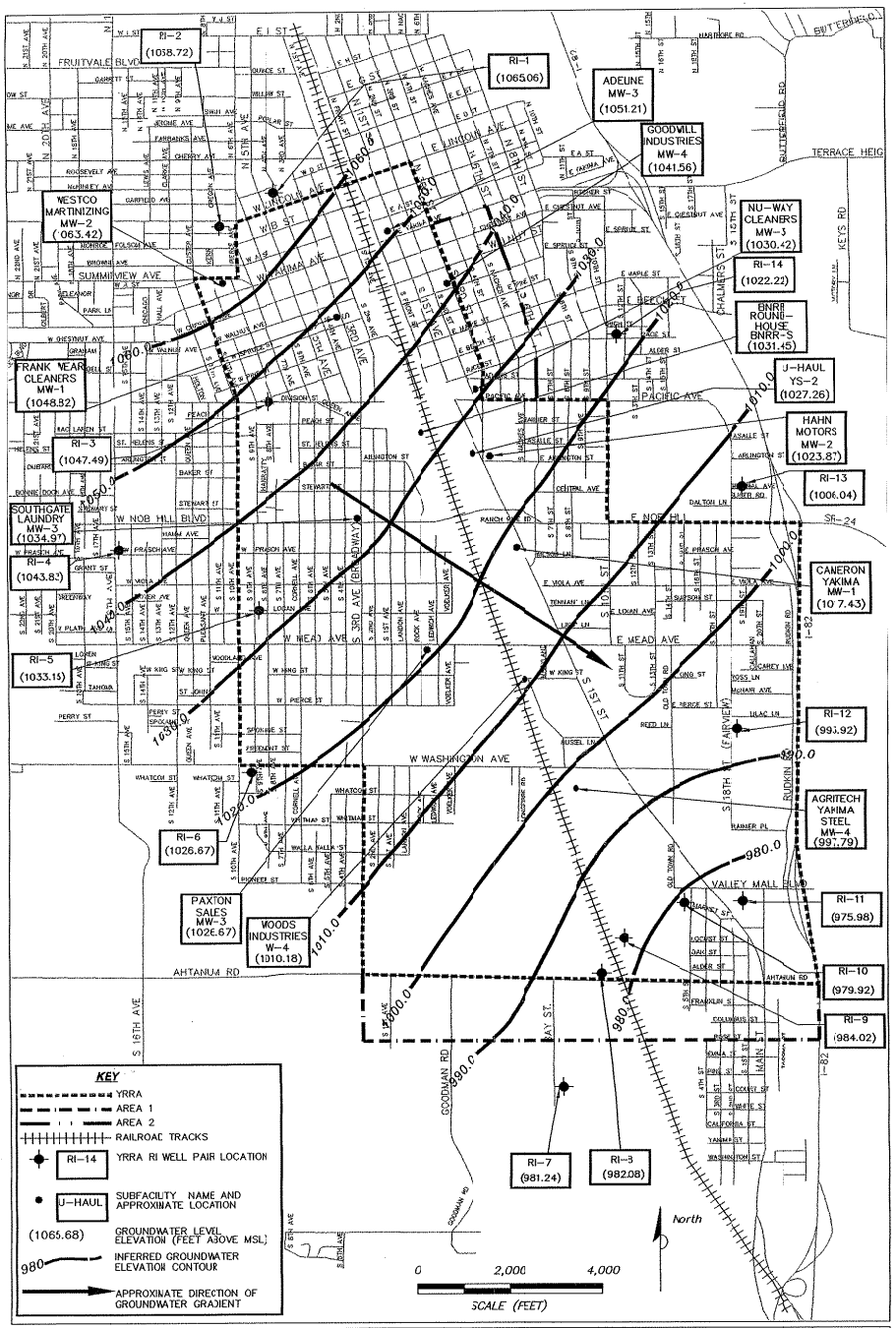
POTENTIOMETRIC SURFACE MAP
SHALLOW WATER-BEARING ZONE - JUNE 1998
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **11**

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YAKMAP9.DWG



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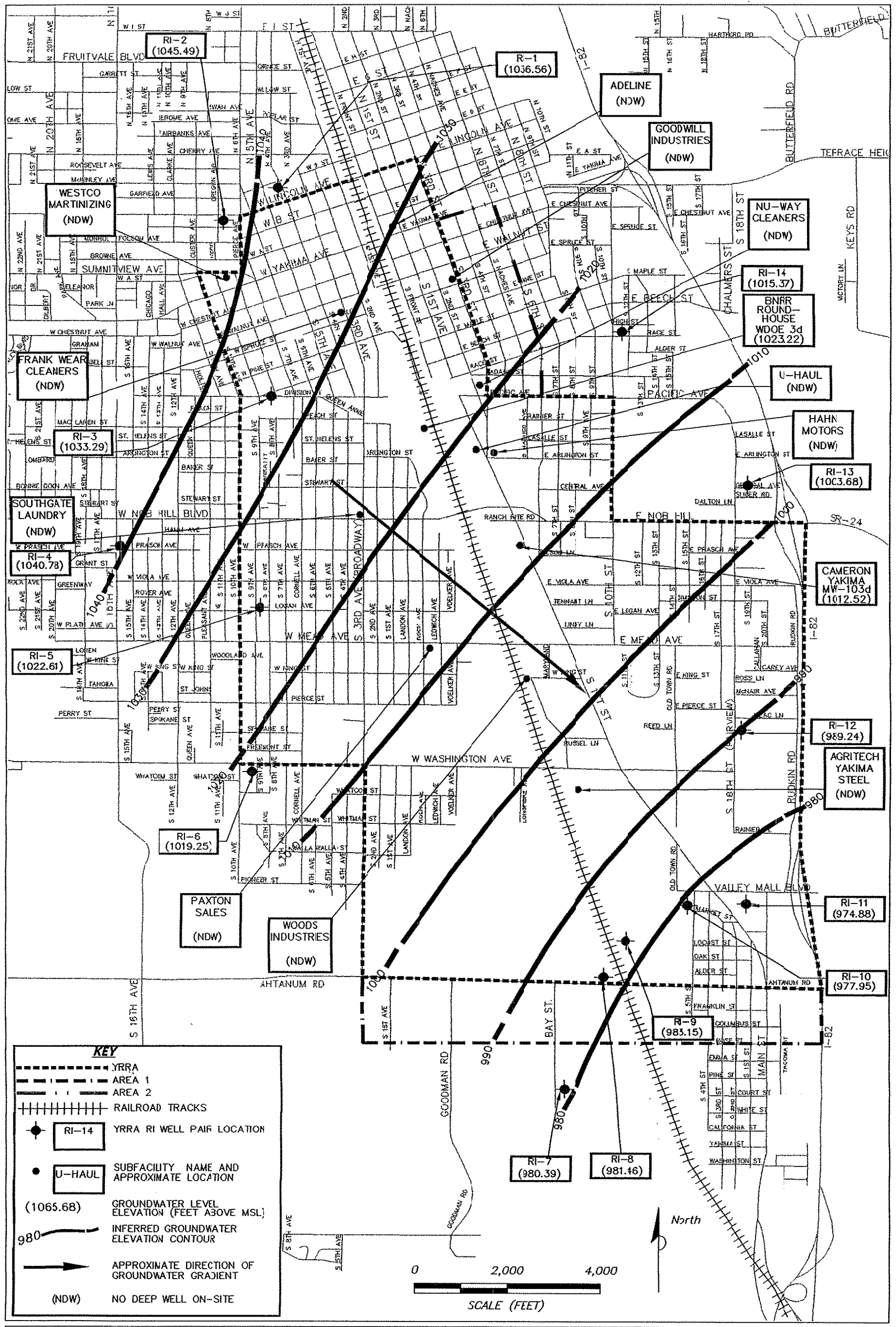
POTENTIOMETRIC SURFACE MAP
SHALLOW WATER-BEARING ZONE - SEPTEMBER 1998
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **12**

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YAKMAP13.DWG



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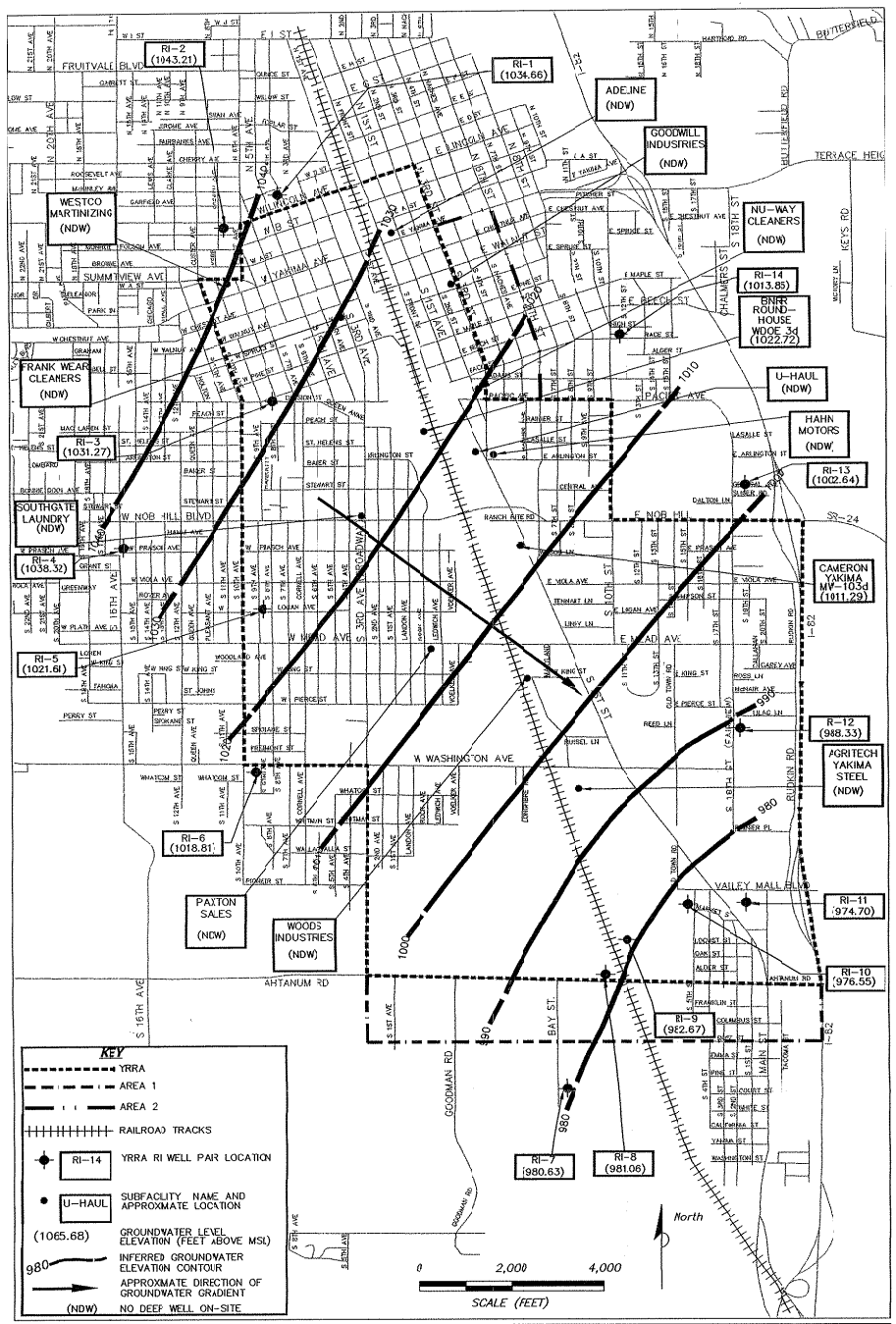
POTENTIOMETRIC SURFACE MAP
DEEP WATER-BEARING ZONE - DECEMBER 1997
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: 13

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YAKMAP6.DWG



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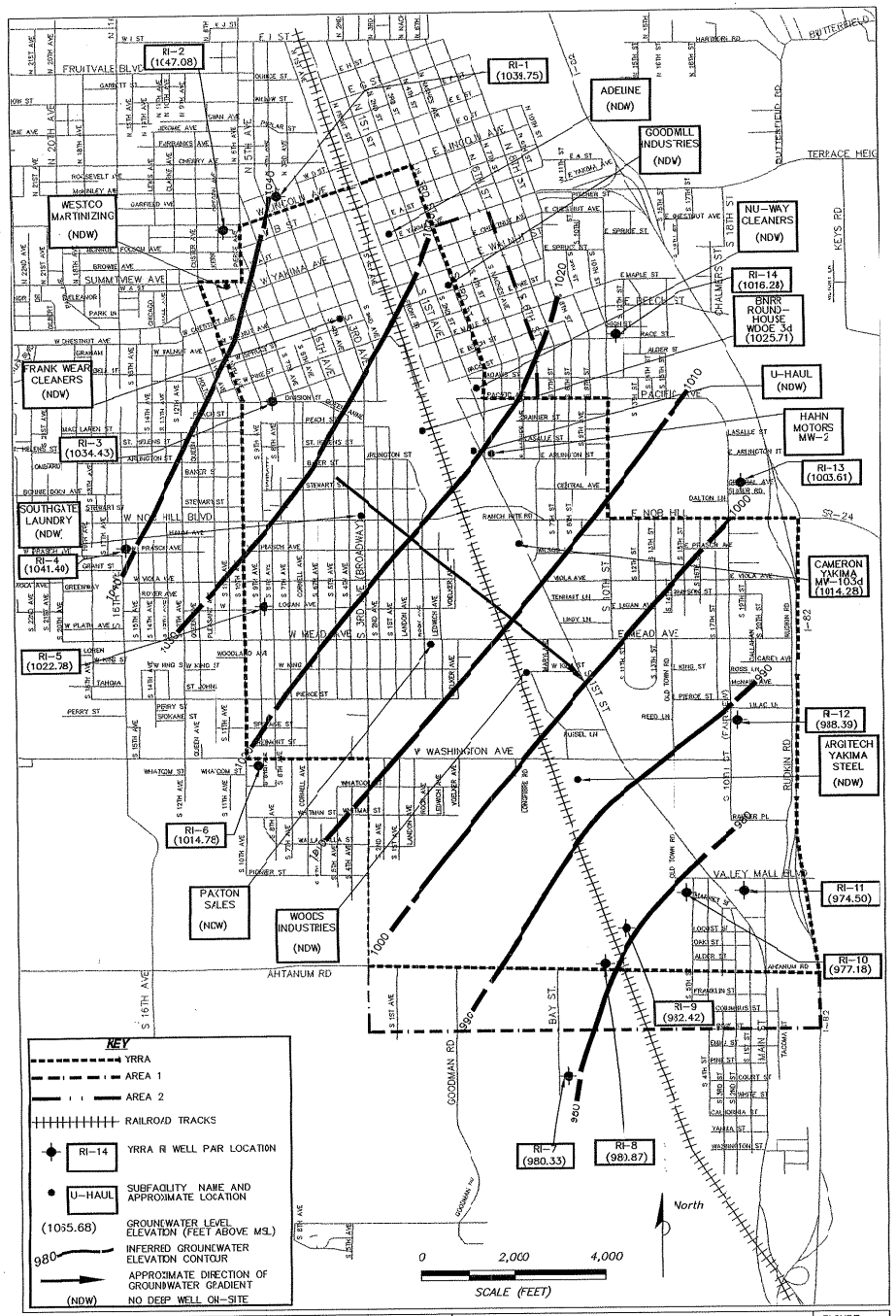
POTENTIOMETRIC SURFACE MAP
DEEP WATER-BEARING ZONE - MARCH 1998
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **14**

JOB#: 00378-401-02 APPR: DWN: QDI DATE: 12/11/98

DWG: YAKMAP8.DWG



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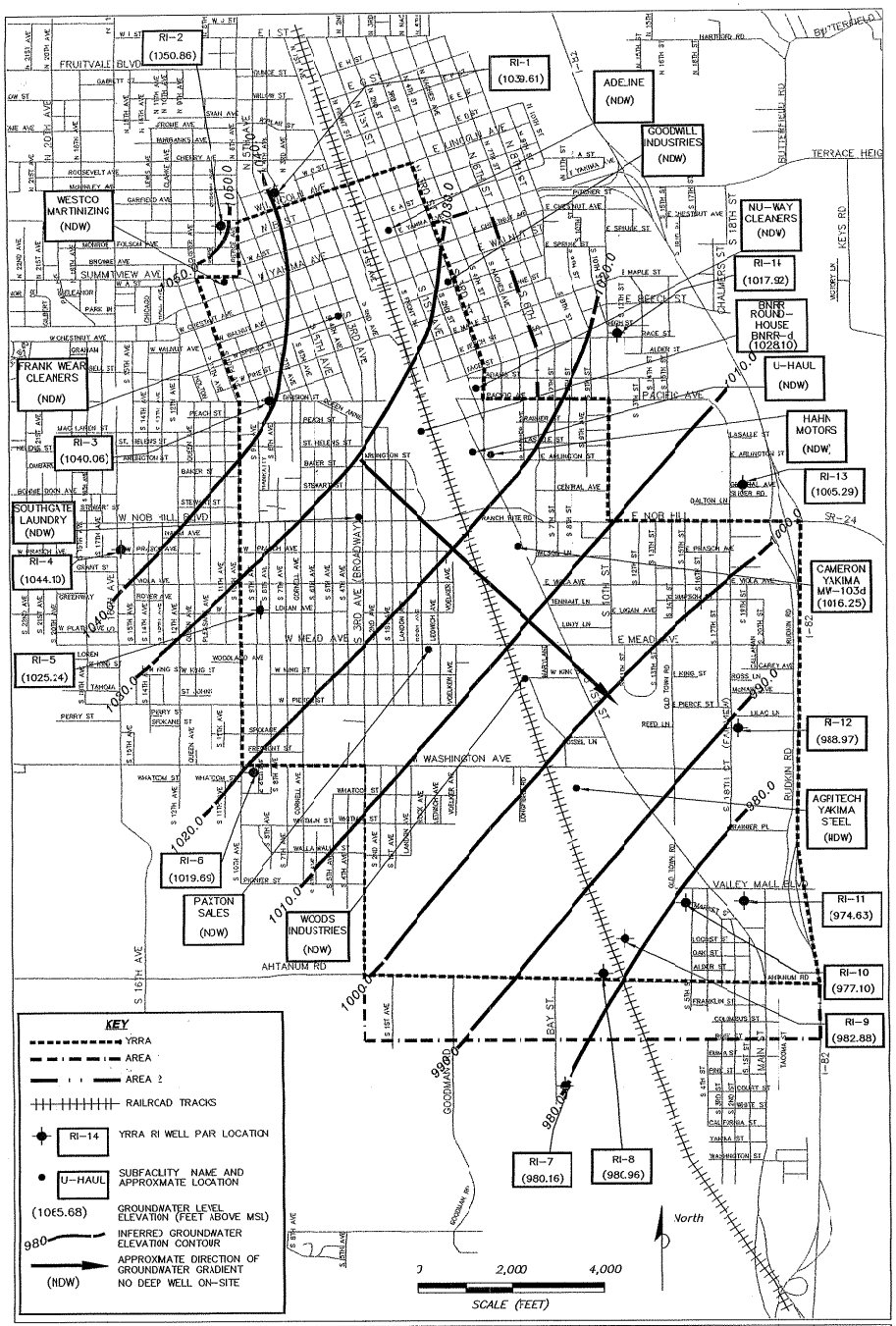
POTENTIOMETRIC SURFACE MAP
DEEP WATER-BEARING ZONE - JUNE 1998
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **15**

JOB#: 00378-001-02 APPR: DWN: QLD DATE: 12/11/98

DWG: YAKMAP10.DWG



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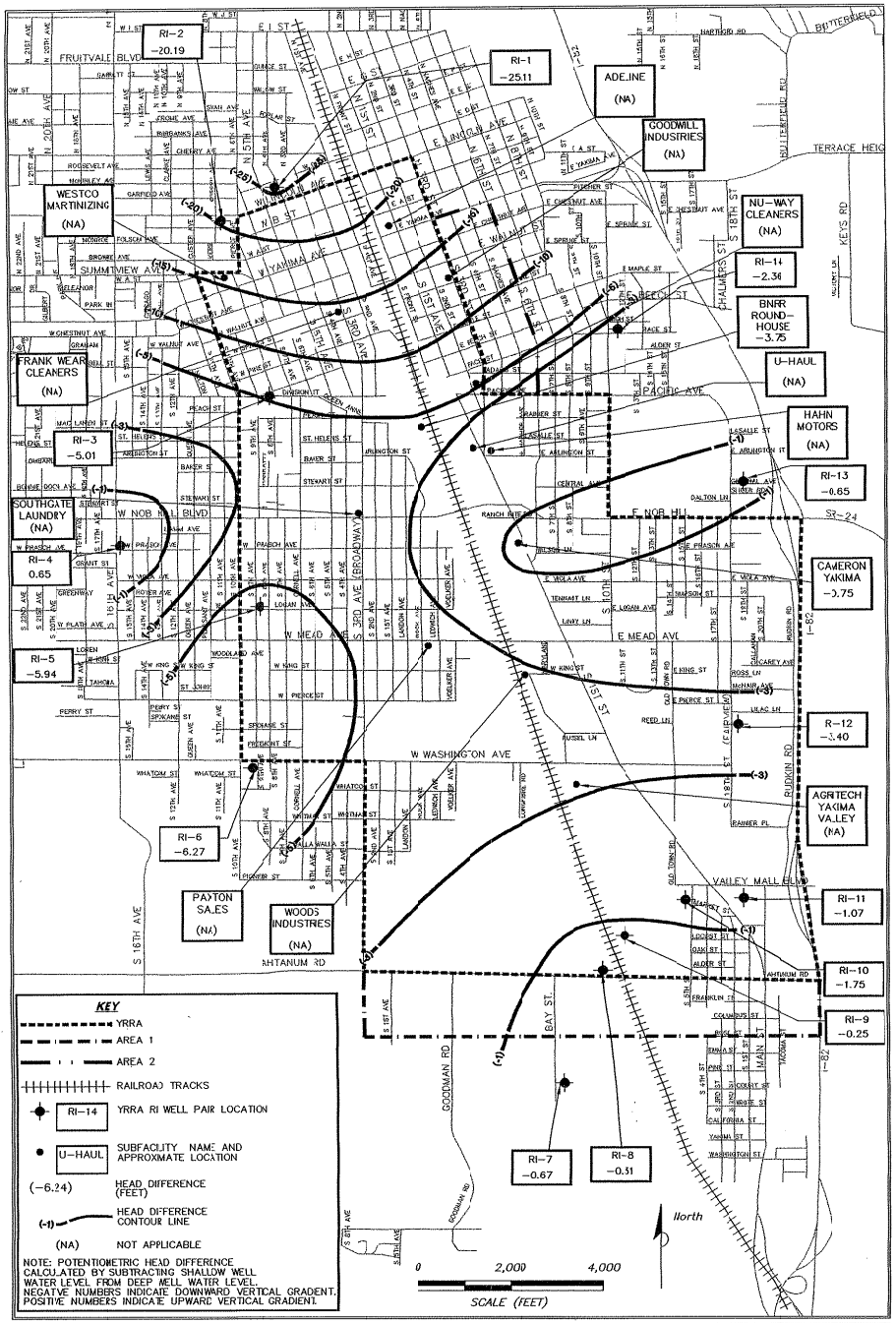
POTENIOMETRIC SURFACE MAP
DEEP WATER-BEARING - SEPTEMBER 1998
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **16**

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: YAKMAP12.DWG



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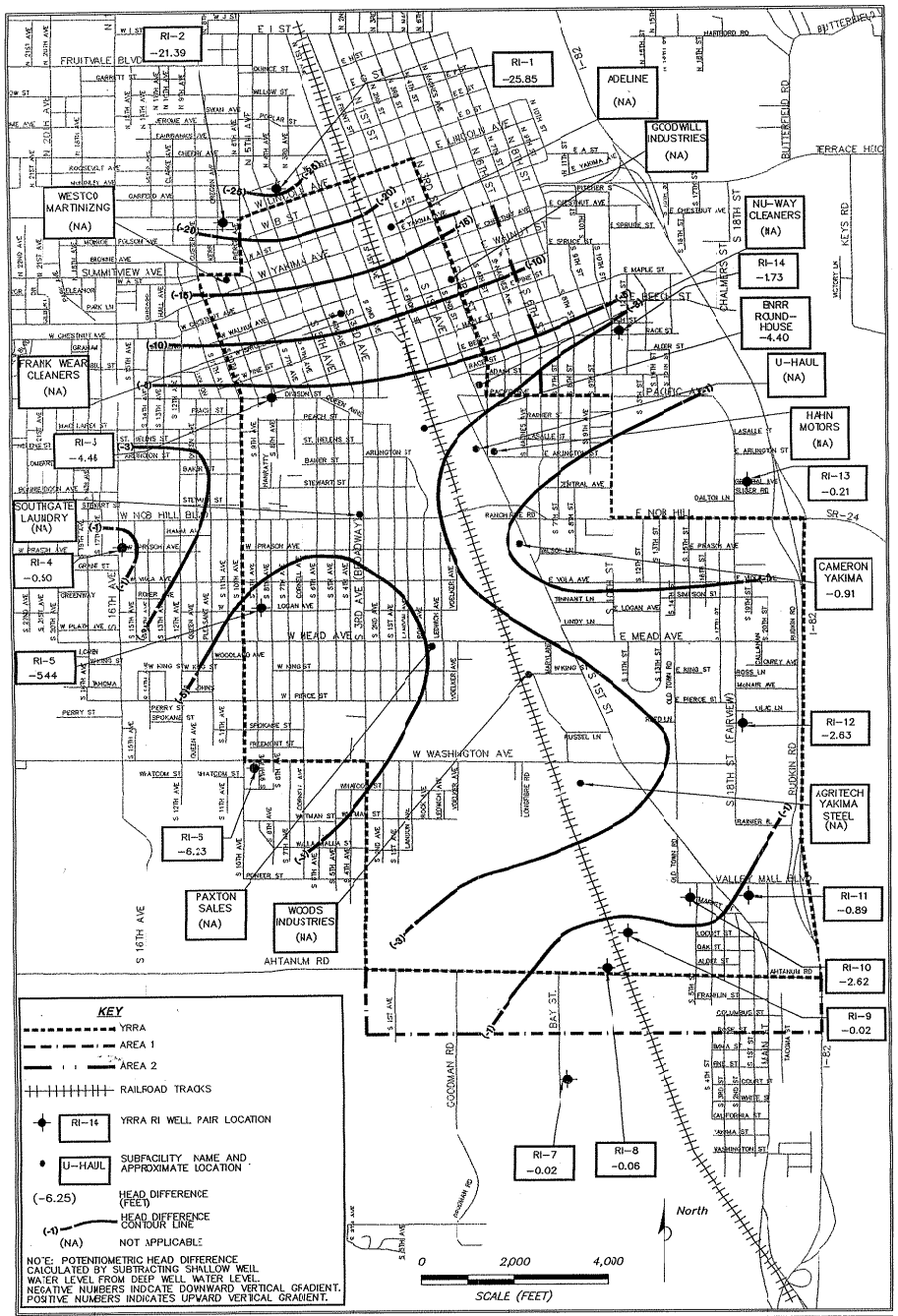
HEAD DIFFERENCE CONTOUR MAP - DECEMBER 1997
SHALLOW AND DEEP WATER-BEARING ZONES
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **17**

JOB#: 00378-101-02 APPR: DWN: QDI DATE: 12/11/98

DWG: MASTER2.DWG



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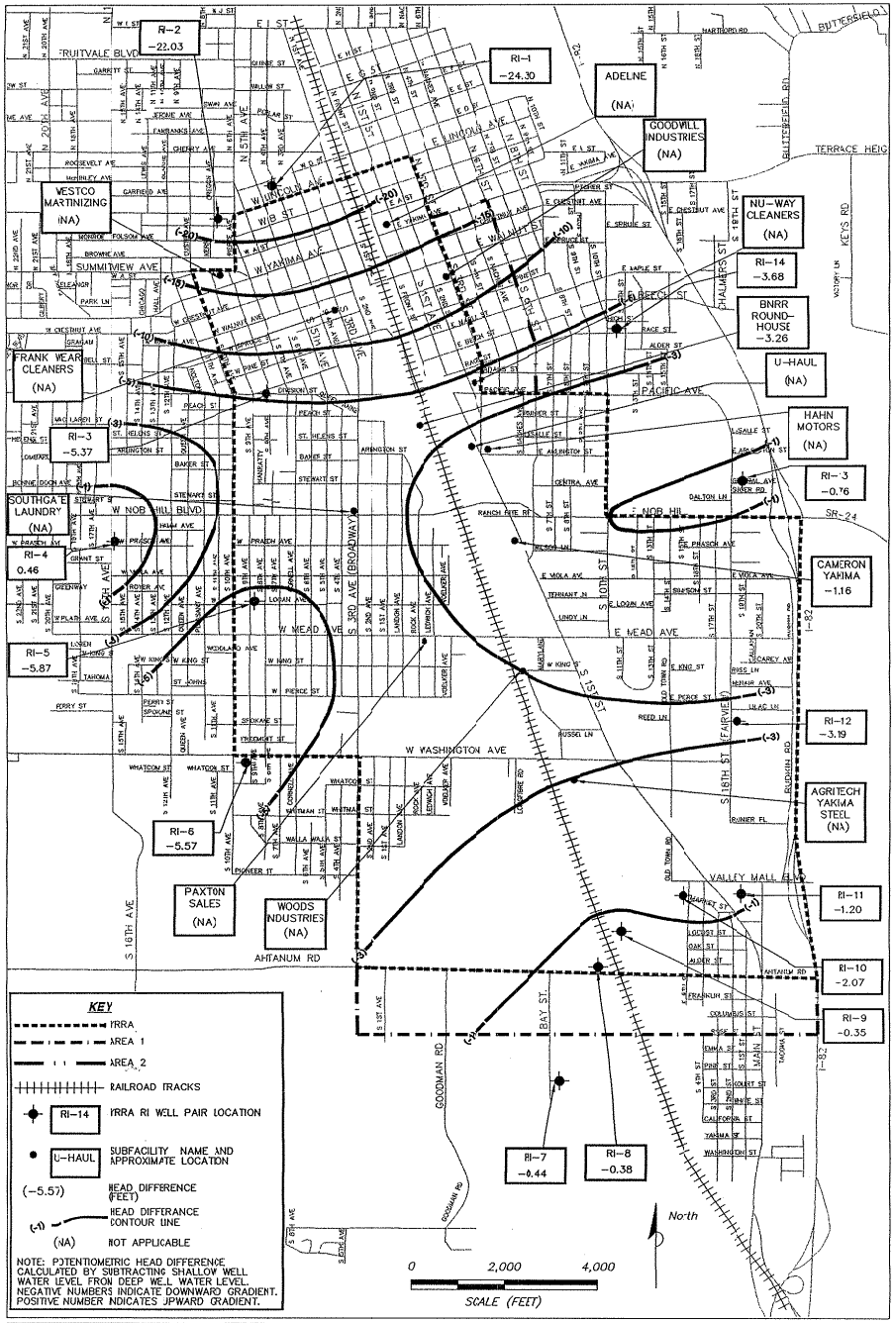
HEAD DIFFERENCE CONTOUR MAP - MARCH 1998
SHALLOW AND DEEP WATER-BEARING ZONES
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **18**

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: MASTER1.DWG



SECOR
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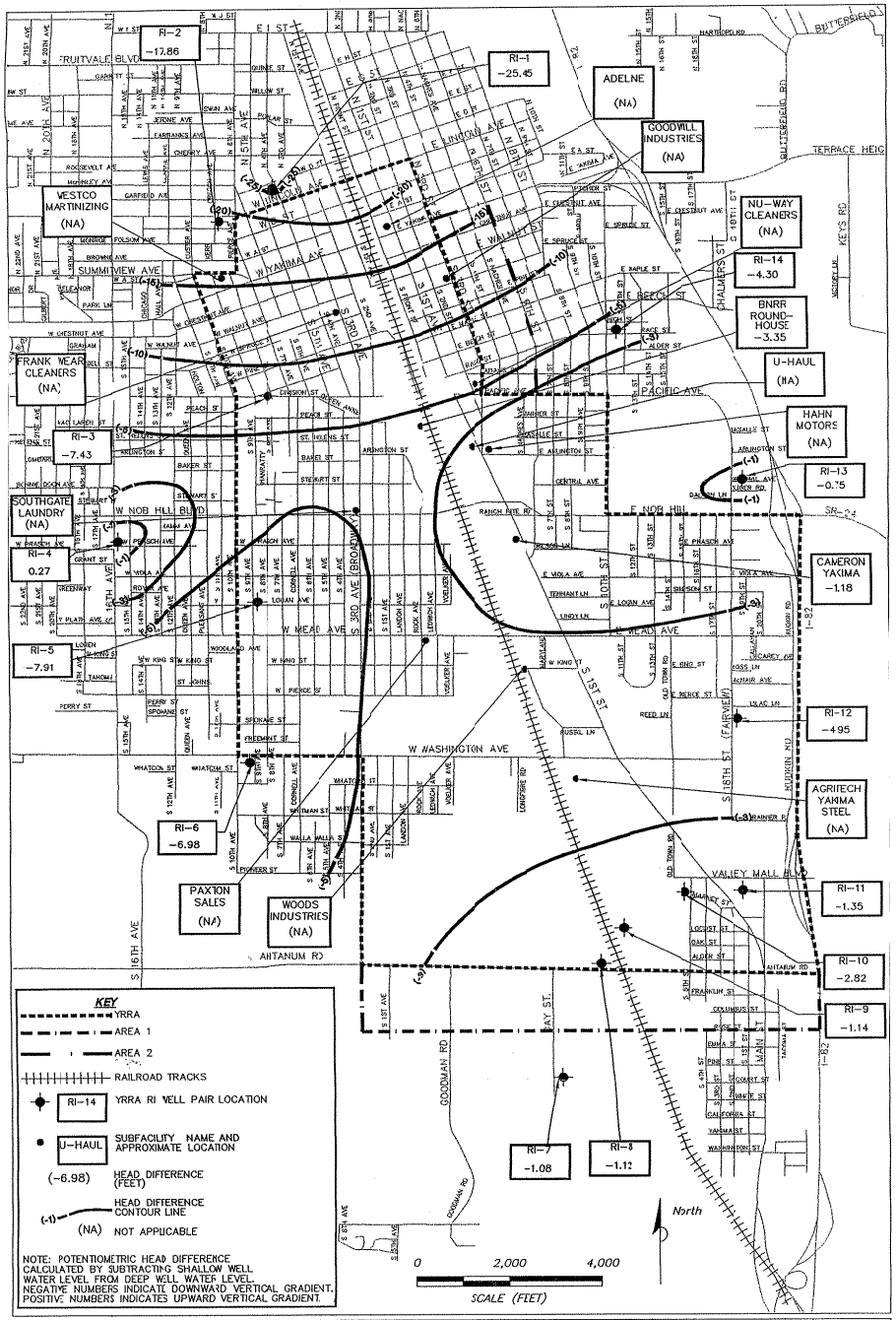
HEAD DIFFERENCE CONTOUR MAP - JUNE 1998
SHALLOW AND DEEP WATER-BEARING ZONES
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: 19

JOB#: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: RASTER3.DWG



SECOR
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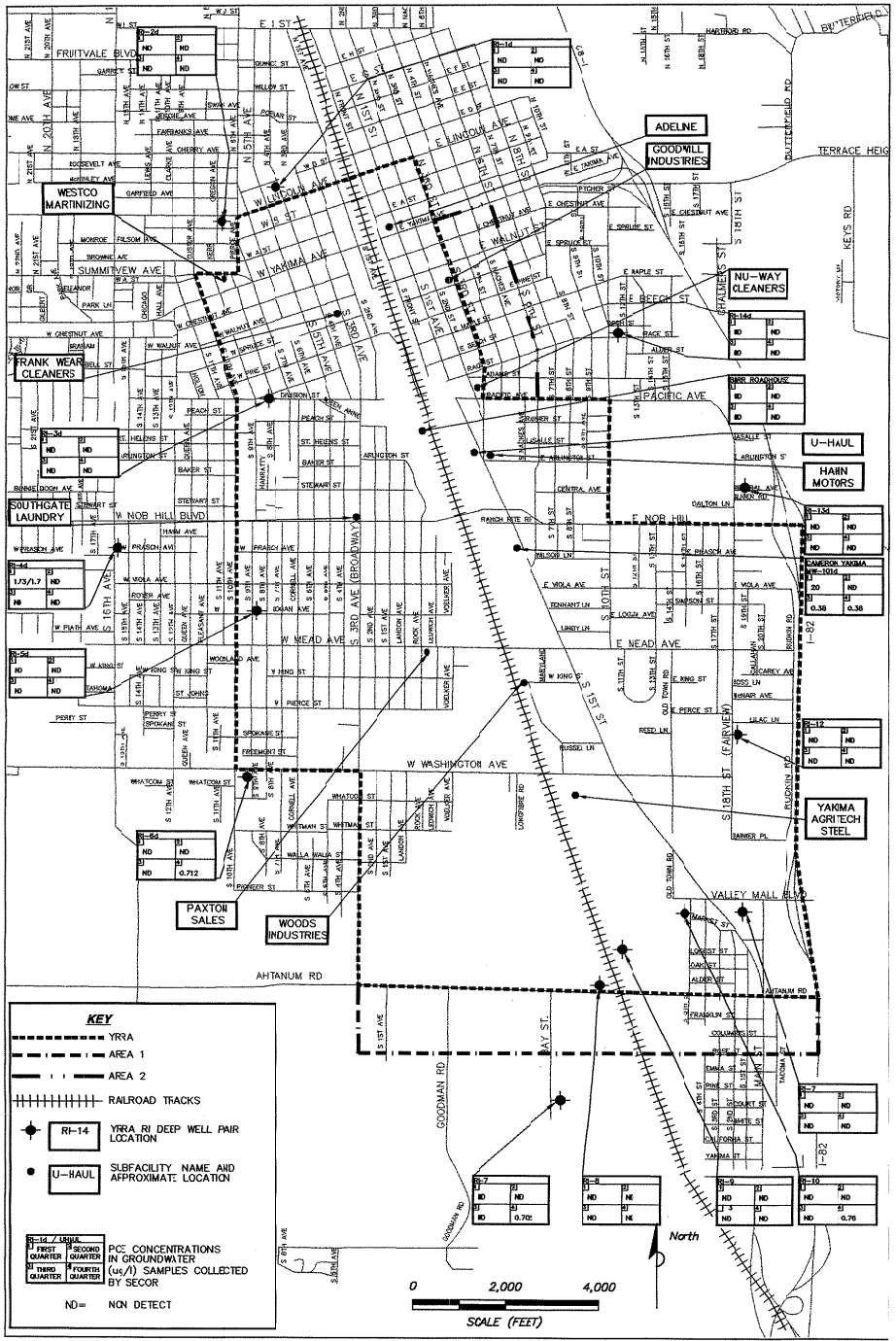
HEAD DIFFERENCE CONTOUR MAP - SEPTEMBER 1998
SHALLOW AND DEEP WATER-BEARING ZONES
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: 20

JOB#: 00378-011-02 APPR: DWN: QDD DATE: 12/11/98

DWG MASTER4.DWG



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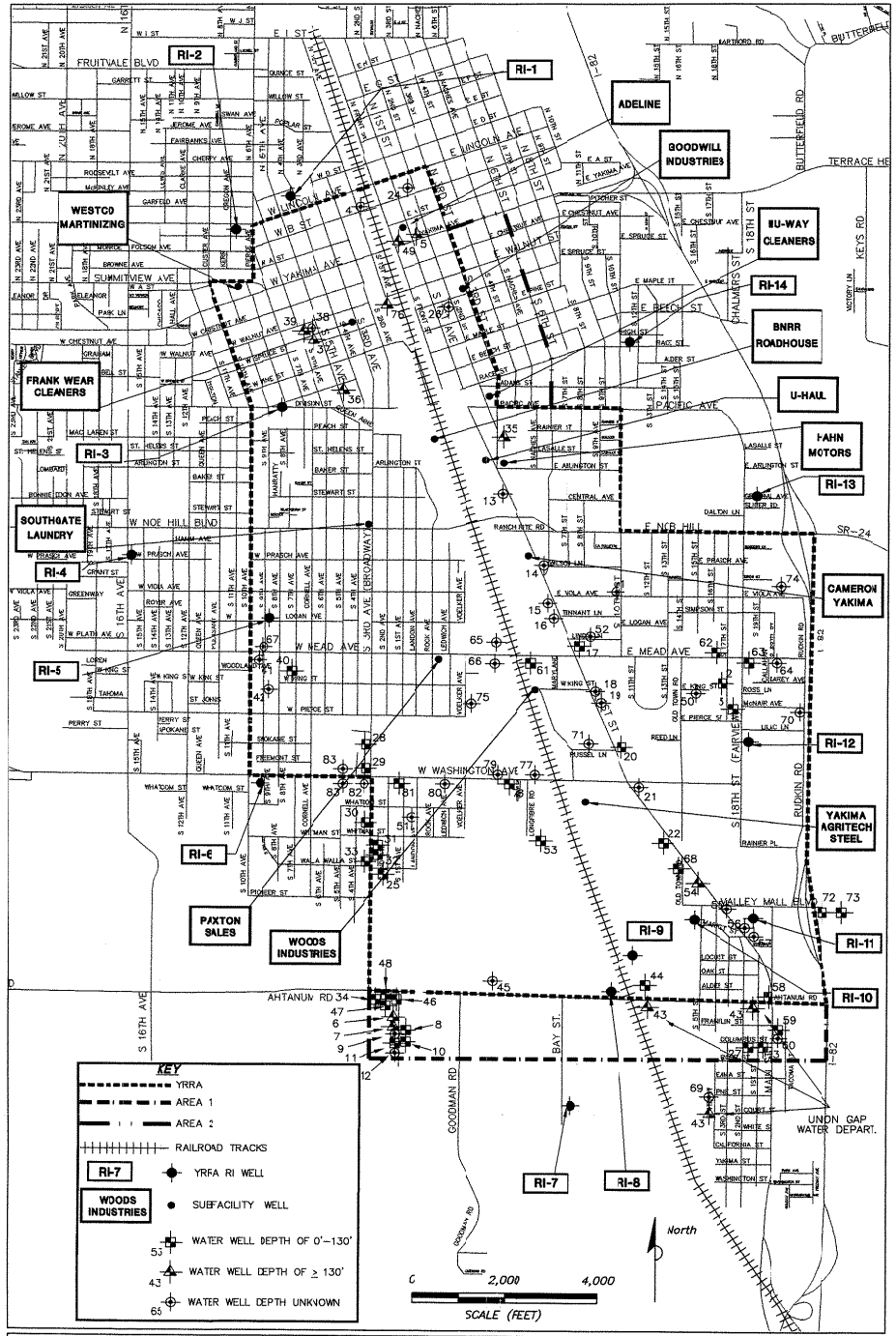
PCE CONCENTRATIONS - FOUR QUARTERS
DEEP WATER-BEARING ZONE
YAKIMA RAILROAD AREA
REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **25**

JOB #: 00378-001-02 APPR: DWN: QDD DATE: 12/11/98

DWG: rokpcedeepl.DWG



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WATER WELL LOCATION MAP

YAKIMA RAILROAD AREA
FOCUSED REMEDIAL INVESTIGATION
YAKIMA, WASHINGTON

FIGURE: **26**

JOB#: 00378-001-01 APPR: DWN: QDD DATE: 12/17/96

DWG: YAK00110E.DWG

Table 1
Yakima Railroad Area Subfacilities[1]
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Site Name	Order/Decree Number
Adeline Property[2]	None
Agri-Tech Inc./Yakima Steel Fabricators[2]	Agreed Order DE 97TC-C154
Bank's Property (formerly J.C. Penney Site)	None
Briar Development	Consent Decree
Burlington Northern Railroad (BNRR) Roundhouse [2]	None
Cameron Yakima, Inc.[2]	Enforcement Order DE 96HW-C113
CMX Corporation	Consent Decree 92 2 02060-1
Crest Linen	Consent Decree 94 2 02176 1
Elliott Tire Center	None
Fifth Wheel Truck Repair/Hahn Motors[2]	Enforcement Order DE 95TC-C103
Frank Wear Cleaners[2]	Agreed Order DE 94TC-C420
Goodwill Industries[2]	Consent Decree 94 2 02050 1
Nu-Way Cleaners[2]	Enforcement Order DE 94TC-C417
Paxton Sales[2]	Consent Decree 96 2 02448-1
Southgate Laundry[2]	Agreed Order DE 95TC-C239
U-Haul/Yakima Valley Spray[2]	Enforcement Order DE 97TC-C182
Westco Martinizing[2]	Agreed Order DE 94TC-C434
Woods Industries[2]	USEPA Order on Consent 1087-03-18-106

Notes:
[1] Information provided by Ecology.
[2] Subfacilities designated by Ecology to be included with RI quarterly sampling.

Table 2
Summary of Historic PCE Maximum Concentrations[1]
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Subfacility	Number of Groundwater Monitoring Wells	Maximum PCE Concentration in Groundwater (µg/l)[1]
Agri-Tech/Yakima Steel Fabricators[2]	4	420
Bay Chemical	5	23
BNRR Roundhouse[2]	3	24
Briar Development	3	6.4
Cameron Yakima Inc.[2]	11	1,110
CMX Corporation	1	1.8
Consolidated Freightways	3	12
Crest Linen	1	7.8
Elliot Tire	3	NA[4]
Fifth Wheel Truck Repair/Hahn Motors[2]	4	12
Frank Wear Cleaners[2]	4	210
Goodwill Industries[2]	5	46
Nu-Way Cleaners[2]	3	12
NW Truck Repair	1	7
Paxton Sales[2]	3	5/11
Rainier Plastics	3	15
U-Haul/Yakima Valley Spray[2]	13	27
Union Gap East	5	5
Union Gap South	2	4.1
Union Gap West	4	4
USGS/Tiger Oil	7	<0.2
Westco Martinizing[2]	4	17
Woods Industries[2]	13	24
Total Monitoring Wells[3]	105	

Notes:

[1] Historic PCE concentration data prepared by Woodward-Clyde prior to RI. SECOR did not make an independent data validation of these results.

[2] Subfacilities subsequently designated by Ecology to be included in RI quarterly sampling. Note that the Adeline and Southgate Laundry Subfacilities are not included on this list as this information was not included in the Woodward-Clyde information reviewed.

[3] Some subfacilities have monitoring wells not included on this list.

[4] NA = Not available.

Table 3
Subfacility Groundwater Monitoring Wells
Sampled for this RI
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Subfacility	Address	Monitoring Wells Split Sampled by SECOR	Monitoring Wells Sampled by Others[2]	Sampling Responsibility
Adeline Property	16 North First Street	MW-3 (Designated A-MW-3)	MW-1 (Upgradient)[3] MW-2 MW-3 (Downgradient)[3] MW-4	Ecology
Agri-Tech/Yakima Steel Fabricators	6 East Washington Street	MW-4 (Designated AG- or YSF-MW-4)	MW-1 (Upgradient)[3] MW-2 MW-3 MW-4 (Downgradient)[3] MW-5 MW-6 WDOE-6	Agra Earth and Environmental
Burlington Northern Railroad Roundhouse	No Address	WDOE-3s (Designated BNRR-s) (Shallow Well)[1] WDOE-3d (Designated BNRR-d) (Deep Well)[1]	WDOE-3i	Ecology
Cameron Yakima, Inc.	1414 South First	MW-103-d (Designated CYI-MW-103d) MW-103-s (Designated CYI-MW-103s)	MW-1 (Upgradient)[3] MW-2 MW-3 (Downgradient)[3] MW-4 MW-101-d MW-102-s MW-103-d MW-103-s MW-104-s MW-105-s MW-106-s MW-107-s	Ecology

Table 3
Subfacility Groundwater Monitoring Wells
Sampled for this RI
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Subfacility	Address	Monitoring Wells Split Sampled by SECOR	Monitoring Wells Sampled by Others[2]	Sampling Responsibility
Cameron Yakima, Inc. (Cont'd)	1414 South First	MW-103-d (Designated CYI-MW-103d) MW-103-s (Designated CYI-MW-103s)	MW-108-s MW-109-s MW-110-s MW-111-s MW-112-s MW-113-s MW-113-d MW-114-s	Ecology
Fifth Wheel/Hahn Motors	307 East Arlington Street	MW-2 (Designated H-MW-2)[1]	None	SECOR
Frank Wear Cleaners	106 South Third Ave.	MW-1 (Designated FW-MW-1)	MW-1 (Downgradient 2/95)[3] MW-2 (Upgradient)[3] MW-3 MW-4 (Downgradient 4/95)[3] MW-5	Environmental Economic Solution, Inc. (12/97) and Sage Earth Science
Goodwill Industries	222 South Third Ave.	MW-2 (Designated G- or GW-MW-2)	MW-1 (Upgradient)[3] MW-2 (Downgradient)[3] MW-3 MW-4	Ecology
Nu-Way Cleaners	801 South Third	MW-2 (Designated N-MW-2)	MW-1 (Upgradient)[3] MW-2 (Downgradient)[3] MW-3	Ecology
Paxton Sales	108 West Mead Ave.	MW-3 (Designated P-MW-3)[1] (Upgradient)[3]	None	SECOR
Southgate Laundry	1020 South Third Ave.	MW-3 (Designated SG-MW-3)	MW-1 (Upgradient)[3] MW-2 MW-3 (Downgradient)[3] MW-4	Maxim Technologies (12/97) and PLSA

Table 3
Subfacility Groundwater Monitoring Wells
Sampled for this RI
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Subfacility	Address	Monitoring Wells Split Sampled by SECOR	Monitoring Wells Sampled by Others[2]	Sampling Responsibility
U-Haul/Yakima Valley Spray	1108 South First Street	YS-2 (Designated U-YS-2)	YS-1 (Upgradient)[3] YS-2 YS-3 (Downgradient)[3] MN-4 MN-5 MN-6 MN-7 MN-8 MN-9 MN-10 MN-11 MN-12	RETEC
Westco Martinizing	812 Summit View Ave.	MW-2 (Designated WM-MW-2)	MW-1 (Upgradient)[3] MW-2 MW-3 (Downgradient)[3]	CH_2M Hill
Woods Industries	1 East King	W-8 (Designated W-8 or WI-W-8)	W-8	GeoEngineers

Notes:
[1] SECOR collected groundwater sample directly. No sample was collected by others.
[2] A total of 105 monitoring wells were installed by others rior to the RI, of these, 68 have been sampled for this RI.
[3] Upgradient/downgradient well designation determined by previous consultant. SECOR did not make subfacility-specific gradient calcuations.

Table 4
Summary of RI Monitoring Well Construction Details
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Installed	Top of Well Casing Elevation (feet msl)[1]	Well Diameter (inches)	Screened Interval (feet bgs)[2]	Screen Type	Sand Pack Interval (feet bgs)
RI-1s	10/15/97	1,075.72	2	20-35	0.020' Slot PVC[3]	17-35
RI-1d	10/14/97	1,075.83	2	113-123	0.020' Slot PVC	110-125
RI-2s	10/16/97	1,079.30	2	20-35	0.020' Slot PVC	17-35
RI-2d	10/17/97	1,078.66	2	98-108	0.020' Slot PVC	94-108
RI-3s	10/21/97	1,071.39	2	33-48	0.020' Slot PVC	30-50
RI-3d	10/21/97	1,071.57	2	120-130	0.020' Slot PVC	117-131
RI-4s	11/12/97	1,051.91	6	20-35	0.030' Slot PVC	18-35
RI-4d	11/12/97	1,052.48	6	106-116	0.030' Slot PVC	100.5-115
RI-5s	10/23/97	1,044.51	2	24-39	0.020' Slot PVC	21-39
RI-5d	10/22/97	1,044.54	2	109-119	0.020' Slot PVC	106-119
RI-6s	11/4/97	1,033.50	2	24-39	0.020' Slot PVC	22-40
RI-6d	11/4/97	1,033.53	2	110-120	0.020' Slot PVC	107-120
RI-7s	10/30/97	984.10	2	15-30	0.020' Slot PVC	12-30
RI-7d	10/29/97	984.01	2	95-110	0.020' Slot PVC	92-110
RI-8s	10/28/97	987.12	2	15-30	0.020' Slot PVC	12-30
RI-8d	10/27/97	987.03	2	100-110	0.020' Slot PVC	97-110
RI-9s	10/24/97	988.30	2	15-30	0.020' Slot PVC	12-30
RI-9d	10/24/97	988.10	2	100-110	0.020' Slot PVC	97-110
RI-10s	11/7/97	989.05	2	20-35	0.020' Slot PVC	17-35
RI-10d	11/10/97	989.10	2	104-114	0.020' Slot PVC	101-114
RI-11s	11/18/97	988.53	2	24-39	0.020' Slot PVC	21-39
RI-11d	11/18/97	988.38	2	97-107	0.020' Slot PVC	94-110
RI-12s	11/20/97	1,003.00	2	20-35	0.020' Slot PVC	17-35
RI-12d	11/19/97	1,002.90	2	106-116	0.020' Slot PVC	103-116
RI-13s	11/3/97	1,021.10	6	26-41	0.030' Slot PVC	23-41
RI-13i[4]	10/30/97	1,021.00	6	80-90	0.030' Slot PVC	77-90
RI-13d	11/14/97	1,020.49	2	111-121	0.020' Slot PVC	108-121
RI-14s	11/6/97	1,037.11	2	29-44	0.020' Slot PVC	27-45
RI-14d	11/6/97	1,037.23	2	114-124	0.020' Slot PVC	111-124

Notes:
[1] msl = mean sea level
[2] bgs = below ground surface
[3] PVC = polyvinyl chloride
[4] Well RI-13i only used for pump test.

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Table 5
Summary of Groundwater Level Data for Shallow Water-Bearing Zone
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Subfacility	Top of Well Casing (feet msl)[1]	December 1997		March 1998		June 1998		September 1998		Maximum Water Level Fluctuation (feet)
			Depth to Water (feet bgs)[2]	Groundwater Elevation (feet msl)	Depth to Water (feet bgs)	Groundwater Elevation (feet msl)	Depth to Water (feet bgs)	Groundwater Elevation (feet msl)	Depth to Water (feet bgs)	Groundwater Elevation (feet msl)	
RI-1s	--[3]	1,075.72	14.05	1,061.67	15.21	1,060.51	11.67	1,064.05	10.66	1,065.06	4.55
RI-2s	--	1,079.30	13.62	1,065.68	14.70	1,064.60	10.19	1,069.11	10.58	1,068.72	4.51
RI-3s	--	1,071.39	33.09	1,038.30	35.66	1,035.73	31.59	1,039.80	23.90	1,047.49	11.76
RI-4s	--	1,051.91	11.78	1,040.13	13.09	1,038.82	10.97	1,040.94	8.08	1,043.83	5.01
RI-5s	--	1,044.51	15.96	1,028.55	17.46	1,027.05	15.86	1,028.65	11.36	1,033.15	6.10
RI-6s	--	1,033.50	7.98	1,025.52	8.46	1,025.04	8.15	1,025.35	6.83	1,026.67	1.63
RI-7s	--	984.10	3.04	981.06	3.45	980.65	3.33	980.77	2.86	981.24	0.59
RI-8s	--	987.12	5.35	981.77	6.00	981.12	5.87	981.25	5.04	982.08	0.96
RI-9s	--	988.30	4.90	983.40	5.61	982.69	5.53	982.77	4.28	984.02	1.33
RI-10s	--	989.05	9.35	979.70	9.88	979.17	9.80	979.25	9.13	979.92	0.75
RI-11s	--	988.53	12.58	975.95	12.94	975.59	12.83	975.70	12.55	975.98	0.39
RI-12s	--	1,003.00	10.36	992.64	12.04	990.96	11.42	991.58	9.08	993.92	2.96
RI-13s	--	1,021.10	16.77	1,004.33	18.25	1,002.85	16.73	1,004.37	15.06	1,006.04	3.19
RI-14s	--	1,037.11	19.38	1,017.73	21.53	1,015.58	17.15	1,019.96	14.89	1,022.22	6.64
WDOE-3s	BNRR Roundhouse	1,053.32	26.35	1,026.97	26.20	1,027.12	24.35	1,028.97	21.87	1,031.45	4.48
MW-103s	Cameron Yakima	1,030.65	17.38	1,013.27	18.45	1,012.20	15.21	1,015.44	13.22	1,017.43	5.23
MW-3	Adeline Property	1,063.78	14.37	1,049.41	15.03	1,048.75	12.7	1,051.08	12.57	1,051.21	2.46
MW-4	Agri-Tech/Yakima Steel Fabricators	1,000.82	4.56	996.26	6.02	994.80	5.02	995.80	3.03	997.79	2.99
MW-1	Frank Wear Cleaners	1,062.90	17.67	1,045.23	20.25	1,042.65	15.86	1,047.04	14.08	1,048.82	6.17
MW-2	Goodwill Industries	1,055.42	16.29	1,039.13	17.88	1,037.54	14.22	1,041.20	13.86	1,041.56	4.02
MW-2	Fifth Wheel/Hahn Motors	1,039.22	17.46	1,021.76	18.25	1,020.97	16.54	1,022.68	15.35	1,023.87	2.90
MW-3	Southgate Laundry	1,054.77	28.47	1,026.30	30.86	1,023.91	25.9	1,028.87	19.8	1,034.97	11.06
MW-2	Nu-Way Cleaners	1,044.21	18.50	1,025.71	19.44	1,024.77	14.67	1,029.54	13.79	1,030.42	5.65
MW-3	Paxton Sales	1,035.51	17.31	1,018.20	19.00	1,016.51	16.73	1,018.78	13.61	1,021.90	5.39
YS-2	U-Haul/Yakima Valley Spray	1,040.48	15.20	1,025.28	15.21	1,025.27	14.61	1,025.87	13.22	1,027.26	1.99
MW-2	Westco Martinizing	1,074.85	19.88	1,054.97	15.79	1,059.06	12.07	1,062.78	11.43	1,063.42	8.45
W-8	Woods Industries	1,014.80	6.82	1,007.98	8.00	1,006.80	NM[4]	NM	4.62	1,010.18	3.38

Notes:

[1] msl = mean sea level

[2] bgs = below ground surface

[3] -- = not applicable

[4] NM = Not measured as subfacility consultant did not conduct monitoring.

Table 6
Summary of Groundwater Level Data for Deep Water-Bearing Zone
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Subfacility	Top of Well Casing (feet msl)[1]	December 1997		March 1998		June 1998		September 1998		Maximum Water Level Fluctuation (feet)
			Depth to Water (feet bgs)[2]	Groundwater Elevation (feet msl)	Depth to Water (feet bgs)	Groundwater Elevation (feet msl)	Depth to Water (feet bgs)	Groundwater Elevation (feet msl)	Depth to Water (feet bgs)	Groundwater Elevation (feet msl)	
RI-1d	--[3]	1,075.83	39.27	1,036.56	41.17	1,034.66	36.08	1,039.75	36.22	1,039.61	3.19
RI-2d	--	1,078.66	33.17	1,045.49	35.45	1,043.21	31.58	1,047.08	27.80	1,050.86	7.65
RI-3d	--	1,071.57	38.28	1,033.29	40.30	1,031.27	37.14	1,034.43	31.51	1,040.06	8.79
RI-4d	--	1,052.48	11.70	1,040.78	14.16	1,038.32	11.08	1,041.40	8.38	1,044.10	5.78
RI-5d	--	1,044.54	21.93	1,022.61	22.93	1,021.61	21.76	1,022.78	19.30	1,025.24	3.63
RI-6d	--	1,033.53	14.28	1,019.25	14.72	1,018.81	13.75	1,019.78	13.84	1,019.69	0.97
RI-7d	--	984.01	3.62	980.39	3.38	980.63	3.68	980.33	3.85	980.16	0.47
RI-8d	--	987.03	5.57	981.46	5.97	981.06	6.16	980.87	6.07	980.96	0.59
RI-9d	--	988.10	4.95	983.15	5.43	982.67	5.68	982.42	5.22	982.88	0.73
RI-10d	--	989.10	11.15	977.95	12.55	976.55	11.92	977.18	12.00	977.10	1.40
RI-11d	--	988.38	13.50	974.88	13.68	974.70	13.88	974.50	13.75	974.63	0.38
RI-12d	--	1,002.90	13.66	989.24	14.57	988.33	14.51	988.39	13.93	988.97	0.91
RI-13d	--	1,020.49	16.81	1,003.68	17.85	1,002.64	16.88	1,003.61	15.20	1,005.29	2.65
RI-14d	--	1,037.23	21.86	1,015.37	23.38	1,013.85	20.95	1,016.28	19.31	1,017.92	4.07
WDOE-3d	BNRR Roundhouse	1,053.12	29.90	1,023.22	30.40	1,022.72	27.41	1,025.71	25.02	1,028.10	5.38
MW-103d	Cameron Yakima	1,030.66	18.14	1,012.52	19.37	1,011.29	16.38	1,014.28	14.41	1,016.25	4.96

Notes:

[1] msl = mean sea level

[2] bgs = below ground surface

[3] -- = not applicable

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
Adeline Property Subfacility						
MW-1 (Upgradient)[2]	12/01/97	Ecology	Tetrachloroethene	--	0.4	J
	03/01/98	Ecology	Tetrachloroethene	--	0.86	J
	06/01/98	Ecology	Tetrachloroethene	--	0.31	J
	08/31/98	Ecology	Tetrachloroethene	--	0.3	J
MW-2	12/01/97	Ecology	Tetrachloroethene	--	0.32	J
	03/01/98	Ecology	Tetrachloroethene	--	0.38	J
	06/01/98	Ecology	Tetrachloroethene	--	1.8	J
	08/31/98	Ecology	Tetrachloroethene	--	0.36	J
MW-3 (Downgradient)[2]	12/01/97	Ecology	Tetrachloroethene	--	4.9	
	12/01/97	SECOR	Tetrachloroethene	0.5	4.9	
	03/02/98	Ecology	Tetrachloroethene	--	16	
	03/02/98	SECOR	Tetrachloroethene	0.500	15.6	
	06/01/98	Ecology	Tetrachloroethene	--	1.9	
	06/01/98	SECOR	Tetrachloroethene	0.500	2.01	
	08/31/98	Ecology	Tetrachloroethene	--	1.8	J
	08/31/98	SECOR	Tetrachloroethene	0.500	2.10	
MW-4	12/01/97	Ecology	Tetrachloroethene	--	7.4	
	03/01/98	Ecology	Tetrachloroethene	--	7.2	
	06/01/98	Ecology	Tetrachloroethene	--	59	
	08/31/98	Ecology	Tetrachloroethene	--	21	J
Agri-Tech/Yakima Steel Fabricators Subfacility						
MW-1 (Upgradient)[2]	12/03/97	AGRA	Tetrachloroethene	--	3.64	
	03/03/98	AGRA	Tetrachloroethene	--	3.39	
	06/03/98	AGRA	Tetrachloroethene	1.0	6.5	
	09/02/98	AGRA	Tetrachloroethene	--	4.22	
MW-2	12/03/97	AGRA	Tetrachloroethene	1.0	ND[4]	
	03/03/98	AGRA	Tetrachloroethene	--	1.59	
	06/03/98	AGRA	Tetrachloroethene	1.0	ND	
	09/02/98	AGRA	Tetrachloroethene	--	1.27	
MW-3	12/03/97	AGRA	Tetrachloroethene	--	6.06	
	03/03/98	AGRA	Tetrachloroethene	--	4.44	
	06/03/98	AGRA	Tetrachloroethene	1.0	4.52	
	09/02/98	AGRA	Tetrachloroethene	--	5.37	
MW-4 (Downgradient)[2]	12/03/97	AGRA	Tetrachloroethene	--	3.32	
	12/03/97	SECOR	Tetrachloroethene	0.5	3.8	
	03/03/98	AGRA	Tetrachloroethene	--	3.78	
	03/03/98	SECOR	Tetrachloroethene	0.500	4.70	
	06/03/98	AGRA	Tetrachloroethene	1.0	3.86	
	06/03/98	SECOR	Tetrachloroethene	0.500	3.26	
	09/02/98	AGRA	Tetrachloroethene	--	3.12	
	09/02/98	SECOR	Tetrachloroethene	0.500	3.84	

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
Agri-Tech/Yakima Steel Fabricators Subfacility (Continued)						
MW-5	12/03/97	AGRA	Tetrachloroethene	--	3.98	
	03/03/98	AGRA	Tetrachloroethene	--	2.25	
	06/03/98	AGRA	Tetrachloroethene	1.0	2.72	
	09/02/98	AGRA	Tetrachloroethene	--	2.65	
MW-6	12/03/97	AGRA	Tetrachloroethene	1.0	ND	
	03/03/98	AGRA	Tetrachloroethene	1.0	ND	
	06/03/98	AGRA	Tetrachloroethene	1.0	ND	
	09/02/98	AGRA	Tetrachloroethene	1.0	ND	
WDOE-6[5]	03/03/98	AGRA	Tetrachloroethene	--	49.6	
	06/03/98	AGRA	Tetrachloroethene	1.0	75.6	
	09/02/98	AGRA	Tetrachloroethene	--	20.8	
Burlington Northern Roundhouse Subfacility						
BNRR-d[6]	12/04/97	SECOR	Tetrachloroethene	0.5	0.9	
(Well WDOE-3d)	03/05/98	SECOR	Tetrachloroethene	0.500	0.771	
	06/04/98	SECOR	Tetrachloroethene	0.500	0.634	
	09/02/98	SECOR	Tetrachloroethene	0.500	ND	
BNRR-s	12/04/97	SECOR	Tetrachloroethene	0.5	23	
(Well WDOE-3s)	03/05/98	SECOR	Tetrachloroethene	0.500	19.3	
	06/04/98	SECOR	Tetrachloroethene	0.500	23.2	
	09/02/98	SECOR	Tetrachloroethene	0.500	10.8	
WDOE-3i	12/02/97	Ecology	Tetrachloroethene	--	11	
	03/01/98	Ecology	Tetrachloroethene	--	4.1	
	06/01/98	Ecology	Tetrachloroethene	--	20	
	09/01/98	Ecology	Tetrachloroethene	--	18	J

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
Cameron Yakima, Inc. Subfacility						
MW-1 (Upgradient)[2]	12/01/97	Ecology	Tetrachloroethene	--	0.24	J
	03/01/98	Ecology	Tetrachloroethene	--	17	
	06/01/98	Ecology	Tetrachloroethene	--	16	
	08/31/98	Ecology	Tetrachloroethene	--	19	J
MW-2	12/02/97	Ecology	Tetrachloroethene	--	17	
	03/01/98	Ecology	Tetrachloroethene	--	14	
	06/01/98	Ecology	Tetrachloroethene	--	7.5	
	09/01/98	Ecology	Tetrachloroethene	--	20	J
MW-3 (Downgradient)[2]	12/02/97	Ecology	Tetrachloroethene	--	6.7	
	03/01/98	Ecology	Tetrachloroethene	--	6	
	06/01/98	Ecology	Tetrachloroethene	--	7.4	
	08/31/98	Ecology	Tetrachloroethene	--	9.5	J
MW-4	12/02/97	Ecology	Tetrachloroethene	--	13	
	03/01/98	Ecology	Tetrachloroethene	--	53	
	06/01/98	Ecology	Tetrachloroethene	--	30	
	09/01/98	Ecology	Tetrachloroethene	--	122	J
MW-101d	12/01/97	Ecology	Tetrachloroethene	--	20	
	03/01/98	Ecology	Tetrachloroethene	1.0	ND	
	06/01/98	Ecology	Tetrachloroethene	--	0.38	J
	09/01/98	Ecology	Tetrachloroethene	--	0.38	J
MW-102s	12/01/97	Ecology	Tetrachloroethene	--	11	
	03/01/98	Ecology	Tetrachloroethene	--	11	
	06/01/98	Ecology	Tetrachloroethene	--	11	
	08/31/98	Ecology	Tetrachloroethene	--	53	J
MW-103d[6]	12/01/97	Ecology	Tetrachloroethene	--	2.6	
	12/01/97	SECOR	Tetrachloroethene	0.5	2.9	
	03/02/98	Ecology	Tetrachloroethene	--	3.3	
	03/02/98	SECOR	Tetrachloroethene	0.500	3.08	
	06/01/98	Ecology	Tetrachloroethene	--	5	
	06/01/98	SECOR	Tetrachloroethene	0.500	4.72	
	08/31/98	Ecology	Tetrachloroethene	--	3.9	J
	08/31/98	SECOR	Tetrachloroethene	0.500	3.28	
MW-103s	12/01/97	Ecology	Tetrachloroethene	--	26	
	12/01/97	SECOR	Tetrachloroethene	0.5	38	
	03/02/98	Ecology	Tetrachloroethene	--	75	
	03/02/98	SECOR	Tetrachloroethene	0.500	94.9	
	06/01/98	Ecology	Tetrachloroethene	--	68	
	06/01/98	SECOR	Tetrachloroethene	0.500	51.8	
	08/31/98	Ecology	Tetrachloroethene	--	106	J
	08/31/98	SECOR	Tetrachloroethene	0.500	98.7	

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
Cameron Yakima, Inc. Subfacility (Continued)						
MW-104s	12/02/97	Ecology	Tetrachloroethene	--	11	
	03/01/98	Ecology	Tetrachloroethene	--	24	
	06/01/98	Ecology	Tetrachloroethene	--	50	
	09/01/98	Ecology	Tetrachloroethene	--	39	J
MW-105s	12/02/97	Ecology	Tetrachloroethene	--	15	
	03/01/98	Ecology	Tetrachloroethene	--	12	
	06/01/98	Ecology	Tetrachloroethene	--	7.6	
	09/01/98	Ecology	Tetrachloroethene	--	19	J
MW-106s	12/01/97	Ecology	Tetrachloroethene	--	27	J
	03/01/98	Ecology	Tetrachloroethene	--	12	
	06/01/98	Ecology	Tetrachloroethene	--	8.8	
	08/31/98	Ecology	Tetrachloroethene	--	8.3	J
MW-107s[7]	08/31/98	Ecology	Tetrachloroethene	--	18	J
MW-108s[7]	09/01/98	Ecology	Tetrachloroethene	--	7.8	J
MW-109s[7]	09/01/98	Ecology	Tetrachloroethene	--	7.1	J
MW-110s[7]	09/01/98	Ecology	Tetrachloroethene	--	8.3	J
MW-111s[7]	09/01/98	Ecology	Tetrachloroethene	--	9.4	J
	09/01/98	Ecology	Tetrachloroethene	--	9.4	J Duplicate[7]
MW-112s[7]	09/01/98	Ecology	Tetrachloroethene	--	15	J
MW-113s[7]	09/01/98	Ecology	Tetrachloroethene	--	21	J
MW-113d[7]	09/01/98	Ecology	Tetrachloroethene	--	5	J
MW-114s[7]	09/01/98	Ecology	Tetrachloroethene	--	15	J
Fifth Wheel/Hahn Motors Subfacility						
MW-2	12/04/97	SECOR	Tetrachloroethene	0.5	9.8	
	03/05/98	SECOR	Tetrachloroethene	0.500	6.49	
	06/02/98	SECOR	Tetrachloroethene	0.500	5.20	
	09/01/98	SECOR	Tetrachloroethene	0.500	9.47	

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
Frank Wear Cleaners Subfacility						
MW-1	12/05/97	EES	Tetrachloroethene	5.0	400	
(Downgradient,	12/05/97	SECOR	Tetrachloroethene	25	310	
February 1995)[2]	03/04/98	Sage	Tetrachloroethene	--	830	
	03/04/98	SECOR	Tetrachloroethene	50.0	927	
	06/04/98	Sage	Tetrachloroethene	--	690	
	06/04/98	SECOR	Tetrachloroethene	10.0	768	
	08/31/98	Sage	Tetrachloroethene	--	33	
	08/31/98	SECOR	Tetrachloroethene	0.500	22.4	
MW-2	12/05/97	EES	Tetrachloroethene	1.0	54	
(Upgradient)[2]	03/04/98	Sage	Tetrachloroethene	--	72	
	06/04/98	Sage	Tetrachloroethene	--	110	
	08/31/98	Sage	Tetrachloroethene	--	39	
MW-3	12/05/97	EES	Tetrachloroethene	1.0	42	
	03/04/98	Sage	Tetrachloroethene	--	860	
	06/04/98	Sage	Tetrachloroethene	--	16	
	08/31/98	Sage	Tetrachloroethene	--	29	
MW-4	12/05/97	EES	Tetrachloroethene	10	1,100	
(Downgradient,	03/04/98	Sage	Tetrachloroethene	--	210	
April 1995)[2]	06/04/98	Sage	Tetrachloroethene	--	280	
	08/31/98	Sage	Tetrachloroethene	--	34	
MW-5	12/05/97	EES	Tetrachloroethene	1.0	83	
	03/04/98	Sage	Tetrachloroethene	--	390	
	06/04/98	Sage	Tetrachloroethene	--	120	
	08/31/98	Sage	Tetrachloroethene	--	17	
Goodwill Industries Subfacility						
MW-1	12/02/97	Ecology	Tetrachloroethene	--	1.4	J
(Upgradient)[2]	03/01/98	Ecology	Tetrachloroethene	--	0.92	J
	06/01/98	Ecology	Tetrachloroethene	--	1.6	
	08/31/98	Ecology	Tetrachloroethene	--	0.56	J
MW-2	12/02/97	Ecology	Tetrachloroethene	--	9.8	
(Downgradient)[2]	12/02/97	SECOR	Tetrachloroethene	0.5	12	
	03/03/98	Ecology	Tetrachloroethene	--	12	
	03/03/98	SECOR	Tetrachloroethene	0.500	11.9	
	06/01/98	Ecology	Tetrachloroethene	--	7.7	
	06/01/98	SECOR	Tetrachloroethene	0.500	5.78	
	8/31/98[8]	Ecology	Tetrachloroethene	--	8.2	J
MW-3	12/02/97	Ecology	Tetrachloroethene	--	1.8	J
	03/01/98	Ecology	Tetrachloroethene	--	1.9	
	06/01/98	Ecology	Tetrachloroethene	--	4.8	
	08/31/98	Ecology	Tetrachloroethene	--	3.4	J
MW-4	12/02/97	Ecology	Tetrachloroethene	--	7	
	03/01/98	Ecology	Tetrachloroethene	--	1.9	
	06/01/98	Ecology	Tetrachloroethene	--	7.3	
	08/31/98	Ecology	Tetrachloroethene	--	99	J

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
Nu-Way Cleaners Subfacility						
MW-1	12/02/97	Ecology	Tetrachloroethene	--	1.8	J
(Upgradient)[2]	03/01/98	Ecology	Tetrachloroethene	--	4.4	
	06/01/98	Ecology	Tetrachloroethene	--	4.4	
	08/31/98	Ecology	Tetrachloroethene	--	1.7	J
MW-2	12/01/97	Ecology	Tetrachloroethene	--	2	
(Downgradient)[2]	12/01/97	SECOR	Tetrachloroethene	0.5	2.2	
	03/02/98	Ecology	Tetrachloroethene	--	3.4	
	03/02/98	SECOR	Tetrachloroethene	0.500	3.86	
	06/02/98	Ecology	Tetrachloroethene	1	ND	
	06/02/98	SECOR	Tetrachloroethene	0.500	ND	
	08/31/98	Ecology	Tetrachloroethene	--	1.1	J
	08/31/98	SECOR	Tetrachloroethene	0.500	1.35	
MW-3	12/01/97	Ecology	Tetrachloroethene	--	3	
	03/01/98	Ecology	Tetrachloroethene	--	3.7	
	06/01/98	Ecology	Tetrachloroethene	--	3.8	
	08/31/98	Ecology	Tetrachloroethene	--	2.3	J

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
Paxton Sales Subfacility						
MW-3 (Upgradient)[2]	12/05/97	SECOR	Tetrachloroethene	0.5	1.7	
	03/04/98	SECOR	Tetrachloroethene	0.500	2.51	
	06/01/98	SECOR	Tetrachloroethene	0.500	2.07	
	09/01/98	SECOR	Tetrachloroethene	0.500	0.637	
Southgate Laundry Subfacility						
MW-1 (Upgradient)[2]	12/05/97	MAXIM	Tetrachloroethene	1	1.7	
	03/06/98	PLSA	Tetrachloroethene	1	0.88	
	06/03/98	PLSA	Tetrachloroethene	1	2.5	
	09/03/97	PLSA	Tetrachloroethene	1	ND	
MW-2	12/05/97	MAXIM	Tetrachloroethene	1	16	
	03/06/98	PLSA	Tetrachloroethene	1	9.6	
	06/03/98	PLSA	Tetrachloroethene	1	28	
	06/03/98	PLSA	Tetrachloroethene	1	22	Duplicate
	09/03/98	PLSA	Tetrachloroethene	1	18.4	
MW-3 (Downgradient)[2]	12/03/97	MAXIM	Tetrachloroethene	1	8.2	
	12/03/97	SECOR	Tetrachloroethene	0.5	4.2	
	03/05/98	PLSA	Tetrachloroethene	1	10.5	
	03/05/98	PLSA	Tetrachloroethene	1	8.6	Duplicate
	03/05/98	SECOR	Tetrachloroethene	0.500	5.03	
	06/01/98	PLSA	Tetrachloroethene	1	47	
	06/01/98	SECOR	Tetrachloroethene	0.500	34.0	
	09/03/98	PLSA	Tetrachloroethene	1	41.3	
	09/01/98	SECOR	Tetrachloroethene	5.00	67.0	.
MW-4	12/05/97	MAXIM	Tetrachloroethene	1	2.0	
	03/06/98	PLSA	Tetrachloroethene	1	1.8	
	06/03/98	PLSA	Tetrachloroethene	1	2.4	
	09/03/98	PLSA	Tetrachloroethene	1	1.3	
	09/03/98	PLSA	Tetrachloroethene	1	1.2	Duplicate

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
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Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
U-Haul/Yakima Valley Spray Subfacility						
MW-4	12/04/97	RETEC	Tetrachloroethene	--	27	
	03/02/98	RETEC	Tetrachloroethene	--	6.5	
	06/06/98	RETEC	Tetrachloroethene	--	6.8	
	06/06/98	RETEC	Tetrachloroethene	--	7.5	Duplicate
	09/03/98	RETEC	Tetrachloroethene	--	20	
MW-5	12/03/97	RETEC	Tetrachloroethene	--	6.4	
	03/02/98	RETEC	Tetrachloroethene	--	1.5	
	03/02/98	RETEC	Tetrachloroethene	--	1.5	Duplicate
	06/06/98	RETEC	Tetrachloroethene	1	ND	
	09/03/98	RETEC	Tetrachloroethene	--	8	
MW-6	12/03/97	RETEC	Tetrachloroethene	--	1.7	
	03/02/98	RETEC	Tetrachloroethene	--	1.6	
	06/05/98	RETEC	Tetrachloroethene	--	1	
	09/03/98	RETEC	Tetrachloroethene	--	7.3	
MW-7	12/04/97	RETEC	Tetrachloroethene	--	10	
	12/04/97	RETEC	Tetrachloroethene	--	8.8	Duplicate
	03/02/98	RETEC	Tetrachloroethene	--	4.1	
	06/05/98	RETEC	Tetrachloroethene	--	1.6	
	09/03/98	RETEC	Tetrachloroethene	--	7.7	
MW-8	12/03/97	RETEC	Tetrachloroethene	1.0	ND	
	03/02/98	RETEC	Tetrachloroethene	1.0	ND	
	06/05/98	RETEC	Tetrachloroethene	1.0	ND	
	09/03/98	RETEC	Tetrachloroethene	1	ND	
MW-9	12/04/97	RETEC	Tetrachloroethene	1.0	ND	
	03/02/98	RETEC	Tetrachloroethene	1.0	ND	
	06/05/98	RETEC	Tetrachloroethene	--	2.3	
	09/03/98	RETEC	Tetrachloroethene	1	ND	
MW-10	12/4/97	RETEC	Tetrachloroethene	--	29	
	03/02/98	RETEC	Tetrachloroethene	--	14	
	06/05/98	RETEC	Tetrachloroethene	--	16	
	09/03/98	RETEC	Tetrachloroethene	--	22	
MW-11	12/04/97	RETEC	Tetrachloroethene	--	30	
	03/02/98	RETEC	Tetrachloroethene	--	13	
	06/05/98	RETEC	Tetrachloroethene	--	10	
	09/03/98	RETEC	Tetrachloroethene	--	25	
MW-12	12/03/97	RETEC	Tetrachloroethene	--	34	
	030/2/98	RETEC	Tetrachloroethene	--	14	
	060/5/98	RETEC	Tetrachloroethene	--	21	
	09/03/98	RETEC	Tetrachloroethene	--	24	
YS-1 (Downgradient)[2]	12/04/97	RETEC	Tetrachloroethene	1.0	ND	
	03/02/98	RETEC	Tetrachloroethene	1.0	ND	
	06/05/98	RETEC	Tetrachloroethene	1.0	ND	
	09/03/98	RETEC	Tetrachloroethene	1	ND	

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
U-Haul/Yakima Valley Spray Subfacility (Continued)						
YS-2	12/04/97	RETEC	Tetrachloroethene	--	1	
	12/04/97	SECOR	Tetrachloroethene	0.5	0.6	
	03/03/98	RETEC	Tetrachloroethene	1.0	ND	
	03/03/98	SECOR	Tetrachloroethene	0.500	ND	
	06/02/98	RETEC	Tetrachloroethene	1.0	ND	
	06/02/98	SECOR	Tetrachloroethene	0.500	ND	
	09/03/98	RETEC	Tetrachloroethene	1	ND	
	09/03/98	SECOR	Tetrachloroethene	0.500	ND	
YS-3 (Upgradient)[2]	12/04/97	RETEC	Tetrachloroethene	--	30	
	03/03/98	RETEC	Tetrachloroethene	--	14	
	06/06/98	RETEC	Tetrachloroethene	--	13	
	09/03/98	RETEC	Tetrachloroethene	--	32	
	09/03/98	RETEC	Tetrachloroethene	--	28	Duplicate

Table 7
Groundwater PCE Analytical Data
Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Sampled By	Analyte	Reporting Limit (µg/L)[1]	Result (µg/L)	Qualifier[3]
Westco Martinizing						
MW-1 (Upgradient)[2]	12/02/97	CH_2M Hill	Tetrachloroethene	1.00	ND	
	03/19/98	CH_2M Hill	Tetrachloroethene	1.00	ND	
	06/02/98	CH_2M Hill	Tetrachloroethene	0.5	ND	
	09/02/98	CH_2M Hill	Tetrachloroethene	1.00	ND	
MW-2	12/02/97	CH_2M Hill	Tetrachloroethene	--	2.52	
	12/02/97	SECOR	Tetrachloroethene	0.5	2.5	
	03/05/98	CH_2M Hill	Tetrachloroethene	1.00	1.63	
	03/19/98	CH_2M Hill	Tetrachloroethene	1.00	1.94	Duplicate
	03/05/98	SECOR	Tetrachloroethene	0.500	1.20	
	06/02/98	CH_2M Hill	Tetrachloroethene	0.5	49.4	
	06/02/98	CH_2M Hill	Tetrachloroethene	0.5	66.2	Duplicate
	06/02/98	SECOR	Tetrachloroethene	1.00	66.8	
	09/02/98	CH_2M Hill	Tetrachloroethene	1.00	19.8	
	09/02/98	SECOR	Tetrachloroethene	0.500	6.45	
MW-3 (Downgradient)[2]	120/2/97	CH_2M Hill	Tetrachloroethene	--	1.53	
	03/19/98	CH_2M Hill	Tetrachloroethene	1.00	ND	
	06/02/98	CH_2M Hill	Tetrachloroethene	0.5	ND	
	09/02/98	CH_2M Hill	Tetrachloroethene	1.00	ND	
Woods Industries Subfacility						
W-8[10]	12/04/97	GeoEngineers	Tetrachloroethene	--	5.62	
	12/04/97	SECOR	Tetrachloroethene	0.5	2.7	
	03/05/98	GeoEngineers	Tetrachloroethene	1.00	3.46	
	03/05/98	SECOR	Tetrachloroethene	0.500	3.53	
	09/02/98	GeoEngineers	Tetrachloroethene	--	3.24	
	09/02/98	SECOR	Tetrachloroethene	0.500	3.12	

Notes:

[1] Reporting limit included where provided. -- = Not provided by Ecology or subfacility consultant.

[2] Groundwater gradient as determined by previous reports.

[3] Qualifiers as indicated. J = Concentration estimated below reporting limits.

[4] ND = Non-detect above laboratory detection limit.

[5] No December 1997 data provided by subfacility consultant.

[6] Wells screened in deep water-bearing zone, all other wells screened in shallow water-bearing zone.

[7] Only one quarter of groundwater data provided by Ecology.

[8] Duplicate sample analyzed from same monitoring well.

[9] No split sample analyzed due to laboratory error.

[10] No June 1998 sample collected by subfacility consultant.

Table 8
Groundwater PCE Analytical Data
Shallow Water-Bearing Zone[1]
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Analyte	Reporting Limit (µg/L)[2,3]	Results (µg/L)
RI-1s	12/2/97	Tetrachloroethene	0.5	ND[4]
	3/2/98	Tetrachloroethene	0.500	ND
	6/1/98	Tetrachloroethene	0.500	ND
	8/31/98	Tetrachloroethene	0.500	ND
RI-2s	12/2/97	Tetrachloroethene	0.5	ND
	3/2/98	Tetrachloroethene	0.500	ND
	6/1/98	Tetrachloroethene	0.500	ND
	8/31/98	Tetrachloroethene	0.500	ND
RI-3s	12/3/97	Tetrachloroethene	0.5	ND
	3/2/98	Tetrachloroethene	0.500	ND
	6/1/98	Tetrachloroethene	0.500	0.500
	8/31/98	Tetrachloroethene	0.500	0.603
RI-4s	12/5/97	Tetrachloroethene	1.00	10.4
	12/5/97(Duplicate)[5]	Tetrachloroethene	0.500	6.9
	3/5/98	Tetrachloroethene	0.500	13.2
	3/5/98(Duplicate)	Tetrachloroethene	0.500	13.4
	6/3/98	Tetrachloroethene	0.500	11.6
	6/3/98(Duplicate)	Tetrachloroethene	0.500	11.9
	9/2/98	Tetrachloroethene	0.50	10.1
	9/2/98(Duplicate)	Tetrachloroethene	0.500	10.1
RI-5s	12/1/97	Tetrachloroethene	0.5	ND
	3/3/98	Tetrachloroethene	0.500	0.555
	6/1/98	Tetrachloroethene	0.500	0.732
	8/31/98	Tetrachloroethene	0.500	ND
RI-6s	12/1/97	Tetrachloroethene	0.5	0.8
	3/5/98	Tetrachloroethene	0.500	0.604
	6/2/98	Tetrachloroethene	0.500	1.04
	9/2/98	Tetrachloroethene	0.500	1.49
RI-7s	12/3/97	Tetrachloroethene	0.5	ND
	3/4/98	Tetrachloroethene	0.500	ND
	6/2/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND
RI-8s	12/3/97	Tetrachloroethene	0.5	0.8
	3/4/98	Tetrachloroethene	0.500	0.753
	6/2/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	0.601

Table 8
Groundwater PCE Analytical Data
Shallow Water-Bearing Zone[1]
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Analyte	Reporting Limit (µg/L)[2,3]	Results (µg/L)
RI-9s	12/3/97	Tetrachloroethene	0.5	1.5
	3/4/98	Tetrachloroethene	0.500	1.25
	6/2/98	Tetrachloroethene	0.500	1.41
	9/1/98	Tetrachloroethene	0.500	0.924
RI-10s	12/3/97	Tetrachloroethene	0.5	1.3
	3/4/98	Tetrachloroethene	0.500	2.04
	6/3/98	Tetrachloroethene	0.500	1.90
	9/1/98	Tetrachloroethene	0.500	1.71
RI-11s	12/4/97	Tetrachloroethene	0.5	0.9
	3/5/98	Tetrachloroethene	0.500	1.03
	6/3/98	Tetrachloroethene	0.500	ND
	9/2/98	Tetrachloroethene	0.500	0.577
RI-12s	12/4/97	Tetrachloroethene	0.5	ND
	3/4/98	Tetrachloroethene	0.500	ND
	6/3/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND
RI-13s	12/5/97	Tetrachloroethene	0.5	ND
	3/3/98	Tetrachloroethene	0.500	ND
	6/2/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND
RI-14s	12/5/97	Tetrachloroethene	0.5	ND
	3/5/98	Tetrachloroethene	0.500	ND
	6/3/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND

Notes:

[1] Groundwater analytical results for subfacility wells screened in the shallow water-bearing zone are summarized on Table 7.
[2] Analyses conducted December 1997 by Superior Analytical. Analysis conducted March, June, and September, 1998 by North Creek Analytical. No qualifiers noted for PCE results in any of the laboratory reports.
[3] µg/l = Micrograms per liter.
[4] ND = Non-detect at the method reporting limit listed.
[5] Duplicate QA/QC sample collected from well shown.

Table 9
Groundwater PCE Analytical Data
Deep Water-Bearing Zone[1]
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Analyte	Reporting Limit (µg/L)[2,3]	Results (µg/L)
RI-1d	12/2/97	Tetrachloroethene	0.5	ND[4]
	3/2/98	Tetrachloroethene	0.500	ND
	6/1/98	Tetrachloroethene	0.500	ND
	8/31/98	Tetrachloroethene	0.500	ND
RI-2d	12/2/97	Tetrachloroethene	0.5	ND
	3/2/98	Tetrachloroethene	0.500	ND
	6/1/98	Tetrachloroethene	0.500	ND
	8/31/98	Tetrachloroethene	0.500	ND
RI-3d	12/3/97	Tetrachloroethene	0.5	ND
	3/2/98	Tetrachloroethene	0.500	ND
	6/1/98	Tetrachloroethene	0.500	ND
	8/31/98	Tetrachloroethene	0.500	ND
RI-4d	12/5/97	Tetrachloroethene	1.00	1.73
	12/5/97(Duplicate)	Tetrachloroethene	0.500	1.7
	3/5/98	Tetrachloroethene	0.500	ND
	6/3/98	Tetrachloroethene	0.500	ND
	9/2/98	Tetrachloroethene	0.500	ND
RI-5d	12/1/97	Tetrachloroethene	0.5	ND
	3/3/98	Tetrachloroethene	0.500	ND
	6/1/98	Tetrachloroethene	0.500	ND
	8/31/98	Tetrachloroethene	0.500	ND
RI-6d	12/1/97	Tetrachloroethene	0.5	ND
	3/5/98	Tetrachloroethene	0.500	ND
	6/2/98	Tetrachloroethene	0.500	ND
	9/2/98	Tetrachloroethene	0.500	0.712
RI-7d	12/3/97	Tetrachloroethene	0.5	ND
	3/4/98	Tetrachloroethene	0.500	ND
	6/2/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	0.702
RI-8d	12/3/97	Tetrachloroethene	0.5	ND
	3/4/98	Tetrachloroethene	0.500	ND
	6/2/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND
RI-9d	12/3/97	Tetrachloroethene	0.5	ND
	3/4/98	Tetrachloroethene	0.500	ND
	6/2/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND

Table 9
Groundwater PCE Analytical Data
Deep Water-Bearing Zone[1]
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Identification	Date Sampled	Analyte	Reporting Limit (µg/L)[2,3]	Results (µg/L)
RI-10d	12/3/97	Tetrachloroethene	0.5	ND
	3/4/98	Tetrachloroethene	0.500	ND
	6/3/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	0.761
RI-11d	12/4/97	Tetrachloroethene	0.5	ND
	3/5/98	Tetrachloroethene	0.500	ND
	6/3/98	Tetrachloroethene	0.500	ND
	9/2/98	Tetrachloroethene	0.500	ND
RI-12d	12/4/97	Tetrachloroethene	0.5	ND
	3/4/98	Tetrachloroethene	0.500	ND
	6/3/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND
RI-13d	12/5/97	Tetrachloroethene	0.5	ND
	3/3/98	Tetrachloroethene	0.500	ND
	6/2/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND
RI-14d	12/2/97	Tetrachloroethene	0.5	ND
	3/3/98	Tetrachloroethene	0.500	ND
	6/3/98	Tetrachloroethene	0.500	ND
	9/1/98	Tetrachloroethene	0.500	ND

Notes:

[1] Groundwater data for subfacility wells screened in the deep water-bearing zone are summarized on Table 7.
[2] Analyses conducted December 1997 by Superior Analytical. Analyses conducted March 1998, June 1998, and September 1998 by North Creek Analytical. No qualifiers noted for PCE results in any of the laboratory results.
[3] µg/l = Micrograms per liter.
[4] ND = Non-detect at the method reporting limit.

Table 10
Summary of Aquifer Test Data
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Pair	Groundwater Extraction Rate	Monitoring Well	Grounwater Levels Prior to Test		Groundwater Level After Completion Test			Maximum Drawdown (feet)
			Feet Below TOC	Elevation (feet msl)	Time (Hours)	Feet Below TOC	Elevation from msl	
RI-4	5 gpm[2] for 0-18.5 hours 8 gpm for 18.5 - 24 hours	RI-4s (Observation Well)	12.32	1,039.59	22.3	12.36	1,039.55	0.04
		RI-4d (Extraction Well)	12.17	1,040.31	24.0	63.78	988.70	51.61
RI-13	30 gpm for 0 - 24 hours	RI-13s (Observation Well)	17.25	1,003.85	17.50	18.40	1,002.60	0.10
		RI-13i (Extraction Well)	17.54	1003.46	17.50	18.40	1,002.60	0.86
		RI-13 (Observation Well)	17.23	1,003.26	22.0	17.59	1,002.90	0.36

Notes:

[1] Top of Casing.

[2] gpm = gallons per minute.

Table 11
Summary of Head Difference Calculations for
Shallow and Deep Water-Bearing Zones
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Pair	Head Difference[1] (feet)				Average Head Difference (feet)
	December 1997	March 1998	June 1998	September 1998	
RI-1[2]	-25.11	-25.85	-24.30	-25.45	-25.18
RI-2	-20.19	-21.39	-22.03	-17.86	-20.37
RI-3	-5.01	-4.46	-5.37	-7.43	-5.57
RI-4	0.65	-0.50	0.46	0.27	0.22
RI-5	-5.94	-5.44	-5.87	-7.91	-6.29
RI-6	-6.27	-6.23	-5.57	-6.98	-6.26
RI-7	-0.67	-0.02	-0.44	-1.08	-0.55
RI-8	-0.31	-0.06	-0.38	-1.12	-0.47
RI-9	-0.25	-0.02	-0.35	-1.14	-0.44
RI-10	-1.75	-2.62	-2.07	-2.82	-2.31
RI-11	-1.07	-0.89	-1.20	-1.35	-1.13
RI-12	-3.40	-2.63	-3.19	-4.95	-3.54
RI-13	-0.65	-0.21	-0.76	-0.75	-0.59
RI-14	-2.36	-1.73	-3.68	-4.30	-3.02
BNRR/WDOE-3[3]	-3.75	-4.40	-3.26	-3.35	-3.69
CYI-103[3]	-0.75	-0.91	-1.16	-1.18	-1.00

Notes:

[1] The head difference for each well pair was calculated by:

Head Difference = (Groundwater Level Deep Water-Bearing Zone) - (Groundwater Level Shallow Water-Bearing Zone)

[2] RI well pairs include wells screened in shallow water-bearing zones (designated as "s") and deep water-bearing zones (designated as "d").

[3] Subfacility well pairs screened in deep and shallow water-bearing zones.

Table 12
Summary of Vertical Gradient Calculations for
Shallow and Deep Water-Bearing Zones
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Well Pair	Shallow Well Screen Inverval (feet bgs)[2]		Deep Well Screen Inverval (feet bgs)		Screen Mid-Points		Distance (feet)	Average Vertical Gradient[1] (feet per foot)	Seasonal Vertical Gradient (feet per foot)			
	Top	Bottom	Top	Bottom	Shallow Well Screen Mid-Point (feet bgs)	Deep Well Screen Mid-Point (feet bgs)			December 1997	March 1998	June 1998	September 1998
RI-1	20	35	113	123	27.5	118	90.5	-0.278	-0.280	-0.290	-0.270	-0.280
RI-2	20	35	98	108	27.5	103	75.5	-0.270	-0.270	-0.280	-0.290	-0.240
RI-3	32	50	120	130	41	125	84.0	-0.066	-0.060	-0.050	0.060	0.090
RI-4	20	35	106	116	27.5	111	83.5	0.003	0.010	-0.010	0.010	0.000
RI-5	24	39	109	119	31.5	114	82.5	-0.076	-0.070	-0.070	-0.070	-0.10
RI-6	25	40	110	120	32.5	115	82.5	-0.076	-0.080	-0.080	-0.070	-0.080
RI-7	15	30	95	110	22.5	102.5	80.0	-0.007	-0.010	0.000	-0.010	-0.010
RI-8	15	30	100	110	22.5	105	82.5	-0.006	0.000	0.000	0.000	-0.010
RI-9	15	30	100	110	22.5	105	82.5	-0.005	0.000	0.000	0.000	-0.010
RI-10	20	35	104	114	27.5	109	81.5	-0.028	-0.020	-0.030	-0.030	-0.030
RI-11	24	39	97.5	107.5	31.5	102.5	71.0	-0.016	-0.020	-0.010	-0.020	-0.020
RI-12	20	35	106	116	27.5	111	83.5	-0.032	-0.030	-0.020	-0.030	-0.040
RI-13	25.5	40.5	110.5	120.5	33	115.5	82.5	-0.007	-0.010	0.000	-0.010	-0.010
RI-14	29	44	114	124	36.5	119	82.5	-0.037	-0.030	-0.020	-0.040	-0.050

[1] The formula used to calculate the Average Vertical Gradient and a detailed explanation regarding vertical groundwater gradient is provided in the report text.

[2] bgs = below ground surface

Table 13
Summary of Subfacility Historical Operations and Site Conditions
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-02

Name/Subfacility	Dates of Documentation Included in Ecology Files	Historical Operations	Site Conditions		
			Potential Releases[1]	Remediation[2]	Maximum Concentration of PCE in Groundwater from RI Sampling ($\mu g/l$)[3]
Adeline Property 16 North First Street	1995 - 1996	Dry cleaners	Liquid spills to surface/wastewater disposal to on-site drywells	Removal of 103 tons of soil. Source removal deemed complete.	59
Agri-Tech/Yakima Steel Fabricators 6 East Washington Avenue	1997	Pesticide manufacturing	Liquid spills to surface/wastewater disposal to on-site drywell	None	75.6
Burlington Northern Railroad Roundhouse	1993	Maintenance facility	Liquid spills to surface	None	23.2
Cameron Yakima Inc. 1414 South First Street	1988 - 1993	Activated carbon filters recycling	Waste slurry disposal to unlined waste pit, disposal tanks, surface spills	None	122
Fifth Wheel/Hahn Motors 307 East Arlington Street/ 1201 South First Street	1989 - 1996	Truck maintenance and body repair	Wastewater disposal to on-site drywells	Removal of 120 yards of soil with TPH: removal of drywells/catch basins. Source removal deemed complete.	9.5
Frank Wear Cleaners 106 South Third Avenue	1989 - 1995	Dry cleaners	Fluid/sludge disposal to the surface	None	1,100
Goodwill Industries 222 South Third Street	1994 - 1995	Dry cleaners	Wastewater disposal to on-site underground sumps/liquid spills to surface	Soil excavation/ off-site disposal. Source removal deemed complete.	99
Nu-Way Cleaners 801 South Third Street	1990 - 1995	Dry cleaners	Wastewater disposal to on-site drywell	None	4.4

Table 13
Summary of Subfacility Historical Operations and Site Conditions
Yakima Railroad Area Remedial Investigation
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Name/Subfacility	Dates of Documentation Included in Ecology Files	Historical Operations	Site Conditions		
			Potential Releases[1]	Remediation[2]	Maximum Concentration of PCE in Groundwater from RI Sampling (µg/l)[3]
Paxton Sales 108 West Mead Avenue	1988 - 1995	Tooling and case-hardened parts machining	Wastewater disposal to on-site drywell	Sludge removal from drywell	2.5
Southgate Laundry 1020 South Third Avenue	1989 - 1998	Dry cleaners	Potential UST leak; liquid spills to surface	Soil excavation/off-site disposal. Remediation not deemed complete.	67.0
Yakima Valley Spray/U-Haul 1108 South First Street	1995	Pesticide manufacturing, wrecking yard, maintenance facility	Liquid spills to surface potential UST leaks	None	34
Westco Martinizing 812 Summitview Avenue	1995 - 1998	Dry cleaners	Wastewater disposal and liquid spills to surface; possible UST leak	118 tons of soil excavation and off-site disposal; UST removal. Source removal deemed complete	66.8
Woods Industries 1 East King Street	1986 - 1992	Pesticide manufacturing	Wastewater disposal to on-site unlined lagoons	Soil excavation and off-site disposal. Source removal deemed complete.	5.6

Notes:

[1] Potential releases identified from information in subfacility reports reviewed in Ecology files August 1998.
[2] Remediation conducted by others. Review of remediation history from documentation in Ecology files reviewed by SECOR. SECOR has not independently evaluated remediation.
[3] PCE concentrations from groundwater sampling for this RI sampling conducted by SECOR, Ecology, or subfacility consultants. Reported PCE concentrations for groundwater based on RI quarterly sampling conducted between December 1997 and September 1998 after any remedial actions conducted on-site. All wells screened in shallow aquifer unless noted.