SECOR
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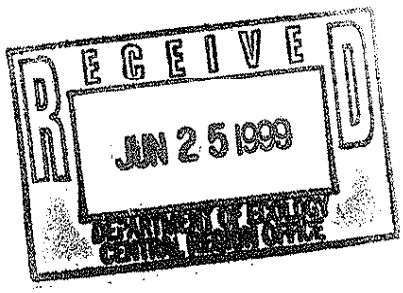

June 22, 1999

Cameron Yakima Working Group
c/o Mr. Mark Valentine
de maximis, inc.
10243 Sunrise Place
Bainbridge Island, WA 98110

RE: FINAL RESPONSE TO ECOLOGY'S COMMENTS AND EXECUTIVE SUMMARY
YAKIMA RAILROAD AREA REMEDIAL INVESTIGATION
SECOR PN: 00378-001-03

Dear Mark:

SECOR International Incorporated (SECOR) is pleased to provide the final *Response to Ecology's February 9, 1999 Comments on the Draft Remedial Investigation Report* and the revised *Executive Summary* of the Draft Remedial Investigation (RI) Report to the Cameron Yakima Working Group. This final document incorporates comments from the Cameron Yakima Working Group and *de maximis, inc.* The attached document and one electronic copy of the document (also sent on June 22, 1999) have been submitted to *de maximis, inc.* for distribution to the Cameron Yakima Working Group and the Washington State Department of Ecology.

We appreciate this opportunity to assist you. If you have any questions, please call (425) 372-1600.

Sincerely,

SECOR International Incorporated

Holly Corner
Project Manager

for Steven E. Locke, P.E.
Managing Principal

HC/ss

cc: Peter Jewett, TriHydro Northwest

Attachment: Final Response Document
Executive Summary

This document is part of the official
Adminsistrative Record for the
Yakima Railroad Area.
Washington State
Department of Ecology

W:\PROJECT\00378\001\03\ECORESP8.WPD
June 22, 1999 (4:23PM))

12034 - 134th Court NE. Suite 102. P.O. Box 230, Redmond, WA 98073-0230 (425) 372-1600 (425) 372-1650 Fax www.secor.com

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 was established in the 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.

The purpose of this RI is to evaluate the regional groundwater flow regime in the vicinity of the YRRA and to evaluate the extent, and potential receptors, of PCE in groundwater within the YRRA. In accordance with the Consent Decree, this report summarizes the existing historical data related to known sources within the YRRA and describes the regional areal and temporal distribution of PCE in groundwater within the YRRA over the period from December 1997 to September 1998.

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 RI report has been prepared in accordance with WAC 173-340-350 (6)(a-c).

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

BACKGROUND

A total of 122 groundwater monitoring wells had been installed at individual subfacilities within the YRRA by others prior to this RI. Sixty-eight of those wells were selected by Ecology for inclusion in the sampling conducted for this RI. The 68 groundwater monitoring wells selected by Ecology have been sampled for this investigation by SECOR, Ecology or subfacility consultants in accordance with the scope of work in the Consent Decree.

Numerous site characterization investigations have been completed by others at each of the subfacilities within the YRRA. The investigations were conducted at and by each subfacility and were not coordinated on a region-wide basis. As a result, these investigations did not produce a region-wide data set that was comparable, or that developed an understanding of the PCE extent or distribution in the YRRA on a regional basis. The multiple investigations at the individual subfacilities suggested that there was potential for regional distribution of concentrations of PCE in groundwater above 5.0 μg/l that should be investigated further.

The scope of work in the Consent Decree was developed to gather a regional data set that was consistent, comparable, and usable for evaluation of the regional groundwater flow regime and the regional extent, distribution, and potential receptors of PCE in groundwater in the YRRA. The RI scope of work required installation of 29 new groundwater monitoring wells at regional locations specified by Ecology, followed

by four quarterly groundwater monitoring events. To develop a consistent and comparable data set for evaluation of regional groundwater conditions, the scope of work required that the 28 new RI monitoring wells, along with monitoring wells selected by Ecology at each of the 13 subfacilities, be sampled during each quarterly monitoring event.

REGIONAL CONDITIONS

Surface water within the YRRA is controlled by a storm water system that captures and conveys surface water runoff from paved areas to the Yakima River. Storm water that occurs in unpaved areas typically infiltrates directly to the shallow groundwater. Regional irrigation practices affect the regional 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 may affect both the surface water and groundwater hydrology in the YRRA. The depth to regional groundwater is typically 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 which 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 in Fall 1997: a shallow well up to a depth of approximately 40 feet bgs designated RI-13s; and a deeper well up to a depth of approximately 130 feet bgs designated RI-13d. At RI-13i, a third (intermediate) well also was installed for the aquifer test. In total, 29 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.

Groundwater samples were collected by SECOR, Ecology, and subfacility consultants from the 68 groundwater monitoring wells within the YRRA. 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 and degradation products by EPA Method 8010. Data summaries of the analyses conducted by Ecology and/or subfacility consultants were provided to SECOR by Ecology.

Historical information in the Ecology files for the 13 subfacilities identified by Ecology were reviewed and summarized in this RI. The historical information reviewed for each subfacility included historical subfacility uses, proximity to irrigation canals and/or underground utilities, documented or potential releases of PCE, historical concentrations of canals PCE in soil and ground water, local groundwater flow direction and source control/remediation history. The results of the historical information review were summarized in this RI as part of the regional evaluation of PCE distribution and the groundwater flow regime within the YRRA.

A groundwater user receptor survey was completed for the YRRA in accordance with the Consent Decree and Work Plan. The purpose of the receptor survey was to identify residential, commercial, or industrial properties which used groundwater within the YRRA.

SITE 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 results of the literature research, subfacility historical data review, deep boring logs, and results of the RI field investigation indicate that the sands and gravels underlying the YRRA have a highly variable hydraulic conductivity throughout most of the YRRA. The results of this RI have identified two discrete water-bearing zones within the regional shallow aquifer underlying the YRRA. The water-bearing zones have been designated the shallow water-bearing zone and the deep water-bearing zone for this RI. The shallow water-bearing zone extends to approximately 60 to 70 feet below ground surface (bgs); the deep water-bearing zone from 60 to 70 feet bgs to approximately 130 feet bgs. The data collected for this RI do not suggest an effect on the regional direction of groundwater flow or groundwater gradient from seasonal changes.

The information obtained from this RI indicates that there are discontinuous layers of fine grained materials or cementation in the northern portion of the YRRA that may act as an aquitard and significantly limit downward migration of PCE from the shallow water-bearing zone to the deep water-bearing zone. The information obtained from this RI indicates that the aquitard is not present in the southern portion of the YRRA.

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 results of the aquifer tests show that there is a greater potential for downward migration of groundwater from the shallow water-bearing zone to the deep water-bearing zone at RI-13, located in the east side of the YRRA, than at RI-4, located in the west side of the YRRA. The aquifer test results suggest that PCE has a greater potential to migrate from the shallow water-bearing zone to the deep water-bearing zone at RI-13 and has significantly less potential for downward migration at RI-4. The results of the

aquifer test and the regional subsurface conditions determined from the RI investigation indicates that the aquitard occurs in the northern portion of the YRRA as characterized by subsurface conditions and the results of the aquifer tests at RI-4 and RI-13. These results indicate that the aquitard is absent in the southern portion of the YRRA.

The depth of the shallow water-bearing zone potentiometric surface 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 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 increased by as much as 12 feet in some of the wells from the non-irrigation to irrigation seasons. The potentiometric surface maps for the shallow water-bearing zone indicate that the regional gradient and regional 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 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.

Field observations and published values were used to estimate hydraulic conductivity in the shallow and deep water-bearing zone in the vicinity of RI-4 and RI-13. The estimates for the shallow water-bearing zone at RI-4 indicate that hydraulic conductivity may range from 10^{-3} to 10^{-5} cm/sec with an estimated groundwater flow rate of less than one foot/year to several tens of feet/year. At RI-13, the hydraulic conductivity may range from 1 to 10^{-3} cm/sec with an estimated groundwater flow rate of several hundred feet/year to several thousand feet/year in the shallow water-bearing zone. The hydraulic conductivity in the deep water-bearing zone was similar in the vicinity of RI-13 and RI-4 and may range from 1 to 10^{-3} cm/sec with an estimated groundwater flow rate of several hundred feet/year to several thousand feet/year.

The hydraulic conductivity values were estimated by Hart Crowser (1996) for aquifer materials at the Cameron Yakima Subfacility which is located in the central portion of the YRRA. The hydraulic conductivity may range between 2×10^{-2} and 2×10^{-1} cm/sec. The estimated groundwater flow rate at the subfacility ranged from several hundred to several thousand feet/year based on these estimated values.

SOURCE CHARACTERIZATION

Ecology has identified 13 subfacilities within the YRRA as potential sources of PCE to the groundwater. These subfacilities were included in the sampling conducted for this RI. 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 have been under Ecology Agreements and/or Orders 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

(Burlington Northern), 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 had concentrations of PCE in groundwater above 5.0 μg/l in groundwater samples collected during this RI except for Nu-Way Cleaners and Paxton Sales. Most of the subfacilities have had some form of source control or remediation completed. Based on the RI results, five subfacilities continue to have concentrations of PCE above 5.0 μg/l in the on-site downgradient wells (as determined by the subfacility consultant) in samples collected during this RI: Adeline, Cameron Yakima, Frank Wear Cleaners, Goodwill Industries, and Southgate Laundry. These five subfacilities appear to be continuing sources of PCE to regional groundwater within the YRRA. The remaining eight subfacilities do not appear to be continuing sources of PCE to the regional groundwater of the YRRA.

The concentrations of PCE in groundwater at the five continuing source area subfacilities remained relatively consistent for the one year of sampling for this RI. Concentrations of PCE in shallow groundwater were generally less than 100 μg/l at the Adeline, Goodwill, and Southgate Subfacilities. At times, the concentrations of PCE detected during this RI ranged above 100 μg/l at some monitoring locations in shallow groundwater at the Cameron Yakima and Frank Wear Cleaners Subfacilities. The concentrations of PCE detected during this RI were generally higher during the irrigation season at the Adeline and Southgate Subfacilities. Comparison of the PCE concentrations in groundwater from samples collected during this RI with historical PCE concentrations indicated the following (see Table 13A).

1. The range of PCE concentrations detected during this RI were generally consistent with the respective data range of historical PCE concentrations reported by subfacility consultants at most subfacilities;

2. A decrease of PCE concentrations at the Cameron Yakima Subfacility in groundwater monitoring wells located downgradient of the former transfer tank, which was removed in 1995; and

3. A slight decrease of PCE concentrations in the downgradient well at the Goodwill Industries Subfacility after completion of soil excavation.

RECEPTOR SURVEY

A receptor survey was completed within the YRRA and Area 1, (defined by Ecology as the area 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 and Area 1. 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 supply wells are located in the southern portion of the YRRA. None of the water supply 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 supply 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 water-bearing zone.

PCE was detected in RI-10 and RI-11, located on the southern edge of the YRRA, at concentrations below drinking water standards. The Union Gap municipal wells, which are screened in significantly deeper intervals, are not currently threatened by PCE. The RI results also suggest that the Union Gap municipal wells would not be threatened by any potential PCE migration in the future based on current groundwater conditions in the YRRA determined during this RI.

EXTENT OF PCE CONTAMINATION

The RI data indicate that there is not a region-wide groundwater plume of PCE concentrations above 5.0 μg/l in the YRRA. Rather, these concentrations are present in localized and isolated areas in the shallow water-bearing zone, near and downgradient of several subfacilities located in the YRRA (primarily north of East Mead Avenue).

Review of historical information indicates that releases of PCE to the shallow water-bearing zone have occurred within the YRRA at all of the subfacilities in the YRRA, and that the PCE may continue to be migrating off-site from the five subfacilities identified previously with PCE concentrations above 5.0 μg/l in the downgradient subfacility well.

The RI results indicate that concentrations of PCE downgradient of the five continuing source areas are limited to areas directly downgradient of known current or historical source areas. It is likely that regional distribution of PCE above 5.0 μg/l was not detected in the shallow water-bearing zone within the YRRA during this RI due to source control measures, dispersion, dilution, natural degradation, and other attenuation factors.

Review of PCE degradation product data indicates that there is not a region-wide plume of PCE degradation products (TCE, PCE, 1,2-DCE, and vinyl chloride) based on the four quarters of sampling conducted for this RI. Some low-level detections of these PCE daughter products were reported only for a limited area in the central portion of the YRRA.

Based on the direction of the regional groundwater flow, concentrations of PCE in the shallow groundwater are potentially migrating to the southeast from the five continuing source areas. The estimated hydraulic conductivity and groundwater flow rates vary within the YRRA, but are relatively high. The estimated high rate of flow is diluting the PCE concentrations in groundwater during migration from source areas. This is reflected in the apparent narrow, localized distribution of PCE concentrations downgradient of the five continuing source areas that are present in the YRRA.

The RI analytical results show that concentrations of PCE in the deep water-bearing zone do not exceed 5.0 μg/l in any of the wells sampled for this RI with the exception of one well (MW-101d) at the Cameron Yakima Subfacility, which had PCE concentrations of 20 μg/l in one well for only one of four quarters. Low concentrations of PCE (less than 5.0 μg/l), were detected for three quarters at the Burlington Northern Subfacility well BNRR-d, for four quarters from the Cameron Yakima Subfacility well CYI 103-d, and for only one of the four quarters at regional RI wells RI-4d, RI-6d, RI-7d, and RI-10d.

The results of the aquifer test, site conditions, and RI sampling suggest that concentrations of PCE theoretically could migrate from the shallow water-bearing zone to the deep water-bearing zone in the southern portion of the YRRA; however there are no known sources of PCE identified in the southern area. In the northern portion of the YRRA, the potential for downward migration of PCE from the shallow to the deep water-bearing zone is impeded by the occurrence of a low permeability layer that acts as an aquitard. This interpretation is supported by boring logs, hydrologic evaluation and

the aquifer test results. In addition, PCE has not been detected in the deep water-bearing zone in proximity to chemical concentrations of PCE in the shallow water-bearing zone in the northern portion of the YRRA, which further supports this conclusion.

The presence of PCE degradation products in the deep water-bearing zone is limited to well WDOE-3d at the BNRR subfacility. The data indicate that there is not a region-wide plume of PCE degradation products in the deep water-bearing zone. The high groundwater flow rate, natural attenuation processes, and source area remediation efforts may be further decreasing the low concentrations of PCE in the deep water-bearing zone.

CAMERON YAKIMA WORKING GROUP

RESPONSES TO ECOLOGY'S FEBRUARY 9, 1999 COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION REPORT

FORMAT OF WORKING GROUP RESPONSE

SECOR International Incorporated (SECOR) has prepared these responses to the Washington State Department of Ecology (Ecology) comments dated February 9, 1999 on the Draft Remedial Investigation (RI) Report for the Yakima Railroad Area (YRRA). The responses were prepared by SECOR on behalf of the Cameron Yakima Working Group (Working Group). The Draft RI Report was submitted to Ecology on January 4, 1999. The responses to Ecology's comments are organized as follows:

Responses to Ecology's Cover Letter Comments – The responses to the comments in Ecology's February 9, 1999 cover letter are referenced as numbered in Ecology's letter. The Responses to Ecology's Cover Letter Comments follow this introductory section.

Responses to Ecology's Detailed Comments – The responses to the detailed comments in Ecology's February 9, 1999 letter are provided in two parts. First, general responses are given under the heading "General Responses" to provide a framework for, and clarification of, specific modifications to the Draft RI Report text. These general responses are followed by the Draft RI Report text modifications under the heading "Specific Responses." The specific responses present revisions to the text previously provided to Ecology in the Draft RI Report.

Throughout the text, Ecology comments are provided in *italics*. The Ecology comments have been sub-divided to clarify responses to specific comments included in Ecology's February 9, 1999 letter by assigning letters **a)**, **b)**, **c)**, etc., to each specific comment. The assigned letters correspond to the response provided to each specific comment. Proposed revised text shown in the Specific Responses has been imported directly from the Draft RI Report. Proposed deletions to the Draft RI Report text are shown as ~~strikethrough~~, proposed insertions are <u>underlined</u>. Clarification or editorial notes added are **<u>double underlined and in boldface type</u>**.

RESPONSES TO ECOLOGY'S COVER LETTER COMMENTS DATED FEBRUARY 9, 1999

ECOLOGY COMMENT 1:

a) *The extent, direction, and rate of movement of PCE have not been defined. The RI as presented offers no insight into the behavior of the PCE in the aquifer.* **b)** *A large amount of data exists regarding the Yakima Railroad Area (YRRA) that needs to be organized, presented, and analyzed to produce an understanding about the contaminant (PCE) behavior within the aquifer.* **c)** *Products needed include: a understanding of current PCE behavior, a estimate of future (PCE) migration,* **d)** *a detailed understanding of what is impacting degradation of the PCE within the YRRA,* **e)** *and the presentation of a Conceptual Site*

Model. **f)** *What do the breakdown products present at many sample locations tell us about the PCE?* **g)** *When or will the PCE impact the receptors identified in the RI?* **h)** *Is there an area-wide problem, either current or anticipated, which needs to be addressed?*

GENERAL RESPONSE TO COMMENT 1

a) The regional extent and direction of PCE movement in the YRRA has been defined in the Draft RI Report in accordance with the scope of the work defined in Exhibit B of the Consent Decree. The RI conclusions, which are based on the field data collected during the RI, indicate that there is no region-wide plume of PCE in groundwater in the YRRA. Rather, only relatively isolated areas of PCE contamination in groundwater are indicated at several YRRA subfacility locations. (This information is included in Sections 8.0 and 10.0 of the Draft RI Report text, as well as on Draft RI Report Figures 21 through 25.) Estimated values for hydraulic conductivity and groundwater flow rates have been provided for the YRRA in the vicinity of RI-4 and RI-13 using published values, and the results of the RI. The text of the Draft RI Report has been revised where appropriate to more clearly describe the basis for the RI conclusions.

b) The scope of work in the Consent Decree requires that the existing historical data be reviewed and summarized in the RI Report. The large amount of YRRA historical data provided by Ecology has been organized, reviewed, and summarized in the Draft RI Report (Section 7.0 of the Draft RI Report). Revisions to the text have been made to more clearly present the results of the historical data review and to incorporate documents that were not included in the review completed for the Draft RI Report. The regional groundwater regime and extent of PCE have been defined by evaluation of the data collected from the quarterly groundwater quality and elevation monitoring program completed for this RI (Section 6.0 and Figures 9 through 20 of the Draft RI Report).

c) A qualitative discussion of the current PCE behavior and an estimation of future PCE migration based on the data collected for this RI have been included in the revisions to the Draft RI Report (see responses to detailed comments to Section 8.0 and 10.0). The revisions to the text base the qualitative evaluation of PCE behavior and future migration on the data collected for this RI.

d) A qualitative evaluation of potential PCE breakdown products, although not required by the RI Work Plan, also has been included in the revised Draft RI Report (see specific responses to comments for Section 8.3). The evaluation is based on the quarterly monitoring data collected during this RI (see specific response to comments for Section 8.3).

e) The Draft RI Report text has been revised to include a section describing the conceptual model of regional groundwater conditions (see specific responses to comments to Section 6.4). The conceptual model is based on evaluation of the data collected during the RI field sampling program. The conceptual model included in the proposed revisions to the Draft RI Report combines conclusions regarding hydrogeologic conditions, PCE distribution and degradation

products, to provide a concise understanding of the regional groundwater flow regime and extent of PCE in the YRRA.

f) See response to Comment 1(d), above.

g) A qualitative assessment of the potential for any PCE migration in groundwater to areas where potential receptors are located has been included in the revisions to the report (see specific response to comments for Section 10.0). The assessment is based on the data collected during the RI and the results of the RI receptor survey.

h) The RI results support the conclusion that there is <u>not</u> an existing area-wide PCE groundwater plume in the YRRA, nor do the RI results indicate the potential for any area-wide plume in the future. The data collected during the RI indicate that there are several sources with potential off-site migration that may have created isolated areas of PCE concentrations higher than 5 µg/l (the MTCA Method A PCE cleanup level) in groundwater downgradient of these source areas. This is discussed in more detail in the revised text (see response to comments for Sections 8.0 and 10.0).

The lack of an area-wide plume from multiple historical sources in the YRRA is likely due to the effects of natural attenuation on the distribution of PCE in groundwater which has been discussed in more detail in the revised text. The results of total carbon analyses, estimated groundwater flow rates, and other available data for the YRRA have been incorporated into the discussion.

ECOLOGY COMMENT 2:

a) *The groundwater flow regime within the YRRA has not been completely characterized.* **b)** *Interpretation of the pump test results needs to occur. How do things like aquifer transmissivity, conductivity, and other parameters affect the situation? What are these parameters? Are these aquifer traits consistent throughout the aquifer?*

GENERAL RESPONSE TO COMMENT 2

a) As indicated in the Response to Comment 1, definition of the regional groundwater flow regime is included in Section 6.0 and Figures 9 through 20 of the Draft RI Report, in accordance with the scope of work in the Consent Decree and RI Work Plan. The RI sampling locations defined by Ecology, the data collected for the four quarters of groundwater monitoring, and the aquifer test results provided sufficient information for an evaluation of the regional groundwater flow and aquifer characteristics in the YRRA, including estimated values for hydraulic conductivity and groundwater flow rates. The revised RI Report text includes additional information regarding the regional flow regime, including estimated values for hydraulic conductivity and groundwater flow rates, in response to Ecology's comments on the Draft RI Report.

b) The aquifer (pumping) test was conducted to "determine whether known impacts to the shallow aquifer units can reasonably be expected to affect a deeper aquifer," as defined in the RI Work Plan. This objective was accomplished by evaluating the results of the pumping tests conducted at RI-4 and RI-13. Interpretation of the aquifer test results showed that the aquifer traits are highly variable within the YRRA. Published values for the aquifer materials encountered in this RI have been used to develop estimated ranges for hydraulic conductivity and groundwater flow rates at RI-4 and RI 13. This has been more clearly defined in the revised text as shown below in the specific response to comments for Section 5.3.4.3.

ECOLOGY COMMENT 3:

a) *The summary of information from each subfacility, both current and historic, has been drastically oversimplified. All subfacility data need to be identified, provided, interpreted, and incorporated into the RI. Many site discussions do not appear to include a review of all documents and their associated data.* b) *To help you in sorting this all out, we have included a bibliography of all documents containing sampling data located in Ecology files that were not referenced as part of the RI (Attachment A). (Prior to the commencement of this RI a computer database of the nearly all of the subfacility sampling data was provided.)* c) *The subfacility summaries need to present PCE sources, explain seasonal variations, flow directions issues, PCE level fluctuations over time, and other details to support the development of a conceptual site model. Without an accurate information basis it will be difficult to define PCE issues and make complete and accurate conclusions regarding the nature of the contamination.*

GENERAL RESPONSE TO COMMENT 3

a) As discussed with Ecology on March 12, 1999, the revised Draft RI Report text includes a description of the YRRA subfacility data review history that led to the Consent Decree scope of work, and subsequently to the installation of the RI monitoring wells. A general review of YRRA subfacility data conducted before the development of the RI scope of work indicated that prior to installation of the monitoring wells for this RI, the data did not provide comprehensive information that could be used to interpret regional groundwater flow and the extent of PCE in the YRRA. Therefore, the scope of work specified that additional monitoring wells be installed during the RI to characterize regional groundwater conditions in the YRRA. Water elevation and quality data collected quarterly from the RI wells, and from selected wells at the subfacilities, provided adequate information to develop a regional conceptual model, which is presented in the revised Draft RI Report.

The historical data for the identified YRRA subfacilities are summarized in the Draft RI Report as specified in Exhibit B of the Consent Decree (see responses to detailed comments below). The Draft RI Report has been revised to include results of the review of the additional subfacility documents identified by Ecology. The historical information that appears reasonably sufficient to characterize subfacility groundwater conditions has been identified in the summary of historical data (see responses to detailed comments below). A revised discussion of the current conditions for the subfacilities based on the results of the four quarters of groundwater sampling performed

for this RI by SECOR, Ecology, and/or the subfacility consultants, has also been included in the revised Draft RI Report.

b) SECOR has completed the review of the documents that were identified in Ecology's February 9th letter. Information from these documents is included in the revised RI Report.

c) The revised subfacility section of the Draft RI Report summarizes the relevant data on PCE sources, seasonal variations (if present), groundwater flow direction, and PCE level fluctuations, to the extent that these data are in the YRRA subfacility documents reviewed. This information has been presented in text and table format. The summaries rely on the information provided by the subfacility consultants and do not re-interpret the conclusions developed by the respective subfacility consultants.

ECOLOGY COMMENT 4:

a) *There is a lack of conclusions in the RI.* **b)** *Present a conceptual site model of what is occurring within the YRRA.* **c)** *Include recommendations for a groundwater sampling program, receptor protection program, or other information/data as needed to confirm the site model, to prevent or predict exposure of receptors to the contamination, and enable the selection of a cleanup action as required in WAC 173-340-350.* **d)** *Develop a model that presents the conditions of the aquifer, how the PCE is behaving within the aquifer, and potential impacts and risks to receptors.* **e)** *Define in detail what is known versus what is speculative or based on interpolations of data.* **f)** *Identify what is still needed to increase our certainty with the interpolations.*

GENERAL RESPONSE TO COMMENT 4

a) Section 10.0 of the Draft RI Report presented the RI's conclusions for the YRRA, characterizing the regional groundwater flow and PCE conditions in the YRRA. The RI conclusions are based on the field data obtained for this RI to the extent that the defined field program provided supporting information. The text has been revised as appropriate to reflect Ecology's comments.

b) A section describing the conceptual model has been added to the Draft RI Report (see specific response to comments for Section 10.0). The conceptual model is based on the information obtained during the RI, which includes hydrogeologic conditions determined from the RI field sampling and research of existing boring logs, maps, and published literature. The description of the extent of PCE is based on data collected from the quarterly groundwater monitoring program conducted for this RI.

c) Selecting a cleanup action required by WAC 173-340-350 should be based on the results of a feasibility study, which is not within the scope of work defined in the Consent Decree. Similarly, a description of a future groundwater sampling plan, a receptor protection program, or other information/data related to any confirmation of the conceptual site model, was not included within the scope of work. The purpose of the RI was to provide sufficient information to characterize

the distribution of PCE in the YRRA. as required by WAC 173-340-350 (6) (c). Therefore, recommendations related to groundwater sampling, a receptor protection program, conceptual model confirmation, and a cleanup action plan are not provided in the Draft RI Report.

d) See response "b)" above.

e) The conclusions presented in the revised Draft RI Report are based on the results of the four quarters of groundwater sampling conducted for this RI. The conclusions are based on known field data. Interpolated conclusions are limited and have been identified in the text as appropriate.

f) The conclusions presented in the revised Draft RI Report are based on the data obtained from the field program conducted for this RI in accordance with the scope of work. Therefore, recommendations for additional investigation were not included in the RI Report.

ECOLOGY COMMENT 5:

Editorial quality: Please double check your facts for the subfacilities, your maps, etc. A variety of locations within the RI exist where up- versus down-gradient wells are transposed; sample units are incorrect, and so forth. Some of these are illustrated in the detailed comments enclosed.

GENERAL RESPONSE TO COMMENT 5

The tables, figures, and text have been reviewed in detail. Modifications have been completed as necessary.

RESPONSE TO ECOLOGY'S DETAILED COMMENTS

ECOLOGY COMMENT:

Page 1: Section 1.1: Purpose: **a)** *It is not acceptable to narrow the scope of the RI to the period of December 1997 to September 1998.* **b)** *The purpose of the RI is to define the aerial and temporal distribution of PCE and its breakdown products within the Yakima Railroad Area (YRRA). It is expected that the report will do this for the life of the YRRA.*

GENERAL RESPONSE:

The RI work included a detailed review and preparation of a summary of the historical information available for the YRRA. The determination of the existing areal and temporal distribution of PCE is based on the data collected over four quarters during this investigation.

a) The text has been modified as discussed in this general response. The purpose of the RI, as defined in the Consent Decree, is: 1) to evaluate the regional groundwater flow regime in the vicinity of the YRRA; and 2) to evaluate the extent of the potential receptors to PCE in groundwater in the vicinity of the YRRA. The Consent Decree defined eight tasks to meet these objectives: 1. Installation of 28 wells, 2. Survey of the wells, 3. Completion of an aquifer test at two locations, 4. Quarterly monitoring for one year of the wells installed for the RI and at one well at each subfacility, 5. Preparation of an electronic database, 6. Performing a receptor survey, 7. Submitting progress reports, and 8. Submitting an RI Report.

As indicated previously in the Response to Comment 3, a review of the YRRA data collected by subfacilities prior to the development of the RI scope of work indicated that there was no comprehensive information that could be used to interpret regional flow or PCE behavior regime. Therefore, the Consent Decree specified that the conclusions in the RI Report are to be based on field data from "the wells installed and sampled as part of this RI" and the RI Report is to "summarize existing data related to known source areas." Consequently, the data to be used to determine the regional groundwater regime and extent of PCE is limited to the data collected during the December 1997 to September 1998 time period. As such, data collected by others prior to December 1997 were not used directly in the analysis of the regional groundwater regime and extent of PCE in the YRRA.

b) The text has been modified to address this comment as discussed above. A discussion of the breakdown products, although not included in the scope of work in the RI Work Plan, has been included in Sections 8.0 and 10.0 of the revised RI Report.

SPECIFIC RESPONSE:

1.1 Purpose

The ~~primary~~ purpose of this RI is to evaluate the regional groundwater flow regime in the vicinity of the YRRA and to evaluate ~~determine~~ the extent, and potential receptors, of ~~the~~ 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 and if necessary, to select a cleanup action under WAC 173-340-360.~~ In accordance with the Consent Decree, this report summarizes the existing historical data related to known sources within the YRRA. The report also describes the regional areal and temporal distribution of PCE in groundwater within the YRRA over the period from December 1997 to September 1998.

Numerous site characterization investigations have been completed at each of the subfacilities by others within the YRRA as discussed in more detail in Section 7.0 of this RI report. The investigations were conducted at and by each subfacility and were not coordinated on a region-wide basis. More specifically, water level elevations and water quality samples were collected at the subfacilities independently of one another, and the sampling time were not coordinated. As a result, these investigations did not produce subfacility data sets that were comparable, or that developed understanding of the PCE extent or distribution in the YRRA on a regional basis. However, the cumulative result of the multiple investigations at the individual subfacilities suggested that there was potential for regional distribution of concentrations of PCE above cleanup levels that should be investigated further.

To address this concern, six PLPs agreed to conduct a review of existing YRRA subfacility data to evaluate if the distribution of PCE in the YRRA could be adequately characterized with the available subfacility data. As documented in the Consent Decree, the results of the 1995 data review, which was conducted by Woodward-Clyde on behalf of the PLPs, indicated that the YRRA data available at that time was insufficient to characterize regional PCE distribution in the YRRA. Therefore, the PLPs subsequently agreed to negotiate a scope of work to conduct a regional groundwater investigation in the YRRA.

ECOLOGY COMMENT:

Page 2: Section 1.3.2: Public participation activities are conducted cooperatively by the Working Group and Ecology per the terms of the Consent Decree.

GENERAL RESPONSE:

The text has been modified.

SPECIFIC RESPONSE:

1.3.2 Ecology

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~~ cooperatively by the Working Group and Ecology in accordance with the terms of the Consent Decree.

ECOLOGY COMMENT:

Page 3: "activated carbon recycling facilities" should be facility.

GENERAL RESPONSE:

The text has been modified.

SPECIFIC RESPONSE:

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, an activated carbon recycling facility ~~facilities~~, wrecking yards, and manufacturing facilities. The locations of the subfacilities are shown on Figure 3.

ECOLOGY COMMENT:

Page 4: Section 2.4: Water Supply Wells: **a)** *Wells in Figure 26: Are those water wells, monitoring wells, or both? The narrative states that at least 70 wells exist. Well logs are provided in Appendix B. Please provide a map with these well locations depicted. Distinguish between monitoring wells and supply wells. Do these wells provide information useful either in the interpretation of hydrogeologic features or as potential future YRRA monitoring wells?* **b)** *What information did the historic data review gather related to these wells and PCE contamination?* **c)** *Which of these wells were also identified in the receptor survey?* **d)** *Is this a complete listing of all wells? You have not included all logs from the subfacilities.*

e) *The third paragraph states that the well log review identified approximately 100 wells yet Figure 26 shows 83. Why the discrepancy?*

f) *Editorial Comment: The Washington Department of Ecology maintains well logs not the Department of Natural Resources.*

GENERAL RESPONSE:

a) The text has been modified. As shown on the Key on Figure 26 and discussed in detail in the Receptor Survey Report (which is included as an Appendix to the RI), Figure 26 shows water supply wells only. The 70 wells referenced in this section are groundwater monitoring wells located at various sites within the YRRA that are not included with the subfacilities (and are not included with the 122 monitoring wells located at the subfacilities). There is no existing map of the locations of these 70 groundwater monitoring wells; thus, no map can be included. The text of Sections 2.4 and 9.0 has been revised to clarify the well types and numbers.

b) This comment has been addressed in this general response only (no text modification is necessary). The 70 groundwater monitoring wells are associated with sites that were not identified in the subfacility file review as sites with documented evidence of PCE. These sites are likely associated with other issues (e.g., UST TPH releases). SECOR only conducted a detailed file review of sites with documented evidence of PCE data.

c) This comment has been addressed in this general response only (no text modification is necessary). The receptor survey only identified water supply wells, as stated in the report. The 70 monitoring wells referenced in the text are groundwater monitoring wells located throughout the YRRA and were not included in this investigation.

d) The text has been modified. Based on the information provided in the historical files reviewed, this is a complete list of the wells within the YRRA. A complete set of boring logs for the subfacility monitoring wells are included with the revised RI Report.

e) This comment has been addressed in this general response only (no text modification is necessary). Figure 26 denotes water supply well locations. As noted in the Receptor Survey Report, which is included as Appendix C of the Draft RI Report, more than one well may be located at each property location shown on the map.

f) The text of Section 2.4 has been modified to clarify that the logs were reviewed at Ecology and DNR.

SPECIFIC RESPONSE:

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. The main municipal water supply for the city of Union Gap are three groundwater extraction wells (shown as well No 43 on Figure 26) that extract over 10,000,000 gallons per month. The wells extract groundwater from 396 feet, 571 feet, and 1,180 feet bgs. Water supply well locations within the YRRA and Area 1 are shown on the maps included in Figure 26. Water use from the wells is depicted on Figure 26. Table AA. and discussed in more detail in Section 9.0 of this report. Water supply well details are summarized in the Receptor Survey Report in Appendix C.

(Note: moved paragraph)

A review of existing permitted ~~groundwater monitoring wells and/or other~~ water supply 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 results of the~~ A review of water supply well logs at Washington Department of Natural Resources (DNR) ~~well log review~~ and Ecology and the Receptor Survey (Section 9.0 of this report) has identified ~~approximately 100~~ 91 water supply wells located within the YRRA and Area 1 ~~which~~ that 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.

The subsurface geologic information obtained from the deep water supply well logs reviewed for this RI was used in evaluating the regional geology of the YRRA. The schematic cross-sections shown on Figures 6 through 8 were developed from the review of geologic descriptions included on the deep (greater than 250 feet) Union Gap water supply well logs and deep RI monitoring well logs. Only well logs located in close proximity to the cross-section lines were used in the evaluation.

2.5 GROUNDWATER MONITORING WELLS

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 70 monitoring wells at depths of less than 30 feet bgs located in the YRRA, in addition to the 122 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 location of the groundwater monitoring wells at each of the subfacilities

is shown on Figure XX. The well logs for the groundwater monitoring wells at each of the subfacilities are included in Appendix XX.

The groundwater monitoring well logs reviewed for this RI were for wells within approximately 130 feet of the surface, and therefore provided information on subsurface geologic conditions within the YRRA from the surface to that depth. The historical data regarding the concentrations, distribution, and extent of PCE in the shallow groundwater obtained from review of the groundwater monitoring wells are discussed in Section 7.0 of this RI report.

ECOLOGY COMMENT:

Page 6: Section 3.1: Previous Investigations: **a)** *Please provide a map of the 105 monitoring wells.* **b)** *Also, on page 7 the discussion states that 68 of the wells were used in RI. What about the balance? Please clarify the details about what occurred with this situation.* **c)** *Additionally, please review the well logs as necessary to enable the removal of any qualifying statements like the "Approximately 95 of the 105...." An accurate statement of the facts is needed.*

GENERAL RESPONSE:

a) The text has been modified. Although not required by the scope of work, a map showing the location of the 122 groundwater monitoring wells located at the subfacilities is provided with the revised report.

b) The report states that "68 of these wells were sampled for this investigation," which is consistent with the defined scope of work. This includes the 28 wells installed for the RI and the 40 existing subfacility wells. The data from the balance of the wells were reviewed for the Draft RI Report and included with the data presented in the Draft RI Report.

c) The text has been modified. A thorough review was performed of all of the well logs. Ninety-six of the 122 wells are shallow wells. The text of Sections 3.1 and 3.2 has been revised to clarify this.

SPECIFIC RESPONSE:

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~~ for 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 Corporation, 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 122 monitoring wells ~~have~~ had been installed at the individual subfacilities within the YRRA by others prior to this RI. ~~Approximately 95 o~~ Of the 122 groundwater monitoring wells located at the

subfacilities, 96 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. Note that the Table 2 summary does not include data collected subsequent to the data review performed in 1995 as part of the Consent Decree. Since that time, nine additional wells were installed at the Cameron Yakima Subfacility. In addition, Southgate Laundry and Adeline subfacilities, which have four wells each, were added to the list of subfacilities that were evaluated as part of this RI. A summary of the historical results from the investigations conducted at each of the subfacilities identified as part of this RI is provided in Section 7.0 of this report.

Numerous site characterization investigations have been completed at each of the subfacilities by others within the YRRA as discussed in more detail in Section 7.0 of this RI report. The investigations were conducted at and by each subfacility and were not coordinated on a region-wide basis. More specifically, water level elevations and water quality samples were collected at the subfacilities independently of one another, and the sampling time were not coordinated. As a result, these investigations did not produce subfacility data sets that were comparable, or that developed understanding of the PCE extent or distribution in the YRRA on a regional basis. However, the cumulative result of the multiple investigations at the individual subfacilities suggested that there was potential for regional distribution of concentrations of PCE above cleanup levels that should be investigated further.

To address this concern, six PLPs agreed to conduct a review of existing YRRA subfacility data to evaluate if the distribution of PCE in the YRRA could be adequately characterized with the available subfacility data. As documented in the Consent Decree, the results of the 1995 data review, which was conducted by Woodward-Clyde on behalf of the PLPs, indicated that the YRRA data available at that time was insufficient to characterize regional PCE distribution in the YRRA. Therefore, the PLPs subsequently agreed to negotiate a scope of work to conduct a regional groundwater investigation in the YRRA.

Ecology and the six PLPs completed the scope of work negotiations and entered into a Consent Decree to conduct the regional groundwater investigation. The agreed-upon scope of work was developed to gather a data set that was consistent, comparable, and usable for evaluation of the regional groundwater flow regime, and the regional extent, distribution, and potential receptors of PCE in groundwater in the YRRA. The scope of work required installation of 28 new groundwater monitoring wells at locations specified by Ecology, followed by four quarterly groundwater monitoring events. To develop a consistent and comparable data set for evaluation of regional groundwater conditions, the scope of work required that the 28 new RI monitoring wells, along with monitoring wells selected by Ecology at each of the 13 subfacilities, be sampled during each quarterly monitoring event.

The conclusions of the regional evaluation of YRRA groundwater conditions are presented in Section 6.4 of the RI.

(Note: Paragraph moved)

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 and are shown on Table 1. The 13 subfacilities included in this RI are: Adeline, Agri-Tech/Yakima Steel Fabricators, 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 Figure XX and Appendix D, and summarized on Table 3.

(Note: Paragraph inserted)

Of the 122 wells installed by others prior to this RI at properties that are currently or were historically included on the list of subfacilities for this RI, not as ~~part of this RI,~~ 68 wells at 13 subfacilities were selected by Ecology for inclusion with the sampling conducted for this RI. These 68 wells have been sampled for this investigation by SECOR, Ecology or subfacility consultants in accordance with the scope of work in the Consent Decree and Work Plan (Figure XX, Table 3). Quarterly sampling of groundwater monitoring wells installed for this RI has included sampling from the accessible, Ecology-identified groundwater monitoring wells located at each of 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.

ECOLOGY COMMENT:

Page 7: Section 3.2: RI Subfacility Locations: **a)** *Please provide a single map with all wells.* **b)** *Please provide clearer facility specific monitoring well maps, as some are not readable.*

GENERAL RESPONSE:

a) The text has been modified (see previous response). A single map showing the location of the 114 monitoring wells located on the subfacilities within the YRRA has been provided in the revised report.

b) The subfacility well location maps were obtained from Ecology files and copied for inclusion in this Draft RI Report. No clearer maps are available from the files. Redrafting or recreating these maps is a significant undertaking and is not within the Consent Decree scope of work. However,

every effort has been made to obtain better quality subfacility maps. The maps are included in Appendix XX.

ECOLOGY COMMENT:

Page 8: Item 4.2: Surface Water Hydrology: **a)** *Details about how and where the leaking canals impact the hydrogeology are needed. While the overall flow direction will continue towards the southeast, are there pockets within the YRRA that have major flow changes? Does this cause PCE to move towards users of the aquifer? A map is provided but what does it mean with regard to PCE? Does the irrigation system provide a preferential pathway? Some of the subfacilities have ditches going right through them.*

b) *Please provide hydraulic conductivity, porosity, effective porosity, pore water velocity, Darcy Velocity, and other aquifer properties that may be developed from the pump test results. Please provide the details of the pump test.*

GENERAL RESPONSE:

a) Although the evaluation of localized groundwater flow data is not required by the RI scope of work, review of the regional groundwater flow patterns and PCE data from the RI did not suggest that any particular irrigation canal was influencing the regional groundwater flow pattern or migration pathways for PCE. Section 4.2 has been modified to address this comment.

b) The RI Work Plan specified that the aquifer test be designed to evaluate the potential for groundwater migration from the shallow to the deep water-bearing zones. The approved scope of work was not designed to obtain quantitative data on aquifer properties such as hydraulic conductivity, porosity and groundwater velocity. However, these parameters have been estimated for areas of the YRRA and are discussed in Section 6.3.3 of the revised text. Table 10 of the Draft RI Report summarizes the data from the aquifer test used to develop the conclusion regarding communication between the shallow and deep water-bearing zones. The raw aquifer test data used to develop this summary can be submitted to Ecology under separate cover, if requested.

SPECIFIC RESPONSE:

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~~ During irrigation from May through October, ~~by redirecting~~ surface water is directed 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 regional surface water and depth to ~~regional~~

groundwater. However, the data collected for this RI do not suggest an effect on the regional direction of groundwater flow or groundwater gradient, as discussed in Section 6.4 of this report.

An interview with the city of Yakima Water and Irrigation Manager indicated that leakage or gain into/out of the regional irrigation system likely is occurring throughout the canal system. The water and irrigation manager stated that all of the small canals likely have some loss, but the loss from the Yakima-area irrigation system is not quantifiable. The initial intake to the Yakima area irrigation system is measured at the sources, but the flow through individual lines is not metered, so exact quantities of water gained or lost in the system can not be determined. The water and irrigation manager indicated that 10 to 15 percent loss is typical for irrigation distribution systems. The city estimated that the operational loss represents a small amount of water relative to the volume of the regional aquifer. Consequently, the loss may cause a very localized effect on groundwater flow, but would not have an effect on the regional flow direction.

A map provided by the city of Yakima showing the irrigation canal locations is included in Packet 1. The location of irrigation canals shown on this map was compared with the potentiometric maps prepared for the YRRA based on the data collected for this RI and subfacility locations. The comparison of the regional groundwater regime in the YRRA with the irrigation maps did not identify any localized effects of leaking irrigation canals or surface water drainage ditches.

Based on a comparison of water level measurement from the irrigation and non-irrigation periods, water level increases were larger in the upgradient portions of the YRRA than in the downgradient portions. However, the regional groundwater flow direction does not change from irrigation to non-irrigation periods, indicating that irrigation has little effect on direction of groundwater flow path of water, or dissimilation of PCE in groundwater, on a regional scale.

ECOLOGY COMMENT:

Page 8: Section 4.3: Regional Geology: The narrative is based on the work of Bently and Campbell, 1983. Do the well logs presented in the YRRA RI support their interpretation of the stratigraphic units?

GENERAL RESPONSE:

The text of Section 4.3 has been modified to address this comment.

SPECIFIC RESPONSE:

4.3 REGIONAL GEOLOGY

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 results of the RI, as discussed in more detail in Section 6.0 of this RI report, are consistent with the regional geology described by Bentley and Campbell (1983). The stratigraphic units are described below.

ECOLOGY COMMENT:

Page 11: Section 5.1: Pre-Field Activities: Reference to Appendix E: Sketch Maps: Please provide clear monitoring well location maps, not just field sketches.

GENERAL RESPONSE:

This comment has been addressed in this general response only (no text modification is necessary). The sketch maps provided in the RI Appendix are sufficiently clear and provide adequate detail to locate the monitoring wells at each location.

ECOLOGY COMMENT:

Page 12: Section 5.2.1: Soil Sampling and Lithologic Descriptions: a) *Was well RI-11d the only well with high PID readings?*

b) *Review of available geologic data: Please include more details regarding what was reviewed.*

GENERAL RESPONSE:

a) The text has been modified. Well RI-11d was the only well with an elevated PID reading from soil, as noted in the revised text of Section 5.2.1.

b) The text has been modified. The geologic information reviewed was referenced in the bibliography and has been incorporated into the revised text of Section 5.2.1.

SPECIFIC RESPONSE:

5.2.1 Soil Sampling and Lithologic Descriptions

(Note: 2nd Paragraph of Section)

The soils spoils 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 in any of the borings with the exception of RI-11d. The high PID readings noted on RI-11d were interpreted to be caused by water interfering with the intake of the PID. Bulk soil cutting samples were collected from the soils for analysis by USEPA Method 8010 for VOCs for waste disposal characterization, as discussed in Section 5.4 of this report. Concentrations of VOCs were not detected above the laboratory detection limits in any of the soil cuttings samples collected.

A review of available geologic and soils data from published literature, subfacility investigations, and water supply well logs (see Section 11.0 of this RI report for a detailed list of the references reviewed) 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.

ECOLOGY COMMENT:

Page 14: Item 5.3.1: Groundwater Elevation Measurements: Narrative states that the groundwater elevation was developed from the 28 SECOR wells and a single site well - for this and the PCE data we need to be presenting all information collected during the RI by both SECOR and each subfacility.

GENERAL RESPONSE:

In accordance with the scope of work defined in Exhibit B of the Consent Decree, groundwater data were collected . from the 28 new wells installed for the RI and from 15 existing subfacility wells. The subfacility wells included in the RI groundwater data collection were identified by Ecology in the Consent Decree, on Table 1 of Exhibit B. Note that two sites on Table 1, Crest Linen and Rainier Plastics, were dropped from the list of subfacilities and two sites, Adeline and Southgate Laundry, were added to the list of subfacilities at which data was to be collected. Groundwater data were collected from a total of 43 new and existing wells, as required in Exhibit B. Evaluation of groundwater elevation data from additional subfacility wells is not part of the scope of work for this RI. As such, groundwater elevation data from these wells are not included.

All of the groundwater elevations measured during the four quarters of sampling completed for the RI are included on Tables 5 and 6 of the Draft RI Report. Development of a regional groundwater gradient at

the scale of the YRRA required that an appropriate data set be selected. The clustering of numerous data points in proximity at each subfacility required averaging or some other data reduction process to generate a data set for interpreting regional groundwater gradients. SECOR elected to use the groundwater elevation data collected at each subfacility by SECOR and Ecology or the subfacility consultant for the interpretation. The groundwater elevations collected from the other subfacility wells does not alter the regional groundwater gradient maps. This is explained in more detail within the Section 5.3.1 text.

SPECIFIC RESPONSE:

5.3.1 Groundwater Elevation Measurements

SECOR measured groundwater elevations in the 28 groundwater monitoring wells installed for this RI and a single well at each of the 13 subfacilities for groundwater elevations in 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). A single well at each of the subfacilities was selected for measurement of the groundwater elevations to reduce the numerous data points clustered at each subfacility. This allowed for evaluation of the four quarters of field data collected during this RI to determine the regional groundwater gradient. Review of the data provided by Ecology and the subfacility consultants indicated that use of the groundwater elevations collected at other wells located at each subfacility does not alter the regional groundwater gradient maps developed for this RI report. The results of the groundwater elevation measurements collected by SECOR are summarized on Tables 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.

ECOLOGY COMMENT:

Page 15: Section 5.3.3: Data Validation: *If data validation is an issue then please ask us for the information. It is important that the information being utilized in this Remedial Investigation be accurate. A letter from Ecology to each subfacility will be sent requesting this information. This will be forwarded to SECOR upon our receipt of it.*

GENERAL RESPONSE:

The analytical results of split samples collected by SECOR during this RI were compared to the results of samples collected by Ecology or subfacility consultants. The consistency in the data for all split samples collected indicates confidence in the data collected by others during this RI as noted in the revisions included in Section 5.3.3.

SPECIFIC RESPONSE:

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. Not all laboratory analytical reports were provided to SECOR by ~~Ecology and/or the subfacility consultants~~ for the samples collected by others at the subfacilities; therefore, not all QA/QC information or reporting limits for the subfacility data were ~~provided~~ available for SECOR's review ~~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" and "J" qualifiers were noted on Ecology sample results reporting concentrations that were below the laboratory detection limit and were estimated. ~~Laboratory detection limits were not provided by Ecology~~. The analytical results of split samples collected by SECOR were compared with the analytical result of the samples collected by Ecology and/or subfacility consultants. The results were consistent for all of the split samples collected, which provided a level of confidence in the data collected by others during this RI. The analytical results from groundwater samples collected during this RI by Ecology and/or subfacility consultants were used as comparable data in the RI evaluation.

ECOLOGY COMMENT:

Page 16: Section 5.3.4: Aquifer Test: a) *Was the pumping test just a measurement of the screen? What does this mean? How valid is the test? What conclusions can be developed?*

b) *The RI concludes from the pump test that there is a potential for vertical communication between shallow and deep zone at RI-13 and a limited potential at RI-4. How big of a concern is this? Are there areas within the YRRA where PCE levels are high enough to make vertical migration a concern? What additional information is necessary to accurately answer this?*

GENERAL RESPONSE:

a) The text has been modified. The screen size and length at RI-13 limited the pumping rate of the test, but not the use of the data for evaluation of the potential communication between the shallow and deep water-bearing zones. The purpose of the pumping test, as defined in the approved Work Plan, was to determine whether known impacts to the shallow aquifer units can reasonably be expected to affect a deeper aquifer. The screen length and distance between midpoints for the pumped well and the observation wells were sufficient to complete this evaluation.

The aquifer test, as designed by Ecology and described in the RI Work Plan, provided qualitative data on the vertical communication between the shallow and deep water-bearing zones at the test locations. The aquifer test was not designed for determining quantitative values of aquifer

parameters. The text of Section 5.3.4 has been revised to clarify these points. A discussion of the aquifer test field procedures has been included as Appendix XX.

b) The text of Section 5.3.4 has been modified to address this comment. There would only be a risk of PCE migration to the deeper water-bearing zone in areas where PCE contamination has been confirmed in the shallow water-bearing zone. The few isolated areas where concentrations of PCE have been detected above 5.0 μg/l in the shallow water-bearing zone in the northern portion of the YRRA have PCE concentrations that are high enough that, should downward migration occur, concentrations of PCE could theoretically be detected in the deep water-bearing zone. However, the PCE results are non-detect for groundwater samples collected from the deep water-bearing zone in proximity to areas where elevated concentrations of PCE occur in the shallow water-bearing zone. This indicates that downward migration of PCE is not occurring in the northern portion of the YRRA.

There is a greater potential for vertical migration of PCE in the southern portion of the YRRA; however, there are no sources identified in this area.

The data evaluated for this RI was sufficient to address concerns about vertical migration between the shallow and deep water-bearing zones in the YRRA.

SPECIFIC RESPONSE:

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, Work Plan, and Technical Memoranda. 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 approved Work Plan ~~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 results of the aquifer tests provided sufficient information to evaluate the potential for vertical migration of groundwater from the shallow water-bearing zone to the deep water-bearing zone, as discussed in more detail below.

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 the shallow well (RI-13s) and deep well (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. Although the maximum pumping rate was limited by the well screen, the 30 gpm pumping rate was sufficient to evaluate the potential communication between the shallow water-bearing and deep water-bearing zones.

A discussion of the aquifer test field procedure is included as Appendix ZZ.

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 at the RI-4 location.

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

The intermediate depth well (RI-13i) was used as the pumped well at location RI-13. 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 potentially allow chemical 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. As discussed in more detail in Section 8.0 of this RI report, there was no evidence of PCE concentrations above 5.0 µg/l in the regional deep water-bearing zone within the YRRA other than at the Cameron Yakima Subfacility. Therefore, the hydraulic communication potential present in the vicinity of RI-13 does not appear to be of significant concern based on the location and level of PCE concentrations detected in the YRRA.

5.3.4.3 Summary of Aquifer Test Results

The results of the aquifer tests show that compared to the area near RI-4, there is a greater potential for downward migration of groundwater from the shallow water-bearing zone to the deep water-bearing zone at RI-13 where subsurface geologic conditions are similar to those in the southern portion of the YRRA. Aquifer test results at RI-4 indicate a significantly reduced potential for downward migration of groundwater at this location. The subsurface geologic conditions at RI-4 are similar to conditions observed in the northern portion of the YRRA. Therefore the aquifer test results suggest that PCE has a greater potential to migrate from the shallow water-bearing zone to the deep water-bearing zone at RI-13 and has less of a potential for downward migration at RI-4.

ECOLOGY COMMENT:

Page 17: Section 5.4: Waste Disposal: a) Soil and water from wells. Where are the sample results for waste disposed of? b) Describe the sampling program for waste designation; number of samples, test run.

GENERAL RESPONSE:

a) The sample results from soil and groundwater waste are included in Section 5.4 of the revised report.

b) The text has been modified to address this.

SPECIFIC RESPONSE:

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. The waste sampling and analysis procedures and the disposal locations selected by Ecology are described below.

Soil

Soil cuttings generated during drilling were stored in drop boxes pending transportation and disposal. Soil samples were collected from the accumulated soil at each boring. The soil waste samples were collected from the drop boxes and contained in laboratory prepared jars, sealed, and labeled immediately after sampling. The samples were stored on ice pending delivery to the laboratory for analysis. All samples were analyzed for PCE by USEPA Method 8010. A total of 15 soil samples were collected for analysis. The analytical results from the soil waste sampling are summarized in Table BB and included in Appendix YY. All of the analytical results were below the laboratory detection limits. The drill cuttings were therefore disposed of as a non-hazardous material.

A total of 6,856 tons of soil were loaded directly into drop boxes from the drilling cyclone, characterized for disposal, 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

Samples were collected from the water generated during the drilling and development of each well and during the aquifer tests. The wastewater was stored and sampled from temporary storage tanks pending disposal. The samples were collected from the storage tanks and contained in laboratory prepared jars, sealed, and labeled immediately after sampling. The wastewater samples were stored on ice pending delivery to the laboratory for analysis. All wastewater samples were analyzed for PCE by USEPA Method 8010. A total of 19 wastewater samples were collected for analysis. The analytical results of the wastewater sampling are summarized on Table BB and included in Appendix YY. All of the analytical results were below the laboratory detection limits. The wastewater was therefore disposed of as non-hazardous material.

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.

ECOLOGY COMMENT:

Page 18: Section 5.5: Aerial Photograph Review: *Include the photos reviewed. Also, why only a review back to 1977?*

GENERAL RESPONSE:

The text has been modified. The aerial photographs reviewed for the RI Report were selected based on the availability of a single flight which included the entire YRRA. In addition, the photographs selected provided the most useful information to meet the requirements of the scope of work. Section 5.5 of the Draft RI Report was revised to address the comment.

SPECIFIC RESPONSE:

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. Over eight aerial photographs were obtained from DNR for flight lines covering 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 in part on photograph availability; ~~and historical operations within the YRRA.~~ few aerial photographs that included the entire YRRA region in a single flight were available prior to 1977. In addition, because the historical operations in the area did not change significantly prior to 1977 and minimal changes occurred in area hydrologic features before that time, it was not necessary to evaluate aerial photographs prior to 1977. 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. The aerial photographs reviewed are included in Appendix XX.

ECOLOGY COMMENT:

Page 18: Section 5.6: Electronic Database: *To enable Ecology and others to review this information please provide it as part of the RI Report.*

GENERAL RESPONSE:

The electronic database has been completed. All of the data collected for this RI has been entered into a Microsoft Access database. Figures, including boring logs, have been included in CAD. The electronic data will be provided with the Final RI Report.

ECOLOGY COMMENT

Page 19: Section 6.1.2: Underground Utilities: **a)** *The RI states that underground utilities have no effect on regional groundwater drainage patterns. Please show information to support this conclusion.* **b)** *Were City of Yakima Wastewater Division staff questions about any system sampling they may undertake? They or others may have supporting information to confirm your conclusion. As with most sewer systems it is highly likely that a more detailed review will show areas where the system is either leaking or gaining significant flows.*

GENERAL RESPONSE:

a) The regional scale of the groundwater study did not identify any localized areas affected by underground utilities. Based on the results of the regional hydrogeologic analysis and the subsurface conditions within the YRRA, there is no discernible effect from leaking utilities on the regional groundwater flow. The text of Section 6.1.2 has been revised to clarify this point. Also see the response to Ecology Comment "Page 8, Item 4.2."

b) The city of Yakima and the city of Union Gap were interviewed to compile additional information on areas where the utility systems are potentially leaking or gaining significant flow. Results of the interviews indicated that the effects of any gain or loss to the shallow water-bearing zone from underground utilities are insignificant relative to the regional aquifer water volume, but that leaking utilities might have localized effects on groundwater flow in the immediate vicinity of the utility. Based on the apparent lack of any regional influences on groundwater levels shown by the RI data, regional effects of leaking utilities were not identified. The results of these discussions will be incorporated into the revised text, as appropriate. The text of Section 6.1.2 has been revised to include this information.

SPECIFIC RESPONSE:

6.1.2 Underground Utilities

SECOR reviewed utility maps for the cities of Yakima and Union Gap and compared them with the potentiometric maps for the regional groundwater regime developed from this RI. According to 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 no discernible effect on the regional shallow groundwater drainage pattern based on groundwater flow patterns observed during the four quarters of this RI. SECOR also interviewed

personnel familiar with the underground utilities of the cities of Yakima and Union Gap regarding areas where specific underground utilities potentially are leaking or gaining significant flow. No specific leaking or gaining utilities were identified by the city representatives. Sewer stubs and other subsurface utilities that enter private properties, specifically at the 13 subfacilities, may have acted as localized conduits for underground migration of surface releases of PCE. However, the regional scale of the groundwater flow regime evaluation completed for this RI did not identify any localized effect from leaking underground utilities.

Based on a comparison of the RI water level measurements taken during the irrigation and non-irrigation periods, water level increases during irrigation periods were larger in the upgradient portions of the YRRA than in the downgradient portions. However, the regional groundwater flow direction does not change from irrigation to non-irrigation periods, indicating that irrigation does not change the flow path of the water, or PCE, on a regional scale.

ECOLOGY COMMENT:

Page 19: Section 6.1.3: Surface Cover: Can you provide more details about how this may impact recharge throughout the site? Possibly an analysis regarding the percentage of impervious versus pervious surface to identify possible areas of higher recharge or discharge. Again, the purpose is to clearly understand how the PCE is behaving and what variables are influencing its behavior.

GENERAL RESPONSE:

As noted in the RI, the net evapotranspiration rate in the Yakima Valley is 38 inches per year. Direct recharge from precipitation within the YRRA would be expected to have a limited effect over a short duration (storm event) with a negligible long-term effect on groundwater flow and PCE migration. As demonstrated by the four quarterly water elevation measurements, the vertical and horizontal groundwater flow gradients did not show a regional seasonal variation. Therefore, an analysis regarding the percentage of impervious versus pervious surface is not necessary. The text of Section 6.1.3 has been revised to include a discussion of the effects of evapotranspiration in the YRRA.

SPECIFIC RESPONSE:

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.

As noted previously in this RI report, the net evapotranspiration in the YRRA is 38 inches per year. Direct recharge from precipitation within the YRRA is expected to have a limited effect over a short duration

(predominantly during storm events) with a negligible long-term effect on the regional groundwater flow and/or PCE migration. As demonstrated by the four quarterly water elevation measurements, the vertical and horizontal groundwater flow gradients did not show a regional seasonal variation. There may be a localized effect of surface water infiltration on specific subfacilities. However, as previously discussed in Sections 4.2 and 6.1.2, surface water discharge does not affect the regional direction of groundwater flow in the YRRA.

ECOLOGY COMMENT:

Page 23: Section 6.3.2.1: Shallow Water-Bearing Zone: **a)** *Anthropological Features: "Comparison of groundwater level data with irrigation canal map indicate no localized regional influence on the shallow water-bearing zone." Earlier the RI said irrigation does impact elevations. Also, what about Frank Wear Cleaners and U-Haul/Yakima Valley Spray as possible examples of how localized areas within the YRRA are impacted?* **b)** *Please show details about how the comparison was done; map layers or overlays.*

GENERAL RESPONSE:

a) As discussed earlier in this document, based on the regional groundwater study in the YRRA, there are no identifiable localized influences on the shallow water-bearing zone from specific irrigation canals. The Draft RI Report noted that irrigation affects the groundwater elevation in the YRRA on a regional scale from large-scale extraction and application of irrigation water within the valley.

b) The regional evaluation was done by comparing the area irrigation canal map with the four quarters of groundwater potentiometric surface maps developed from the four quarters of monitoring conducted for this RI. The maps are provided in the draft RI report (Figures 9 through 16 and Packet 1).

SPECIFIC RESPONSE:

6.3.2.1 Shallow Water-Bearing Zone

(Note: Fifth paragraph in Section 6.3.2.1)

Anthropical features, such as irrigation canals and buried utilities, could influence local groundwater flow conditions due to leakage, which would recharge groundwater or affect groundwater discharge from the structure. Regional groundwater potentiometric surface maps shown on Figures 9 through 16 were compared with the Irrigation Canal Map in Packet 1. The comparison of the information shown on the potentiometric surface maps with the canal locations ~~level data collected for the RI with the irrigation canal map in Packet 1~~ did not ~~indicate~~ identify regional gradient anomalies in proximity to existing canals. The results indicate that localized anthropical features do not have a ~~localized~~ regional influence on the direction or gradient of the shallow or deep water-bearing zones. However, the regional irrigation practices affect the depth to water in the shallow and deep water-bearing zones in the YRRA, as previously discussed. ~~Review of the groundwater elevation did not identify any depth to water or gradient anomalies in proximity to anthropical features.~~

6.3.3 Estimation of Aquifer Characteristics

This section provides estimate ranges for physical characteristics of the aquifer material of the shallow aquifer underlying the YRRA. Ranges for hydraulic conductivity, effective porosity, and horizontal gradient have been estimated for use in developing an estimated range for the regional groundwater flow rate. The ranges of regional groundwater flow rate have been estimated for specific areas: RI-4, RI-13, and the Cameron Yakima Subfacility. The estimated range of the regional groundwater flow rate has been incorporated into the hydrogeologic summary in Section 6.4 and used to evaluate PCE distribution in the YRRA, as discussed in Section 8.0 of this report.

Qualitative observations made during the field investigation conducted for this RI with published ranges of typical aquifer parameters have been used to develop estimated aquifer characteristics for the YRRA at RI-4 (located on the west side of the YRRA) and RI-13 (located on the east side of the YRRA). Aquifer characteristics estimated for this RI include hydraulic conductivity, which corresponds to the ability of the geologic formation to transmit groundwater; effective porosity, which is a measure of the water-bearing capacity of the aquifer material and affects the capacity for the transmission of water; and horizontal gradient. These estimated ranges have been used with Darcy's Law to calculate ranges for groundwater flow rates at RI-4, RI-13, and the Cameron Yakima Subfacility.

The following information was used to estimate the generalized aquifer characteristics:

- Visual observations of disturbed soil cuttings generated from well installations completed for this RI;

- Soil descriptions reviewed in boring logs for deep water-recovery wells installed by others in the YRRA;
- Soil descriptions from subfacility characterization reports reviewed by SECOR for this RI;
- Estimates of groundwater production rates during installation, development, and aquifer testing of the groundwater monitoring wells at RI-4 and RI-13;
- Published typical values for aquifer characteristics, including effective porosity and hydraulic conductivity, based on the observed soil types, and;
- Ranges of potentiometric surface gradients for the shallow and deep water-bearing zones defined in this RI.

The soil types described from the field observations during the installation of the wells for this RI, soil descriptions from wells installed by others, and groundwater production rates at RI-4 and RI-13 were compared to average ranges for hydraulic conductivity and effective porosity provided in Davis & De Wiest (1966). The published ranges have been used to estimate groundwater flow rates in the shallow regional aquifer in the vicinity of RI-4 and RI-13. Concentrations of PCE in the groundwater would be expected to migrate at a significantly slower rate due to the effects of natural attenuation.

A description of the estimated aquifer characteristics at the RI-4, RI-13, and Cameron Yakima Subfacility locations follows.

6.3.3.1 Estimated Aquifer Characteristics in the Vicinity of RI-4

The description of subsurface soil types within the YRRA encountered during the installation of the groundwater wells at RI-4 for this RI indicated that sand with silt occurred in the shallow water-bearing zone from the surface to 65 feet bgs and graded to primarily sand and sand with gravel in the deep water-bearing zone from 65 to 116 feet bgs. It appears that the shallow and deep water-bearing zones are segregated by an aquitard in this area.

The more fine-grained material noted from the shallow water-bearing zone likely would have a lower hydraulic conductivity than the underlying sand and sand with gravel noted in the deep water-bearing zone. The groundwater production observed during the installation of well RI-4 (noted as "abundant water production from formation") at 110 feet bgs supports the interpretation that the yield of the shallow aquifer increases with depth at this location.

Shallow Water-Bearing Zone. Based on the information available, the estimated aquifer characteristics for the shallow water-bearing zone in the vicinity of RI-4 range as shown below:

Hydraulic Conductivity, (K) in centimeters per second (cm/sec)(published ranges)

Range: 10^{-5} - 10^{-3}

Gradient,(*i*) in feet per foot (ft/ft) (RI results)

Range: 0.005 - 0.007

Effective Porosity, (n) in percent (published ranges)

Range: 0.2 - 0.3

Based on these estimated values, and using Darcy's Law, the estimated groundwater flow rate for the shallow water-bearing zone in the vicinity of RI-4 may range from less than one foot per year to several tens of feet per year.

Deep Water-Bearing Zone. Based on the information available, the estimated aquifer characteristics for the deep water-bearing zone in the vicinity of RI-4 range as shown below:

Hydraulic Conductivity, (K) cm/sec (published ranges)

Range 10^{-2} - 1

Gradient,(*i*) ft/ft (RI results)

Range: 0.004 - 0.007

Effective Porosity, n (published ranges)

Range: 0.2 - 0.3

Based on these estimated values, and using Darcy's Law, the estimated groundwater flow rate for the deep water-bearing zone in the vicinity of RI-4 may range from several hundred feet per year to several thousand feet per year.

6.3.3.2 Estimated Aquifer Characteristics in the Vicinity of RI-13

Shallow and Deep Water-Bearing Zones. The description of subsurface soil types within the YRRA encountered during the installation of the groundwater wells for this RI in the vicinity of RI-13 indicated that sand with gravel occurred from surface to 121 feet bgs. It appears that the shallow and deep water-bearing zones are not separated by and aquitard in this area. Groundwater production observed during the installation of the groundwater wells at RI-13 was very high for the entire depth of the boring which suggests that the subsurface soils are relatively homogeneous and would likely have similar hydraulic characteristics.

Based on the information available, the estimated aquifer characteristics for the shallow and deep water-bearing zones in the vicinity of RI-13 range as shown below:

Hydraulic Conductivity, (K) cm/sec (published ranges)

Range: 10^{-2} - 1

Gradient,(*i*) ft/ft (RI results)

Range: 0.004 - 0.007

Effective Porosity, (n) (published ranges)

Range: 0.2 - 0.3

Based on these estimated values, and using Darcy's Law, the estimated groundwater flow rate for the shallow and deep water-bearing zones in the vicinity of RI-13 may range from several hundred feet per year to several thousand feet per year.

6.3.3.3 Estimated Aquifer Characteristics in the Vicinity of the Cameron Yakima Subfacility

A summary of aquifer characteristics for the Yakima Gravel was complied on Table 4-2 of the Hart Crowser (1996) report prepared for the Cameron Yakima Subfacility. The aquifer characteristics provided in Hart Crowser (1996) were based on tests conducted on the Cameron Yakima Subfacility, including aquifer tests conducted by Delta (1989) and a slug test conducted by Hart Crowser (1996).

The Hart Crowser (1996) report determined that the site specific hydraulic conductivity values for the aquifer material at the Cameron Yakima Subfacility most likely range between 2 x 10^{-2} and 2 x 10^{-1} cm/sec, with a median of near 6.5 x 10^{-2} cm/sec.

6.3.3.4 Summary of Estimated Aquifer Characteristics

The results of the estimated groundwater flow rate calculated from the ranges for hydraulic conductivity and effective porosity estimated from published values, and the hydraulic gradient determined from this RI, show that the relatively high groundwater flow rate in the shallow water-bearing zone is much less at RI-4, located on the west side of the YRRA, than at RI-13, located on the east side of the RI. These results indicate that the estimated groundwater flow rate in the deep water-bearing zone is similar at both RI-4 and RI-13 and substantially higher than the estimated groundwater flow rate in the shallow water-bearing zone at RI-4. The estimated groundwater flow rate at the Cameron Yakima Subfacility also is relatively high and similar to the estimated flow rate at RI-13 for both the shallow and deep water-bearing zones.

6.4 HYDROGEOLOGIC SUMMARY

A summary of the hydrogeologic conditions of the YRRA has been developed based on research of published geologic and hydrologic information, review of groundwater monitoring and water supply well boring logs, and review of subsurface information obtained from subfacility site characterization reports, the aquifer tests conducted for this RI, and the field observations made during installation of groundwater monitoring wells for this RI. The hydrogeologic conditions are summarized below:

- The YRRA is underlain by gravelly sand/sandy gravel with discontinuous layers of cemented gravels and/or caliche.
- The gravels appear to have a predominantly high hydraulic conductivity, which varies significantly across the YRRA.
- There are two water-bearing zones within 130 feet bgs defined in this RI report.
- The shallow water-bearing zone is unconfined, with a southeast direction of horizontal flow. The horizontal gradient is slightly steeper on the northern portion of the YRRA (0.007 feet/foot) than on the southern portion (0.005 feet/foot).
- The deep water-bearing zone appears to be semi-confined in the northern portion of the YRRA and unconfined to the south, has a southeast direction of horizontal flow, has a consistent gradient (0.005 feet/foot) throughout the YRRA, and has a predominantly high hydraulic conductivity.
- The effects of seasonal variations, which include changes in irrigation, runoff, precipitation, and groundwater extraction on the shallow water-bearing zone include an increased depth to groundwater during the non-irrigation period (from 3 to 12 feet of seasonal variation). The regional gradient and direction of flow are not affected by the seasonal irrigation.
- The effects of seasonal variations, which include changes in irrigation, runoff, precipitation, and groundwater extraction on the deep water-bearing zone are not seasonally consistent across the YRRA. The deep wells located on the northern portion of the YRRA show a greater variation in elevation than the deep wells located on the southern portion. The regional gradient and direction of flow are not affected by seasonal irrigation.
- The shallow and deep water-bearing zones appear to be separated by a low permeability layer that acts as an aquitard in the northern portion of the YRRA and appear to have a higher potential for migration from the shallow to the deep water-bearing zone in the southern portion.

- The results of the RI indicate that there is an overall downward vertical gradient for groundwater in the shallow water-bearing zone to the deep water-bearing zone in the YRRA, with a greater potential in the north than the south.

- The results of the estimated groundwater flow rate calculated from the ranges for hydraulic conductivity and effective porosity estimated from published values, and the hydraulic gradient determined from this RI, show that the relatively high groundwater flow rate in the shallow water-bearing zone is much less at RI-4, located on the west side of the YRRA, than at RI-13, located on the east side of the RI. These results indicate that the estimated groundwater flow rate in the deep water-bearing zone is similar at both RI-4 and RI-13 and substantially higher than the estimated groundwater flow rate in the shallow water-bearing zone at RI-4. The estimated groundwater flow rate at the Cameron Yakima Subfacility also is relatively high and similar to the estimated flow rate at RI-13 for both the shallow and deep water-bearing zones.

ECOLOGY COMMENT:

Page 27: Section 7: Source Characterization: Please note that the 13 subfacilities were as of the time of writing the RI. Explain how the number of sites changes over time.

GENERAL RESPONSE:

A discussion of how the listed subfacilities have changed historically has been included with the revised text. The text of Section 7.0 has been revised to address this comment.

ECOLOGY COMMENT:

Page 27: Section 7.1: Subfacility Background Data: On all of these sites expand the narrative to include more than just the highest result. Explain seasonal variations, flow direction issues, PCE level fluctuations over time and space.

GENERAL RESPONSE

The revisions to Ecology's comments on Section 7.1 have been addressed below in the revised text of Section 7.0. Significant text modifications are included in the revised text and several new sections were added to the report to address Ecology's comments. To allow a clearer understanding of the flow of the revised document, the general responses to all of Ecology comments pertaining to Section 7.0 are reproduced at the start of the section and the revised Section 7.0 (the Specific Response) is subsequently reproduced in its entirety.

ECOLOGY COMMENT:

Page 27: Section 7.1.1.1: Adeline Subfacility: The property is a vacant lot. Please field check your information about this site and all others.

The narrative talks about the concentrations of PCE in groundwater but does not discuss the groundwater flow and seasonal variations at this facility. The "RI Results" section states that the maximum concentration of PCE was detected in MW-3, the downgradient well. According to the report prepared by Maxim, groundwater flow directions shift 60 degrees from an east-northeasterly direction during the winter months to southeast during the spring and summer. This trend appears to be consistent for the four quarters of sampling conducted as part of this RI. The oversimplification of subfacility conditions results in an inaccurate portrait of PCE in the YRRA. Please address this for all subfacilities.

A simple chart presenting groundwater elevation data and PCE results for the subfacility over time will help the reader to relate conditions between this and the other facilities. In the case of the Adeline discussion, the maximum groundwater concentration is presented but no discussion addresses when this was, its relation to the soil removal work that occurred, nor the potential impacts this site may be having downgradient when compared with other subfacilities. (Please conduct a similar, more detailed historic data analysis for all facilities. If the Woodward-Clyde analysis did this then it needs to be included within this document. Again our main objective is to present an accurate portrait of PCE and its behavior within the YRRA).

GENERAL RESPONSE:

The text has been modified. A table summarizing the historical and RI PCE concentrations has been prepared for the five subfacilities, including Adeline, that appear to be continuing sources of PCE to the regional groundwater in the YRRA. In addition, Table 13 has been revised to better summarize historical information regarding the subfacilities. A new table (13A) has been included to present a summary of the estimated groundwater flow direction and historical PCE concentration trends for the five subfacilities identified as continuing sources of PCE to the regional groundwater of the YRRA.

ECOLOGY COMMENT:

Page 29: Section 7.1.1.2: Agri-Tech/Yakima Steel Fabricators Subfacility: Clarify which building Agri-Tech purchased in 1989. What about the other data in the file which is not necessarily in a report format such as Ecology sampling and pre-site history information? See aforementioned bibliography.

GENERAL RESPONSE:

The text has been modified.

ECOLOGY COMMENT:

*Page 31: Section 7.1.1.3: **Burlington Northern Roundhouse Subfacility:** What information was reviewed? If a complete review was done of the YRRA files you will find this information in the YRRA Investigation of PLPs report by Ecology 1989. Also, if you are using these wells in the groundwater elevation and PCE information database then you must have found information about construction and depth, etc. In Appendix D you have provided a copy of a map depicting well locations. Source of this map? Are wells logs and such available in this same document?*

The narrative states that soil/sediment samples were taken in June 1993. The results are presented in µg/l. Is this correct or should it be µg/kg since these were soil samples?

Editorial comment: In the "RI Results" discussion there is a statement about the collection of groundwater samples from BNRR-s and BNRR-d being required by Ecology. What value does this statement add with regards to the summary of information about this facility?

GENERAL RESPONSE:

The text has been modified.

ECOLOGY COMMENT:

*Page 31: 7.1.1.4: **Cameron-Yakima, Inc. (CYI) Subfacility:** Where is the Draft RI information? Also, for all facilities, provide information aimed at giving the user a feel for the scale of the operation and hence the potential scale of contribution to the YRRA problem.*

Please be clearer about the administrative history regarding this facility. The USEPA Final Order on consent was just one of the many others that addressed CYI's problems. CYI went into bankruptcy when they determined they could not accomplish the corrective action requirements and plant upgrades necessary to receive their RCRA permit.

The wells identified as downgradient and as in the center of the property are not correct. MW-4 is right on the downgradient side of the western part of the facility and MW-101d is upgradient. MW-103d and MW-103s are downgradient wells for the first three quarters. New wells, both up- and downgradient, were installed and sampled in the fourth quarter. Some of the new ones are located further downgradient than the MW-103 pair.

GENERAL RESPONSE:

The text has been modified (see Response to Ecology Comment Section 7.1.1.1.[Adeline]).

ECOLOGY COMMENT:

*Page 35: Section 7.1.1.5: **Fifth Wheel Truck Repair/Hahn Motor Company Subfacility:** Explain that they did not do the sampling others did. This leaves a hole with regards to understanding the contribution this site made the YRRA.*

GENERAL RESPONSE:

The text has been modified and the issue addressed.

ECOLOGY COMMENT:

*Page 36: Section 7.1.1.6: **Frank Wear Cleaners Subfacility:** 1988 monitoring wells are not the current monitoring wells. Need to clarify what these were and their locations. Include narrative about treatment with ozone and what it may or may not be doing.*

GENERAL RESPONSE:

Documentation regarding the remediation system performance at Frank Wear Cleaners Subfacility was not present in the Ecology files reviewed. The historical PCE concentrations discussed in the revised text identify the sources. The wells used to collect data for this RI are identified in the text.

ECOLOGY COMMENT:

*Page 39: Section 7.1.1.8: **Nu-Way Cleaners Subfacility:** The tank located by the building was removed in 1995 or 1996. Please field check your work. Also, If a report or information was not present then ask for it. Tank removal report was and still is available (see attached bibliography).*

GENERAL RESPONSE:

The text has been modified.

ECOLOGY COMMENT:

*Page 42: Section 7.1.1.10: **Southgate Laundry Subfacility:** The facility is and has been empty during the time frame of this RI. Please correct narrative which states that "dry cleaning solvents are used..." to reflect this. Additionally, three downgradient wells? Are there seasonal variations?*

Correct units for the soil samples.

GENERAL RESPONSE:

The text has been modified.

ECOLOGY COMMENT:

Page 48: Section 7.1.1.13: U-Haul/Yakima Valley Spray Subfacility: *Again, please ask for reports and data. The site has a long history of information. Some specific comments include: Believe the auto wrecking yard was next door to U-Haul on the south. MW-12 is not located in the central portion of the property, but to the north on Nissan Motors property. U-Haul's maximum groundwater PCE hit was 34 ppb. not 32 ppb.*

Table 2, Vol. 1: U-Haul's number of permanent groundwater monitoring wells is 12, not 13. Highest PCE hit is 34 ppb, not 27 ppb.

Table 3, Vol. 1: YS-1 and YS-3 should be reversed as to up and downgradient wells.

GENERAL RESPONSE:

The text, tables, and figures have been modified.

ECOLOGY COMMENT:

Page 49: Section 7.1.2: Other Subfacilities Within YRRA: *Banks Property and Elliot Tire both have information available in files. See enclosed bibliography.*

SPECIFIC RESPONSE (Section 7.0 in entirety):

7.0 SOURCE CHARACTERIZATION

7.1 BACKGROUND

As discussed in Section 3.1, the USEPA identified concentrations of PCE above the regulatory cleanup levels in soil and groundwater in the YRRA during site inspections performed in the 1980s. Subsequent investigation work was performed in the area and PCE was identified at the Cameron Yakima Incorporated and Woods Industries Subfacilities. Based in part on these findings, USEPA in 1989 directed that a regional soil-gas survey be conducted in the YRRA. The results of the regional soil-gas survey identified four subfacilites as potential sources of PCE in the soil gas: Nu-Way Cleaners, U-Haul, Cameron Yakima Incorporated, and Woods Industries.

In 1991, Ecology notified eight facilities that they might be name as PLPs for the YRRA. The eight facilities were: Briar Development, Cameron Yakima Incorporated, Frank Wear Cleaners, Hahn Motors

Company, Nu-Way Cleaners, Paxton Sales Corporation, U-Haul, and Yakima County. In 1991, based on the results of subsequent subsurface investigations at the subfacilities, Ecology subsequently made final PLP determinations for the following subfacilities: Agri-Tech, Briar Development, Burlington Northern Railroad, Cameron Yakima Incorporated, CMX Corporation, Fifth Wheel/Hahn Motors, Frank Wear Cleaners, Nu-Way Cleaners, Paxton Sales Corporation, U-Haul, Westco Martinizing, and Yakima County. From mid-1992 to mid- 1995, Ecology issued Enforcement and Agreed Orders to seven PLPs to conduct source control remediation. The source control required for most of the subfacilities involved soil excavation. Additional investigation was required at the subfacilities to define the extend of PCE in soil and groundwater.

The list of 13 subfacilities originally included with this RI, which was a modification of the list of 13 PLPs identified in 1991, was defined on Table 1 of Exhibit B of the Consent Decree. Ecology subsequently modified the list of 13 subfacilities identified in the Consent Decree. The final list of subfacilities that are included with this RI were selected by Ecology during preparation of the YRRA RI Work Plan, based on new analytical data from the subfacilities. Ecology determined that groundwater sampling was not necessary at the Crest Linen and Rainier Plastics Subfacilities for this RI, and removed the two subfacilities from the list included in the Consent Decree. The Adeline and Southgate Subfacilities subsequently were added to the list in the Consent Decree. The final list of subfacilities included with this RI are: Adeline, Agri-Tech/Yakima Steel Fabricators, Burlington Northern Railroad Roundhouse, Cameron Yakima Incorporated, Frank Wear Cleaners, Goodwill Industries, Hahn Motors/Fifth Wheel, Nu-Way Cleaners, Paxton Sales, Southgate Laundry, U-Haul/Yakima Valley Spray, Westco Martinizing, and Woods Industries.

7.2 SUBFACILITY HISTORICAL SUMMARIES

SECOR reviewed historical information for each of the 13 subfacilities Ecology identified as part of this RI. The results of the review are summarized in Sections 7.2.1 and 7.2.2. Table 1 summarizes the 13 subfacilities identified by Ecology 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 at each subfacility. Detailed well location maps for each subfacility are shown on Figure XX and included in Appendix D.

Based on the results of the review and the YRRA RI, five of the thirteen subfacilities were identified as potential on-going sources of PCE to groundwater in the YRRA, as discussed below in Section 7.3.1. The five subfacilities that are potential on-going PCE sources are identified on Table 13. The historical summaries for these five subfacilities are included in Section 7.2.1, and include a discussion of historical and current uses of each subfacility; summaries of the spill/release history, historical and YRRA RI PCE data, and remediation history for each subfacility; a comparison of discernible trends in concentrations of PCE in groundwater; and a general discussion of TCE occurrence in groundwater at each subfacility. Tables CC through GG summarize historical groundwater data for the five subfacilities.

The historical summaries for the eight subfacilities not identified as potential on-going sources of PCE to groundwater are included in Section 7.2.2. The summaries include a discussion of historical and current uses of the subfacility; summaries of the spill/release history, historical PCE data, and remediation history at the subfacilities; and results of the YRRA RI. Some of the properties for which Ecology files were reviewed were not included with the 13 subfacilities identified by Ecology as part of the RI. The information for these other facilities within the YRRA were reviewed and discussed in Section 7.2.3.

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. 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 summaries provided below are based on the information which was included in the Ecology files reviewed.

7.2.1 Subfacilities for RI Monitoring - Properties Identified as Potential On-Going Sources of PCE to Groundwater

7.2.1.1 Adeline Subfacility

Introduction

The Adeline Subfacility is located at 16 North First Street, in the northeast portion of the YRRA (Figure 3). The subfacility is an approximately 0.5-acre site that comprises approximately two-thirds of the northeastern quadrant of the city block between Yakima Avenue and East A Street. The subfacility consists of several parcels (described as Lots 13 through 19 of Block 10, Yakima) located north of an approximately east-west trending alley and south of the Blue Banjo Tavern. The subfacility is located in an area zoned for commercial use. The subfacility currently is owned by Antonio Adeline; portions of the property have been owned by Mr. Adeline since approximately 1945. The Adeline Subfacility is currently vacant.

Summary of Information Sources

SECOR reviewed documents available in the Ecology files for the Adeline Subfacility. The information summarized below has been obtained from review of the following documents:

- 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.

- Velikanje, Moore & Shore, Inc., P.S. Letter to Ecology (Rick Roeder) Re: Response to 30-day Notice Letter Dated October 20, 1995 - Adeline Property at 16 N. First Street, Yakima, Washington. November 17, 1995.

Historical Uses

The subfacility, or portions of the subfacility, were developed by at least 1935. By 1968, structures were present on all of the lots comprising the subfacility. The subfacility lots reportedly remained fully developed until the early 1980s. Structures reportedly were demolished on Lots 16, 18, and 19 by 1982, and on Lots 13 and 14 by 1989. A mission and a tavern (operating on Lots 15 and 17) were the only structures at the subfacility in March 1995. Those remaining buildings were demolished between March 1995 and December 1997. Some portions of the subfacility that had undergone demolition subsequently were paved to create parking areas.

Historical operations at the subfacility included several restaurants (including a hotel/restaurant), a mission, several taverns, a barbershop, taxicab companies, and parking lots. Businesses that may have managed or stored PCE at the subfacility were not identified in the documents SECOR reviewed. Specific inquiries into historical hotel operations did not find evidence that laundering or dry-cleaning was performed as a tenant service.

A Phase I environmental site assessment performed for the subfacility in 1995 identified one 750-gallon heating oil UST located behind The Way mission, one of the businesses located at the subfacility. One drywell also was identified in the parking lot area in the northeast portion of the subfacility.

Current Use

The Adeline Subfacility is vacant and no buildings currently are present. The ground surface at the subfacility is grass and exposed soil.

Proximity to Irrigation Canals and/or Utilities

No irrigation canals have been identified near the Adeline Subfacility. The Adeline Subfacility was served by both city water and sewer systems prior to the demolition of the buildings. City water lines are located adjacent to the east side of the subfacility, along North First Street, and along East A Street, north of the subfacility. Sanitary sewer lines are located beneath the alleys west and south of the subfacility and beneath North First Street.

Documented and/or Potential Releases

No specific notices of releases or spills were present in the Ecology files reviewed. Reported and/or potential releases include the following.

- Maxim (1996) reported that concentrations of PCE detected in soil along the north-south alley along the west subfacility boundary and in the southwest corner of the subfacility detected during sampling in 1996 may have been the result of long-term "dumping" by off-site parties. No reports of dumping were documented in the Ecology files reviewed.

- One drywell formerly was located in the northeast portion of the subfacility. No documentation regarding historical use of the drywell was present in the Ecology files reviewed.

- Businesses that may have managed or stored hazardous material at the subfacility have not been identified; however, hotels operating at the site may have performed dry cleaning. Inquiries by others into historical hotel operations did not find evidence dry-cleaning was performed at the subfacility.

The potential releases noted above could represent historical sources of PCE to groundwater. Historical operations performed at the subfacility which used PCE were not identified in the reports SECOR reviewed.

There was no documentation of any on-going releases at the subfacility in the Ecology files reviewed. No operations currently are being performed at the Adeline Subfacility and the site is vacant.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during the period from 1995 to 1996.

Huntingdon Engineering & Environmental, Inc. Huntingdon Engineering & Environmental, Inc. (Huntingdon) conducted a Phase I Environmental Site Assessment (ESA) at the subfacility in 1995 (Huntingdon 1995a). No businesses that may have managed or stored hazardous material such as PCE at the subfacility were identified in the Phase I ESA. Huntingdon identified a 750-gallon heating oil underground storage tank (UST) located at the rear of the Way Station building (the mission) and one drywell in the parking lot north of the Way Station building. The Phase I ESA identified several automobile sales and repair facilities, service stations, and dry-cleaners at other properties in the subfacility vicinity. The Phase I ESA concluded that a subsurface investigation would be necessary to determine whether the subfacility had been impacted by the identified environmental conditions.

Huntingdon (1995b) conducted a subsurface investigation at the subfacility in 1995 to assess soils for PCE. The subsurface investigation included collecting nine soil samples at depths of 5 feet bgs from test pits excavated throughout the subfacility. One soil sample was collected from 7 feet bgs in the excavation created from the removal of the heating oil UST for VOC analysis. Sediment in the drywell also was sampled. The analytical results revealed PCE in soil samples at concentrations ranging from 0.014 to 0.203 mg/kg. The highest PCE concentrations were identified in soil at 5 feet bgs near the western subfacility boundary. Concentrations of PCE were not detected in the sediment sample collected from the drywell. Huntingdon recommended additional sampling of the subsurface soil and sampling of groundwater at the subfacility.

Maxim Technologies, Inc. Maxim Technologies, Inc. (Maxim), directed site investigation and soil remediation work at the subfacility in July 1996 (Maxim 1996). The site investigation included excavating 20 test pits, installing four monitoring wells, and collecting soil and groundwater samples. The test pits were excavated to delineate the extent of PCE in soil at the subfacility and identify potential source areas. The test pits were excavated throughout the subfacility and soil samples were collected from 4, 8, and 11 feet bgs and analyzed for VOCs. The analytical results revealed PCE in the soil samples at concentrations ranging from 0.008 to 0.130 mg/kg. The soil samples that contained concentrations of PCE were collected either from the western edge of the property or from underground utility lines on the western portion of the subfacility. The report identified the primary areas with highest PCE concentrations (up to 0.130 mg/kg at 8 feet bgs) as the subsurface soils from the southwest corner of the site. One soil sample collected in the middle of the property contained 0.014 mg/kg PCE. Maxim reported that the PCE in soil may have been the result of "dumping" by off-site parties.

Maxim (1996) installed four groundwater monitoring wells (MW-1 through MW-4) at the four corners of the subfacility in February 1996, subsequent to the soil removal performed in July 1996. The wells were installed to 30 feet bgs. Groundwater samples were collected in March and July 1996 and analyzed for selected VOCs. The analytical results of the groundwater samples are summarized on Table CC. Groundwater analytical results showed that PCE concentrations ranged from non-detect to 24 µg/l during March and July 1996. The highest concentrations of PCE were detected in well MW-4.

Local Groundwater Flow Direction

According to Maxim (1996), the irrigation system in the region influences groundwater depth and flow directions in the Yakima area. Maxim stated that the highest water levels at the subfacility occurred in the spring and summer (irrigation season) and the lowest water levels occurred in the winter (non-irrigation season).

Maxim calculated the local direction of groundwater flow at the subfacility for February, March, May, and July 1996, and for February 1997. Based on these calculations, Maxim reported that the direction of local groundwater flow at the subfacility varied seasonally. In the winter, February and March 1996, the direction of groundwater flow reportedly was primarily to the

northeast, with an east to southeast component. In the spring and summer, May and July 1996, the direction of local groundwater flow was to the southeast. Based on these data, Maxim reported that the groundwater flow direction varied 60 degrees from winter (non-irrigation season) to spring/summer (irrigation season). Maxim reported that the northeasterly groundwater flow direction was not common for the subfacility area and could be attributed to leaky sewer lines. The February 1997 direction of local groundwater flow was reported to be to the southeast, which did not confirm the northeasterly flow direction reported for February and March 1996.

The northeast to east direction of local groundwater flow noted at the subfacility in February and March 1996 is inconsistent with the southeast direction of regional groundwater flow for the YRRA determined from the results of this RI. The direction of local groundwater flow noted at the subfacility during the period from May 1996 to February 1997 is consistent with the southeast direction of regional flow for the YRRA determined for this RI.

Summary of Historical PCE Concentrations

Soil. Results of previous investigations by others indicated that concentrations of PCE up to 0.13 mg/kg were present in soil at depths of 4 to 8 feet bgs prior to remediation. The concentrations of PCE in soil remaining subsequent to remediation at the Adeline Subfacility are below the 0.5 mg/kg cleanup level for soils (Maxim 1996).

Groundwater. Historical concentrations of PCE in groundwater at the Adeline Subfacility are summarized on Table CC. Historical concentrations of PCE ranged from non-detect to 25 µg/l in the site wells.

The historical concentrations of PCE have been the highest in well MW-4, located on the southwest corner of the subfacility (see map in Appendix D), in the area where soil remediation was completed in 1996. The historical concentrations of PCE in MW-4 ranged from 8 to 25 µg/l. MW-4 is an upgradient well based on the northeast direction of local groundwater flow reported for February and March 1996. MW-4 is a cross-gradient well based on the southeast direction of local groundwater flow reported for the period May 1996 to February 1997, as well as the direction of regional groundwater flow in the YRRA regional groundwater flow.

Historical concentrations of PCE in groundwater samples collected from well MW-1, located on the northwest corner of the subfacility, have been non-detect. MW-1 is a cross-gradient well based on the northeast direction of local groundwater flow calculated in February and March 1996, but an upgradient well based on the southeast direction of local groundwater flow reported for the period May 1996 to February 1997, as well as the direction of regional groundwater flow in the YRRA regional groundwater flow, and regional groundwater flow.

Historical concentrations of PCE in groundwater samples collected from well MW-2, located on the northeast corner of the subfacility, have been non-detect. MW-2 is a downgradient well based on the northeast direction of local groundwater flow calculated in February and March 1996, but

a cross-gradient well based on the southeast direction of local groundwater flow reported for the period May 1996 to February 1997, as well as the direction of regional groundwater flow in the YRRA regional groundwater flow, and regional groundwater flow.

The historical concentrations of PCE in groundwater sample collected from MW-3, located on the southeast corner of the subfacility, have ranged from non-detect to 25 µg/l. MW-3 is a cross-gradient to downgradient well based on the northeast direction of local groundwater flow calculated in February and March 1996, but a downgradient well based on the southeast direction of local and regional groundwater flow. The concentrations of PCE in MW-4 appear to have been lower during the non-irrigation season (8-16 µg/l) than during the irrigation season (24-35 µg/l). There were no discernible differences in PCE concentrations between irrigation and non-irrigation seasons in the remaining wells on-site.

Remediation History

Source Removal and Soil Remediation. In 1996, Maxim removed soil with PCE from the southwest corner and west-central portion of the subfacility, and from the drywell area.

A total of 103 tons of PCE-contaminated soil were excavated from the southwest corner of the property. Soil was removed to depths up to 9 feet bgs and disposed of off-site. Analytical results of soil samples collected at the base of the excavation showed that residual concentrations of PCE in soil were at or below 0.08 mg/kg. The excavation was backfilled with clean pit-run material.

The west-central excavation extended to approximately 6 feet bgs. Analytical results for soil samples collected from the base of the excavation were non-detect for PCE. The soil removed from the excavation (reported as non-detect for PCE) was re-used as backfill in the excavation.

The drywell area was excavated during two rounds of excavation in August and September 1996. The final excavation in the drywell area was approximately 9.5 feet deep. Soil samples collected from the base of the drywell excavation were not analyzed for PCE. Approximately 57 tons of soil from the drywell excavation were transported off site for disposal. The excavation was backfilled with clean pit-run material.

Maxim (1996) reported that source control at the site was completed by removal of PCE-contaminated soil. However, Maxim stated that the extent of PCE contamination in soil off-site to the south and west were not known. Maxim concluded that the soils in the southwest part of the subfacility and nearby soils to the west of the subfacility were sources for the PCE concentrations in the groundwater. Maxim stated that since source control activities were successful, the local groundwater impacts would remediate naturally over time.

Groundwater Remediation. Groundwater remediation has not been conducted at the subfacility.

RI Results

Ecology collected four quarters (December 1997-September 1998) of groundwater samples from the Adeline Subfacility (MW-1 through MW-4) for this RI for analysis for PCE (Table 3). A map of the well locations is attached in Appendix D. The analytical results of the Ecology sampling have been provided for this RI and are included on Table 7 and Table CC. A split groundwater sample from MW-3 was collected by SECOR for analysis of PCE for each quarter. The results of the split sample analysis are consistent with Ecology results.

The results of the quarterly sampling and analysis conducted for this RI and reviewed by SECOR indicate that the maximum concentration of PCE in the groundwater at the subfacility was 59 µg/l in MW-4, a downgradient well located in the southwest corner of the property. The concentrations of PCE in MW-4, appear to be higher during the irrigation season (21 and 59 µg/l) than in the non-irrigation season (7.4 and 7.2 µg/l) after soil remediation had been completed. There was no discernible trend to the concentrations of PCE in groundwater samples collected for this RI when compared with the historical concentrations. The concentrations of PCE in MW-4 were lower during the non-irrigation season (7.2-7.4 µg/l) than the irrigation season (21-59 µg/l) which is consistent with the historical PCE concentrations.

Based on the results of historical PCE analysis and PCE concentrations from this RI, it appears that this subfacility is a continuing source of PCE to regional groundwater in the YRRA.

7.2.1.2 Cameron Yakima Subfacility

Introduction

The Cameron Yakima Incorporated (CYI) Subfacility consists of approximately 1.8 acres located at 1414 South First Street, in the central portion of the YRRA (Figure 3). The subfacility area is zoned for industrial and light manufacturing use. The subfacility was occupied by CYI, which operated a carbon regeneration/reactivation facility at the property starting in 1953. CYI filed for bankruptcy in 1997 and the facility has discontinued operations.

Summary of Information Sources

SECOR reviewed the documents available in the Ecology files for the subfacility. The information summarized below has been obtained from review the following documents.

- Black & Veatch Waste Management, Inc. *Draft Field Investigation Report, Cameron-Yakima, Inc. Site.* October 25, 1988.
- Delta Environmental Consultants, Inc. *Hydrogeologic Assessment.* November 9, 1989.

- Ecology. Enforcement Order No. DE 94TC-C168. March 31, 1994.
- Ecology. Enforcement Order No. DE96HW-C113. February 5, 1996.
- Ecology and Environment, Inc. *Preliminary Assessment Report, Cameron-Yakima, Inc.* June 1988.
- Ecology. *Interim Action Soil Removal Work Plan, Cameron-Yakima, Inc.* April 15, 1999.
- Hart Crowser. *Preliminary Site Assessment, Cameron Yakima, Inc.* September 28, 1993.
- Hart Crowser. *Final Facility History, Cameron Yakima, Inc.* March 9, 1995.
- Hart Crowser. *Draft Phase I Remedial Investigation Report, Cameron Yakima, Inc. Facility, Yakima, Washington.* Volume I. January 18, 1996.
- Manchester Environmental Laboratory. *Case Narrative, Cameron Yakima.* September 11, 1995.
- Manchester Environmental Laboratory. *Case Narrative, Cameron Yakima.* November 8, 1995.
- Noll Environmental, Inc. *Results of Monitoring Well Installation Work, Former Cameron-Yakima, Inc., Site, Yakima, Washington* (letter report). September 28, 1998.

Historical Uses

The subfacility vicinity reportedly was utilized as orchards prior to the 1940s. By the early 1940s, an automobile and parts and reclamation yard reportedly was operating at the subfacility. The CYI operated an activated carbon recycling business at the property beginning in 1953. Several businesses operated simultaneously at the subfacility with CYI. Northwest Chemical Company (Norkem) warehoused and distributed pesticides and fertilizers and used a building in part of the subfacility as an ammonia bottling facility from 1951 until 1959. Tri-Tech Resources, Inc., used the former Norkem ammonia plant for pyrolysis of automobile tires to carbon during the 1980s.

CYI's carbon recycling operations included regenerating granular activated carbon from air, water, and industrial process filtration systems and marketing the regenerated carbon. A majority of the saturated carbon was regenerated in high temperature furnaces and recycled.

Two spent carbon storage areas were utilized at the site. In the 1950s to 1980s, the carbon storage areas were primarily located in the eastern part of the subfacility property. By the mid- to late-1980s, hazardous waste-manifested carbon (including PCE-laden carbon) was stored in drums and other containers in the western part of the subfacility (see Subfacility Map, Appendix D).

Carbon transported to the subfacility was transferred from container to container in transfer tanks. One transfer tank, constructed in 1988, was located in the south-central part of subfacility west of the New Shanno Ditch. The 5,500 gallon transfer tank consisted of an open concrete structure with two side walls, a back wall, and a floor that sloped toward the back wall. A sump was located behind the back wall of the transfer tank and was designed to accumulate carbon and wastewater. In 1994, a new transfer tank with secondary containment was built east of old transfer tank and west of the kiln building. Both transfer tanks were used to store carbon slurries and storm water runoff accumulated from the western part of the property. Prior to 1994, carbon containers were rinsed in a concrete-lined trench located east of the old transfer tank sump. After the new transfer tank was constructed in 1994, the rinsing was performed in the secondary containment area for the 1994 transfer tank.

The kiln building was located along the south-central property boundary and housed the rotary kiln and several of the multiple hearth furnaces in which the incoming carbon was regenerated. Steam retorts apparently were present west of the kiln building during facility operations. A concrete trench for conveyance of process and storm water was located behind the kiln building and conveyed boiler blow down and storm water accumulated from the area along the south property boundary to the 1988 transfer tank sump.

Production buildings were located in the north-central portion of the property and contained two steam retorts and multiple hearth furnaces. A sump was present within the plant electrical shop that was located along the northeast property boundary. The sump reportedly was located beneath one of the multiple hearth furnaces used for reactivation of spent carbon.

From 1953 until the late 1970s, CYI marketed and regenerated carbon filters which were primarily used in fruit warehouses. In 1979, CYI began accepting and regenerating spent activated carbon which had been used to filter a wide variety of hazardous compounds, including PCE. The facility accepted PCE-saturated carbon filters from dry cleaners from 1988 to at least 1990. CYI initially operated the hazardous waste regeneration process under an exemption to the Resource Conservation and Recovery Act (RCRA). In 1983, CYI filed with USEPA Region 10 for Interim Status under RCRA. In 1987, USEPA granted CYI Interim Status retroactive to the CYI permit application submittal in May 1985.

During RCRA facility inspections of the CYI operations at the subfacility in the late 1980s and early 1990s, the USEPA identified several areas of concern, including the storage of 500, 55-gallon drums in the outdoor drum storage area of spent activated carbon that had been used to filter PCE. In addition, groundwater samples collected from monitoring wells and domestic wells located downgradient of the subfacility revealed PCE at concentrations of 15 to 80 µg/l. Based in part on this information, the USEPA required that corrective actions and facility upgrades be performed in order for CYI to receive their RCRA permit. An USEPA Final Order on Consent was initiated that required CYI to conduct an on-site field investigation of surface soil, surface water, and sediment for VOCs.

In March 1994, under an Enforcement Order from Ecology, CYI began work on an RI/FS to determine the extent of soil and groundwater contamination at the subfacility. The draft RI report (Hart Crowser 1996) identified PCE as the primary contaminant of concern or in soils and groundwater at the subfacility. Other identified contaminants of concern for groundwater and/or soil at the subfacility include VOCs other than PCE, semivolatile organic compounds, metals, chlorinated pesticides, PCBs, organophosphorus pesticides, herbicides, and dioxins. Ecology issued CYI a second Enforcement Order in January 1996, requiring completion of the RI/FS that began in 1994 (Ecology, 1996). The RI/FS begun by CYI at this subfacility was not completed.

CYI was required to close all of the above-ground RCRA units at the subfacility as part of RCRA closure. CYI determined that the corrective actions and plant upgrades required to receive their RCRA permit could not be accomplished due to financial concerns. CYI subsequently filed for bankruptcy. Therefore, all facility structures, with the exception of a multiple-hearth kiln that reportedly was never operated by CYI, were removed by Ecology by the fall of 1998.

In 1999, Ecology proposed entering into a Consent Decree with several companies identified as PLPs for the next phase of remedial work at this subfacility. The companies included in the proposed Consent Decree sent contaminated carbon to CYI for treatment. The proposed Consent Decree will provide resources for continued investigation and source removal at the subfacility. Work performed to date as part of the proposed Consent Decree includes installation of nine monitoring wells in the subfacility vicinity in August 1998 (described below).

Current Use

CYI is bankrupt and has discontinued operations at the subfacility. All above-ground structures, except for one multiple-hearth kiln, have been removed from the subfacility. The ground surface at the subfacility is paved. Ecology is proceeding with further investigation and source removal cleanup; including removal of the kiln.

Proximity to Irrigation Canals and/or Utilities

The New Shanno Ditch, an irrigation canal originally built in the 1870s, crosses the center of the subfacility. The New Shanno Ditch historically was an open canal on the subfacility but was lined with tile underground and covered within the subfacility boundaries in about 1988 (Hart Crowser 1995). The New Shanno Ditch currently crosses beneath the subfacility in a culvert, trending northwest to southeast across the approximate mid-point of the subfacility. The canal surfaces as a three-foot wide open ditch south of the property. The New Shanno Ditch extends to the south, passing through the city of Union Gap, and discharges to the Yakima River. Irrigation water, which flows generally southeast, is carried in the canal during the irrigation season for approximately six months. The New Shanno Ditch reportedly received little maintenance during the early years of use and has considerable leakage and higher quantities of spillage than normal delivery canals (Hart Crowser, 1995).

Before the New Shanno Ditch was re-routed into a below-grade culvert on the subfacility property (in about 1988), the open canal received surface water run-off from the facility during periodic flooding events. Normal storm water runoff from the subfacility was routed into catch basins that were periodically pumped into CYI's on-site water treatment system, filtered, and re-used.

The subfacility is served by city water, gas, and sanitary sewer systems. The utility corridors run along both the east and west sides of First Avenue South. The subfacility was connected to the city sanitary sewer in 1994.

Documented and/or Potential Releases

As noted above, operations at the subfacility included storage and regeneration of spent activated carbon filters which had been used for treatment of wastes containing PCE. Chemical releases reportedly have occurred at the subfacility. The following PCE-related releases and potential releases were documented in the Ecology file reviewed by SECOR:

- Spills of spent carbon reportedly occurred near the former processing building location (in the south-central part of property) in the early 1980s.

- Prior to 1988, the New Shanno Ditch was an open canal, and received surface water run-off from the facility during periodic flooding events.

- During a facility inspection in 1988, USEPA indicated that the entire property was covered with a layer of powdered charcoal and noted that about 500 drums of spent carbon containing PCE were stored improperly on pallets in the northwest corner of the property.

- A 1989 facility inspection by USEPA indicated continued improper storage of drums containing PCE-saturated carbon in the northwest property corner. Some drums reportedly were not sealed. Supersacks filled with carbon and leaking an unknown liquid also were reported in the storage area.

- A 1989 facility inspection report indicated that the old transfer tank, which historically was used to transfer spent carbon and rinse spent carbon containers, was not sealed.

The documented and potential releases noted above could be potential historical sources of PCE to groundwater.

A number of subsurface investigations have been conducted at the subfacility, as discussed in more detail below. Based on the result of the subsurface soil and groundwater sampling conducted at the subfacility during the period from 1989 to 1996, the following areas have been identified by others as sources of PCE to groundwater.

- Based on the analytical results of soil samples collected at the subfacility, the carbon storage areas located on the west side of the subfacility were identified as a potential source of PCE (Black and Veatch 1989). Concentrations of PCE exceeded 0.5 mg/kg in shallow (up to 1 foot bgs) soil in much of the west two-thirds of the subfacility due to carbon accumulating on the work surfaces before the site was paved (Hart Crowser 1996).

- Based on the analytical results of groundwater samples, the former transfer tank area and associated sump, reportedly constructed in 1988 to store and transfer carbon and associated process waters, were identified as potential sources of contamination (Hart Crowser 1996).

- A concrete trench that conveyed process water and storm water from the area around the former kiln building in the south-central portion of the property to the old transfer tank sump in the south-central part of the subfacility was identified as a potential source of contaminants (Hart Crowser 1996).

- Based on the analytical results of soil samples, a former sump located beneath one of the multiple hearth furnaces was identified as a possible source of contaminants (Hart Crowser 1996). The sump may have received process water from the carbon regeneration process. The sump was located in the northeast part of the subfacility, near the former plant electric shop.

The CYI facility is not operating and all above-ground structures except one kiln have been removed from the subfacility. PCE-contaminated soil is still present at the subfacility beneath paved areas and remains a potential source of PCE to groundwater. Ecology has prepared a work plan for further site characterization and removal and disposal of the contaminated soil currently located at the subfacility to mitigate these potential sources of PCE to groundwater (Ecology 1999). The source removal work is scheduled to be performed in 1999.

Historical Subfacility Characterization Summary

The following is a summary relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during the period of 1988 to 1998.

Black & Veatch Waste Management, Inc. In early August 1988, Black & Veatch Waste Management, Inc. (B&V) collected thirty soil samples from ten test pits from between 0.5 and 8 feet bgs (B&V 1989). Nine of the test pits were located throughout the subfacility and one test pit was located off-site south of the subfacility. Analytical results for the soil samples revealed the concentration of PCE ranging from non-detect to 170 mg/kg. The soil sample with the highest concentration of PCE was collected from the east side of the spent carbon storage area at a depth of 3 feet bgs. B&V also 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 surface water or sediment samples above the laboratory reporting limits.

Delta Environmental Consultants. Delta Environmental Consultants (Delta) advanced four soil borings at the subfacility and completed the borings as groundwater monitoring wells (MW-1 through MW-4) in August 1989. The groundwater monitoring wells were completed to depths of 22 to 23.5 feet bgs. No soil samples were collected during drilling. The analytical results of groundwater samples collected from the monitoring wells in August 1989 revealed concentrations of PCE ranging from 7.8 to 960 µg/l. The highest concentration of PCE was detected in the groundwater sample collected from monitoring well MW-4, located southeast of the transfer tank area.

Ecology &Environment. In June and July of 1989, E&E conducted a soil vapor survey at the subfacility. The results of the E&E report identified concentrations of PCE less than 1 to 2 mg/m^3 in the soil vapor samples collected throughout the subfacility. These results reportedly were lower than concentrations of PCE in soil vapor samples collected upgradient and downgradient of the subfacility (Hart Crowser 1996). Concentrations of TCE in soil vapor were detected both upgradient and downgradient of the subfacility at concentrations ranging from 4 to 18 mg/m^3.

Hart Crowser. In May 1993, Hart Crowser collected soil vapor samples from 39 soil vapor probe locations and the four pre-existing monitoring well locations on the subfacility (Hart Crowser 1993). Soil vapor samples were collected approximately two feet bgs and revealed concentrations of PCE ranging from non-detect to 26 mg/m^3. The highest concentrations of PCE were detected in the former transfer tank area.

Hart Crowser (1993) collected soil samples from five test pits to a maximum depth of 4.5 feet bgs and ten hand auger borings to between 1.5 to 4.0 feet bgs at the subfacility. 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. The maximum PCE concentration of 720 mg/kg was identified in a soil sample collected in the western portion of the subfacility, near the spent carbon storage areas. Hart Crowser reported that elevated concentrations of PCE were generally limited to the upper few feet of soil at the subfacility.

Hart Crowser (1993) collected groundwater samples from the existing groundwater monitoring wells (MW-1 through MW-4) in June 1993. The analytical results revealed PCE concentrations in groundwater samples from each well ranging from 2 to 120 µg/l. The highest concentration of PCE was detected in the groundwater sample collected from monitoring well MW-4, located downgradient of the former transfer tank area.

In 1996, Hart Crowser collected soil and groundwater samples at the subfacility as part of an RI (Hart Crowser 1996). Soil samples were collected from five test pits at depths of up to 4.5 feet bgs excavated to assess the extent of the PCE contaminated soil identified during Hart Crowser's 1993 investigation. Soil samples were collected between 2.5 and 9 feet bgs in six soil borings

advanced in the vicinity of monitoring wells MW-1 and MW-4. Soils samples were collected between 1 and 2.3 feet bgs from three hand auger borings. The highest concentrations of PCE in soil were located in two general areas: in the vicinity of the western property boundary, near the carbon storage area (with PCE concentrations up to 900 mg/kg), and in the southeastern part of the property (with PCE concentrations up to 31 mg/kg). Both areas were within a "carbon fill" area identified by Hart Crowser as having elevated PCE concentrations in shallow soil. According to Hart Crowser, the concentrations of PCE were greater than 0.5 µg/kg in the western two-thirds of the subfacility. Hart Crowser estimated 4,000 to 20,000 cubic yards of soil potentially contained concentrations of PCE.

Hart Crowser (1996) installed five wells in the upper 20 feet of the aquifer (MW-102s through MW-106s) and two wells to depths of 60 feet bgs (MW-101d and MW-103d). Groundwater samples were collected from the four existing monitoring wells (MW-1 through MW-4) and the seven new monitoring wells. Analytical results of the groundwater samples collected from the shallow groundwater monitoring wells indicated concentrations of PCE ranging from non-detect to 840 µg/l. Analytical results of the groundwater samples collected from the deep groundwater monitoring wells indicated concentrations of PCE ranging from non-detect to 6 µg/l. The highest concentration of PCE was detected in the monitoring well MW-4, a shallow well located downgradient from the former transfer tank on the south-central part of the property.

Manchester Environmental Laboratory. Ecology collected two soil samples at the subfacility in August 1995 (Manchester Environmental Laboratory [MEL], 1995). Based on the sample designations, the soil samples apparently were collected from the sidewall and floor of a sump excavation. No site plan showing sampling locations was present in the file SECOR reviewed. Analytical results for the soil samples indicated that PCE was detected at concentrations of 3.82 and 1.44 mg/kg in soil samples SUMPWAL and SUMPFLR, respectively.

Noll Environmental, Inc. In August 1998, Noll Environmental, Inc. (NEI) directed installation of nine groundwater monitoring wells (MW-107s through MW-114s and MW-113d) at the subfacility, in accordance with a work plan developed by Ecology (NEI 1998). Wells MW-107s through MW-114s were installed to approximately 30 feet bgs and well MW-113d was installed to approximately 60 feet bgs. One well (MW-107s) was installed off site, north and upgradient of the east part of the subfacility; one well (MW-108s) was installed southeast of the former gate located on the east side of the subfacility, and seven wells (MW-109s through MW-114s and MW-113d) were installed off-site, south of the subfacility. Soil and groundwater samples were not collected during the work. The wells subsequently were sampled by Ecology in September 1998. Results of the September 1998 sampling are reported in the RI results section.

Local Groundwater Flow Direction

Hart Crowser reported that the direction of local groundwater flow at the subfacility was to the east in June 1993 (Hart Crowser 1993) and to the east-southeast during the sampling in March, June, and September 1995 (Hart Crowser 1996). Based on these data, Hart Crowser (1996) reported

that the local groundwater flow direction varied seasonally at the subfacility. Hart Crowser determined that the local groundwater flow direction was due east during the winter, and to the southeast during the summer. However, the east direction of local groundwater flow identified during the June 1993 sampling event may be anomalous, since the local direction of groundwater flow in June 1995 was reported to be southeast.

The east direction of local groundwater flow in June 1993 determined by Hart Crowser is not consistent with the southeast regional groundwater flow direction in the YRRA determined for this RI. The generally southeast direction of local groundwater flow Hart Crowser identified in subsequent sampling events is consistent with regional groundwater flow as determined for this RI.

Based on the southeast direction of local groundwater flow determined by Hart Crowser during three sampling events in 1995 and the regional groundwater flow determined for this RI, MW-1, MW-106s, and MW-101d are upgradient of the west part of the subfacility. MW-107s is located upgradient of the east part of the subfacility. MW-4, MW-102s, MW-103s, and MW-103d are located immediately downgradient of the west part of the subfacility; and wells MW-108s, MW-109s, MW-110s, and MW-111s are immediately downgradient of the east part of the subfacility. Wells MW-112s, MW-113s, MW-114s, and MW-113d are located off-site to the south of the subfacility, and are the most downgradient wells from the subfacility based on the southeast direction of regional groundwater flow determined for this RI (see the subfacility map in Appendix D).

Summary of Historical PCE Concentrations

Soil. Historical analytical results for the soil samples collected across the subfacility at depths up to nine feet bgs have shown concentrations of PCE ranging from non-detect to 720 mg/kg. The maximum concentration of PCE of 720 mg/kg was detected in a soil sample collected from 1 to 1.5 feet bgs along the western portion of the subfacility, near the spent carbon storage areas.

Groundwater. The historical concentrations of PCE in the shallow (20 to 30 feet deep) subfacility wells ranged from non-detect to 960 µg/l. The highest historical concentrations of PCE were detected groundwater samples collected from MW-4, located downgradient of the former transfer tank area, where concentrations of PCE were detected in soil samples.

The historical concentrations of PCE in groundwater samples collected from the deep (approximately 60 feet deep) wells ranged from non-detect to 6 µg/l. The highest historical concentrations of PCE in the deep wells was detected a groundwater samples collected from MW-103d, located downgradient of the former transfer tank area, where concentrations of PCE were detected in soil samples.

Concentrations of PCE appeared to be lower in MW-4 and MW-102s during the non-irrigation season (MW-4, 13-320 µg/l; MW-102s, 7-11 µg/l) than during the irrigation season (MW-4,

71-160 µg/l; MW-102s, 39-67 µg/l). Both wells are located in the same vicinity of the subfacility. The concentrations of PCE did not appear to vary between seasons in the monitoring wells.

Remediation History

Source Removal and Soil Remediation. Removal of source materials and remediation of soil has occurred at the subfacility. The following remedial actions were performed:

- The in-ground transfer tank and the associated sump constructed in 1988 and surrounding soil were removed in May 1995 by Hart Crowser. The excavation was backfilled with the removed soil and capped with asphalt. The soil subsequently was re-excavated in October 1996, as described below (Ecology 1999).

- The trench located along the south-central property boundary that conveyed process water and storm water from the area south of the kiln building to the in-ground transfer tank sump also was closed by Hart Crowser in May 1995. Hart Crowser closed the trench by filling the trench with concrete.

- The sump located in the northeast part of the subfacility, beneath one of the multiple hearth furnaces, was removed by Hart Crowser in 1995. The excavation was backfilled with clean gravel and capped with concrete in May 1995. Hart Crowser reported that the excavated soil was contained and stored on-site. The documentation in the Ecology files reviewed did not indicate the final disposition of the removed soil.

- In October 1996, Ecology required that CYI remove approximately 250 cubic yards of soil in the area of the former in-ground transfer tank, sump, and process trench formerly excavated and/or closed by Hart Crowser in 1995 (Ecology 1999). The excavation was backfilled with clean gravel and the area was re-paved. The final disposition of the soil was not documented in the Ecology files reviewed. Soil samples collected from the bottom of the excavation reportedly indicated that concentrations of PCE up to 62 mg/kg were present in the remaining soil. No other sampling results were present in the Ecology files reviewed.

In 1999, Ecology prepared a work plan for soil removal at the subfacility (Ecology 1999). The purpose of the soil removal is to reduce/eliminate the quantity of material that is a continuing source of PCE to the groundwater at the subfacility. The work will include the removal and disposal of contaminated soil identified during previous subfacility investigations and the remaining multiple hearth kiln located at the subfacility. The work will include removal of an estimated 17,000 cubic yards of soil from the west part of the subfacility and 10,000 cubic yards of soil from the east part of the facility. The work plan also includes groundwater monitoring that will be performed to document groundwater contaminant concentrations prior to soil removal. The work is scheduled to be performed under Ecology's direction in 1999.

Groundwater Remediation. Groundwater remediation has not been conducted at 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 subfacility (Table 3). Eleven groundwater monitoring wells were sampled for all four quarters of sampling completed for this RI. An additional nine wells were installed off-site and adjacent to the subfacility in August 1998 and sampled during only one (September 1998) of the four quarters of sampling completed for this RI. The analytical results of the Ecology and split sampling have been provided for this RI and are included on Tables 7 and DD. A map of the well locations is attached in Appendix D. Split samples were collected by SECOR for Ecology's groundwater samples from well MW-103s (shallow water-bearing zone) and well MW-101d (deep water-bearing zone) for the four quarters of sampling, for analysis of PCE. The results of the split sample analyses are consistent with Ecology results.

The results of the RI sampling are described below. Because of the size and complexity of the subfacility and placement of the wells relative to potential PCE sources at the subfacility, the RI results for the areas west and east of the New Shanno Ditch are discussed separately, as are RI results for the off-site wells installed downgradient of the subfacility in August 1998.

West Portion of Subfacility. Shallow monitoring wells MW-1, MW-2, MW-4, and MW-102s through MW-106s and deep monitoring wells MW-101d and MW-103d are located within the western portion of the subfacility (see subfacility map in Appendix D). In the shallow wells, concentrations of PCE ranged from 0.24 to 122 µg/l during the RI. Concentrations of PCE in the shallow upgradient wells MW-1, and MW-106s, ranged from 0.24 to 27 µg/l and concentrations of PCE in the shallow downgradient wells, MW-4, MW-102s, and MW-103s, ranged from 11 to 122 during this RI. In the deep wells, concentrations of PCE in the upgradient well, MW-101d, ranged from non-detect to 20 µg/l and concentrations of PCE in the downgradient well, MW-103d, ranged from 2.6 to 5.0 µg/l.

Concentrations of PCE in groundwater samples collected from MW-4, MW-102s, and MW-103s for this RI appear to be lower than the historical concentrations for these wells. All of these wells are located downgradient of the former transformer tank where soil remediation had occurred in 1995. The concentrations of PCE in the samples collected for this RI are consistent with historical data.

East Portion of Subfacility. Shallow monitoring wells MW-3 and MW-107s through MW-111s and no deep monitoring wells are located within the eastern portion of the subfacility (see subfacility map in Appendix D). Concentrations of PCE in well MW-3, located immediately downgradient of eastern subfacility features, ranged from 6 to 9.5 µg/l during the RI. Wells MW-107s through MW-111s were installed in August 1998; therefore, only one quarter of data (September 1998) is reported. The concentration of PCE in well MW-107s, the upgradient well,

was 18 µg/l in September 1998. Concentrations of PCE in the off-site downgradient wells, MW-108s through MW-111s, ranged from 7.1 to 9.4 µg/l during this RI. The concentrations of PCE in MW-3 are consistent for irrigation and non-irrigation seasons and for the RI and historical results.

Off-site, Downgradient Wells. Shallow monitoring wells MW-112s, MW-113s, and MW-114s and deep well MW-113d are located downgradient (southeast) of the subfacility, near the New Shanno Ditch. The wells were installed in August 1998; therefore, only one quarter of data (September 1998) is reported. Concentrations of PCE in the shallow downgradient wells in this location ranged from 15 to 21 µg/l during September 1998. The concentration of PCE in the deep downgradient well in this location was 5 µg/l.

The analytical results of groundwater samples collected during this RI from the twenty on- and off-subfacility groundwater monitoring wells screened in the shallow water-bearing zone indicated that concentrations of PCE were above the 5.0 µg/l cleanup level in all of the wells sampled during the RI, with the exception of the December 1997 sample collected from MW-1 (0.24 µg/l). Off-site migration of PCE in groundwater appears to be occurring from the subfacility based on analytical results collected from off-site, downgradient groundwater monitoring wells (MW-108s through MW-114s). Concentrations of PCE above the 5.0 µg/l cleanup level have also been detected in groundwater samples collected from upgradient wells (MW-1 and MW-106s). However, the upgradient wells are located proximate to known source areas where concentrations of PCE above the regulatory cleanup levels have been detected in soil.

Therefore no discernible trends in the concentrations of PCE in groundwater samples collected for this RI when compared to historical concentrations. No trends in concentrations of PCE were discernible in groundwater samples collected before and after on-site soil remediation.

Historical PCE concentrations generally decreased at the Cameron Yakima Subfacility at wells MW-4, MW-102s, and MW-103s, all located downgradient of the former transfer tank, which was removed in 1995. There were no discernible trends in other concentrations of PCE in groundwater samples collected for this RI when compared to historical concentrations.

Based on the results of historical PCE analysis and PCE concentrations from this RI, it appears that this subfacility is a continuing source of PCE to regional groundwater in the YRRA.

7.2.1.3 Frank Wear Subfacility

Introduction

The Frank Wear Subfacility is located at 106 South Third Avenue (Figure 3), in the north-central portion of the YRRA. The area surrounding the subfacility area is utilized primarily by business. The subfacility is currently owned by Mr. Greg Stoffers. It is approximately 0.25 acres in size,

and consists of one commercial building and a detached shed. A dry-cleaning facility has operated at the subfacility since 1949.

Summary of Information Sources

SECOR reviewed documents available in the Ecology files for the Frank Wear Subfacility. The information summarized below has been obtained from review of the following documents.

- AGRA Earth and Environmental (AGRA). *Site History, Frank Wear Cleaners.* December 1994.
- AGRA Earth and Environmental. *Soil Vapor Survey.* January 1995.
- Cayuse Environmental. *Groundwater Laboratory Results.* July 12, 1996 and November 14, 1996.
- Ecology. Letter to G. Stoffers RE: Sample Results. February 5, 1990.
- Environmental Economic Solutions, Inc. *Remediation System Design.* June 1997.
- Huntingdon Engineering and Environmental Inc. *Remedial Investigation - Interim Report* May 1995.
- Maxim Technologies, Inc. *Remedial Investigation and Interim Action Remediation.* March 22, 1996.
- Science Applications International Corporation (SAIC). *Preliminary Assessment Report, Frank Wear Cleaners.* April 1989.
- URS Consultants, Inc. (URS). *Site Inspection Report for Frank Wear Cleaners.* July 1, 1994.

Historical Uses

The subfacility property was reportedly residential in 1941. A dry-cleaning establishment has operated at the subfacility property from at least 1949 to the present.

The dry-cleaning operation reportedly used solvents, including PCE, beginning in the 1970s. One 500-gallon UST that contained gasoline and one 1,000-gallon UST that contained heating oil reportedly were present west of the Frank Wear Cleaners building.

Current Use

The Frank Wear Cleaners Subfacility currently consists of an operating dry-cleaning facility with one dry cleaners building and one detached shed. A furniture refinishing business and a boat sales business are located in buildings to the south of the subfacility, in the vicinity of the off-site subfacility wells.

A Perk-Matic dry-cleaning machine currently is used at the dry cleaners. Two floor drains are located near the washing machines in the west part of the building. A sump was observed immediately west of the main building during a 1994 site visit by AGRA. The sump, which was covered by a metal lid approximately two feet in diameter, may have been installed around 1970; the sump may have been part of the overflow system for the subfacility dry cleaning machine. The sump apparently is still present on site.

Wastewater containing PCE generated during dry-cleaning activities reportedly is collected and stored in containers that are periodically collected by Safety Kleen for off-site recycling. In 1994, the owner of the dry cleaners reportedly estimated that 15 gallons of dry-cleaning waste containing up to 5 percent PCE were generated at the dry cleaning facility every two to three months, although reports of approximately 100 pounds of waste per week were present in the Ecology files.

The area surrounding the east and north sides of the buildings is paved. The area on the west side of the property, between the Frank Wear Cleaners building and the shed, is gravel. A building adjoins the Frank Wear Cleaners building to the south; the area surrounding the south-adjacent building is paved.

Proximity to Irrigation Canals and/or Utilities

No irrigation canals are located in the immediate vicinity of the subfacility. The nearest irrigation system line (the New Shanno line) runs two blocks west of the subfacility, along South Fifth Avenue.

The Frank Wear Cleaners Subfacility is served by city water and sanitary sewer systems. A sewer line is located west of the subfacility beneath the alley. A water line is located along South Third Avenue, just east of the subfacility. One storm drain reportedly is present in the parking lot north of the subfacility. Surface water reportedly is conveyed off-site and discharged to the New Shanno irrigation system lines, which include storm sewer lines in the subfacility vicinity. The wide variance in PCE concentrations noted in the historical data did not indicate a discernible trend with seasonal changes.

Documented and/or Potential Releases

Chemical spills and releases have reportedly occurred at this subfacility. The documented and potential releases reported include the following:

- During the 1970s, dry-cleaning solvent sludge containing trace amounts of PCE was reportedly used for dust abatement by spraying the PCE-containing sludge on the gravel area west of the dry cleaning building. The practice reportedly was ceased in about 1986.

- During historical dry-cleaning operations at the subfacility, the PCE-containing sludge reportedly was disposed of west of the dry-cleaning building onto the gravel parking lot. An inspection by Ecology in 1985 identified a "milky fluid" puddling behind the building. Ecology reportedly identified the material as 1,1,1-trichloroethane and not PCE.

- An inspection by Ecology in 1987 identified multiple dangerous waste violations. The analytical results of soil samples collected by Ecology from the gravel parking lot, west of the Frank Wear Cleaners building, reportedly revealed elevated concentrations of PCE.

- PCE-containing fluid reportedly was discharged periodically from a former dry-cleaning machine at the subfacility to the sump located west of the building. The fluid reportedly was discharged due to the dry-cleaning machine overflowing into an underlying catch basin that subsequently overflowed into the sump. The location of the dry-cleaner catch basin was not provided in the Ecology files reviewed.

- A ruptured sewer line was encountered on the west side of the building during soil removal by Maxim in 1995. The sewer line reportedly carried wastewater from the Frank Wear Cleaners washing machines to the sanitary sewer; no documentation of whether the wastewater contained PCE was present in the Ecology files reviewed. The sewer line was approximately seven to nine feet bgs, west of the building. No information regarding how long the line had been broken was provided.

The documented and potential releases noted above could be potential historical sources of PCE to groundwater.

No reports of any on-going releases were documented in the Ecology files reviewed; however, dry-cleaning currently is performed at the Frank Wear Cleaners Subfacility.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during the period from 1989 to 1997.

Science Applications and International Corporation (SAIC). In a preliminary assessment report, SAIC reported that Ecology collected two samples of "milky fluid" during a site inspection in 1985 (SAIC 1989). Ecology reportedly identified the material as 1,1,1-trichloroethane and not PCE. Ecology also collected soil samples from the disposal area in February 1987. Analytical

results for the samples collected in 1987 reportedly indicated concentrations of PCE in the soil; however, the laboratory data subsequently were determined to be unacceptable for use.

SAIC (1989) reported that Ecology sampled three wells off-site, downgradient of the Frank Wear Cleaners Subfacility, in August 1988. The sampling reportedly was performed to determine whether contamination had potentially occurred from Frank Wear Cleaners and whether other potential PCE sources were present. Analytical results revealed concentration of 1.3 µg/l PCE in one well, located at the Worrell Meats facility at 501 South Fifth Avenue. The SAIC report did not indicate whether the Frank Wear Subfacility was identified as the source of the contamination.

Ecology. Ecology collected soil samples from the base of two test pits located west of the dry cleaning building, where two USTs were being removed at the subfacility in November 1989 (Ecology 1990). Residual concentrations of PCE up to 10 mg/kg were detected in the soil samples collected. The information in the Ecology files reviewed did not indicate the depth of the soil samples or the fate of the soil removed during the UST removal. Ecology indicated that another soil sample had been collected at 12 feet bgs at the site under the direction of the Frank Wear Cleaners owner, and that the sample contained 3 mg/kg PCE. No other documentation regarding this sample was present in the Ecology files reviewed. However, URS (1994) reported that two soil samples were collected at the subfacility by PLSA in 1989. The soil samples were collected from 6 feet bgs in the area where dry-cleaning sludge had been dumped west of the dry cleaner building. Concentrations of PCE in the two samples were 3 and 0.63 mg/kg.

URS Consultants, Inc. (URS). URS conducted a site inspection and file review of the subfacility for the USEPA in 1994. URS reported that PLSA Engineering and Surveying Company collected and analyzed two soil samples west of the building, in the vicinity of the historical sludge disposal area west of the dry cleaner building. The soil samples reportedly were collected from 6 feet bgs. Concentrations of PCE up to 3 mg/kg were reportedly detected in the analyzed soil samples.

AGRA Earth and Environmental (AGRA). AGRA performed a soil-vapor survey at the subfacility in 1994 (AGRA 1995). Twenty-five soil-vapor samples were collected below the concrete floor of the building and outside the building. Concentrations of soil-vapor PCE were detected in all the samples collected, at concentrations ranging from 7 to 727 mg/m^3. The highest soil-vapor concentrations were located outside, along the north wall of the building.

Maxim Technologies. Maxim (formerly Huntingdon) performed an RI at the subfacility in 1995 (Maxim 1996). The RI work included: installing four groundwater monitoring wells to a depth of 35 feet bgs on- and off-site to the north, west, east, and south of the subfacility building; excavating 11 test pits on- and off-site to the north, northeast, and west of the building; advancing 19 boreholes beneath the building; advancing 10 boreholes beneath the shed; and collecting groundwater and soil samples.

The test pit soil samples were collected between 0.5 and 12 feet bgs (Maxim 1996). Analytical results indicated that concentrations of PCE ranged from non-detect to 1,260 mg/kg in soil

collected from test pits outside the building. Beneath the Frank Wear Cleaners building, borehole samples were collected between 1 and 6 feet bgs. Soil samples collected from at 1 foot bgs beneath a floor drain near the washing machines indicated concentrations of PCE ranging from 0.14 to 0.62 mg/kg; the highest concentration of PCE (1.81 mg/kg) was detected in a soil sample from a borehole located near the dry-cleaning machine. In the shed, soil samples were collected between 1 and 4 feet bgs. Only one soil sample, collected at 3 feet bgs in the northeast corner of the shed, contained PCE (0.08 mg/kg).

In September 1995, Maxim collected soil samples from an excavation located west of the building (Maxim 1996). Concentrations of PCE ranged from non-detect to 0.19 mg/kg in soil samples collected from the excavation. Soil samples collected at the base of the excavation did not contain measurable concentrations of PCE.

Maxim installed monitoring wells MW-1 and MW-2 east and west of the Frank Wear Cleaners building, respectively (Maxim 1996). Monitoring wells MW-3 and MW-4 were installed off-site to the south (south of the Min Tie Boat building along West Walnut Street). Groundwater samples were collected from each of the four monitoring wells in February, April, September, and December 1995. The concentrations of PCE during the historical sampling period ranged from 23.9 to 1,140 µg/l in the groundwater samples collected from MW-1, located near the northeast corner of the property; 8.8 to 605.0 µg/l in the groundwater samples collected from MW-2, located near the northwest corner of the property; 5.0 to 1,080.0 µg/l in the groundwater samples collected from MW-3, located near the southwest corner of the property; and 1.7 to 332.0 µg/l from the groundwater samples collected from MW- 4, located near the southeast corner of the property. Groundwater well locations are shown on the subfacility map in Appendix D. The analytical results from groundwater samples collected at the subfacility are summarized on Table EE.

Cayuse Environmental. Cayuse Environmental sampled groundwater in wells MW-1 through MW-4 in July (Cayuse Environmental 1996a) and November 1996 (Cayuse Environmental 1996b). Concentrations of PCE in the wells ranged from 16 to 61 µg/l in July 1996 and from 18 to 214 µg/l in November 1996. The highest concentrations of PCE were detected in well MW-1 (61 µg/l) in July 1996 and in well MW-4 (214 µg/l) in November 1996. The analytical results from groundwater samples collected at the subfacility are summarized on Table EE.

Environmental Economic Solutions, Inc. (EES). In June 1997, EES installed one off-site monitoring well (MW-5) northeast of the site and one sparge testing well (SP-1) next to the shed, near MW-2 (EES 1997). Concentrations of PCE were detected in soil from boring MW-5 at 13 feet bgs (0.053 mg/kg) and soil from boring SP-1 at 7 and 14 feet bgs (0.74 and 0.24 mg/kg, respectively).

EES collected groundwater samples from the new and existing subfacility wells in June 1997 (EES 1997). Concentrations of PCE ranged from 7.4 to 110 µg/l in groundwater. The highest

concentrations were detected in well MW-1. Results of the groundwater sampling are summarized on Table EE.

Local Groundwater Flow Direction

The direction of local groundwater flow at the subfacility varies from south to east based on data reported by others. Maxim (1996) reported that the direction of local groundwater flow was to the south during February and December 1995 and to the southeast in April and September 1995. EES (1997) reported that the local direction of groundwater flow was to the east-southeast in September 1997. Based on these flow direction calculations, Maxim (1996) concluded that local groundwater flow ranged from south to east during the year, with a more easterly component of flow in the winter months. EES (1997) reported that local groundwater flow direction varied from south-southeast during the fall and winter to east-southeast during the spring and summer. Maxim attributed the groundwater flow direction change to the fluctuating irrigation system levels, which change noticeably during the summer months. Maxim reported that the east groundwater flow direction is not common for the area and could be attributed to influences from regional irrigation practices.

The south and east directions of local groundwater flow at the subfacility reported by Maxim (1996) for the February and December 1995 were somewhat inconsistent with the southeast direction of regional groundwater flow for the YRRA determined for this RI. The southeast direction of local groundwater flow for the subfacility reported by Maxim (1996) for April and September 1996 and the east-southeast to south-southeast local flow reported by EES (1997) were generally consistent with the southeast direction of regional groundwater flow for the YRRA determined for this RI.

Summary of Historical PCE Concentrations

Soil. PCE at concentrations up to 10 mg/kg were detected in soil samples collected by Ecology in November 1989. The samples were collected from test pits located west of the dry-cleaning building, during the UST removal at the subfacility. PCE at concentrations up to 3 mg/kg were detected in soil samples collected by PLSA in 1989, in the area where dry-cleaning sludge reportedly was dumped. Soil samples collected by Maxim in 1995 indicated that PCE was detected in soil outside the dry-cleaning building at concentrations up to 1,260 mg/kg and beneath a floor drain inside of the building at concentrations up to 0.62 mg/kg. Soil samples collected by EES during installation of MW-5 and SP-1 indicated concentrations of PCE up to 0.74 mg/kg in soil collected from the borings.

Groundwater. The historical concentrations of PCE in groundwater at the subfacility are shown on Table EE. Historical concentrations of PCE ranged from 1.7 to 1,140 µg/l in the subfacility wells. The highest historical concentration of PCE (1,140 µg/l) was detected in groundwater from well MW-1 in April 1995.

In well MW-1, located on the northeast side of the property, directly east of the Frank Wear Cleaner building, concentrations of PCE ranged from 18 to 1,140 µg/l. The historical concentrations of PCE in groundwater in MW-2, located on the northwest side of the property, directly west of the Frank Wear Cleaners building, ranged from 8.8 to 210 µg/l. MW-2 is located west of the former UST location. The historical concentrations of PCE in groundwater in MW-3, located off the property to the southwest ranged from 5 to 1,080 µg/l. The historical concentrations of PCE in groundwater in MW-4, located off the property to the southeast, ranged from 1.7 to 332 µg/l. MW-4 is located on the northwest corner of South 33rd Avenue and West Walnut Street. Monitoring well MW-5 is located off-site. Only one round of groundwater sampling was conducted prior to this RI. The concentration of PCE was 7.4 µg/l for the groundwater sample.

Based on the fluctuating local groundwater flow directions reported by others, well MW-5 is the most upgradient well at the subfacility and there is no consistent downgradient monitoring well at the subfacility. Wells MW-3 and MW-4 are generally downgradient when groundwater flow is to the south, well MW-1 is downgradient when groundwater flow is to the east, and well MW-4 is downgradient when groundwater flow is to the southeast.

Both Maxim (1996) and EES (1997) reported a correlation between the contaminant fluctuations and the change in groundwater flow direction at the subfacility. Maxim reported that PCE concentrations were higher in MW-2 and MW-3 when flow directions were southerly and in MW-1 when flow directions were easterly. EES reported that elevated PCE concentrations in MW-1 during June 1997 likely were attributable to the seasonal groundwater flow to the east (towards MW-1). Maxim also noted that PCE concentration fluctuations may be influenced by dilution due to irrigation system loss in the subfacility vicinity.

Remediation History

Source Removal and Soil Remediation. Soil reportedly was excavated at the subfacility during UST removal in 1989. Ecology reportedly collected two soil samples from the base of the UST excavations and identified concentrations of PCE up to 10 mg/kg. No other information pertaining to soil removed during the UST decommissioning was present in the Ecology files reviewed.

In September 1995, Maxim removed approximately 610 tons of soil from the subfacility during remedial activity west of the building. Soil samples collected at the base of the excavation did not contain measurable concentrations of PCE. Approximately 300 tons of removed soil was determined to be clean and used as backfill. The remaining soil was transported off-site for disposal.

Groundwater Remediation. In March 1997, Environmental Economic Solutions, Inc., proposed using ozone sparging to remediate solvent-contaminated groundwater at the subfacility (EES 1997). One sparge testing well was installed by EES at the subfacility in 1997. According to Ecology, the system was installed at the subfacility in 1998 and has been operating sporadically.

No other information regarding system installation or remediation results was present in the Ecology files reviewed.

RI Results

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 results of the split sample analyses collected by SECOR are consistent with Sage's results.

The results of the quarterly sampling and analysis conducted for this RI indicate that the maximum concentration of PCE in the groundwater at the subfacility was 1,100 µg/l in MW-4 (Table 7). Concentrations of PCE exceeded the 5.0 µg/l cleanup level in all of the wells sampled for all four quarters of this RI. The off-site upgradient well, MW-5, contained concentrations of PCE up to 390 µg/l.

The comparison of the RI results with the historical results did not define a discernible trend to PCE concentrations in groundwater samples collected before and after the soil and/or groundwater remediation completed at the subfacility. The highest concentration of PCE (1,140 µg/l) was detected in groundwater from well MW-1 in April 1995, after UST removal was performed in 1989, prior to soil remediation performed west of the subfacility building in 1996, and prior to groundwater remediation at the subfacility. However, concentrations of PCE continued to range up to 1,100 µg/l in MW-4 in groundwater samples collected for this RI.

Based on the results of historical PCE analysis and PCE concentrations from this RI, it appears that this subfacility is a continuing source of PCE to regional groundwater in the YRRA.

7.2.1.4 Goodwill Industries Subfacility

Introduction

The Goodwill Industries Subfacility is located at 222 South Third Street, near the intersection of South Third Street and East Spruce Street, in the northeast portion of the YRRA (Figure 3). The subfacility is 0.86-acres in size, and is located in an area zoned for commercial use. The Goodwill Industries Subfacility was occupied by the Goodwill Industries building until 1994, when the building and the entire city block was demolished to construct the Yakima Police Station and Legal Center.

Summary of Information Sources

SECOR reviewed the documents available in the Ecology files for the Goodwill Subfacility. The information summarized below has been obtained from review of the following documents.

- 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.
- Huntingdon Engineering and Environmental, Inc. Letter to the city of Yakima (R.L. Paolella) regarding groundwater monitoring at former Yakima Goodwill Industries Site. April 29, 1995.

Historical Use

The Goodwill Subfacility was developed in the early 1940s with a 19,250 square-foot building. The building was bounded by South Third Street to the east, East Spruce Street to the south, and an alley and Buick automobile facility to the west. The Buick automobile facility reportedly was contaminated; however, information regarding the nature and extent of the contamination was not present in the Ecology files reviewed. The information reviewed did not indicate the occupant of the area north of the building.

The building at the Goodwill Subfacility was used by several automobile dealerships between 1942 and 1964. After 1964, the building was occupied by Goodwill Industries, which used the building as a retail store and training center for the physically challenged. The building was demolished in October 1994 and replaced with the Yakima Police Station and Legal Center building. The northeast part of the new building and associated parking area are located on the site of the former Goodwill Industries building.

PCE reportedly was used historically at the subfacility as a de-greaser and/or dry-cleaning solvent. A grated sump, which may have discharged water to the sanitary sewer or a drywell, reportedly was located in the northwest part of the building, in the former Goodwill Industries retail store's production area. The sump may have been located beneath a vehicle wash rack when the facility was used an automobile dealership. The automobile dealership also performed repair and painting work. A dry-cleaning machine was located in the Goodwill Industries retail store laundry area between 1972 and 1989. Water vapor condensate drains from the dry-cleaning machine were located in the floor at the laundry area. The building facilities, presumably including the sump and

floor drain, were removed during building demolition in 1994. A 500-to 1,000-gallon UST that reportedly contained gasoline was removed from the subfacility in 1991.

Current Uses

The Yakima Police Station and Legal Center now occupies the site of the former Goodwill Industries building and the adjoining properties. The Yakima Police Station and Legal Center consists of one large building that houses offices and a detention facility. A paved parking area and grass-covered lawn are located along the east and northeast sides of the building, in the approximate location of the east side of the former Goodwill Industries building.

Proximity to Irrigation Canals and/or Utilities

No irrigation canals are located proximate to the subfacility. The subfacility has water, sanitary sewer, electricity, and natural gas provided by the city. The utility lines are located immediately east of the subfacility along South Third Street.

Documented and/or Potential Release History

No specific notices of releases or spills were present in the Ecology files reviewed. Reported and/or potential PCE releases at the subfacility include the following.

Several floor drains and one sump were located within the building prior to construction of the existing Police and Legal Center. The floor drains and sumps were located proximate to equipment wash areas and dry cleaning machines which potentially utilized PCE. The wastewater captured by the floor drains and sumps reportedly may have discharged to the sanitary sewer or a drywell; however, no documentation regarding a on-site drywell was present in the Ecology files reviewed. Occasional upsets or improper wastewater disposal practices may have released wastewater with PCE to the floor drains and sumps. This could represent a potential historical source of PCE to groundwater.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during 1994 and 1995.

Huntingdon Engineering and Environmental, Inc. (Huntingdon). Huntingdon conducted a subsurface investigation to assess soil and groundwater conditions at the subfacility in 1994, prior to demolition of the building (Huntingdon 1994a). Huntingdon advanced one boring beneath the on-site sump and three borings in the area of the former dry-cleaning machine. Concentrations of PCE were detected at 3.3 mg/kg and 0.010 mg/kg in soil samples collected from the sump and dry cleaner areas, respectively.

Huntingdon installed two monitoring wells at the subfacility in April 1994 (Huntingdon 1994b). Well MW-1 was installed north of the Goodwill Industries building near the location of the former UST, and well MW-2 was located south of the building. The wells were installed to approximately 23 feet bgs. Huntingdon collected a groundwater sample from well MW-1 in April 1994. A concentration of 46.0 µg/l PCE was detected in the sampled groundwater. In May 1994, Huntingdon collected groundwater from the new wells and from three existing monitoring wells (LW-1, LW-3 and LW-4) located off-site in an alley west and northwest of the building. The off-site wells apparently were installed by Landau Associates, Inc., as part of investigation work performed at the Buick automobile facility located west of the Goodwill Industries building. The analytical results for groundwater samples collected from MW-1 and MW-2 revealed PCE at concentrations of 12 and 14 µg/l, respectively. Concentrations of PCE were not detected above the laboratory reporting limits in groundwater samples collected from LW-1, LW-3 and LW-4.

Huntingdon (1995a) conducted soil sampling at the property during the demolition of the Goodwill Industries building in 1994. Soil samples were collected at depths up to 14.5 feet bgs in the excavation. Analytical results indicated PCE concentrations ranging from non-detect to 5.15 mg/kg of soil samples collected from the base of the excavation. The highest PCE concentrations were identified in soil samples collected near the sump that was located in the former Goodwill Industries building. Off-site wells LW-1 and LW-4 installed at the west-adjacent property reportedly were abandoned during construction activities. Huntingdon also collected groundwater samples from on-site wells MW-1 and MW-2 and off-site well LW-3 in October and December 1994. Concentrations of PCE ranged from 4.0 to 10.0 µg/l in wells MW-1 and MW-2. The groundwater samples collected from well LW-3 were non-detect for PCE.

According to Ecology, by February 1995 two additional groundwater monitoring wells reportedly had been installed at the subfacility. One well, initially designated HW-1, was installed along the east side of the former Goodwill Industries building location, and one well, initially designated HW-4, was installed near the northeast corner of the former Goodwill Industries building location. No other information regarding construction of the wells was present in the Ecology files reviewed. According to Ecology, Wells HW-1 and HW-4 were subsequently re-designated MW-3 and MW-4, respectively.

Huntingdon (1995b) collected groundwater samples from the four existing on-site wells and one off-site well (LW-3) associated with the west-adjacent property in February 1995 and April 1995. Concentrations of PCE ranged from 1.5 to 18.1 µg/l in groundwater collected from the on-site wells and from 0.6 to 1.3 in groundwater collected from off-site well LW-3.

Local Groundwater Flow Direction

The direction of local groundwater flow at the Goodwill Subfacility reportedly was to the east during monitoring conducted by Huntingdon during the period from May 1994 to April 1995. This flow direction is not consistent with the southeast regional groundwater flow direction determined for the YRRA during this RI.

Summary of Historical PCE Concentrations

Soil. One soil sample collected beneath the former on-site sump and one soil sample collected beneath the area of the former dry cleaning machine contained PCE at concentrations of 3.3 mg/kg and 0.010 mg/kg, respectively. Soil samples collected from up to 14.5 feet bgs in the base of the soil remediation excavation at the subfacility contained concentrations of PCE ranging from non-detect to 5.15 mg/kg.

Groundwater. Historical concentrations of PCE in groundwater samples collected from MW-1, located on the northeast side of the subfacility, upgradient of the former Goodwill Industries building, ranged from 4 to 12 µg/l for the three rounds of groundwater samples collected in 1994 (Table FF). Historical concentrations of PCE in groundwater samples collected from MW-2, located on the south side of the subfacility, downgradient of the former Goodwill Industries building, ranged from 8.3 to 46 µg/l for the six rounds of groundwater samples collected in 1994 and 1995(Table FF).

Groundwater samples were collected once, in May 1994, from wells LW-1 and LW-4, and five times during 1994 and 1995 from well LW-3. These groundwater monitoring wells were located west and upgradient of the Goodwill Industries building. Concentrations of PCE were not detected in wells LW-1 and LW-4, and ranged from non-detect to 1.3 µg/l in well LW-3. The wells were abandoned prior to the sampling conducted for this RI.

Groundwater samples were collected from MW-3/HW-1 and MW-4/HW-4 twice prior to this RI, in February and April 1995. Concentrations of PCE were 5.6 and 3.8 µg/l in well MW-3 and 4.7 and 1.5 µg/l in well MW-4 during the February and April 1995 sampling rounds, respectively.

Remediation History

Source Removal and Soil Remediation. Soil remediation was performed during demolition of the Goodwill Industries building in 1994. Soil was excavated in the northeast part of the former building until groundwater was encountered at a depth of approximately 14 feet bgs. The sump and floor drains were removed during the excavation work. The excavated soil was transported off-site for disposal at a landfill; however, the volume of soil transported was not reported. The excavation was backfilled with clean fill during construction of the new Police Station and Legal Center building.

Groundwater Remediation. No groundwater remediation has been performed at the Goodwill Subfacility.

RI Results

Ecology has collected four quarters (December 1997-September 1998) of groundwater samples from the Goodwill Subfacility for this RI for analysis of 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 results of the split sample analyses are consistent with Ecology results.

The analytical results of the quarterly groundwater samples collected at this subfacility during this RI indicate that the maximum concentration of PCE in groundwater was 99 µg/l in MW-4, located on the east side of the property (Appendix D, Table 7). The well is located in a crossgradient direction from the laundry area of the former Goodwill Industries building. The concentrations of PCE in groundwater samples collected from MW-1, the upgradient well, and MW-2, the downgradient well, appear to have decreased relative to the historical results reported for groundwater samples collected in 1994 and 1995. Concentrations of PCE were consistently above the 5.0 µg/l cleanup level for samples collected for this RI in MW-2 and MW-4 during this RI.

Based on the results of historical PCE analysis and PCE concentrations from this RI, it appears that this subfacility is a continuing source of PCE to regional groundwater in the YRRA.

7.2.1.5 Southgate Laundry Subfacility

Introduction

The Southgate Laundry Subfacility is located at 1020 South Third Avenue, in the west-central portion of the YRRA (Figure 3). The subfacility property currently is owned by the Noel Corporation and consists of several businesses that occupy the 4.5-acre Southgate Shopping Center. The vicinity of the subfacility is used for commercial purposes along Nob Hill Boulevard and for residential purposes along South Third Avenue. The shopping center was constructed in 1978. Southgate Laundry was located in the shopping center. The Southgate Laundry operated at the subfacility from 1978 to 1997 and is currently not in operation.

Summary of Information Sources

SECOR reviewed documents available in the Ecology files for the Southgate Laundry Subfacility. The information summarized below has been obtained from review of the following documents.

- Ecology and Environment, Inc. Memorandum to USEPA, Region 10, regarding Site Inspection Summary and EPA Form 2070-13. November 29, 1989.
- Manchester Environmental Laboratory. Case Narrative, Southgate/ YRRA. July 28, 1994.
- 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 1997.

- Maxim Technologies, Inc. *Yakima Railroad Area Remedial Investigation, Interim Action Soil Removal/Groundwater Investigation, Southgate Laundry*. January 1998.

Historical Uses

The Southgate Laundry Subfacility was located within a residential area prior to construction of the Southgate Shopping Center in 1978. The Southgate Laundry was a coin-op laundry and a dry-cleaning service that operated in the shopping center from the time of construction of the facility to 1997.

Two dry-cleaning machines were used at the Southgate Laundry. The dry cleaning machines were set in sumps in the concrete building floor. One self-service dry cleaning machines also was used at the subfacility during the first few years of operation. Dry cleaning solvents, including PCE, were used at the laundry. A 110-gallon UST, reportedly used for PCE storage until approximately 1991, was located at the rear of the laundry. Solvents also were stored in a 55-gallon drum located inside the laundry building without containment. After approximately 1991, dry cleaning solvents were purchased in one and two gallon containers and stored inside the facility. A drywell used for disposal of storm water by infiltration reportedly was located approximately 50 feet west of the Southgate Laundry building in the parking area.

Approximately 400 gallons of PCE were used per year at the Southgate Laundry. Historically, wastes generated per year at the Southgate Laundry reportedly included approximately 18 to 20 spent filters used in the dry cleaning process and approximately three gallons of wastewater separated from the reclaimed PCE. The spent filters were disposed of into the municipal trash containers. The wastewater separated from the reclaimed PCE was collected and disposed of in the city sewer system.

Current Use

The Southgate Laundry Subfacility is currently occupied by the Southgate Shopping Center, which houses a grocery store and various other operating retail facilities. The Southgate Laundry is one unit within the Southgate Shopping Center; the laundry is not currently operating and the facility has been vacant since June 1997. The ground surface in the vicinity of the Southgate Laundry Subfacility is paved, with the exception of a dirt-covered area near the alley immediately west of the shopping center property.

Proximity to Irrigation Canals and/or Utilities

Maxim (1996) reported that an irrigation canal was located on the east side of the property in the 1920s; however, no open canal is currently present. The Broadgauge Canal apparently runs in

the subsurface along the west side of South Third Avenue, based on irrigation system maps of the area. Maxim (1998) noted that remedial excavation conducted in 1997 was abandoned at 4.5 feet bgs due to the presence of a subsurface irrigation line. Maxim did not indicate whether the line was active.

The Southgate Subfacility is served by city water and sanitary sewer systems. Underground utility corridors are located along West Nob Hill Boulevard and South Third Avenue. Utility corridors reportedly are also located in the subsurface beneath the Southgate Laundry building and in the parking lot in front of the facility. Maxim (1996) reported that the utilities located beneath the laundry building may have acted as potential migration routes for PCE to shallow groundwater.

Documented and/or Potential Releases

Chemical spills and releases have reportedly occurred at this subfacility. The documented and potential releases reported include:

- A five- to 10-gallon release of PCE reportedly occurred at the self-serve dry-cleaning machines inside the Southgate Laundry building in 1978.
- A 55-gallon drum that stored PCE in the Southgate Laundry building was covered by a loose-fitting lid and had no spill containment.
- Spent carbon filters for reclaiming PCE were disposed of in the municipal trash. Waste water that was separated from the reclaimed PCE was directed to the city sewer system with no analysis for PCE content.
- A 110-gallon UST containing PCE reportedly was located at the rear of the subfacility.
- Improper discharge of waste may have occurred into the drywell located outside the laundry facility to the west.

The documented and potential releases noted above may represent potential historical sources of PCE to groundwater.

No documentation of any on-going releases at the subfacility was present in the Ecology files reviewed. No operations currently are performed at the Southgate Laundry, and the building is vacant.

Historical Subfacility Characterization Summary

Specific operations at the subfacility which could have been a source of PCE were not identified in the file reviewed.

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports and documents prepared by others during the period from 1994 to 1998.

Ecology. Ecology collected soil samples at the subfacility in November 1992, according to Maxim (1996). No analytical results associated with the November 1992 sampling were present in the Ecology file reviewed by SECOR. Ecology issued a Notice of Potential Liability for the Release of Hazardous Substances to the site owner in 1992, based on the results of the sampling. Ecology performed additional soil sampling at the Southgate Laundry Subfacility in May 1994 (Manchester Environmental Laboratory, 1994). No information regarding soil sampling locations was present in the Ecology files reviewed. Analytical results indicated that concentrations of PCE ranging from 0.192 to 2.3 mg/kg were detected in the five soil samples collected. Ecology re-issued the Notice of Potential Liability for the Release of Hazardous Substances to the site owner based on the analytical results for soil samples collected in 1994. Ecology subsequently issued an Agreed Order to conduct an RI at the subfacility in January 1996.

Maxim Technologies, Inc. Maxim Technologies, Inc.(Maxim) collected a total of 11 soil and 11 soil vapor samples beneath and adjacent to the Southgate Laundry Subfacility in March 1996 (Maxim, 1996). The soil and soil vapor samples were collected at depths ranging from 0.5 to 8.5 feet bgs. Six soil and six soil vapor samples were collected from inside the laundry building; three soil and three soil vapor samples were collected from the parking lot area outside the laundry building; one soil and one soil vapor sample were collected from the sidewalk east of the laundry building; and one soil and one soil vapor sample were collected as background samples approximately 45 feet west of the laundry building.

The analytical results for the soil vapor samples revealed PCE at concentrations ranging from 1.33 to 923.41 mg/m^3 (Maxim 1996). The soil vapor sample containing the highest concentration of PCE was collected under the concrete floor slab beneath the subfacility. The soil vapor samples containing the lowest concentrations of PCE were detected in the samples collected from the parking lot areas surrounding the Southgate Laundry.

The analytical results for the soil samples revealed PCE at concentrations ranging from 0.11 to 3.99 mg/kg (Maxim 1996). The soil sample containing the highest concentration of PCE was collected beneath the middle of the laundry building, 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 release reportedly had occurred. The Maxim (1966) report did not clearly specify the location of the release; however, it appeared based on a site plan provided that the release occurred near the southeast corner inside the laundry facility. The soil samples containing the lowest PCE concentrations were collected from the parking lot areas surrounding the building.

Maxim directed the installation of four groundwater monitoring wells (MW-1 through MW-4) at the subfacility in April 1996 (Maxim, 1997). The wells were installed to 45 feet bgs. Maxim

collected groundwater samples during April 1996, July 1996, October 1996, and February 1997. The analytical results are summarized on Table GG. Concentrations of PCE were detected in all the site wells during the period sampled; concentrations ranged from non-detect to 107 µg/l. Concentrations of PCE ranged from non-detect to 9.5 µg/l in MW-1, the upgradient well as determined by Maxim, and from 45 to 107 µg/l in MW-3, the most downgradient well as determined by Maxim.

Maxim collected 11 additional soil samples using hand auger points in August 1996 (Maxim 1997). Soil sampling locations were based on the results of the March 1996 soil sampling. The soil samples were collected beneath the floors of the stores adjacent to the Southgate Laundry building at depths ranging from 0.5 to 3 feet bgs. The PCE concentrations in the samples ranged from non-detect to 179 µg/kg. The soil sample containing the highest concentration of PCE was collected at 1.5 feet bgs on the south adjacent property, directly south of the drywell located at the back of the Southgate Laundry.

Maxim collected soil samples from two remedial excavations outside the Southgate Laundry building in July 1997 (Maxim, 1998). One excavation was located west of the Southgate Laundry and included the drywell. Analytical results of eleven soil samples collected from the drywell excavation revealed PCE at concentrations ranging from non-detect to 0.05 mg/kg. The second outside excavation was located in the alley northwest of the Southgate Laundry, near a previous soil sampling location. Analytical results for two soil samples collected at 2 and 4.5 feet bgs from the second excavation revealed PCE at concentrations of non-detect and 0.06 mg/kg, respectively.

Maxim collected soil samples from two remedial excavations inside the Southgate Laundry building in September 1997 (Maxim, 1998). The Test Pit #1 excavation was located inside the southeast building corner, near a former soil sample with high PCE concentrations. Seven soil samples were collected from varying depths in the Test Pit #1 excavation. The analytical results revealed PCE at concentrations of 0.61 mg/kg, 1.12 mg/kg, and 1.01 mg/kg in soil samples collected at the base of the excavation (from 4 to 8.5 feet bgs). The Test Pit #2 excavation was located in the southwest part of the Southgate Laundry, near the former self-service dry-cleaning machine. Nine soil samples were collected from the Test Pit #2 excavation. The analytical results revealed PCE at concentrations of 0.65 mg/kg, 0.85 mg/kg, and 0.29 mg/kg in soil samples collected at the base of the excavation (from 3 to 8.5 feet bgs).

Local Groundwater Flow Direction

Maxim reported that the direction of local groundwater flow at the subfacility was consistently to the southeast during monitoring conducted from April 1996 to December 1997. This flow direction is consistent with the southeast regional groundwater flow direction for the YRRA determined from this RI.

Results of the YRRA RI indicated that seasonal irrigation in the region influenced depth to groundwater in the YRRA. Maxim (1996) stated that leakage from irrigation waters in the Yakima

Valley influences depth and flow direction in the region; however, no data were provided to support this statement. Results of RI monitoring events at the subfacility did not indicate localized effects of regional irrigation on the groundwater flow direction beneath the Southgate Laundry Subfacility.

Summary of Historical PCE Concentrations

Soil. Results of previous investigations by others indicated that concentrations of PCE that remain in the soil after remediation at the Southgate Laundry Subfacility were identified at concentrations up to 1.12 mg/kg. The highest residual concentrations of PCE in soils were identified at depths of 4 to 8 feet bgs located beneath the floor slab of the vacant Southgate Laundry building.

Groundwater. Results of previous investigations by Maxim during the period from April 1996 to February 1997 indicated that concentrations of PCE in groundwater at the Southgate Laundry Subfacility were identified at concentrations ranging from non-detect to 9.5 µg/l in MW-1 (identified by Maxim as the most upgradient well) and from 45 to 107 µg/l in well MW-3 (identified by Maxim as the most downgradient well). The historical analytical results are summarized on Table GG.

As shown on Table GG, the historical concentrations of PCE in groundwater in MW-3, located downgradient of the Southgate Laundry facility (see map in Appendix D), consistently have been above the 5.0 µg/l cleanup levels. The historical concentrations of PCE in well MW-1 (upgradient) and in wells MW-2 and MW-4 (both cross-gradient) generally have been near or below the 5.0 µg/l cleanup levels. Concentrations of PCE appeared to be slightly higher in MW-2 during the irrigation season (20-52 µg/l) than during the non-irrigation season (9-11.9 µg/l). There was no discernible difference in PCE concentrations between the irrigation/non-irrigation season in the other monitoring wells on-site.

Remediation History

Source Removal and Soil Remediation. Maxim removed PCE-contaminated soil from two excavations outside of the Southgate Laundry building in July 1997. One excavation was located adjacent to the back door (west) of the building and included the drywell; the excavation measured approximately 25 feet by 8 feet and from 7 to 13 feet deep. A total of approximately 43 cubic yards of soil was removed from the excavation and disposed of off-site. The second excavation was located in the alley west of the building and measured approximately 10 feet by 8 feet and 4.5 feet deep. The removed soil was replaced in the excavation.

Maxim removed PCE-contaminated soil in two "hot spots" located beneath the vacant Southgate Laundry building during soil removal at the subfacility in September 1997. The first area of soil removal was conducted in the southwest area of the building, in the former dry-cleaner area. The excavation measured approximately 7 feet by 7 feet and 4 to 8.5 feet deep. The second area of soil was removed in the southeast building corner, near the former self-service dry cleaning

machine. The excavation measured approximately 7 feet by 8 feet and 3 to 8.5 feet deep. Approximately 30 cubic yards of soil were removed from both excavations and disposed of off-site.

Groundwater Remediation. Groundwater remediation has not been conducted at the Southgate Laundry Subfacility.

RI Results

During this RI, Maxim conducted one quarter (December 1997) and PLSA collected three quarters (March 1998-September 1998) of groundwater samples from groundwater monitoring wells MW-1 through MW-4 at the Southgate Laundry Subfacility for analysis for PCE (Table 3). A map of the subfacility well locations is attached in Appendix D. The analytical results of the Maxim and PLSA sampling and the SECOR split sampling have been provided for this RI and are included on Table 7 and Table GG. A split was collected of the groundwater sample from MW-3 by SECOR for the four quarters of sampling for this RI for analysis of PCE. The collection of split samples from MW-3 was determined by Ecology, as MW-3 was determined to be the most downgradient well by Maxim. The results of the split sample analyses are consistent with others' results.

The results of the quarterly sampling and analysis conducted for this RI indicate that the maximum concentration of PCE in the groundwater was 67 µg/l in the most downgradient well (MW-3) for groundwater samples collected for this RI (Table 7). Concentrations of PCE above the 5.0 µg/l cleanup level were also detected in MW-2 during this RI. Well MW-2 is located proximate to, and cross-gradient of, the Southgate Laundry building. The upgradient well MW-1 and cross-gradient well MW-4 had concentrations of PCE at or below the 5.0 µg/l cleanup level for groundwater samples collected for this RI. These results are consistent with historical concentrations of PCE reported in the documents reviewed in Ecology files.

The concentrations of PCE in groundwater samples collected from MW-3 were consistently high (greater than 30 µg/l) for irrigation and non-irrigation seasons prior to the soil remediation conducted in early to mid- 1997. The historical concentrations of PCE in groundwater in samples collected from MW-3 decreased significantly in the non-irrigation season, but remained above the 5.0 µg/l cleanup level. The historical concentrations of PCE continued to be high (greater than 30 µg/l) during the irrigation season after the soil remediation in 1997.

Concentrations of PCE in groundwater samples collected from MW-2, located proximate to and cross-gradient of the Southgate Laundry facility, have historically been above the 5.0 µg/l cleanup level. There does not appear to have been any decrease in the concentration of PCE in the groundwater samples collected from MW1, MW-2, or MW-4 after the soil remediation was completed in 1997.

Based on the results of historical PCE analysis and PCE concentrations from this RI, it appears that this subfacility is a continuing source of PCE to regional groundwater in the YRRA.

7.2.2 Subfacilities for RI Monitoring - Properties Not Identified as Potential On-Going Sources of PCE to Groundwater

7.2.2.1 Agri-Tech/Yakima Steel Fabricators Subfacility

Introduction

The Agri-Tech/Yakima Steel Fabricators Subfacility is located at 6 East Washington Avenue in Union Gap, in the south-central portion of the YRRA (Figure 3). The subfacility includes both the 1.6-acre property owned by Agri-Tech, Inc. (Agri-Tech), located in the north portion of the subfacility, and the 6.4-acre property owned by Yakima Steel Fabricators, located in the south portion of the subfacility. The area surrounding the eight-acre subfacility is zoned for light industrial use.

Summary of Information Sources

SECOR reviewed the documents available in the Ecology files for the Agri-Tech Subfacility. The information summarized below has been obtained from review of the following documents.

- AGRA Earth and Environmental, Inc. *Remedial Investigation Report Agri-Tech/Yakima Steel Fabricators*. June 29, 1998.
- Ecology. *Analytical Results*. December 15, 1997.
- Maxim Technologies, Inc. *Remedial Investigation Work Plan - Site History Report, Agri-Tech/Yakima Steel Fabricators*. April 1997.

Historical Uses

The subfacility was reportedly undeveloped land until 1947. In 1947, the subfacility (including both the future Agri-Tech and Yakima Steel Fabricators properties) was purchased by Yakima Farmers Supply. Yakima Farmers Supply reportedly constructed a warehouse building and railroad spur at the subfacility between 1945 and 1952, and operated a lime-sulfur pesticide formulation facility at the property from 1960 to 1971. Yakima Farmers Supply filed for bankruptcy in 1971 and the site reportedly remained vacant until 1978, when ANCO Industrial Park purchased the subfacility. ANCO reportedly demolished at least some site improvements and re-graded between 1971 and 1979; however, the Ecology files reviewed did not document whether all subfacility buildings and improvements were removed at that time.

Yakima Steel Fabricators, a steel fabricating business, purchased the southern portion of the subfacility in 1979 and subsequently constructed the building in that part of the property. The northern portion of the subfacility was purchased in 1982 by Team Research Engineering, a veterinary/pharmaceutical supply company, and the existing building was constructed. Agri-Tech, a purchased the northern portion of the subfacility in 1989.

A lime mixing pit was operated at the subfacility by Yakima Farmers Supply from the late 1960s until the early 1980s, when it was filled and graded. The primary waste materials identified at the subfacility were reported to be lime sulfur pesticide mixed in a carrier oil. The residual solids from the pesticide formulation and water from the floor drains reportedly were washed into a waste pit located in the northwest part of the subfacility, underlying and between the current Agri-Tech and Yakima Steel Fabricators building. The pit reportedly overflowed into a drainage feature south of the pit.

Other features present at the Yakima Farmers Supply facilities reportedly included one diesel tank, two aboveground storage tank with unknown contents, two open-top storage tanks with unknown contents, and one 1,000-gallon concrete UST used for temporary storage of rinsate from cleaning lime sulfur drums. Yakima Farmer's Supply reportedly steam-cleaned lime sulfur drums once a year, and residual material in the UST reportedly was pumped out on a regular basis. There was no specific reference to PCE use at the subfacility in the documentation reviewed.

Current Use

Yakima Steel Fabricators currently operates as a steel fabricating business in the southern part of the subfacility. One single-story, aluminum building currently is present on the Yakima Steel Fabricators portion of the subfacility and houses the fabricating facilities. The remainder of the Yakima Steel Fabricators portion of the site, to the south of the building, is used for loading and storage of steel and steel products. The ground surface in the Yakima Steel Fabricators portion of the subfacility is paved in and near the site building. Gravel along the driveway areas, with grass-covering in the remaining portions of the site, including the large area used for storage located south of the building.

One single-story cinder block building is located on the Agri-Tech portion of the subfacility and currently is vacant; no operations currently are performed at the Agri-Tech facilities. The ground surface in the Agri-Tech portion of the subfacility is paved in and immediately around the Agri-Tech building.

A clean out vault reportedly is present on site between the Agri-Tech and Yakima Steel Fabricators buildings, in the approximate center of the former waste pit. The vault is connected to the sanitary sewer. Two surface water structures are located on this subfacility. A pond is located on the south portion of the property and a drainage ditch is located on the eastern border of the subfacility. An unnamed creek is located approximately 500 feet southeast of the subfacility.

Proximity to Irrigation Canals and/or Utilities

No irrigation canals are located proximate to the subfacility.

The subfacility apparently is served by city water and sanitary sewer systems. Natural gas lines also are present on site. The water and gas mains run underground along the west property boundary to East Washington Avenue, approximately 750 feet north of the site. A sanitary sewer line runs underground east-west underground between the Yakima Steel Fabricators and Agri-Tech buildings.

Documented and/or Potential Releases

No specific notices of releases or spills were present in the Ecology files reviewed. Potential releases at the subfacility include the following.

- From 1960 to 1971, the subfacility was used to formulate a lime-sulfur pesticide. The bulk dry lime and sulfur were stored in stockpiles east of the current Yakima Steel Fabricators building. The Ecology files reviewed indicated that PCE was detected in soil samples collected in the location of the former stockpiles.

- A lime mixing pit, used from 1960 to 1971, was used to collect remaining solids generated during the formulation of a lime-sulfur pesticide. This former mixing pit also received wastewater from the floor drains from the warehouse. The Ecology files reviewed did not document whether the pit was lined or unlined. The Ecology files reviewed indicated that PCE was detected in soil and groundwater grab samples collected in the vicinity of the former mixing pit.

- Soil samples collected in an area of staining identified by AGRA south of the current Yakima Steel Fabricators building contained concentrations of PCE in soil.

- Former site features included two ASTs and two open-top storage tanks with unknown contents, and one 1,000-gallon concrete UST used for storing rinsate generated by washing lime-sulfur drums. Although the Ecology files reviewed did not specifically identify uses of PCE on site, PCE could have been placed in these tanks during facility activities.

The potential releases noted above could represent historical sources of PCE to shallow groundwater.

There was no documentation of any on-going releases at the subfacility in the Ecology file reviewed. Yakima Steel Fabricators currently is performing metal fabrication operations at the subfacility.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during the period from 1997 to 1998.

Ecology. In November 1992, Ecology reportedly installed one groundwater monitoring well (WDOE-6) to 17 feet bgs and one soil boring to 5 feet bgs in the location of the former lime mixing pit (Maxim 1997). The analytical results indicated concentrations of 2.2 mg/kg PCE in a soil sample collected at 10 feet bgs and 420 µg/l in a groundwater sample collected from the well.

PLSA Engineering (PLSA). In May 1993, PLSA collected six soil samples from approximately 4.5 to 6 feet bgs in four test pits at the subfacility (Maxim 1997). Four soil samples were collected outside and two soil samples were collected inside the former lime mixing pit area. The analytical results revealed PCE at a very low concentration of 0.013 mg/kg in soil collected in the former lime mixing pit, adjacent to the existing monitoring well installed by Ecology. PCE concentrations up to 0.0072 mg/kg were detected in soil samples collected outside the former lime mixing pit.

PLSA and Ecology collected split groundwater samples from the four test pits near the former lime mixing pit in April 1993 (Maxim 1997). Analysis of the grab groundwater samples indicated PCE at concentration of 220 µg/l (PLSA) and 260 µg/l (Ecology) in groundwater.

AGRA Earth & Environmental, Inc. (AGRA). AGRA performed an RI at the subfacility in 1997 (AGRA 1998). AGRA segregated the subfacility into three sub-areas based on aerial photographs. Area 1 encompassed the former waste pit and former Yakima Farmers Supply facilities. AGRA advanced twenty-two shallow soil probe borings to assess the lateral limits of the former waste pit. Soil samples were collected from depths between 11 to 25 bgs contained concentrations of PCE. AGRA estimated that approximately 6,963 cubic yards of contaminated soil were within the former waste pit area.

Area 2 was identified as the area east of the Yakima Steel Facility Building, in the east-central portion of the subfacility (AGRA 1998). AGRA reviewed aerial photographs which depicted white piles of suspect material. AGRA indicated that the piles were former lime-sulfur pesticide piles based on review of historical subfacility data. Three soil borings were advanced to maximum depths of 7.5 feet bgs in the area. Area 3 was identified as the area located on the south end of the subfacility (AGRA 1998). AGRA's review of aerial photographs indicated an area of dark staining in Area 3, which AGRA identified as a potential concern due to potential impacts by the former Bay Chemical facility located west of the subfacility.

Analytical results for soil samples collected in Area 1, Area 2, and Area 3 indicated that very low concentration of PCE were detected in all three areas ranging from non-detect to 0.77 mg/kg in the sampled soil.

Six monitoring wells (MW-1 through MW-6) were installed at the subfacility as part of remedial investigation work in 1997 (AGRA 1998). The wells were installed to depths between 13 and 30 feet bgs. Well MW-1 was installed on the upgradient (northwest) portion of the subfacility, wells MW-2 and MW-6 were installed in the former lime mixing pit area, and wells MW-3, MW-4, and MW-5 were installed downgradient (south and southeast) of subfacility buildings.

In December 1997, AGRA collected groundwater samples from monitoring wells MW-1 through MW-6) at the subfacility for Ecology (Ecology 1997). Analytical results revealed PCE at concentrations ranging from 3.32 to 6.06 µg/l in groundwater from the wells MW-1, MW-3, MW-4, and MW-5. The highest PCE concentration was detected in groundwater from well MW-3, a crossgradient well located near the former stockpile area in Area 2.

Local Groundwater Flow Direction

AGRA reported that direction of local groundwater flow at the subfacility was to the southeast during monitoring conducted December 1997. This local flow direction is consistent with the southeast direction of regional groundwater flow in the YRRA determined for RI.

Summary of Historical PCE Concentrations

Soil. Results of previous investigations by others indicated that very low concentrations of PCE remain in soil at concentrations ranging from non-detect to 2.2 mg/kg.

Groundwater. Analytical results indicated concentrations of PCE were 220 µg/l (PLSA) and 260 µg/l (Ecology) in grab groundwater samples collected from a test pit excavated in the area of the former lime mixing pit in 1993. Concentrations of PCE ranged from 3.32 to 6.06 µg/l in groundwater from the wells MW-1, MW-3, MW-4, and MW-5. The highest PCE concentration was detected in groundwater from well MW-3, a crossgradient well located near the former stockpile area in Area 2. One groundwater sample collected from well WDOE-6 by Ecology in 1992 contained 420 µg/l PCE. Well WDOE-6 is located in the former lime mixing pit area.

Remediation History

Source Removal and Soil Remediation. Soil remediation has not been conducted at the subfacility.

Groundwater Remediation. Groundwater remediation has not been conducted at the subfacility.

RI Results

AGRA has collected four quarters (December 1997-September 1998) of groundwater samples from the subfacility (Wells MW-1 through MW-6) during this RI 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 maximum concentrations of PCE was detected in the groundwater sample collected from WDOE-6, located within the approximate location of the former waste pit in the center of the subfacility. The concentrations of ranged from 20.8 to 75.6 µg/l in the groundwater samples collected from WDOE-6. The maximum concentration of PCE in the most downgradient well on the subfacility, MW-4, was 4.7 µg/l (Table 7). There was no discernible trend to the concentrations of PCE in groundwater samples collected for this RI when compared with historical concentrations.

Based on the results of groundwater sampling conducted at the Agri-Tech/Yakima Steel Fabricators subfacility for this RI, this subfacility does not appear to be a continuing source of PCE to regional groundwater in the YRRA.

7.2.2.2 Burlington Northern Railroad (BNRR) Roundhouse Subfacility

Introduction

The Burlington Northern Railroad Roundhouse Subfacility (BNRR Subfacility) is located approximately 350 feet northwest of the U-Haul Subfacility's western boundary, in the north-central portion of the YRRA (Figure 3). The subfacility has no parcel or address number. The property is owned by Burlington Northern. The BNRR Subfacility, which is located within an active rail yard, is approximately 3 acres in size.

Summary of Information Sources

SECOR reviewed documents available in the Ecology files for the BNRR Subfacility. The information summarized below has been obtained from review of the following documents.

- Ecology. Letter to Burlington Northern Railroad Company (B. Shepard) RE: Notice of Potential Liability for the Release of Hazardous Substances Under the Model Toxics Control Act - Burlington Northern Railroad Co. (BNRR) Roundhouse, Yakima, Washington. August 1, 1994.

- Ecology. Letter to Burlington Northern/Santa Fe Railway (D.J. Babb) RE: Notice of Potential Liability for the Release of Hazardous Substances Under the Model Toxics Control Act - Washington Central Railroad Roundhouse (WCRR), Yakima, Washington. February 10, 1998.

- GeoEngineers, Inc. *Summary Letter Soil Sampling and Site Remediation.* March 16, 1998.

- Manchester Environmental Laboratory. Data Review (Roundhouse). July 28, 1993.

Historical Uses

The BNRR reportedly has been used as a maintenance yard since the late 1800s. A railroad roundhouse historically used for turning rail cars was located at the subfacility. There was no specific reference to PCE use, however maintenance operations may have included the use of PCE.

Current Use

The subfacility is located within an active rail yard. The roundhouse located within the subfacility is not currently in use.

Proximity to Irrigation Canals and/or Utilities

No irrigation canal are located proximate to the subfacility. The west drain of the New Shanno Ditch runs east-west approximately 1,500 feet north of the subfacility and then trends south along South First Street, east of the subfacility. No subsurface utilities were identified proximate to the subfacility.

Documented and/or Potential Releases

No specific notices of releases or spills were present in the Ecology files reviewed. Historical operations performed at the subfacility that used PCE were not identified in the documentation reviewed. Documented and potential PCE releases include the following.

- PCE was detected in soil near the diesel shop at concentrations ranging from 0.9 to 5.8 µg/kg.
- PCE may have been used in typical rail yard maintenance operations, such as painting and parts cleaning.

The potential releases noted above could represent historical sources of PCE to groundwater at the BNRR Subfacility.

There was no documentation of any on-going releases at the subfacility in the Ecology file reviewed by SECOR. However, the area is currently utilized as a rail yard.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during the period from 1994 to 1998.

Ecology. Groundwater samples reportedly were collected from on-site monitoring wells BNRR-3s, BNRR-3d, and BNRR-3i in November 1992 (Ecology 1998). Since these three wells were not installed at similar depths upgradient and downgradient well designation could not be assigned. Concentrations of PCE were 24 µg/l, 1.3 µg/l, and 5.9 µg/l, in the groundwater samples collected from BNRR-3s, BNRR-3i, and BNRR-3d, respectively.

In June 1993, Ecology collected three soil samples near the diesel shop located on the southeast side of the subfacility (Ecology 1998). No detailed site plans were present in the Ecology files reviewed; however, the diesel shop location appears to be within about 1,000 feet of the roundhouse, based on one site vicinity map (GeoEngineers 1998). PCE was detected in soil at concentrations ranging from 0.0009 to 0.0058 mg/kg (Manchester Environmental Laboratory 1993).

GeoEngineers, Inc (GeoEngineers). In February 1995, GeoEngineers collected three soil samples near the diesel shop, where Ecology sampled in June 1993 (GeoEngineers 1998). The soil samples were collected from depths ranging from the ground surface to 6 inches bgs. Concentrations of PCE were non-detect in the sampled soil.

GeoEngineers collected three soil samples from the base of a diesel shop building foundation excavation in May 1995 and four samples from the base of the foundation for a new drop table facility in July 1996. Both areas apparently were located on the northwestern corner of the BNRR subfacility. The soil samples were collected between 2.2 and 5.5 feet bgs. Analytical results indicated that concentrations of PCE were non-detect in the soil sampled beneath the diesel shop or new drop table facility.

Local Groundwater Flow Direction

The local groundwater flow direction was not documented in the Ecology files reviewed.

Summary of Historical PCE Concentrations

Soil. Results of previous investigations by Ecology and GeoEngineers indicated that concentrations of PCE in soil ranged from non-detect to 0.0058 mg/kg near the diesel shop, reportedly located in the northwestern portion of the subfacility. Soil samples collected near the new drop table factory by GeoEngineers in 1995 were non-detect for PCE.

Groundwater. In 1992, concentrations of PCE in groundwater in the shallow water-bearing zone at the BNRR subfacility ranged from 5.9 to 24 µg/l, with the highest PCE concentration detected in the shallower well BNRR-3s. The 1992 concentration of PCE in groundwater in the deep water-bearing zone at this subfacility was 1.3 µg/l.

Remediation History

Source Removal and Soil Remediation. Soil remediation has not been conducted at the BNRR Subfacility.

Soil. Groundwater remediation has not been conducted at the BNRR Subfacility.

RI Results

Ecology has collected four quarters (December 1997-September 1998) of groundwater samples from well BNRR-3i at the BNRR Subfacility for this RI analysis for PCE (Table 3). SECOR collected groundwater samples for the four quarters of sampling from monitoring wells screened in the shallow well (BNRR-3s) and deep well (BNRR-3d) water-bearing zones for analysis of PCE. The analytical results of the Ecology and SECOR sampling have been provided for this RI and are included on Table 7. The results of the quarterly sampling and analysis indicate that concentrations of PCE exceeded 5.0 µg/l for all four quarters in samples from shallow well BNRR-3s. PCE concentrations ranged from 10.8 to 23.2 µg/l in this well (Table 7). The concentrations of PCE were above 5.0 µg/l for three of the four quarters in the WDOE-3i, which also is screened in the shallow water-bearing zone. PCE concentrations ranged from 4.1 to 20 µg/l. The concentrations of PCE were below the 5.0 µg/l cleanup level for all four quarters in the groundwater samples collected from BNRR-d; PCE concentrations ranged from non-detect to 0.9 µg/l. The PCE concentrations in the groundwater samples collected for this RI were consistent with historical PCE concentrations in both the shallow and deep water-bearing zones at this subfacility.

While PCE concentrations exceeded 5.0 µg/l in the shallow water-bearing zone, there are no upgradient or downgradient well locations at this subfacility that could be used to determine whether this subfacility is a potential source of PCE to regional groundwater in the YRRA.

7.2.2.3 Fifth Wheel Truck Repair/Hahn Motor Company Subfacility

Introduction

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). The subfacility is located in the northeast portion of the YRRA, in an area zoned for commercial use. The Fifth Wheel Subfacility is located adjacent to and is owned by the same owners as Hahn Motor Company.

Summary of Information Sources

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.
- 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.
- PLSA Engineering & Surveying. *Engineering Report on Drywell Intermediate Cleanup for Fifth Wheel Truck Repair Premises.* February 1991.

Historical Uses

S&S Auto Body and Fifth Wheel occupied the 14,000 square-foot building at the subfacility starting in 1969 and 1948, respectively. S&S Auto Body occupied the east half of the building and provided auto body repair and painting services. Fifth Wheel has occupied the west half of the building and provided maintenance and repair services for large trucks.

An interior catch basin was used to collect wastewater from the Fifth Wheel repair area prior to 1991. The wastewater was conveyed from the catch basin to a drywell previously located in the parking lot north of the Fifth Wheel building. The drywell was removed in 1991 and wastewater subsequently was conveyed through an oil/water separator and to the city sewer system. A new drywell reportedly was installed at the Fifth Wheel facility for surface water runoff. Two sump drains formerly were located inside and one sump drain was located outside the S&S Auto Body building. The sump drains were used for the disposal of wastewater which was co-mingled with storm water runoff water from the roof. The sumps were removed in 1992.

Current Use

As noted above, S&S Body Shop and Fifth Wheel occupy the subfacility building. Auto body repair and painting services (S&S Body Shop) and truck maintenance and repair (Fifth Wheel) are currently being performed at the subfacility. Wastewater generated at the Fifth Wheel Subfacility

reportedly is discharged to a subfloor oil/water separator, which is connected to the city sewer system.

Documented and/or Potential Releases

No specific notices of spills or releases were present in the Ecology files reviewed for the Fifth Wheel/Hahn Motors Subfacility. Use of PCE was not specifically documented in the information reviewed, but is common with these types of operations. Potential releases include the following:

- PCE may have been released during operations at the facility and discharged with wastewater to the on-site drywells and/or sumps.

The potential release noted above could represent a historical source of PCE to groundwater.

No documentation of any on-going releases was present in the Ecology files reviewed; however, automobile repair, maintenance, and painting operations currently are performed at the site.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports and documents prepared by others during the period from 1989 to 1995.

Earth Consultants Inc. In May 1989, Earth Consultants, Inc., collected one soil sample at 9 feet bgs in the vicinity of the drywell located in parking lot of the Fifth Wheel building. PCE was not detected in the soil sample analyzed. One groundwater sample was collected from the sump. Concentrations of PCE were non-detect in the sampled groundwater.

PLSA Engineering & Surveying (PLSA). During late 1990 and early 1991, PLSA sampled sediment from the drywell located north of the building on the Fifth Wheel Subfacility. PCE was detected in the sediment sample collected from the drywell at a concentration of 0.265 mg/kg. Additionally, PLSA installed two groundwater monitoring wells (currently labeled MW-3 and MW-4, but previously identified as MW-4 and MW-5, respectively) along the west side of the building. The wells were installed to approximately 35 feet bgs. One groundwater sample was collected from each well. Analytical results indicated concentrations of PCE were non-detect in the sampled groundwater.

In November 1993, PLSA drilled one soil boring through the backfill adjacent to the drywell previously located on the north side of the Fifth Wheel Subfacility. One soil sample was collected from the boring at a depth of approximately 14 feet bgs and one soil sample was collected from the drill cuttings. The analytical results indicated that concentrations of PCE were non-detect in the sampled soil and drill cuttings.

Huntingdon Engineering & Environmental Inc. (Huntingdon) In February 1995, Huntingdon installed two groundwater monitoring wells (currently labeled MW-1 and MW-2) south and east of the previously installed monitoring wells installed by PLSA (MW-3 and MW-4). One soil sample was collected from each monitoring well boring at a depth 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.

Huntingdon conducted quarterly monitoring at the subfacility in February and April 1995. Groundwater samples were collected from each of the four monitoring wells. The analytical results indicated concentrations of PCE ranged from 3.5 to 4.3 µg/l in February 1995 and from 0.6 to 1.3 µg/l in April 1995.

In April 1995, Huntingdon excavated two test pits 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 indicated that concentrations of PCE were non-detect in the sampled soil. Sludge samples also were collected from one sump inside and one sump outside the S&S Auto Body building. The analytical results indicated that concentrations of PCE were non-detect in the sludge samples.

Maxim Technologies, Inc. (Maxim). Maxim (formerly Huntingdon) performed groundwater sampling activities at the Fifth Wheel Subfacility between August 1995 and February 1996. Groundwater samples were collected from each of the four existing monitoring wells during four sampling rounds. The analytical results revealed PCE at concentrations ranging from 3.5 to 9.3 µg/l during the four sampling rounds. The highest PCE results was detected in groundwater from well MW-2 in September 1995. Maxim reported the PCE concentrations in groundwater samples collected from groundwater monitoring wells located on the north northwest side of the subfacility were similar to the PCE concentrations in the south-southeast wells, which Maxim suggested indicated a potential off-site source of PCE.

Local Groundwater Flow Direction

Huntingdon calculated an east direction of local groundwater flow for the subfacility in February and November 1995 and an east-southeast direction of flow in April, August, and September 1995 and February 1996. The east direction of local groundwater flow calculated for two monitoring periods is not consistent and the east-southeast direction of groundwater flow calculated in the remaining four monitoring periods generally is consistent with the southeast direction of regional groundwater flow for the YRRA determined by this RI.

Summary of Historical PCE Concentrations

Soil. The analytical results of a sediment sample collected in 1989 from the Fifth Wheel drywell contained 0.265 mg/kg PCE. Soil samples collected from approximately 20 feet bgs in monitoring well borings MW-1 and MW-2 were 0.16 mg/kg and 0.05 mg/kg, respectively.

Groundwater. Analytical results for groundwater samples collected from the on-site monitoring wells in 1995 and 1996 indicated concentrations of PCE ranging from 0.6 µg/l to 9.3 µg/l. The highest PCE result was from a groundwater sample collected from well MW-3, located northwest (upgradient) of the subfacility.

Remediation History

Source Removal and Soil Remediation. In April 1991, PLSA excavated a drywell and the surrounding soil from the area north of the Fifth Wheel Subfacility. Sediment previously collected from the drywell contained 0.265 mg/kg PCE. Approximately 120 cubic yards of soil with concentrations of TPH above the regulatory cleanup levels was removed from the drywell excavation. The excavation was backfilled with clean granular fill. Prior to backfilling, a groundwater sample was collected from the excavation. The analytical result indicated concentrations of PCE were non-detect in the groundwater sample.

In September and October 1995, the three sumps utilized by S&S Auto Body were excavated and removed. 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 for the confirmation soil samples indicated that concentrations of PCE were non-detect. The sumps excavations were backfilled with concrete.

Groundwater Remediation. Groundwater remediation has not been conducted at the subfacility.

RI Results

SECOR collected four quarters (December 1997-September 1998) of groundwater samples from well MW-2 at the Fifth Wheel/Hahn Motors Subfacility (Table 3). No sampling was performed at subfacility well MW-2 or at any other subfacility monitoring well by the subfacility consultant during this RI. Consequently, SECOR's samples are the only results evaluated for subfacility for the four quarters of this RI. 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 located on the south side of the subfacility, between the Fifth Wheel subfacility and the Hahn Motors property. MW-2 is a crossgradient well based on the local direction of groundwater flow calculated by Huntingdon/Maxim and the regional direction of groundwater flow calculated for this RI.

The results of the quarterly sampling and analysis indicate that the maximum concentration of PCE in the groundwater at well MW-2 for samples collected during this RI was 9.8 µg/l (Table 7). There was no discernible trend to the concentration of PCE in groundwater samples collected for this RI when compared with historical concentrations.

While PCE concentrations exceeded 5.0 µg/l in the on-site well sampled, there are no upgradient or downgradient well locations at this subfacility that could be used to determine whether this subfacility is a potential source of PCE to regional groundwater in the YRRA.

7.2.2.4 Nu-Way Cleaners Subfacility

Introduction

The Nu-Way Cleaners Subfacility is located at 801 South Third Street, on the southeast corner of the intersection of South Third Street and Adams Street, in the northeast portion of the YRRA (Figure 3). The Nu-Way Cleaners Subfacility is an approximately 0.5-acre property located within an area zoned for residential and commercial use. The subfacility has operated as a dry-cleaning business since the since the 1950s. Mr. Wallace Munly reportedly has owned the facility since 1971.

Summary of Information Sources

SECOR reviewed documents available in the Ecology files for the Nu-Way Cleaners Subfacility. The information summarized below has been obtained from review of the following documents.

- Ecology and Environment, Inc. *Site Inspection Report for Nu-Way Cleaners*. January 1990.
- Enviros. *Field Work Report, Nu-Way Cleaners*. June 30, 1995.
- Enviros. *Draft RI Field Work Report*. July 16, 1995.
- Enviros. *Remedial Action and Feasibility Study*. June 30, 1996.
- URS Consultants, Inc. *Memorandum: Site Inspection for Nu-Way Cleaners*. September 10, 1993.

Historical Uses

A dry-cleaning operations have been conducted at the subfacility since the 1950s. Two gravel-bottom sumps reportedly were present north of the subfacility building. A floor drain inside the building discharged to one of the sumps. The sumps reportedly were removed from the subfacility in 1996. One 500-gallon heating oil UST, one 650-gallon solvent UST, and one 1000-gallon solvent UST reportedly were located on the north side of the building; the USTs were installed before 1971 and removed in 1996. Vehicle maintenance and leather dying reportedly were performed at the subfacility historically; however, those activities was not occurring during a site visit performed by others in 1990.

Current Use

The Nu-Way Cleaners is currently an operating dry cleaning facility. The ground surface to the north and west of the dry cleaner building is paved. A gravel alley is present east of the building and a grass yard is present to the south of the building.

Proximity to Irrigation Canals and/or Utilities

No irrigation canals are located proximate to the Nu-Way Cleaners Subfacility. The Nu-Way Cleaners Subfacility is served by city water and sanitary sewer systems. Subsurface gas, sewer, and irrigation lines reportedly are located in the subsurface along the unpaved alley east of the subfacility. The gas line for the subfacility building and a water main are located west of the subfacility building.

Documented and/or Potential Releases

Chemical releases have reported occurred at this subfacility. The reported and/or potential releases at the Nu-Way Cleaners Subfacility include the following.

- One 650-gallon and one 1000-gallon solvent UST and one sump formerly were located on the north side of the subfacility building. PCE-contaminated soil and groundwater were identified in these locations.

- An approximately 750-gallon underground storage tank used to store dry-cleaning solvents was located on the north side of the building. Approximately 1,000-gallons of solvent were used in the dry-cleaning machine each year.

- During past years of operation, the floor surrounding the machine was reportedly washed down with a hose once a week. Wastewater and spilled solvents drained into a floor drain that discharged to the gravel-bottom sump located north of the subfacility building.

The releases and potential releases noted above could represent historical sources of PCE to groundwater. No documentation of any on-going releases at the subfacility were present in the Ecology file reviewed. However, dry cleaning currently is performed at the subfacility.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during the period from 1990 to 1996.

Ecology and Environment Inc. (E&E). E&E collected one soil sample at six inches bgs from a park northwest of the subfacility to establish background contaminant levels at the subfacility

(E&E 1990). The concentration of PCE was non-detect in the background soil sample. One sludge sample was collected from the material present in the sump north of the subfacility building in March 1989. The analytical results for the sludge sample revealed PCE at a concentration of 35 mg/kg.

Enviros. Enviros conducted a soil vapor assessment at the subfacility in June 1995 (Enviros 1995a). 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.

In June 1995, soil samples were collected from two test pits on the northwest and northeast of the subfacility building (Enviros 1995b). The test pits were excavated to depths of 9 feet bgs and one soil sample was collected from the base of each test pit. Very low concentrations of 0.0013 and 0.0016 mg/kg of PCE were detected in the sampled soil. The excavated soil was subsequently replaced in the test pits.

Enviros installed three groundwater monitoring wells (MW-1, MW-2, and MW-3) at the subfacility in 1996, as part of an RI/FS at the site (Enviros 1996). The monitoring wells were installed to 25 feet bgs. MW-1 was located on the northwest (upgradient) corner of the subfacility, MW-2 was located off-site in the field southeast (downgradient) of the subfacility, and MW-3 was located on the northeastern (cross-gradient) portion of the subfacility. Very low concentrations of PCE ranging from 0.0003 to 0.0018 mg/kg were detected in soil samples collected from the drill cuttings at each boring. Concentrations of PCE in groundwater samples collected from MW-1, MW-2, and MW-3 in June 1995 showed PCE concentrations ranging from 5.4 µg/l in MW-1, the upgradient well, to 7.5 µg/l in MW-2, the downgradient well.

Three USTs were removed from the subfacility by Enviros in April 1996 (Enviros 1996). Enviros decommissioned one 500- gallon heating oil UST located near the boiler room on the north end of the subfacility. Two solvent USTs approximately 650 and 1000 gallons in size were also decommissioned. The solvent USTS were located approximately 15 feet west of the heating oil UST. Two sumps located near the solvent USTs were also decommissioned during tank removal activities. Soil samples were collected from 3 to 12 feet bgs in the UST and sump excavations during removal activities. Concentrations of PCE ranged from non-detect to 1.5 mg/kg in the sampled soil. Residential concentrations of PCE in soil samples collected from the excavation bottoms ranged from non-detect to 0.15 mg/kg.

Enviros collected groundwater sampling at the site in April 1996. Very low concentrations of PCE in groundwater samples collected from MW-1, MW-2, and MW-3 showed PCE concentrations were 2.7 µg/l, non-detect, and 0.85 µg/l, respectively.

Local Groundwater Flow Direction

Enviros reported that the direction of local groundwater flow at the subfacility was consistently to the southeast during monitoring conducted from June 1995 to June 1996. This flow direction is generally consistent with the southeast direction of regional groundwater flow for the YRRA determined from this RI.

Summary of Historical PCE Concentrations

Soil. The analytical results for the sludge sample collected from an on-site sump in March 1989 revealed PCE at a concentration of 35 mg/kg. Concentrations of PCE ranging from 0.0003 to 0.0018 mg/kg were detected in soil samples collected from test pits excavated northeast and northwest of the subfacility building and from the drill cuttings at borings MW-1, MW-2, and MW-3 during 1995. During UST and sump removal activities in April 1996 by Enviros, PCE was detected in soil beneath the former sump and near the former 650-gallon solvent UST north of the building at a low concentrations up to 1.5 mg/kg.

Groundwater. PCE concentrations ranged from non-detect to 7.5 µg/l in groundwater samples collected from MW-1, MW-2, and MW-3 during June 1995 and April 1996. The maximum concentration of PCE was detected in groundwater from well MW-2 (downgradient) in 1995. The PCE concentrations was non-detect in MW-2 in 1996.

Remediation History

Source Removal and Soil Remediation. Enviros removed approximately 31 tons of TPH contaminated soil from around the former heating oil and solvent USTs. TPH-contaminated soil was transported to an off-site disposal facility. Four 55-gallons of PCE-contaminated soil from the former sump area were also transported to an off-site disposal facility. Residual PCE concentrations in soil collected at the base of the excavations ranged from non-detect to 0.15 mg/kg.

Groundwater Remediation. Groundwater remediation has not been conducted at the Nu-Way Cleaners subfacility.

RI Results

Ecology has collected four quarters (December 1997-September 1998) of groundwater samples from the Nu-Way Cleaners Subfacility for this RI 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. 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). Since PCE concentrations in the downgradient well MW-2 were less than 5.0 µg/l, this subfacility is not considered a potential continuing source of PCE to regional groundwater in the YRRA.

Since PCE concentrations in the downgradient well MW-2 were less than 5.0 µg/l, this subfacility is not considered a potential continuing source of PCE to regional groundwater in the YRRA.

7.2.2.5 Paxton Sales Subfacility

Introduction

The Paxton Sales Subfacility is located at 108 West Mead Avenue, in the west-central portion of the YRRA (Figure 3). The subfacility is approximately 0.5 acres in size, and is located within a mixed commercial, industrial, and residential area. The subfacility has operated as a small machine parts and metal fabrication business since 1969.

Summary of Information Sources

SECOR reviewed documents available in the Ecology files for the Paxton Subfacility. The information summarized below has been obtained from review of the following documents.

- 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.

Historical Uses

The subfacility building reportedly was constructed in the 1950s or 1960s, when an investment company operated at the property. As noted above, the Paxton Sales Subfacility has operated as a small machine parts and metal fabrication business since 1969. Portions of the Paxton sales building have been leased to other users at various times, including a vendor supply company and an engineering firm.

An on-site drywell reportedly was located in the loading dock area along the west side of the building. Spent cutting solution reportedly was disposed of into the drywell prior to 1985. Small tool parts reportedly may have been washed in portable containers or in a sink that drained to the drywell. Cyanide wastewater generated from the facility processes reportedly also was disposed of into the drywell. Two USTs containing oil that were present on the property reportedly were closed in place in the early 1970s.

The subfacility operations included tooling and case-hardening of steel parts. As of 1989, the machine shop consisted of a shop, welding area, and garage. The shop used lathes and cutting (cooling) fluids to machine custom steel parts. From 1969 until about 1984, the subfacility reportedly used Trimsol brand cutting oils containing halogenated hydrocarbons. Use of the material left some Trimsol residue on machine parts, in metal shaving on the shop floor, and in diluted cutting solution that may have been discharged to the shop floor due to overspraying. Use of Trim Sol reportedly was discontinued from 1985 to 1987 and then resumed after 1987. The post-1987 use reportedly was within a closed-loop system. According to the manufacturer, the Trimsol reportedly contained no PCE, and a sample of the cutting solution collected in 1989 reportedly did not contain detectable concentrations of PCE. Prior to 1985, the subfacility reportedly used solvents to clean raw materials and machinery. No records regarding the types of solvents used reportedly were available. After 1985, kerosene reportedly was used as the primary cleaning solvent.

Current Use

The Paxton Sales Subfacility is currently operating as a custom metal machining shop. Tooling, case hardening, and welding still is performed at the subfacility. Subfacility operations include use of cutting oils. As part of the facility processes, non-contact cooling water associated with welding operations is known to discharge to the on-site drywell.

The ground surface immediately around the subfacility building is paved, with the exception of a gravel driveway located immediately south of the building, and a gravel road surface on Rock Avenue just south of the driveway.

Proximity to Irrigation Canals and/or Utilities

A section of the Broadgauge Canal runs in the subsurface north of West Mead Avenue, north of the Paxton Sales Subfacility. The subfacility building is served by city water and sanitary sewer systems. The utility corridors run along West Mead Avenue, north of the subfacility. The nearest surface body is a tributary of Wide Hollow Creek located approximately one mile south of the site.

Documented and/or Potential Release History

No specific notices of releases or spills were present in the Ecology files reviewed for the Paxton Sales Subfacility. Use of PCE has not been documented in historical or current operations

performed at the subfacility; however, solvents that were not identified have been used at the subfacility historically. Documented and/or potential releases include the following.

- Prior to 1985, the subfacility reportedly used solvents to clean raw materials and machinery. No records regarding the types of solvents used reportedly were available.

- Spent cutting solution and cyanide wastewater generated from facility operations were disposed of in the on-site drywell located in the loading dock area along the west side of the building. Washing solutions that may have contained solvents also may have been disposed of into the drywell.

The documented and potential releases noted above could be potential historical sources of PCE to groundwater.

There was no documentation of any on-going releases at the subfacility in the Ecology file reviewed. However, machining is currently being performed at the site.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the Paxton Sales Subfacility site. The summary is based on information obtained from the review of reports prepared by others during the period from 1989 to 1995.

Ecology & Environment, Inc. (E&E). In March 1989, E&E collected a sediment sample from the on-site drywell and groundwater samples from three domestic wells located off-site (E&E 1989). The domestic wells were re-sampled in June 1989. Analytical data for the drywell sediment sample indicated that PCE was present at a concentration of 34 mg/kg in the sediment. PCE was not detected in any of the groundwater samples collected from the domestic wells.

Landau Associates, Inc. (Landau). Between December 1994 and April 1995, Landau conducted a remedial investigation at the Paxton Subfacility (Landau 1995a). The investigation consisted of the installation of three on-site soil borings completed as groundwater monitoring wells (MW-1, MW-2, and MW-3). PCE results from soil boring samples were all non-detect. The wells were installed to approximately 30 feet bgs. Groundwater samples were collected from each of the three monitoring wells in January 1995. The analytical data for the groundwater samples indicated that PCE was present in the three wells at concentrations ranging from 1.7 to 3.1 µg/l. The highest concentration of PCE was detected in the upgradient well MW-3, located near the southwest building corner.

Landau installed a fourth groundwater monitoring well at the Paxton Subfacility and sampled groundwater in each of the four monitoring wells in June 1995 (Landau 1995b). Analytical data for the June 1995 sampling event indicated that concentrations of PCE ranged from 1.7 to 2.2 µg/l

in groundwater from the wells, with the highest PCE concentration detected in upgradient well MW-3.

Landau subsequently collected groundwater samples from the four on-site wells in September and December 1995. Analytical results for the sampling events indicated that concentrations of PCE ranged from 1.2 to 1.8 µg/l in groundwater from the wells, with the highest PCE concentration detected of in upgradient well MW-3.

Local Groundwater Flow Direction

The direction of local groundwater flow at the subfacility was reported to be toward the southeast. This is consistent with the southeast regional direction of flow in the YRRA determined for this RI.

Summary of Historical PCE Concentrations

Soil. Analytical data for a sediment sample collected from an on-site drywell contained a reported PCE concentration of 34 mg/kg. Soil samples collected during Landau's 1995 RI investigation were non-detect for PCE.

Groundwater. Analytical data for groundwater samples collected during Landau's 1995 RI indicated that PCE was present in groundwater samples at concentrations ranging from 1.7 to 3.1 µg/l. Analytical data for a three subsequent groundwater sampling events conducted in 1995, following installation of MW-4, indicated that PCE concentrations ranged from 1.2 to 2.2 µg/l in groundwater from the monitoring wells.

Remediation History

Source Removal and Soil Remediation. In 1992, Ecology requested that Paxton clean out the drywell to remove accumulated sludge. Paxton removed approximately two feet of oily residue from the drywell and took the material in five-gallon buckets to a hazardous waste collection station (Landau 1994).

Groundwater Remediation. Groundwater remediation has not been conducted at the subfacility.

RI Results

SECOR has collected four quarters (December 1997-September 1998) of groundwater samples from well MW-3 at the Paxton Sales Subfacility for analysis for PCE. Analytical data for the SECOR sampling events 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 collected from well

MW-3 (Table 7). The PCE concentrations in groundwater samples collected during this RI were consistent with historical PCE concentrations at this subfacility.

Since this subfacility's PCE concentrations are consistently less than 5.0 µg/l with the highest concentrations reported in the upgradient well location, this subfacility is not considered a potential source of PCE to regional groundwater.

7.2.2.6 Yakima Valley Spray/U-Haul

Introduction

The Yakima Valley Spray/U-Haul Subfacility is located at 1108 South First Street (Figure 3). The subfacility is four acres in size, and is located in an area predominantly occupied by light industrial facilities including an automobile dealership, rail yard, and a cement forms processing plant. The site is zoned for commercial use and lies between areas zoned for light and heavy industrial use. The subfacility is currently owned by U-Haul.

Summary of Information Sources

SECOR reviewed the documents available in the Ecology files for the Yakima Valley Spray/U-Haul Subfacility. The information summarized below has been obtained from review of the following documents.

- Ecology. *Enforcement Order No. DE 97TC-C182.* November 19, 1997.
- Remediation Technologies, Inc. (RETEC). *Remedial Investigation Report for the Yakima Valley Spray Company (U-Haul) Facility Yakima, Washington.* March 1995.
- Remediation Technologies, Inc. (RETEC). *Feasibility Study for the Yakima Valley Spray Company (U-Haul) Facility Yakima, Washington.* March 1995.
- Sweet-Edwards/EMCON, Inc. (EMCON). *Preliminary Environmental Assessment Yakima Valley Spray Site Yakima, Washington.* July 30, 1991.

Historical Uses

The U-Haul Subfacility site historically was divided into three parcels (A, B, and C) with separate ownership. Parcel A was located in the south part of the subfacility, Parcel B was located in the middle and northeast part of the subfacility, and Parcel C was located in the northwest part of the subfacility and along the north property boundary. The three parcels were combined under a single ownership in 1973 and were sold to U-Haul in 1984.

Parcel A historically was owned by the Webb Tractor and Equipment Company (Webb). Webb used the parcel for sale and maintenance of farm machinery and heavy equipment, and as an automobile wrecking yard. Maintenance activities were carried out in a building located along the northern boundary of the site. A disposal pit reportedly was present near the Webb buildings during the late 1930s.

A portion of Parcel B, was owned by Washington Refining Company from 1912 to 1942. The entire parcel was owned by Washington Refining Company from 1942 until 1955 when it was sold to Shell Oil Company (Shell). The Shell parcel was used for bulk storage and distribution of petroleum products between 1955 and 1971. Seven 50,000-gallon above-ground storage tanks containing fuel were used in the Shell operations.

Parcel C was originally owned by The Yakima Rex Company, and later by the Yakima Valley Spray Company (YVS). YVS formulated and distributed pesticides and manufactured lime-sulfur spray between 1909 and 1973. Manufacture of the lime-sulfur spray resulted in generation of lime-sulfur sludge which was stored on the subfacility in an open pit. The sludge was reportedly dried and sold as a soil amendment or transported off-site for disposal. Pesticides were formulated or re-packaged in a building which was damaged by fire and ultimately demolished in 1973. One 6,000-gallon PCE/solvent tank was present at the YVS facility, and was used for on-going operations from 1968 until 1973, when the tank was destroyed by fire.

Current Use

The U-Haul Subfacility currently is used to rent, store, and service rental vehicles. Administrative operations also are performed on site. The ground surface at the subfacility is paved.

Proximity to Irrigation Canals and/or Utilities

The New Shanno pipeline, part of the regional irrigation distribution system, crosses the eastern portion of the site in a generally north-south direction. The U-Haul Subfacility is served by city water and sewer systems. A sanitary sewer pipeline traverses the western portion of the site in a north-south direction roughly parallel to the western site boundary.

Documented and/or Potential Releases

Chemical spills and releases have reportedly occurred at this subfacility. The reported releases include:

- Destruction of a 6,000-gallon PCE/solvent tank and associated piping at the U-Haul facility during the 1973 fire reportedly resulted in releases of an unknown volume of product.

- One soil sample collected from a test pit excavated at the site by U-Haul (in conjunction with Ecology) indicated the presence of concentrations of pesticides, herbicides, and TPH in subfacility soil.

There was no documentation of any on-going releases at the subfacility in the Ecology file reviewed.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the U-Haul Subfacility. The summary is based on information obtained from the review of reports prepared by others during the period from 1991 to 1997.

Sweet-Edwards/EMCON, Inc. (SE/E). SE/E completed a preliminary assessment at the subfacility in 1991 (SE/E EMCON 1991). The work included excavating five test pits, drilling two soil borings, installing three groundwater monitoring wells (YS-1, YS-2, and YS-3), and collecting soil and groundwater samples. Concentrations of PCE ranging from 1.0 to 12 µg/l were detected in groundwater from the three wells, with the highest reported concentration in well YS-3. Concentrations of PCE were non-detect in soil samples collected from depths up to 17 feet bgs in the monitoring well borings. Based on the results of the investigation, Ecology issued an Enforcement Order to U-Haul on December 16, 1991, to complete a remedial investigation and feasibility study (RI/FS) at the subfacility.

Remediation Technologies, Inc. (RETEC). RETEC conducted a remedial investigation and supplemental remedial investigation as part of the Enforcement Order beginning in November 1992 (RETEC 1995). These investigations included advancing a total of fifteen test pits, advancing 13 soil borings, installing nine groundwater monitoring wells (MW-4 through MW-12), and collecting soil and groundwater samples. The wells were installed to approximately 28 feet bgs. Groundwater samples were collected from the eight of the new monitoring wells (all the wells except MW-12) and three existing monitoring wells during four sampling rounds conducted between November 1992 and August 1993. Groundwater samples also were collected from monitoring well MW-12 and two hydropunch locations during a February 1994 sampling event. Analytical results for groundwater samples indicated that reported concentrations of PCE ranging from 1 to 27 µg/l were detected in eleven of the twelve monitoring wells and in one hydropunch locations located in the central part of the site. No concentrations of PCE were detected in well MW-8.

Soil samples were collected from the soil borings, test pits, four drywells located in the southeast corner of the subfacility, and five sumps located in the southwest corner of the subfacility (RETEC 1995a). The soil samples were collected at varying depths from 0.3 to about 17 feet bgs (near the groundwater table). Analytical results indicated that concentrations of PCE ranging from non-detect to 4.0 mg/kg were present in 14 sample locations in the northwest portion of the property, one sample location near the storage building in the northeast part of the site, and one sample

location near the west property line, in a storage building in the southwest part of the subfacility. The maximum concentration was detected in a sample collected at 0.3 feet bgs in the central part of the subfacility.

In March 1995, RETEC prepared an FS to evaluate cleanup action alternatives at the subfacility pursuant to the 1991 Enforcement Order (RETEC 1995b). According to Ecology, the final FS has not been completed to date.

Local Groundwater Flow Direction

SE/E reported that the direction of local groundwater flow was to the southeast in April and May 1991 (SE/E 1991). RETEC performed monthly monitoring at the site between November 1992 and January 1994. Based on the data collected, RETEC reported that the direction of local groundwater flow varied seasonally from south to southwest in December through March to south to southeast in July to September. The south to southwest direction of local groundwater flow reported by RETEC for December through March 1993 is not consistent with the regional flow for the YRRA determined for this RI. The southeast direction of local flow reported by SE/E for April and May 1991 and the south to southeast direction of local flow reported by RETEC for July to September 1993, is generally consistent with the southeast direction of regional flow in the YRRA determined by this RI.

Summary of Historical PCE Concentrations

Soil. Analytical data for soil samples collected as part of the subfacility RI conducted by RETEC in 1992 and 1994 indicated that concentrations of PCE ranged from non-detect to 4.0 mg/kg in soil samples collected at the subfacility. The maximum concentration was detected in a sample collected at 0.3 feet bgs.

Groundwater. Analytical results for groundwater samples collected at the subfacility indicated that concentrations of PCE were detected in groundwater samples collected from each of twelve permanent groundwater monitoring wells during at least one groundwater monitoring event. Reported concentrations of PCE have ranged from 1.0 to 27 µg/l in the groundwater samples collected.

Remediation History

Based on information reviewed by SECOR, no remediation has been conducted at the site. Ecology reportedly is developing a corrective action plan to address soil and groundwater contamination at the subfacility.

RI Results

RETEC has collected four quarters (December 1997 - September 1998) of groundwater samples from the twelve monitoring wells at the Yakima Valley Spray/U-haul Subfacility during this RI for analysis for PCE (Table 7). SECOR collected a split sample from monitoring well YS-2. The analytical results of the split samples are consistent with the RETEC results. The analytical results of groundwater samples collected for this RI show that the concentrations of PCE have been above the 5.0 µg/l cleanup level in MW-4, located on the north (upgradient) side of the property; in YS-3, MW-10, MW-11, and MW-12, located up or cross-gradient of the subfacility; and in MW-7, located on the west-central portion of the subfacility. The analytical results of samples collected form YS-2, located on the east-southeast side of the property, were non-detect. The highest concentrations of PCE have been detected off-site, upgradient of the subfacility.

There was no discernible trend to the PCE concentrations in groundwater samples collected for this RI when compared with the historical concentrations.

Based on results of the historical PCE analysis and PCE concentrations from this RI, this subfacility is not considered a potential source of PCE to regional groundwater in the YRRA.

7.2.2.7 Westco Martinizing Subfacility

Introduction

The Westco Martinizing Subfacility is located at 812 Summitview Avenue, between South Eighth Avenue and South Ninth Avenue in the northwest portion of the YRRA (Figure 3). The subfacility is located an area zoned for commercial use. The subfacility is approximately 0.5 acres in size. A dry-cleaning facility currently operates at the subfacility.

Summary of Information Sources

SECOR reviewed documents available in the Ecology files for the Westco Martinizing Subfacility. The information summarized below has been obtained from review of the following documents.

- CH_2M Hill. *Preliminary Site Investigation*. April 6, 1994.
- 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. *Remedial Site Investigation Feasibility Study*. January 1996
- 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.

Historical Uses

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. Vapor emissions are the only known waste stream associated with this machine. The single building located at the subfacility was constructed in the 1940s and is the only known building present.

Current Use

The subfacility is currently an operating dry-cleaning facility. As noted above, the dry cleaning equipment used on-site was installed in 1988. The machine contains PCE recovery units. Vapor emissions are the only known waste stream associated with this machine. The ground surface around the subfacility building is paved.

Proximity to Irrigation Canals and/or Utilities

No irrigation canals are located in the immediate vicinity of the subfacility; however, the R.S.&C. irrigation system is situated one block west of the subfacility, along South 10th Avenue. The Westco Martinizing Subfacility is served by both city water and sewer systems. A water line reportedly runs southeast-northwest along the northern end of the subfacility. A sewer line and natural gas are located on the south end of the subfacility.

Documented and/or Potential Releases

No specific notices of spills or releases were present in the files reviewed at Ecology for the Westco Subfacility. However, dry-cleaning operations have taken place at the Westco Martinizing Subfacility since 1953. In addition, an inspection by Ecology identified improperly stored PCE in containers located near the rear of the subfacility. This potential release could represent an historical source of PCE to groundwater.

No documentation of any on-going releases at the subfacility in the Ecology files reviewed by SECOR.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during the period from 1994 to 1998.

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

CH_2M Hill. In 1993, CH_2M Hill installed three groundwater monitoring wells (MW-1, MW-2, and MW-3) on the northeast, east, and southeast corners of the subfacility, respectively. PCE was detected in groundwater collected from MW-2 at a concentration of 17.0 µg/l. Concentrations of PCE reported as trace were detected in MW-1 and MW-3.

CH_2M Hill collected twenty-two soil samples from nine test pits at the subfacility in June 1994 (CH_2M Hill 1996). Analytical results indicated that concentrations of PCE ranged from 0.64 mg/kg to 13 mg/kg in the sampled soil. The highest concentrations of PCE were detected below the former air discharge vent at 1 foot bgs.

In 1995, CH_2M Hill installed monitoring well MW-5 at the subfacility. Groundwater samples were collected from all four of the monitoring wells in July, October, and December, 1995. The analytical results revealed PCE concentrations ranging from 5.4 to 120 µg/l in the groundwater samples collected from monitoring well MW-2, located east of the building. Concentrations of PCE were non-detect or below 4.0 µg/l in groundwater samples collected from the three remaining monitoring wells.

Samples were collected from the contents of two USTs identified near the southeast corner of the subfacility building. Analytical results revealed PCE in the material in both USTs. The USTs were removed in June 1996. Four soil samples were collected from the floor of the UST excavation. The analytical results revealed concentrations of PCE ranging from non-detect to 1.47 mg/kg. The highest concentration was detected in a sample collected from the northwest corner of the excavation. In June 1996, additional soil was excavated from the UST cavity; analytical results for soil samples collected from the excavation indicated that remaining soil did not contain PCE at concentrations above 0.5 mg/kg.

Local Groundwater Flow Direction

CH_2M Hill reported that the direction of local groundwater flow was to the south-southwest at the subfacility, and indicated that the flow direction was inconsistent with the regional flow direction

to the southeast. CH_2M Hill attributed this inconsistent flow direction to localized geologic deposits. The south-southwest direction of local groundwater flow is inconsistent with the southeast direction of regional groundwater flow in the YRRA determined for this RI.

Summary of Historical PCE Concentrations

Soil. Analytical results for twenty-two soil samples collected from nine test pits at the subfacility in June 1994 indicated that 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 in soil samples collected below the former air discharge vent, at 1 foot bgs. Analytical results for four soil samples collected from the floor of the UST excavation indicated that concentrations of PCE ranged from non-detect to 1.47 mg/kg in the sampled soil.

Groundwater. Groundwater samples collected from the four monitoring wells (MW-1, MW-2, MW-3, MW-5) in September 1993, July, October, and December 1995 revealed PCE concentrations up to 120 µg/l in the groundwater samples collected. The highest concentrations of PCE were detected in groundwater from well MW-2, located east of the building.

Remediation History

Source Removal and Soil Remediation. A total of 103 tons of soil were excavated by CH_2M Hill from the southeast portion of the subfacility in March 1996. 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. An additional 15.28 tons of soil were excavated from the UST cavity later in 1996. Soil samples collected from the excavation did not reveal PCE above 0.5 mg/kg.

Groundwater Remediation. Groundwater remediation has not been conducted at the Westco Martinizing Subfacility.

RI Results

CH_2M Hill has collected four quarters (December 1997-September 1998) of groundwater samples from the Westco Martinizing Subfacility for this RI 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. 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 concentration of PCE in the groundwater exceeded the 5.0 µg/l cleanup level in two of the four quarters sampled for this RI, ranging from 1.2 to 66.8 µg/l. (Table 7). The higher concentrations

occurred during the irrigation season. The maximum concentrations in the most down gradient well, MW-2 was 1.59 µg/l.

Based on results of the historical PCE analysis and PCE concentrations from this RI, this subfacility is not considered a potential source of PCE to regional groundwater in the YRRA.

7.2.2.8 Woods Industries/Crop King Subfacility

Introduction

The Woods Industries/Crop King Site (Woods Industries) Subfacility is located at 1 East King Street in an area zoned for commercial/industrial use (Figure 3). The subfacility is owned by Burlington Northern Railroad (BNRR) and was formerly leased by BNRR to Woods Industries, who historically sublet a portion of the subfacility to Akland Irrigation. The subfacility is four acres in size and consists of two areas: the Woods Industries/Crop King buildings on the north part of the subfacility, and the Akland Irrigation buildings on the south part of the subfacility.

Summary of Information Sources

SECOR reviewed documents available in the Ecology files for the Woods Industries Subfacility. The information summarized below has been obtained from review of the following documents.

- Burlington Environmental, Inc. Letter to BNRR (Mr. M. Burda) regarding Yakima Railroad Tetrachloroethylene (PCE) Study Area and Woods Industries. February 14, 1992.
- Burlington Environmental, Inc. *Remedial Investigation Report, Woods Industries Site.* October 23, 1992.
- Burlington Environmental, Inc. *Draft Feasibility Study Woods Industries Site.* August 25, 1993.
- John Mathes & Associates, Inc. *Preliminary Site Characterization Summary.* February 1991.
- Morrison Knudsen Engineers. *Site Characterization Plan.* March 1986.
- Morrison Knudsen Engineers. *Preliminary Site Characterization Report.* March 1987.

Historical Uses

A distiller of industrial alcohol operated on the subfacility prior to about 1937. BNRR reportedly has owned the subfacility since before 1938. 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 Inc. (initially operated as Crop King Company) purchased the formulation plant around 1952, and sublet a portion of the subfacility to Akland Irrigation. The Woods Industries/Crop King buildings, used to formulate pesticides, were located on the north part of the subfacility, and the Akland Irrigation buildings, used for the storage and retail sales of irrigation supplies, were located on the south part of the subfacility. BNRR terminated the lease for the subfacility in May 1985.

Wastewater from the Woods Industries/Crop King pesticide formulation operations reportedly was dumped down a drain and eventually discharged to a sump and/or french drain located southwest of the Woods Industries building, in the northwest part of the subfacility. Two wastewater storage lagoons were located near the middle portion of the Akland Irrigation building area. The lagoons were reportedly used to collect and store liquids carried by a pipeline from the Woods Industries area. The lagoons were filled with surrounding soil and debris between 1973 and 1977. Four USTs used for fuel storage for Akland Irrigation were removed in 1986.

Current Use

No operations are occurring at the subfacility. No buildings are present at the subfacility. The ground surface is unpaved and covered with vegetation.

Proximity to Irrigation Canals and/or Utilities

No irrigations canals have been identified near the Woods Industries Subfacility. The Woods Industries Subfacility was served by both city water and sanitary sewer systems.

Documented and/or Potential Releases

No specific notices of releases or spills were present in the files reviewed at Ecology. Documentation of potential releases includes:

- Former pesticide manufacturing could represent a potential PCE source.
- BNRR reportedly terminated the Woods Industries lease at the subfacility due to "environmental concerns" which were not specifically identified in the documents reviewed.
- Wastewater pumped into the sump/french drain area located in the northwest corner of the subfacility for disposal. One soil sample collected from the sump prior to removal contained 0.03 mg/kg PCE.

- Two discharge lagoons located on the southwest part of the subfacility were used to collect and store liquids carried by pipeline from the Woods Industries (north) area of the subfacility. The liquids were subsequently discharged to the sanitary sewer.

- Samples of standing water were collected from a sump south of the Akland building contained concentrations of PCE.

The potential releases noted above could represent a potential historical source of PCE. No documentation of any on-going releases at the Woods Industries Subfacility were documented in the Ecology files. No operations are currently being performed at the Woods Industries Subfacility and the subfacility is vacant.

Historical Subfacility Characterization Summary

The following is a summary of information relating to historical concentrations of PCE in soil and groundwater at the subfacility. The summary is based on information obtained from the review of reports prepared by others during the period from 1986 to 1992.

USEPA. USEPA conducted a site-inspection of the Woods Industries Subfacility in 1985 (MKE, 1986). USEPA collected surface soil samples from five selected areas located throughout the subfacility. MKE was retained by BNRR to collect split samples. Based on the results of the site-inspection and soil sampling, USEPA issued a Remedial Order to the Woods Industries Subfacility on December 6, 1985. The order required that subfacility be characterized to determine the nature and extent of hazardous substance contamination in soil, groundwater, and surface water at the subfacility. The Order included a requirement to sample groundwater at the subfacility for volatile organic compounds.

Morrison Knudsen Engineers (MKE). MKE conducted a site characterization of the Woods Industries Subfacility in 1986 (MKE 1987). The site characterization activities included installing four groundwater monitoring wells and collecting soil samples from surface soils, trenches up to 3 feet deep, and soil borings. Three wells (W-1, W-2, W-3, and W-4s) were installed at depths between 15 and 23.5 feet bgs and one well (W-4D) was installed at 55 feet bgs. Concentrations of PCE were identified in groundwater samples collected from all five wells. PCE concentrations in the shallow wells ranged from 19 to 31 µg/l, with the highest concentration measured in well W-4. The PCE concentration in the well W-4D was 37 µg/l. Metals and pesticides also were detected in the sampled groundwater.

MKE (1987) also collected soil samples from the borings and from surface soil throughout the facility. Five surface soil samples were reported as containing "trace" amounts of PCE. One soil sample, collected in a sump located on the west side of the Woods Industries Subfacility, contained 0.25 mg/kg PCE. MKE excavated the sump area, and the excavated material was placed in an on-site vault.

John Mathes & Associates, Inc. (Mathes). Mathes conducted a subsurface investigation at the subfacility in 1990 (Mathes 1991). The investigation included installing nine monitoring wells and collecting groundwater and soil samples. Wells W-5s and W-6 through W-10 were installed to 22 to 25 feet bgs, and wells W-2d, W-5d, and W-11d were installed to 53 feet bgs. Analytical results indicated that concentrations of PCE up to 24 µg/l were detected in each of the subfacility wells at concentrations ranging from 5 to 24 µg/l. Mathes reported that concentrations of PCE were highest in the sample collected from well W-5s.

Concentrations of PCE ranging from non-detect to 0.3 mg/kg were detected in surface and subsurface soil at over 100 sampling locations throughout the subfacility (Mathes 1991). Samples of surface water were collected from a sump south of the Akland building. The analytical results revealed PCE at concentrations ranging from non-detect to 0.014 mg/kg.

Burlington Environmental (Burlington Environmental). In 1991, Burlington Environmental sampled the soil excavated from the sump which had been placed in an on-site vault by MKE in 1987 (Burlington Environmental 1992). Analytical results indicated that the soil from the vault was non-detect for PCE. Burlington Environmental also removed perforated drums and removed the underlying soil located in the french drain area located west of the Woods Industries building. Soil samples were collected from the french drain area from the ground surface to 4 feet bgs. Analytical results for soil samples revealed PCE at concentrations ranging from 0.02 to 0.39 mg/kg in the excavated soil. Samples collected from residual soil below the high water level revealed PCE at concentrations ranging from 0.027 to 0.084 mg/kg.

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

Local Groundwater Flow Direction

The direction of local groundwater flow was assessed by others to be to the southeast in July 1986 and 1990. The direction of groundwater flow was calculated to the south-southeast for both the shallow and deep water-bearing zones in 1990. This direction of local groundwater flow is consistent with the direction of regional groundwater flow determined by this RI for YRRA.

Summary of Historical PCE Concentrations

Soil. Soil samples were collected from the borings and from surface soil throughout the facility. Five surface soil samples were reported as containing "trace" amounts of PCE. One soil sample, collected in a sump located on the west side of the Woods Industries Subfacility, contained 0.25 mg/kg PCE.

Concentrations of PCE ranging from non-detect to 0.3 mg/kg were detected in surface and subsurface soil at over 100 sampling locations throughout the subfacility (Mathes 1991).

Analytical results indicated that the soil from the vault was non-detect for PCE. Soil samples were collected from the french drain area from the ground surface to 4 feet bgs. Analytical results for soil samples revealed PCE at concentrations ranging from 0.02 to 0.39 mg/kg in the excavated soil. Samples collected from residual soil below the high water level revealed PCE at concentrations ranging from 0.027 to 0.084 mg/kg.

Groundwater. Historical concentrations of PCE in groundwater range from 5 to 31 µg/l in groundwater samples collected from on-site monitoring wells.

Remediation History

Source Removal and Soil Remediation. MKE excavated a sump located in the northwest part of the subfacility in 1987. The excavated material was placed in an on-site vault. In 1991, Burlington Environmental sampled the soil that was stored in the vault by MKE. The vault soil and soil underlying the nearby french drain was removed and piled next to the french drain. Samples collected from residual soil below the high water level in the excavation revealed PCE at concentrations ranging from 0.027 to 0.084 mg/kg. The amount and final disposition of the removed soil was not documented.

Groundwater Remediation. No groundwater remediation has been performed at the Woods Industries Subfacility.

RI Results

GeoEngineers has collected four quarters (December 1997-September 1998) of groundwater samples from the Woods Industries Subfacility for this RI 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).

There was no discernible trend to PCE concentrations in groundwater samples collected for this RI when compared to historical concentrations.

Based on results of the historical PCE analysis and PCE concentrations from this RI, this subfacility is not considered a potential source of PCE to regional groundwater in the YRRA.

7.2.3 Other Subfacilities within the 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
- Banks Property (formerly J.C. Penney site)
- Elliot Tire Center

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.

ECOLOGY COMMENT:

Page 50: Section 7.2: Potential PCE Source Summary: The hydrology at each site is complex enough that you cannot use a single downgradient well to accurately describe conditions. This type of portrait presents a picture at only one specific point in time or place. The highest concentration may not have occurred at the same time or location for each facility.

GENERAL RESPONSE:

To address the above comments, the text of Section 7.3 (formerly 7.2) has been revised to include summaries of historical PCE source information and RI results, as shown below. Table 13 has been modified to include additional PCE source information.

SPECIFIC RESPONSE:

7.3 POTENTIAL PCE SOURCE SUMMARY

7.3.1 Summary of Subfacility Historical Information

Ecology has identified a number of potential and confirmed sources of PCE to groundwater within the YRRA. These PCE sources include dry-cleaning operations, pesticide manufacturing facilities, wrecking yards, an activated carbon recycling facility, maintenance facilities, and manufacturing facilities. The 13 subfacilities included within the quarterly groundwater sampling conducted for this RI were identified by Ecology as potential sources of PCE to the regional groundwater within the YRRA based on historical operations, the results of subsurface investigations at each subfacility, and limited regional investigations conducted prior to this RI. Subsurface investigations completed at each subfacility prior to the results of this RI indicated that concentrations of PCE were detected in soil and groundwater above the current regulatory cleanup levels at all of the subfacilities.

~~The following~~ Table 13 summarizes the historical uses of each subfacility, the ~~nature of source~~ potential release~~(documented or potential)~~, and the source control/remediation completed at the subfacilities prior to this RI, and identifies the subfacilities which appear to be continuing sources of PCE to the regional groundwater of the YRRA. ~~The analytical results of groundwater samples collected at the subfacilities during this RI are summarized on Table 7 and shown on Figures 21 through 25.~~ Table 13 also summarizes the maximum PCE concentration detected in groundwater for this RI.

The results of this RI have identified five subfacilities (Adeline, Cameron Yakima, Frank Wear, Goodwill Industries, and Southgate Laundry) that represent continued sources of PCE concentrations to the regional groundwater of the YRRA. The historical concentrations and results of this RI are summarized on Table 13A.

7.3.2 Summary of RI Results

~~Historical data~~ The analytical results for groundwater samples collected by SECOR, Ecology, or subfacility consultants for the 13 subfacilities for this RI are summarized on Table 7 and shown on Figures 21 through 25. These results have been compared with the sampling location at each subfacility to evaluate if concentrations of PCE exceed the 5.0 µg/l cleanup level in the upgradient and/or downgradient side of each subfacility. ~~identified by Ecology reviewed for this RI~~ The comparison indicated 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 **within the respective subfacility boundaries**, 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 subfacility property, as local groundwater flow direction has been defined by subfacility consultants in previous investigations, or in the most upgradient well, as defined by the regional direction of groundwater flow determined by this RI, ~~include~~ are:

Subfacility	Upgradient Well	Maximum Concentration of PCE (µg/l)
Agri-Tech/Yakima Steel Fabricators	MW-1 (local and regional)	6.5
Cameron Yakima	MW-1 (local) MW-106s (regional)	19 27
Frank Wear Cleaners	MW-5 (local and regional)	~~110~~ 390
U-Haul/ Yakima Valley Spray	MW-12 (local and regional)	~~2~~ 34

- 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 subfacility property, as local groundwater flow direction has been defined by subfacility consultants in previous investigations, or in the most downgradient well as defined by the regional direction of groundwater flow determined by this RI, ~~include~~ are:

Subfacility	Downgradient Well	Maximum Concentration of PCE (µg/l)
Adeline	MW-3 (local and regional)	15.6
Cameron Yakima	MW-3 (local only)	9.5

	MW-109s (local and regional)	7.1
	MW-113s (local and regional)	21
Frank Wear Cleaners	MW 1 (local)	830
	MW-4 (local and regional)	1,100
Goodwill Industries	MW-2 (local and regional)	12
Southgate Laundry	MW-3 (local and regional)	67.0

- Subfacilities where only one on-site well from the shallow water-bearing zone was sampled for this RI ~~in the groundwater of the shallow water-bearing zone,~~ which had concentrations of PCE concentrations of above 5.0 µg/l, ~~but only one well was sampled at the subfacility for this RI~~ include are:

Subfacility	Well	Maximum Concentration of PCE (µg/l)
BNRR	WDOE-i (60 ft bgs)	20.0
	BNRR-s (30 ft bgs)	23.2
Fifth Wheel/Hahn	MW-2	~~9.8~~ 9.5
Woods Industries	W-8	5.62

- The subfacilities sampled for this RI where concentrations of PCE occurred on-site in the shallow water-bearing zone above 5.0 µg/l in neither up nor downgradient wells sampled on the property for this RI are:

Subfacility	Well	Maximum Concentration of PCE (µg/l)
Westco Agri-Tech/ Yakima Steel Fabricators	MW-2	66.8
	WDOE-6	75.6

7.3.3 Source Characterization Summary

The historical operations at the 13 subfacilities identified by Ecology as potential sources of PCE to groundwater included processes that used, stored, and/or disposed of PCE. There is evidence that documented or potential releases or spills of materials which contained PCE have occurred at all of the 13 subfacilities. Some form of source control and/or remediation has been conducted at most of the subfacilities, including Adeline, Cameron Yakima, Fifth Wheel, Frank Wear Cleaners, Goodwill Industries, Nu-Way Cleaners, Paxton, Southgate Laundry, Westco, and Woods Industries. Source control activities have included the removal of soil with elevated concentrations of PCE, catch basins or dry wells containing PCE sediment, and USTs or ASTs used for storage of PCE. In addition, a groundwater remediation system has been installed at Frank Wear Cleaners (see Table 13).

The direction of local groundwater flow at each subfacility, as determined from historical data compiled by the subfacility consultant, is generally consistent with the southeast direction of regional groundwater flow for the YRRA as determined by this RI. Local groundwater flow direction did vary somewhat from the regional groundwater flow direction at the Adeline Subfacility. The deviation of the localized groundwater flow direction at Adeline may be due to potential leakage from underground utilities. The Cameron Yakima Subfacility is bisected by the New Shanno Ditch irrigation canal. The Southgate Laundry Subfacility is crossed by the Broadgauge Irrigation Canal. While leakage from the irrigation canals could potentially affect localized migration of PCE in shallow groundwater, the results of the RI did not identify any regional effects on PCE concentrations in the YRRA associated with leakage from irrigation canals.

The historical results of groundwater samples collected prior to this RI at each of the subfacilities indicates that all of the 13 subfacilities have had concentrations of PCE above 5.0 µg/l in groundwater samples collected from monitoring wells located on the respective properties. The analytical results of the groundwater samples collected during this RI indicate that the concentrations of PCE exceed 5.0 µg/l in groundwater samples collected from monitoring wells located on the respective property at all of the subfacilites except Nu-Way and Paxton. Concentrations of PCE exceeded 5.0 µg/l in the downgradient well on the respective properties, based on the regional direction of groundwater flow in the YRRA during this RI, at Adeline, Cameron Yakima, Frank Wear Cleaners, Goodwill Industries, and Southgate Laundry subfacilities. Soil remediation has been conducted at all five of these subfacilities. A substantial soil removal is planned at the Cameron Yakima subfacility. Groundwater remediation was occurring during the RI at the Frank Wear Cleaners Subfacility.

The concentrations of PCE in groundwater at the five continuing source area subfacilities remained relatively consistent for the one year of sampling for this RI. Concentrations of PCE in shallow groundwater were generally less than 100 µg/l at the Adeline, Goodwill, and Southgate subfacilities. At times, the concentrations of PCE detected during this RI ranged above 100 µg/l at some monitoring locations in shallow groundwater at the Cameron Yakima and Frank Wear Cleaners subfacilities. The concentrations of PCE detected during this RI were generally higher during the irrigation season at the Adeline and Southgate Subfacilities. Comparison of the PCE concentrations in groundwater from samples collected during this RI with historical PCE concentrations indicated the following (see Table 13A).

1. The range of PCE concentrations detected during this RI were generally consistent with the respective range of historical PCE concentrations reported by subfacility consultants at most subfacilities;

2. A decrease of PCE concentrations at the Cameron Yakima Subfacility in groundwater monitoring wells located downgradient of the former transfer tank, which was removed in 1995; and

3. A slight decrease of PCE concentrations in the downgradient well at the Goodwill Industries Subfacility after completion of soil excavation.

ECOLOGY COMMENT:

Page 53: Section 8.2: Extent of PCE in the Deep Water-Bearing Zone: Fate and Transport: Deep Aquifer: Statement that PCE is present. **a)** *What is migration potential downward?* **b)** *What needs to be looked at for specific facilities?* **c)** *Area-wide?*

GENERAL RESPONSE:

a) As noted in the Draft RI Report, the results of the hydrogeologic evaluation and aquifer tests have identified the potential for downward migration from the shallow water-bearing zone to the deep water-bearing zone as greater in the southern portion of the YRRA than in the northern portion. The results show that there is a discontinuous, less permeable layer in the northern portion of the YRRA, which may impede downward migration of PCE; however, the layer does not extend to the south or southeast. The vertical gradient is downward throughout the YRRA. The text of Section 8.0 has been revised to address the comment.

b) The text of Section 8.0 has been revised to address the comment.

c) This comment has been addressed in the Draft RI report. Also, refer to revised Section 8.0.

SPECIFIC RESPONSE:

8.0 EXTENT OF PCE CONTAMINATION

The ~~regional~~ evaluation of the regional extent of PCE in groundwater within the YRRA was based on the analytical results of groundwater samples collected for the four quarters ~~of water quality data collected for the RI~~ at the ~~28~~ 68 RI monitoring wells, including selected ~~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 (Figure 25) water-bearing zones 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. A region-wide plume is typically defined as a commingled plume of concentrations of PCE greater than 5.0 µg/l in groundwater from various source areas located within a specified geographical area (e.g the YRRA). Data presented on these figures indicate that the regional 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 within a respective subfacility property boundary.

Figures 21 through 24 show the PCE concentrations at the subfacilities. 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 > 5.0 µg/l in at least one well on the subfacility property; and
- subfacilities with concentrations of PCE > 5.0 µg/l in the most downgradient well on the subfacility property as determined by the respective subfacility consultant.

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 Subfacility) in the southern portion of the YRRA. This PCE contamination was isolated to the center of ~~and limited to~~ the subfacility property. No YRRA RI monitoring wells located south of the Agri-Tech 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 the Agri-Tech Subfacility.

PCE concentrations varied seasonally somewhat, but did not indicate any regional patterns or trends between RI monitoring events during non-irrigation (December 1997 and March 1998) versus irrigation (June 1998 and September 1998) seasons. ~~Two s~~Subfacilities that did indicate seasonal effects where PCE concentrations increased from the non-irrigation to the irrigation seasons include: Southgate Laundry (well MW-3), increased from ranges of 4 to 11 µg/l during the non-irrigation season to 34 to 67 µg/l during the irrigation season; Westco (well MW-2) increased from ranges of 1 to 3 µg/l during the non-irrigation season to 6 to 67 µg/l during the irrigation season; and Adeline (well MW-4) increased from ranges of 7.2 to 7.4 µg/l during the non-irrigation season to 21 to 59 µg/l during the irrigation season. These trends 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 µg/l; 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 concentrations of PCE in the deep water-bearing zone in the YRRA above 5.0 µg/l, except at the Cameron Yakima well 103d during one quarter.

Concentrations of PCE were not detected above the laboratory detection limits in groundwater samples collected from the deep water-bearing zone from RI wells located in the northern section of the YRRA during this RI, with the exception of the December 1997 sample collected at RI-4d. Very low concentrations of PCE were detected in the southern portion of the YRRA from deep wells RI-6d, RI-7d, and RI-10d in the groundwater samples collected in September 1998. The minimal presence of PCE in the northern area could be due to presence of a low permeability layer separating the shallow and deep water-bearing zones in the northern portion, but not in the southern portion, of the YRRA. This may preclude the downward migration of PCE in the northern area. The analytical results of the groundwater sample collected from well BNRR-i are representative of the shallow water-bearing zone and do not represent deep water-bearing zone conditions.

8.3 PCE DEGRADATION PRODUCTS

Under typical aquifer conditions, the transport of PCE is primarily affected by adsorption and biodegradation. Biodegradation of PCE results in the transformation of PCE to other chlorinated aliphatic hydrocarbons (referred to as "daughter products"), such as trichloroethene (TCE), 1,2-dichloroethene (DCE), and vinyl chloride (VC). The primary transformation pathway for PCE biodegradation is:

PCE → TCE → cis-1,2-DCE → VC → carbon dioxide and water

Both the cis and trans isomers of 1,2-DCE are produced by the breakdown of TCE; however, the cis-1,2-DCE isomer is generated at approximately 25 to 30 times the rate of the trans-1,2-DCE isomer. With increasing time and distance from a source, a plume of PCE in groundwater will commonly include detectable concentrations of TCE or 1,2-DCE if the concentration of PCE at the source area is high enough. The daughter products may not be detectable in a groundwater sample with relatively low concentrations of PCE. VC is a gas at temperatures above 7 degrees Fahrenheit and volatilizes rapidly in the environment. As a result, VC often is not detected in groundwater.

The chlorinated aliphatic hydrocarbons 1,1,1-trichloroethane (1,1,1-TCA) and 1,1-dichlorochloroethane (1,1-DCA) are not generated from the breakdown of PCE. The presence of these compounds in groundwater indicates that they were either released into the environment or formed due to the breakdown of tetrachloroethane (PCA).

8.3.1 PCE Degradation Products in the Shallow Water-Bearing Zone

A qualitative evaluation of the PCE degradation products was conducted based on the analytical results of the groundwater samples collected by SECOR for this RI (Table YY). The results show that PCE daughter products TCE, 1,2-DCE, and vinyl chloride were not detected in any of the shallow regional RI wells. Instead, the data indicate that the distribution of TCE and/or 1,2-DCE in groundwater samples collected from the shallow water-bearing zone is limited to some of the subfacilities adjacent to the railroad corridor in the central portion of the YRRA (Table XX). Concentrations of TCE and 1,2 DCE were generally only detected sporadically at very low concentrations during the four quarters of the RI groundwater monitoring program and vinyl chloride was not detected in any sample. Concentrations of TCE and 1,2-DCE were detected during all four quarters at the wells sampled for this RI at the Cameron Yakima and Agri-Tech Subfacilities.

Additionally, the data indicate that there is not a localized or region-wide plume of either TCE or 1,2-DCE during the four quarters of sampling conducted for this RI. Detections of these daughter products were only consistently reported for a limited area in the central portion of the YRRA. This further supports the RI conclusion that there is no region-wide plume of PCE in the YRRA.

The TCE data for the five subfacilities identified as potential sources of PCE to regional groundwater in the YRRA are inconsistent and inconclusive. The data indicate off-site migration of TCE in groundwater from these subfacilities.

8.3.2 PCE Degradation Products in the Deep Water-Bearing Zone

Groundwater data collected for this RI show that PCE daughter products TCE and 1,2-DCE were not detected in any of the deep RI wells (Table YY). The results show that the distribution of TCE and 1,2-DCE in groundwater samples from the deep water-bearing zone is limited to very low concentrations in well BNRR-3d at the BNRR subfacility. These data indicate that there is no region-wide plume of either TCE or 1,2-DCE identified in the deep water-bearing zone.

8.4 EXTENT OF PCE AND PCE DAUGHTER PRODUCTS SUMMARY

The results of the hydrogeologic conditions, historical data review, and analytical results of four quarters of groundwater samples collected from the 68 wells in the YRRA for this RI have been used to develop a conceptual model of PCE distribution within the YRRA. The conceptual model is qualitative based on the field data collected for this RI in accordance with the scope of work. The conceptual model developed for this RI indicates the following.

- The occurrence of concentrations of PCE above 5.0 µg/l is limited to discrete, localized plumes in the shallow water-bearing zone proximate and downgradient of known sources.
- Most of the potential on-going source areas are located in the north-central portion of the YRRA and include the Adeline, Cameron Yakima, Frank Wear Cleaners, Goodwill Industries, and Southgate Laundry Subfacilities.
- Localized seasonal variations in groundwater flow direction at specific subfacilities do not appear to affect the regional distribution of PCE, because the regional groundwater flow is consistently to the southeast.
- Downward migration of PCE from the shallow water-bearing zone to the deep water-bearing zone appears to be impeded by a low permeability layer in the northern portion of the YRRA.
- Downward migration of PCE from the shallow water-bearing zone to the deep water-bearing zone has a greater potential of occurring in the southern portion of the YRRA than in the northern portion of the YRRA based on the lack of a defined confining layer in this area; however, there is a lack of PCE sources in this area.
- Concentrations of PCE above 5 µg/l were not detected in the deep water-bearing zone in the northern section of the YRRA outside of specific subfacility boundaries.

- Natural attenuation processes, including dilution, volatilization, dispersion, or degradation, are likely reducing the concentration of PCE in regional groundwater in the YRRA.

- The daughter products of PCE are present only in a few localized areas of the YRRA, indicating no region-wide plume of any PCE daughter products in the YRRA.

8.5 PCE ATTENUATION IN GROUNDWATER

Results of this RI show that there is not a commingle region-wide plume of PCE concentrations in groundwater within the YRRA. Rather, there are localized plumes proximate to and down gradient of known sources. The lack of a region-wide plume from multiple sources that have released PCE to groundwater is likely due to the locations of the potential source areas and to the effects of natural attenuation processes within the aquifer. The following discussion is based on general parameters which could be affecting PCE distribution in groundwater within the YRRA.

Natural attenuation consists of naturally occurring processes which may reduce the toxicity, mobility, and volume of contamination in the environment. Natural attenuation processes relevant to chlorinated solvents such as PCE include:

- Sorption;
- Dispersion;
- Dilution;
- Biodegradation; and;
- Volatilization.

The effect of these processes on contamination in soil and/or groundwater is subject to a number of natural and natural conditions. These include the type and concentrations of contamination, source area characteristics, location in the environment, geology, hydrogeology, groundwater and aquifer material geochemistry, and time. The following general information is available for the YRRA.

Dilution/Dispersion. Dilution affects the distribution of PCE concentrations in groundwater by spreading the mass of a contaminant throughout a larger volume of groundwater. Dispersion affects the distribution of PCE concentrations in groundwater by promoting migration of the contaminants laterally from the direction of groundwater flow.

Concentrations of PCE in aquifer systems with high flow rates, where the aquifer material has a high hydraulic conductivity and a moderate to steep gradient such as the shallow regional aquifer in the YRRA, tend to be distributed somewhat narrowly and along the direction of groundwater flow. In these conditions, the effect of dispersion on the distribution of contaminants is decreased and dilution or other factors have a more significant role in the contaminant distribution.

Contaminant plumes in aquifer systems with low flow rates, where the aquifer material has a low hydraulic conductivity and low to moderate gradient, tend to be distributed in a wider and shorter configuration.

Contaminant dispersion becomes a much more important mechanism for distribution of the contaminants in an aquifer system with slow flow rates.

The estimated hydraulic conductivity and groundwater flow rates vary within the YRRA, but are relatively high, particularly in the deep water-bearing zone. The estimated high rate of flow is likely affecting the local distribution of PCE in groundwater in some areas of the YRRA by minimizing the lateral dispersion of PCE concentrations and diluting these concentrations as PCE migrates away from the potential source area. This is reflected in the narrow extent of PCE concentrations detected downgradient of the potential continuing PCE source areas that are present in the YRRA. Therefore, dilution/dispersion is probably the most significant PCE attenuation factor in the shallow regional aquifer in the YRRA.

Sorption. The distribution of PCE between groundwater and the aquifer materials is directly affected by the sorption characteristics of the aquifer materials. Sorption of PCE to the aquifer materials is affected by a number of parameters, including soil grain size, bulk density, and the fraction of organic carbon (f_{oc}) content. Studies have shown that aquifer materials comprised of coarse grained material, such as clean sands and gravels, with a organic carbon content of less than 1,000 mg/kg have little influence on the retardation of PCE in groundwater (Olson and Davis 1990).

The report prepared by Ecology (1997) entitled *Organic Carbon Sampling and Methodology Project: Yakima Railroad Area* included analytical results from 38 soil samples collected in the YRRA for evaluation of organic carbon content. The soil samples were collected from surface to a maximum depth of 10 feet bgs at eight facilities located within the YRRA. The organic carbon content ranged from 130 mg/kg up to 17,000 mg/kg, with an average organic carbon content of approximately 2,300 mg/kg. These results indicate that the carbon content of the soil at depths of 10 feet bgs potentially could have a retardation effect on PCE concentrations in groundwater. There are no data available for the organic carbon content of the aquifer materials at depths below 10 feet bgs to quantitatively extrapolate for the soil at depth. The soils at depth appeared to be the same as shallow soils. Qualitative evidence indicates that sorption from carbon may be a contributing factor to natural attenuation of PCE in the groundwater.

Biodegradation and Volatilization. Processes of biodegradation and volatilization likely are affecting the distribution of PCE in groundwater within the YRRA, based on the soil types and high hydraulic conductivity estimated for the area.

ECOLOGY COMMENT:

Page 54: Section 9.0: Receptor Survey: a) *Relate the statement about area 2 not being impacted with conclusions of the RI.*

b) *Survey Findings: Of the 83 responses using well water, which ones are domestic versus commercial/industrial.*

c) *Please make sure that the actual property owners of the 105 places that did not know if there was a well on site are contacted. It is crucial that this information be accurate as we look into future sampling and/or hookup needs. Our past experience has shown that renters often do not know if their water comes from a well.*

d) *Clarification is necessary to be able to actually identify on the ground the various aquifer users identified in the survey. For example: How many of the 32 properties are entirely dependent on well water are residential? Commercial? Industrial? Are these 32 part of the 83 identified as using well water for some purpose? If so, which of the remaining 51 users represent the 42 that are identified on page 55 as using water for drinking and domestic purposes?*

e) *Please provide maps depicting the locations of the different types of water users. Relate the water users to the plume locations, either current or predicted. This may be done in either the receptor survey or the conclusions.*

f) *The conclusions for the receptor survey state that the deep water-bearing zone has not been significantly impacted with PCE. PCE is a Dense Non-Aqueous Phase Liquid (DNAPL) which means that it is heavier than water and sinks. If there are no monitoring wells screened in the deep zone near the wells referenced how do we know that the aquifer has not been impacted?* g) *Additionally, WDOE-3d (a 97-foot deep well located at the BNRR Roundhouse), located immediately downgradient of the area in question, has shown historic levels of PCE as high as 5.9 ppb (11/22/92). WDOE-3i (a 51-foot deep well located at the BNRR Roundhouse) showed PCE during the RI sampling program at levels up to 23 ppb. Do these wells monitor water from the same zone(s) as the deep wells referenced in this conclusion?*

h) *How does the confining layer eluded to earlier in the RI relate to this situation? A simple estimate of transport rates based on aquifer characteristics may help you in answering this question. This same type of information needs to be presented for the wells referenced as being located along South First Avenue.*

GENERAL RESPONSE:

a) The statement regarding Area 2 has been addressed in the revised conclusions of Section 10.4.

b) The required information has been included in the revised Section 9.0 text and is shown on the revised Figure 26.

c) Every effort was made to contact the property owners per the procedures described in the Work Plan and approved by Ecology. This is described in the revised Section 9.0 text.

d) The required information is included in the Receptor Survey Report and has been included in the revised Section 9.0 text and Table AA, and shown on the revised Figure 26 of the Draft RI Report.

e) Figure 26 has been modified to show graphically the different water users. The water supply well locations have been related to the extent of PCE concentrations in the revised Section 9.0 text.

f) As discussed in Sections 8.2 and 8.3, concentrations of PCE do not occur above 5.0 µg/l in groundwater samples collected from deep water-bearing zone in any of the RI wells sampled during this RI, except for well 101d at the Cameron Yakima Subfacility. These results are consistent with the hydrogeologic data, which indicate the existence of an aquitard in the northern portion of the YRRA. Refer to the text of Section 8.0 which has been modified to address this comment.

g) The text has been modified. The historical data for the BNRR deep well is not consistent with the data collected for this RI, which show consistent concentrations of PCE below 0.9 µg/l at this well. This may be due to source removal, dilution/dispersion, or other attenuation processes, as discussed in Section 8.0. The groundwater samples collected from the intermediate well (WDOE-3i), located at the BNRR subfacility, are not collected from the deep water-bearing zone and are indicative of the shallow water-bearing zone conditions. This has been addressed in the revised text of Section 8.0.

h) The text has been modified. As noted in the RI, the confining layer segregates the shallow and deep water-bearing zones in the northern portion of the YRRA, which includes the BNRR subfacility. Therefore, this confining layer would likely prevent any downward migration of PCE at these subfacilities, as discussed in Section 8.0.

SPECIFIC RESPONSE:

9.0 RECEPTOR SURVEY

A groundwater use receptor survey was completed for the YRRA in accordance with the scope of work in the Consent Decree and the Work Plan 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 potentially 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 initial database identified 1,243 businesses located in the YRRA and 104 businesses and residences located in Area 1. In the course of the mailing, three of which were determined to be duplicates, seven additional listings were added in the YRRA and one in Area 1. In 12 cases, despite repeated mailings, calls and site visits, it was not possible to obtain information. In two of these 12 cases, the occupant refused to provide information. In 58 cases, it was determined that the location was vacant. However, information was obtained from previous occupants and/or landowners. All of the owners of the 105 sites who did not know if there was a well on-site were contacted.

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 Appendix C ~~the attached report~~.

The results of the survey were tabulated and are statistically analyzed in the attached report by Fitch & Marshall and on Table AA of this RI report. Information on groundwater use, well construction details, and other specific information is provided in the report in Appendix C. The survey results are summarized below.

Survey Findings

The results of the Survey indicate the following.

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
  - 40 properties use the well water for some or all of their drinking water
  - 43 properties use the well water for non-drinking water, commercial/industrial purposes

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 83 properties which indicated that they use well water depended entirely on well water:

- 31 properties (79 percent of the properties that depend entirely on well water) for drinking water
- 8 properties (21 percent of the properties that depend entirely on well water) for non-drinking water, commercial/industrial use

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 83 properties within the YRRA and Area 1 which indicated that they use well water for on-site purposes. Note that some users may use water for more than one purpose.

- Forty two users (51 percent) use water for drinking and domestic purposes:
  - 31 users depend totally on well water
  - 11 users use other sources in addition to well water
- Forty-one users (49 percent) use water for irrigation:
  - 5 users depend totally on well water
  - 5 users use other sources in addition to well water
- Ten users (12 percent) use water for food processing:
  - 6 users depend totally on well water
  - 4 users use other sources in addition to well water
- Ten users (12 percent) use water for watering livestock:
  - 6 users depend totally on well water
  - 4 users use other sources in addition to well water
- Seven users (8 percent) use water for heating:
  - 3 users depend totally on well water
  - 4 users use other sources in addition to well water
- Nineteen users (23 percent) use water for other uses such as washing, refrigeration, photo developing and dewatering:
  - 7 users depend totally on well water
  - 12 users use other sources in addition to well water

The different types of water users are summarized on Table AA and depicted on Figure 26. More specific detail is included in the receptor survey report and tables in Appendix C.

Well Locations

Of the 83 properties ~~which~~ that 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~~ that 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 supply 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 supply wells extract groundwater from depths greater that 250 feet bgs in the deep water-bearing zone.~~; however, there were no RI monitoring wells screened in the deep water-bearing zone proximate to these water wells.~~ As discussed in Section 5.0 and 6.0, it appears that a confining layer, which separates the shallow and deep water-bearing zone in the northern portion of the YRRA, is present in the vicinity of these water supply wells. In addition, the results for 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 regionally ~~significantly~~ impacted with concentrations of PCE greater the 5.0 µg/l. Concentrations of PCE above 5.0 µg/l in the deep water-bearing zone have only been detected in groundwater samples collected from one deep well (101d) located at the Cameron Yakima Subfacility. There are no water supply wells located in proximity to this subfacility.

Although PCE was detected in monitoring wells RI-10 and RI-11. located on the southern edge of the YRRA, the concentrations were well below 5.0 µg/l. The Union Gap municipal wells, which are screened in significantly deeper intervals, do not appear to be currently threatened by potential PCE migration. The RI results also suggest that the Union Gap municipal wells would not be threatened by any potential PCE migration in the future based on groundwater conditions in the YRRA determined during this RI.

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

ECOLOGY COMMENT:

Page 56: Section 10: Conclusions: **a)** *"The sediments are relatively permeable..." What has the pump test and other information told us about the permeability?* **b)** *If nothing else, what are some typical book values one would expect for this area?* **c)** *A detailed review of well logs gathered in the RI, both from subfacility and non-subfacility wells, should allow the identification of areas where the aquitard may be located.*

d) *Qualitative evidence indicates hydraulic separation in northern area. Elaborate on this and how it impacts PCE.*

e) *Does fate and transport work confirm or predict that these conclusions are correct?*

f) *Again, the statement about "significant concentrations" need to be addressed as was mentioned earlier.*

g) *What is occurring within the aquifer to allow you to reach this conclusion? Supporting data or just speculation?*

h) *The purpose of the pump test was to develop quantitative information about the shallow and deep zones of the aquifer. What conclusions may be generated from it? What are the expected ranges for things like hydraulic conductivity?* **i)** *What does your work versus subfacility work show? Agreement?*

GENERAL RESPONSE:

a) The results of the aquifer test and other information indicate that the aquifer material has a relatively high permeability in the southern portion of the YRRA, but the permeability varies across the YRRA. The results of the aquifer test show that there may be a layer of material with low permeability relative to the aquifer soil that is impeding downward migration of groundwater in the northern portion of the YRRA, and that appears to be absent in the southern portion of the YRRA. This was discussed in the revised Section 5.3.4, and is also discussed in Section 10.1 of the revised Draft RI Report.

b) The range of values for hydraulic conductivity and groundwater flow rates at RI-4 and RI-13 in the YRRA, using the results of this RI with published values for similar soil types is included in the revised text in Section 6.3.

c) The well logs for the deep water supply wells, subfacility wells, and RI wells were reviewed to develop the conclusions presented in the RI. The location of the aquitard is presented based on the available data.

d) Sections 5.3.4 and 8.0 have been modified to elaborate on qualitative evidence of hydraulic separation. Specifically, the evidence includes: the result of the aquifer test at RI-4; the data on deep well logs reviewed; and the lack of PCE in the deep water-bearing zone in proximity to elevated PCE concentrations in the shallow water-bearing zone. Furthermore, Section 10.1 has been revised to include this information.

e) The results of the site conceptual model presented in the revised text are consistent with this interpretation. This has been addressed in the revised text of Sections 6.4, 8.0, and 10.1.

f) "Significant concentrations" has been defined as PCE concentrations exceeding the MTCA Method A cleanup level of 5.0 μg/l. This has been clarified in the edited text of Section 10.1.

g) As noted in the RI report, the conditions limiting the PCE concentrations in the deep water-bearing zone include: an aquitard in the northern portion of the YRRA, where most of the sources are

located; lack of sources in the southern portion of the YRRA; and natural degradation/attenuation. This has been described in the revised text of Sections 5.3.4, 8.0 and 10.1.

h) The aquifer test, as designed and approved by Ecology, provided sufficient data to confirm the potential for migration of PCE between the shallow and deep water-bearing zones in the southern portion of the YRRA and not in the northern portion. The data do not allow a quantitative calculation for hydraulic conductivity values. However, a qualitative evaluation based on published values has been conducted to develop estimated ranges for hydraulic conductivity and groundwater flow rates in monitoring wells RI-4, RI-13, and at the Cameron Yakima Subfacility (see Section 6.3 of the revised text).

i) There are limited data from the subfacilities which extend to depths of greater than 30 feet bgs. The results of the aquifer test and estimated groundwater flow rate at RI-13 are consistent with the results of the aquifer test and groundwater flow rates calculated at the Cameron Yakima Subfacility. The data are in general agreement with the interpretation presented in the RI as noted in the revised text of Section 10.1.

SPECIFIC RESPONSE:

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 results of the literature research, review of subfacilities, review of deep boring logs, and results of the RI field investigation indicate that the sands and gravels underlying the YRRA have a highly variable hydraulic conductivity throughout most of the YRRA. ~~are relatively permeable with the exception of the areas~~ The information obtained from this RI indicates that there are discontinuous layers of fine grained materials or cementation in the northern portion of the YRRA that may act as an aquitard and limit downward migration of PCE from the shallow water-bearing zone to the deep water-bearing zone. The information obtained from this RI indicates that the aquitard is not present in the southern portion of the YRRA.

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.

It appears from the data reviewed that the aquitard observed in the northern portion of the YRRA likely occurs at a depth greater than 30 feet bgs, which is below the depth of the shallow boring logs reviewed. The determination of a low permeability layer was based on ~~Shallow and deep water-bearing zones in the YRRA have been identified in this report.~~ review of deep boring logs in the YRRA as well as several lines of qualitative evidence that 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 the following.

- Geologic conditions reported on deep 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.

- The results of the RI generally are consistent with the subsurface conditions presented in historical reports for individual subfacilities.

- Relatively large variations in the vertical 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 only one detection of ~~lack of any significant~~ concentrations of PCE greater than 5.0 µg/l in the deep water-bearing zone in the northern portion of the YRRA in immediate proximity to elevated concentrations of PCE in the shallow-water-bearing zone~~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 during one quarter. 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 did not change with ~~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. However, the hydraulic conductivity of both the shallow and deep water-bearing zone is highly variable throughout the YRRA.

- Qualitative evaluation of published values for aquifer materials similar to the subsurface soil types observed during installation for the groundwater monitoring wells for this RI, descriptions in boring and well logs completed by others within the YRRA, water production observed for the aquifer tests conducted at RI-4 and RI-13, and the regional gradients calculated for this RI were used to estimate hydraulic conductivity and groundwater flow rates in the shallow water-bearing zone. Estimates were developed for YRRA areas at RI-4, located on the west side of the YRRA, and RI-13 in the east side of the RI. The aquifer conditions and groundwater flow rate calculated at RI-4 appear to be representative of the aquifer characteristics of the northern portion of the YRRA. The aquifer conditions and groundwater flow rate calculated at RI-13 appear to be

representative of the conditions of the southern portion of the YRRA. These estimates indicated that the hydraulic conductivity values for the shallow water-bearing zone range from 10^{-3} to 10^{-5} cm/sec with an estimated groundwater flow rate of less than one foot/year to several tens of feet/year at RI-4. The hydraulic conductivity ranged from 1 to 10^{-3} cm/sec with an estimated groundwater flow rate of several hundred feet/year to several thousand feet/year at RI-13.

- The same lines of evidence were used to estimate hydraulic conductivity and groundwater flow rate in the deep water-bearing zone at RI-4 and RI-13. These estimates indicated that the hydraulic conductivity ranged from 1 to 10^{-3} cm/sec with an estimated groundwater flow rate of several hundred to several thousand feet/year.

- The hydraulic conductivity values estimated by Hart Crowser (1996) for the aquifer materials at the Cameron Yakima Subfacility range between 2 x 10^{-2} and 2 x 10^{-1} cm/sec with an estimated groundwater flow rate of several hundred to several thousand feet/year.

ECOLOGY COMMENT:

Page 57: Section 10.2: Shallow Water-Bearing Zone: **a)** *Are the 5- to 12-foot variations in water associated with specific irrigation lines?* **b)** *Do some leak substantially? Where does this occur in relation to the subfacilities and their associated plumes?*

c) *Does the seasonal change in groundwater elevation create smear zones?* **d)** *Impact PCE migration and receptors?*

GENERAL RESPONSE:

a) As noted in the revised text of the Draft RI Report, the seasonal variations in the water levels are associated with region-wide irrigation practices, which include large-scale extraction and application of water throughout the Yakima Valley and do not appear to be associated with localized effects of specific irrigation canals. The text of Section 10.2 has been revised to clarify this.

b) Evaluation of the regional groundwater regime did not identify specific irrigation canals that leak substantially and effect the groundwater flow regime. The text of Section 10.2 has been revised accordingly.

c) Smear zones typically occur for chemicals that are lighter than water (e.g., petroleum hydrocarbons). PCE is denser than water, and therefore, smear zones of PCE are not likely to be present in the YRRA.

d) The regional groundwater investigation did not identify impacts to PCE migration and receptors from seasonal groundwater elevation changes. The text of Section 10.2 has been revised to address this comment.

SPECIFIC RESPONSE:

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 regional 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 regional 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 (non-irrigation period) and highest in September (irrigation period).

- Seasonal irrigation in the Yakima Valley is interpreted to be responsible for the regionally 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 for irrigation and non-irrigation season.

- 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.

- The seasonal variation of the groundwater levels in the shallow water-bearing zone are not expected to affect regional migration of PCE as the regional gradient and direction of flow were consistent in both irrigation and non-irrigation periods.

- The estimated hydraulic conductivity in the shallow water-bearing zone in the vicinity of RI- 4 ranges from 10^{-3} to 10^{-5} cm/sec with an estimated groundwater flow rate of less than one foot/year to several tens of feet/year. Hydraulic conductivity estimated in the shallow

water-bearing zone in the vicinity of RI- 13 ranges from 1 to 10^{-3} cm/sec with an estimated groundwater flow rate of several hundred feet/year to several thousand feet/year.

- The hydraulic conductivity values estimated by Hart Crowser (1996) for the aquifer materials at the Cameron Yakima Subfacility range between 2 x 10^{-2} and 2 x 10^{-1} cm/sec.

ECOLOGY COMMENT:

Page 57: Section 10.3: Deep Water-Bearing Zone: **a)** *Again, what is the spatial variation of these groundwater level fluctuations?* **b)** *Where are the wells that are impacted by groundwater elevation fluctuations?*

c) *What is meant by the term insignificant? Horizontal gradients are less than what?*

GENERAL RESPONSE:

a) The text has been modified. The deep RI wells with the largest seasonal variation in water fluctuations are defined on Table 6 of the Draft RI Report. These wells are located predominantly in the northern portion of the YRRA. This has been shown on the revised figures and explained in the revised text of Section 10.3.

b) The text has been modified. The water level variations were shown on Table 6 of the Draft RI Report. This has been shown in more detail on the report figures.

c) The text has been modified. "Insignificant" refers to concentrations of PCE less than 5.0 μg/l. Horizontal gradients are less than 0.005 feet/foot. This has been clarified in the revised text.

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 location.

- The greatest seasonal variation was observed in the deep RI wells located on the northeast portion of the YRRA (RI-1d through RI-5d, and RI-13d and -14d). There was minimal seasonal variation of the groundwater elevations in the deep water-bearing zone in the southern portion of the YRRA. This may be due to the increased potential that water from the shallow water-bearing zone can migrate more readily to the deep water-bearing zone

in the southern portion of the YRRA, which attenuates the seasonal variation in the deep water-bearing zone.

- The estimated direction of regional 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 (0.004 feet per foot versus 0.005 to 0.007 feet per foot). The deep water-bearing zone approximate average horizontal gradient was 0.004 feet per foot across the YRRA. Seasonal variations in the horizontal gradient was 0.004 feet per foot across the YRRA.

- The estimated hydraulic conductivity in the deep water-bearing zone in the vicinity of RI-4 ranges from 1 to 10^{-2} cm/sec with an estimated groundwater flow rate of several hundred feet/year to several thousand feet/year.

- The estimated hydraulic conductivity in the deep water-bearing zone in the vicinity of RI-13 ranges from 1 to 10^{-3} cm/sec with an estimated groundwater flow rate of several hundred feet/year to several thousand feet/year.

- The hydraulic conductivity values estimated by Hart Crowser (1996) for the aquifer materials at the Cameron Yakima Subfacility range between 2 x 10^{-2} and 2 x 10^{-1} cm/sec, with an estimated groundwater flow rate of several hundred to several thousand feet/year.

ECOLOGY COMMENT:

Page 58: Section 10.4: PCE Distribution in the Shallow Water-Bearing Zone: **a)** *Where is the plume(s)?* **b)** *How has the PCE moved within the YRRA and where is it likely to go?* **c)** *If several areas exceed 5 ppb then show them.* **d)** *"There may be evidence"? Either there is or there is not.* **e)** *Some facilities may have ongoing releases, others may have historic ones that have migrated well downgradient of them. Again, please show supporting evidence.*

f) *Degradation of PCE has the ability to produce chemicals of higher risk than the PCE itself. To truly understand what is happening with PCE one must identify its breakdown products and present how they are behaving.*

g) *To conclude that there is no region-wide plume is incorrect. There is PCE detected in wells throughout the area. However, it may be true to state that only one of the 28 wells exceeds the 5-ppb level at this time.* ***h)*** *Please be sure and explain in the RI what the 5 ppb means.*

GENERAL RESPONSE:

a) The results of the RI show that the concentrations of PCE in groundwater above 5.0 µg/l are localized in discrete areas of the shallow water-bearing zone located in proximity to, and downgradient of, known source areas (Adeline, Cameron Yakima, Frank Wear Cleaners, Goodwill Industries, and Southgate Laundry Subfacilities). It is likely that the localized concentrations of PCE have migrated downgradient, to the southeast of the source areas, based on the direction of the regional groundwater flow. The locations of elevated PCE concentrations at these identified source areas are presented in Figures 21 through 25 in the Draft RI Report. Section 10.4 has been revised to address this comment.

b) The results of this RI indicate that the PCE has moved regionally downgradient of the known sources towards the south-southeast. The PCE potentially could continue to migrate in the south-southeast direction; however, dilution, natural degradation, and attenuation will further dissipate PCE concentrations in these areas. This has been addressed in the revised text of Section 10.4.

c) The localized areas with concentrations of PCE above 5.0 µg/l are shown on the Draft RI Report figures in bold.

d) The text of Section 10.4 has been modified to clarify this.

e) Additional subfacility research and discussion address this in Section 7.0.

f) A new Section 8.3 has been added to discuss degradation of PCE. Also, Section 10.4 has been revised to summarize the evaluation in Section 8.3.

g) The data do not support the interpretation of a region-wide, commingled PCE plume with concentrations higher than 5.0 µg/l. Instead, the data indicate that discrete areas of elevated PCE concentrations are present downgradient of separate source areas within the YRRA. The text of Section 10.4 has been revised to clarify this.

h) The MTCA Method A cleanup level for PCE is 5.0 µg/l. This has been defined in a previous section of the revised text.

SPECIFIC RESPONSE:

10.4 PCE DISTRIBUTION IN THE SHALLOW WATER-BEARING ZONE

The analytical results of the groundwater samples 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, these concentrations are present

in localized isolated areas ~~of PCE concentrations~~ in the shallow water-bearing zone, near and downgradient of 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. The results of this RI indicate that there is the potential of ~~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 Adeline, ~~BNRR,~~ Cameron Yakima, Frank Wear Cleaners, Goodwill Industries, and Southgate Laundry Subfacility sites.

- The areas cross-gradient of known source areas, particularly Area 2, have not been affected by off-site migration of PCE in groundwater from known sources in shallow groundwater. The distribution of PCE appears to be limited to areas directly downgradient of known source areas.

- 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, as shown on Figures 21 through 25.

- 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 or based on the regional groundwater flow direction determined by this RI) on the respective property. These subfacilities are:

Subfacility	Maximum PCE Concentration in Downgradient Well (µg/l)
Adeline	15.6
Cameron Yakima (more than one well considered)	9.5 to 21
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~~ 390

- 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~~ The upgradient/downgradientwell locations 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 during the RI, which is located west of the YRRA. There was no subfacility identified by Ecology for this RI within proximity of this location.

- Review of PCE degradation product data indicated that there is not a region-wide plume of PCE degradation products (TCE, PCE, 1,2-DCE, and vinyl chloride) during the four quarters of sampling conducted for this RI. No vinyl chloride was detected in any wells and low concentrations of TCE and 1,2 DCE were detected for only a limited area in the central portion of the YRRA.

- Concentrations of PCE in the shallow groundwater are likely migrating to the southeast from known source areas, based on the direction of the regional groundwater flow in the YRRA. The estimated hydraulic conductivity and groundwater flow rates vary within the YRRA, but are relatively high, particularly in the deep water-bearing zone and shallow water-bearing zone on the east and south side of the YRRA. The estimated high rate of flow is likely affecting the regional distribution of PCE in groundwater by minimizing the lateral dispersion of PCE and diluting downgradient PCE concentrations as PCE migrates away from the potential continuing PCE source areas. This is reflected in the apparent narrow distribution of PCE concentrations downgradient of the source areas in the YRRA.

- Review of historical information indicates that releases of PCE to the shallow water-bearing zone have occurred at all of the subfacilities in the YRRA, and that the PCE may continue to be migrating off-site from at least five of the subfacilities. The RI results indicate that these elevated PCE concentrations are localized in discrete areas of the YRRA. It is likely that regional distribution of PCE above 5.0 µg/l was not detected in the shallow water-bearing zone within the YRRA during this RI due to source control, as well as PCE dispersion, dilution, and natural degradation.

ECOLOGY COMMENT:

Page 59: Section 10.5: PCE Distribution in the Deep Water-Bearing Zone: a) *Again, the BNRR well has a history of being up to two times the drinking water standard. That is significant.* b) *Also, wells in Union Gap have detections of PCE. What can be expected from this?* c) *Add RI-10D to the list of deep wells with a detection under the 5 µg/l.*

GENERAL RESPONSE:

a) The data collected from the BNRR wells for this RI did not identify concentrations of PCE above 5.0 µg/l in the deep water-bearing zone. The historical data are pre- 1993 and do not represent current conditions. The analytical results from the groundwater sample collected from the intermediate well at BNRR are representative of the shallow water-bearing zone. This is clarified in the revised text of Section 10.5.

b) Groundwater samples from the RI wells located in the deep water-bearing zone at the southern extent of the YRRA have shown only slight detections of PCE in one quarter. The detected concentrations are near the laboratory detection limit, and the data could be considered inconclusive. The text of Section 10.5 has been revised to state this.

c) RI-10d has been added to the revised Section 10.5 text.

10.5 PCE DISTRIBUTION IN THE DEEP WATER-BEARING ZONE

- The RI analytical results show that concentrations of PCE in the deep water-bearing zone do not exceed 5.0 µg/l in any of the wells sampled for this RI ~~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) at the Cameron Yakima Subfacility which had PCE concentrations of 20 µg/l in one well for only one of four quarters. Concentrations of PCE above the method reporting limit of 0.5 µg/l, but less than 5.0 µg/l, were detected ~~all four~~ for three quarters at subfacility well BNRR-d, for four quarters from CYI 103-d, and for only one of the four quarters at wells RI-4d, RI-6d, ~~and~~ RI-7d, and RI-10d.

- The analytical results of groundwater samples collected from the deep water-bearing zone from RI wells RI-6d, RI-7d, and RI-10d, located in the southern portion of the YRRA, showed detection of PCE only slightly above the laboratory detections limits of 0.5 µg/l for only one quarter of sampling in September 1998.

- The analytical results for groundwater samples collected from the deep water-bearing zone from RI-4d, located in the northern portion of the YRRA, showed detection of PCE slightly above the laboratory detections limits for only one quarter of sampling in December 1998.

- The results of the aquifer test, geology, and RI sampling suggest that concentrations of PCE could potentially migrate from the shallow water-bearing zone to the deep water-bearing zone in the southern portion of the YRRA; however there are no known sources of PCE identified in the southern area.

- The potential for downward migration of PCE from the shallow to the deep water-bearing zone is impeded by the occurrence of a low permeability layer in the northern portion of

the YRRA that acts as an aquitard. This interpretation is supported by boring logs, hydrologic evaluation and the aquifer test results. In addition, PCE has not been detected in the deep water-bearing zone in proximity concentrations of PCE in the shallow water-bearing zone in the northern portion of the YRRA, which further supports this conclusion.

- A similar extent of concentrations of PCE as detected in the shallow water-bearing zone was not observed in the deep water-bearing zone. The very limited extent of PCE above 5.0 µg/l in the deep water-bearing zone during this RI is likely due to segregation of the shallow and deep water-bearing zones on the northern portion of the YRRA, which impedes the migration of PCE to the deep water-bearing zone. The limited extent could also be due to source control measures at subfacilities, and natural attenuation of PCE, including dispersion, dilution, natural degradation, and other attenuation factors.

- The presence of PCE degradation products in the deep water-bearing zone is limited to very low concentrations of TCE in well WDOE-3d at the BNRR subfacility. The data indicate that there is not a region-wide plume of PCE degradation products in the deep water-bearing zone. The high groundwater flow rate for the YRRA may have diluted the PCE and any degradation products to the very low concentrations observed during this RI. Other natural attenuation processes, source control, and source remediation effects also may be decreasing the concentrations of PCE in the deep water-bearing zone.

Note: Section added.

10.6 SUMMARY OF PROCESSES AFFECTING PCE DISTRIBUTION

Results of this RI show that there is not a commingled region-wide plume of PCE concentrations in groundwater within the YRRA. The lack of a region-wide plume from multiple sources that have released PCE to groundwater likely is due to the scattered locations of the few continuing source areas that have been identified in the YRRA, as well as the effects of natural attenuation processes within the aquifer. Only five continuing PCE source areas have been identified in the approximately 6-square-mile YRRA area.

The effect of natural attenuation on PCE concentrations in soil and/or groundwater in the YRRA is subject to a number of natural and man-made conditions. These include the type of contamination, source area characteristics, concentrations, location in the environment, geology, hydrogeology, groundwater and aquifer material geochemistry, and time. The primary attenuation processes identified for the YRRA are dilution and dispersion due to relatively high groundwater flow rates as indicated by the narrow distribution of PCE concentrations in limited areas directly downgradient of continuing PCE source areas.

Concentrations of total organic carbon from 38 soil samples collected in the YRRA collected from surface to a maximum depth of 10 feet bgs at eight facilities located within the YRRA ranged from 130 up to 17,000 mg/kg, with an average total organic carbon content of approximately 2300 mg/kg. Studies have shown that aquifer materials comprised of coarse grained materials with a total organic carbon content of less than 1,000 mg/kg have little influence on the retardation of PCE in groundwater. The results of carbon sampling

in the shallow soils in the YRRA indicate that the soil would have a significant retardation effect on PCE concentrations in groundwater. There are no data available for the total organic carbon content of the aquifer materials at a depth below 10 feet bgs to quantitatively extrapolate to depth. However, soil conditions at depth appear to be similar to shallow soil samples for carbon. Qualitative evidence indicates that sorption may be a factor in the attenuation of PCE.

The estimated hydraulic conductivity and groundwater flow rates vary within the YRRA, but are relatively high, particularly in the deep water-bearing zone and the shallow water-bearing zone on the east and south sides of the YRRA. The estimated high rate of flow may be affecting the regional distribution of PCE in groundwater by minimizing the lateral dispersion of PCE and diluting PCE concentrations downgradient from the source area(s). This is reflected in the apparent narrow, distribution of PCE concentration down gradient of the source areas that are present in the YRRA.

ECOLOGY COMMENT:

Page 59: Section 10.6: Receptor Survey: *Update conclusions to reflect changes made in Section 9. Please relate well locations and receptors to plume locations and expected fate of the PCE.*

GENERAL RESPONSE:

The text of Section 10.6 (now Section 10.7) has been revised accordingly.

SPECIFIC RESPONSE:

~~10.6~~ 10.7 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 supply 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~~ that 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. A total of XX properties depend exclusively on well water for domestic drinking water.

~~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.~~

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 deep 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 depths significantly greater than 130 feet bgs. There are no monitoring wells screened in the deep water-bearing zone in proximity to these water supply wells. It appears that there is a confining layer separating the shallow and deep water-bearing zone in the vicinity of these wells. In addition, 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 regionally ~~significantly~~ impacted with concentrations of PCE greater the 5.0 µg/l. Concentrations of PCE above 5.0 µg/l in the deep water-bearing zone have only been detected in groundwater samples collected from one deep well located at Cameron Yakima (MW-101d). There are no water supply wells located in proximity to the Cameron Yakima Subfacility.

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

The city of Union Gap obtains municipal drinking water from three wells located on the southern end of the YRRA. These wells extract groundwater from depths of 400, 500, and 1,200 feet bgs. The results of the RI have shown that concentrations of PCE have not occurred in the deep water-bearing zone, at depths of 130 feet bgs, above 5.0 µg/l in the YRRA, except at Cameron Yakima well MW-101d during December 1997. Insignificant concentrations of PCE were detected at deep monitoring wells RI-7, RI-8, RI-9, and RI-10, which are located upgradient of the Union Gap wells and screened to depths of 130 feet bgs. This suggests that it is highly unlikely that concentrations of PCE could occur in groundwater at the much greater depths to which the Union Gap wells extend.

ECOLOGY COMMENT:

Page 60: Section 11: References: It appears that many documents within the YRRA files at Ecology were not utilized. As stated earlier, we have enclosed a list of subfacility documents we were able to quickly identify as missing. Additionally, there are a couple of area-wide reports/investigations with extensive information about the aquifer and the PCE contamination.

GENERAL RESPONSE:

These documents have been reviewed by SECOR and referenced documents are included in the revised report.

ECOLOGY COMMENT:

*Page 63: Section 12: **Standard Limitations:** This YRRA Remedial Investigation report is a public document. Please remove the qualifier about the need for written consent of SECOR and the Working Group for its use.*

GENERAL RESPONSE:

The text of Section 12.0 has been modified.

SPECIFIC RESPONSE:

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.~~

ECOLOGY COMMENT:

Tables

a) *Table 1: Please revise the title to show that this is the list of subfacilities as of XXX date.*

b) *Table 2: Provide a complete copy of the Woodward-Clyde historic data review. Many of the numbers in this table are incorrect, and the list of subfacilities and their respective monitoring wells is incomplete.*

c) *If the reader is being referenced to a document it needs to be listed in the bibliography and readily available to both Ecology and the public.*

d) *Table 7: Note 7: Please explain why only one quarter of data was provided.*

e) *Table 13: Title states that this is a presentation of Historic Operations and Site Conditions. If so, then why does this table present max PCE concentration from RI sampling? Additionally, a single number for each subfacility does not portray an accurate picture of the scale or magnitude of contribution the various subfacilities may have made to the problem. The reader needs to be able to read this RI and clearly understand the contribution a dry cleaner versus a RCRA Treatment Storage and Disposal facility may have made.*

GENERAL RESPONSE:

a) Table 1 has been modified.

b) This comment has been addressed in this general response only. The Woodward-Clyde historical data review was completed and the results were presented in a December 1995 meeting with Ecology, as documented in Exhibit B of the Consent Decree.

c) The bibliography has been modified.

d) Table 7 has been modified.

e) The text has been modified. This issue is addressed in Section 7.0 of the modified text.

ECOLOGY COMMENT:

Maps

a) *Figure 1: Boundary of YRRA is incorrect on all maps attached to the Consent Decree is correct. Changes include the west boundary being 9th Avenue not 10th Avenue, and the northeast boundary being 5th Street not 3rd Street.*

b) *Figures 6, 7, and 8; Cross Section: Are the well logs utilized included in RI? Please create an easy reference to them. Why were so few wells utilized in creating these cross sections?*

c) *Figure 21: Up- and down-gradient wells at U-Haul are reversed.*

d) *Figure 26: What do the numbers beside the water wells refer to?*

e) *Packet 1 and 2: How do the maps go together (Irrigation Distribution maps) and what do they mean to the PCE distribution? What about the irrigation in Union Gap? Interpretation and relevance to PCE fate and transport is needed.*

GENERAL RESPONSE:

a) Figure 1 has been modified.

b) This comment has been addressed in the general response only (no text modification is necessary). All of the RI wells were utilized in generation of the cross-sections. The RI wells and other deep wells used for the cross-sections were selected based on the proximity to the cross-section loc ation. There are a limited number of well logs in proximity to the cross-sections of sufficient depth to provide useful information.

c) Figure 21 has been modified.

d) This comment has been addressed in the general response only (no text modification is necessary). The meaning of the numbers is defined on the key for Figure 26 and in the report text.

e) Packets 1 and 2 have been modified. This issue also is addressed in Sections 4.2 and 6.3 of the text.

ECOLOGY COMMENT:

Appendices

a) *Appendix B: Well logs come from Ecology. It does not appear that you have gathered all existing well logs since you have not included well logs from all of the subfacilities.*

b) *Appendix C: Receptor Survey: Page 2 of 5: As stated in an earlier comment, please make contact with the actual property owners. This will ensure that accurate information is gathered on vacant parcels and properties where the current resident is not sure about their water supply.*

c) *Appendix D: Subfacility Well Location Maps: Burlington Northern RR Roundhouse Map: Copy is not readable. Where are the wells in relation to landmarks at this site? Which are the shallow, intermediate, and deep ones? Map shows A, B, and C.*

d) *Appendix E: RI Monitoring Well Locations: Please provide location coordinates and other available survey information on the maps to allow for easy location of the wells in the field.*

GENERAL RESPONSE:

a) The report has been modified. All of the subfacility well logs are included in the revised report.

b) The text has been modified. As noted in the report, all property owners were contacted in accordance with the approved scope of work. These additions were included in Section 9.0 of the report.

c) The comment has been addressed in the general response only (no text modification is necessary). The BNRR map was the only map available in the Ecology files provided.

d) The text has been modified. These data are included in the Draft RI Report.

APPENDIX ZZ
AQUIFER TEST PROCEDURES

Aquifer tests were conducted at the RI-4 and RI-13 well pair locations in December 1997. The aquifer test procedures are summarized below. The aquifer tests were performed in accordance with the Ecology scope of work in the Consent Decree and Technical Memoranda, with the exception of the following:

- 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 aquifer tests were determined to be unnecessary based on field observations during well installation, development, and sampling, as described in the RI report text and below.

The discharge rates for the constant discharge rate tests were determined based on field observations during well installation, development, and/or sampling at the RI-4 and RI-13 well pair locations. Pumping rates and drawdown measurements were recorded during development and purging at RI-4. Review of the field data indicated that a pumping rate of 5 gallons per minute (gpm) would result in substantial drawdown at the RI-4 location. The high rate of water production during drilling and well installation at RI-13 indicated that the water-bearing zone in that location would yield water at a higher rate than the 10-foot section of screen at RI-13i could produce. These field observations were used to determine the discharge rates for the constant discharge rate tests at each well pair.

The constant discharge rate tests were performed at the RI-4 and RI-13 well pair locations. The constant discharge rate test at each location was a 24-hour duration test. The tests were run by placing 4-inch-diameter submersible impeller pumps in the pumping wells. At RI-4, well RI-4d was used as the pumping well and RI-4s was used as the observation well during the constant discharge rate test. The pumping rate at RI-4d was 5 gpm for 18.5 hours, then 8 gpm for 5.5 hours. At RI-13, well RI-13i was used as the pumping well and well RI-13s and RI-13d were used as the observation wells. The pumping rate at RI-13i was maintained at 30 gpm for the duration of the test.

To record draw-down and recovery data, pressure transducers were placed in both the pumping well and observation well at each well pair location. The transducers were connected to data loggers for data collection and storage. The data was collected at timed intervals of one reading every 10 seconds for the first 2 minutes of each test, one reading every 30 seconds for the next 5 minutes, one reading every 1 minute for the next 6 hours, and one reading every 5 minutes for the next 18 hours. Recovery data were collected following pump shutdown at each well pair location. Backup readings were collected manually throughout each pumping test.

Water disposal procedures were approved by Ecology prior to the aquifer tests based on the groundwater sampling results for the RI-4 and RI-13 wells. Water generated during the constant discharge rate test at RI-4 was discharged directly to the storm sewer located at the corner of South 16th Avenue and Prasch

Avenue in Yakima. Water generated during the constant discharge rate test at RI-13 was discharged directly to the Old Union irrigation canal that crosses Central Avenue east of South 18th Avenue in Yakima.

Table AA
Summary of YRRA Receptor Survey Water Supply Wells and Key Characteristics
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Number[1] (see Figure 26)	Name	Address	Rate of Use	Well Water Proportion	Use	Well Depth (ft)
1	ALPINE MEADOWS MOBILE HOME PK	1524 S 10TH ST	Little	2%	IR	UNK
2	MARVIN KELSCH SALES-SVC EQUIPT	1820 S 17TH ST	100 GPH Alt Days, Summer	10%	IR	41 FT
3	RONS AUTO DETAILING	1903 S 17TH ST	20 GPDay	10%	IR	20 FT
4	INLAND FPUIT & PRODUCE CO	201 N 1ST AVE	11000 GPDay	100%	FP, DR	UNK
5	COUNTY DETENTION CENTER	111 N 1ST ST	250 GPDay	10%	H	840
6	HERRERA, AGUSTIN	2704 S 1ST AVE	50 GPDay	100%	IR, DR, L	UNK
7	ZIMMERMAN, BILL J	2714 S 1ST AVE	20000 GPMonth	100%	IR, DR	UNK
8	YOERGER, E M	2801 S 1ST AVE	30000 GPMonth	100%	IR, DR, L	125
9	LEWIS CONSTRUCTION	2802 S 1ST AVE	15000 GPMonth	10%	DR	UNK
10	HOEFT, J G	2803 S 1ST AVE	20000 GPMonth	100%	IR, DR,	125
11	KEZAR, DAVE	2804 1/2 S 1ST AVE	40000 GPMonth	100%	IR, DR, H	20
12	NASH, BONNIE	2804 S 1ST AVE	Unknown	100%	IR, DR, L	UNK
13	SKOV SQUARE BUSINESS PARK	1210 S 1ST ST	Unknown	5%	H	UNK
14	SUN VALLEY ENTERPRISES	1511 S 1ST ST	Unknown	UNK	L	UNK
15	MIKE OLSON DODGE INC	1710 S 1ST ST	Unknown	100%	DR, O	UNK
16	MORTONS SUPPLY INC	1724 S 1ST ST	30 GPH	70%	DR	UNK
17	TIRES FOR LESS	1833 S 1ST ST	15000 GPMonth	100%	DR	>30 FT
18	CIRCLE Z FOOD PRODUCTS	1901 S 1ST ST	15000 GPMonth	70%	DR	UNK
19	A & W AUTO SALES	1903 S 1ST ST	25000 GPMonth	95%	DR, O	UNK
20	MORTON & SONS NURSERY INC	2009 S 1ST ST	Unknown-Little	5%	IR	10-15 FT
21	MEREDITH FURNITURE	2201 S 1ST ST	1-5GPDay	10%	DR	UNK
22	BLOSSOM SHOP	2416 S 1ST ST	Unknown	100%	DR, O	75
23	KEELING, ELVIN	3305 S 1ST ST	50 GPHour	20%	IR	UNK
24	COLONIAL HOUSE	220 N 2ND ST	10 GPHour	10%	IR	UNK
25	CONTEMPORARY CONSTRUCTION	2208 S 2ND AVE	5000 GPMonth	10%	IR	20
26	AMERICAN RED CROSS	302 S 2ND ST	50 GPHour	15%	O	UNK
27	GANGLE, ALVIN W	3301 S 2ND ST	Unknown	5%	IR	21

Table AA
Summary of YRRA Receptor Survey Water Supply Wells and Key Characteristics
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Number[1] (see Figure 26)	Name	Address	Rate of Use	Well Water Proportion	Use	Well Depth (ft)
64	MEAD AVENUE GOSPEL TABERNACLE	2004 E MEAD AVE	30 GPHour	UNK	IR	UNK
65	VOELIKER FPUIT & COLD STORAGE	15 W MEAD AVE	200 GPHour	100%	FP, DR, H	UNK
66	SNOKIST GROWERS	18 W MEAD AVE	3000 GPDay	40%	FP, O	#1-90, #2-175, #3-275
67	MANYS MARKET	811 W MEAD AVE	1GPHour	100%	FP, OR	UNK
68	SKATELAND FUN CTR	2505 OLD TOWN RD	60 GPHour	10%	IR, O	10
69	UNION GAP WEST MOBILE ESTATES	408 W PINE ST	Unknown	10%	IR	UNK
70	YAKIMA CITY PUMP STATION	1913 RUDKIN RD	Unknown	UNK	O	UNK
71	FUEL INJECTION SYSTEMS INC	803 RUSSELL LN	Unknown	10%	IR	UNK
72	NEW HORIZONS CONSTRUCTION	204 E VALLEY MAL	10000 GPMonth	100%	DR, IR	UNK
73	DEL RANCHO MARINE & RV CTR	210 E VALLEY MAL	72000 GPMonth	100%	DR, O	85-100
74	MOBILE FLEET SVC	2003 E VIOLA AVE	50 GPDay	100%	DR, IR	UNK
75	EATONS REFRIGERATION	1625 VOELKER AVE	10000 GPMonth	90%	IR	21
76	DEL MONTE CORP	108 W WALNUT ST	143GPMonthIN	87%	FP	515
77	WESTERN POWER & EQUIPMENT CORP	13 W WASHINGTON	Unknown	10%	O	UNK
78	GOLDEN VILLA MOBILE HOME COURT	18 W WASHINGTON	500 GPMonth	30%	L, IR	17
79	J R SMITH TRUCKING	19 W WASHINGTON	36000 GPMonth	100%	DR, O	UNK
80	D-N-A ENTERPRISES	34 W WASHINGTON	50-75GPHour	15%	DR,IR	UNK
81	CRAIGS SERVICE	110 W WASHINGTO	Summer ONLY	25%	IR, O	60
82	BEES A BUNCH	306 W WASHINGTO	30000 GPMonth	100%	DR	UNK
83	MODERN MILLWORK & DESIGN	401 W WASHINGTO	Unknown	20%	DR	UNK

NOTES:

[1]Well locations by well number shown on Figure 26 of this RI Report
IR = Irrigation
FP = Food Processing and other manufacturing process, recepter survey(Table 3).
DR = Drink
H = Heat
L = Water Livestock
O = Other uses, see recepter survey, (Table 2), Appendix X.
UNK = Unknown

Table BB
Summary of Waste Soil and Water PCE Concentrations
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Sample ID	Date Sampled	PCE Results
Waste Disposal Samples/Soil Cuttings			(µg/Kg)[1]
RI-1	S-1	10/14/97	ND[2]
RI-2	RI-2 Soil	10/11/97	ND
RI-3	RI-3 Soil	10/20/97	ND
RI-4	RI-4 Soil	11/11/97	ND
RI-5	RI-5 Soil	10/22/97	ND
RI-6	RI-6 Soil	11/04/97	ND
RI-7	RI-7 Soil	10/28/97	ND
RI-8	RI-8 Soil	10/27/97	ND
RI-9	RI-9 Soil	10/24/97	ND
RI-10	RI-10 Soil	11/07/97	ND
RI-11	RI-11 Soil	11/17/97	ND
RI-12	RI-12 Soil	11/19/97	ND
RI-13[3]	RI-13 Soil	10/30/97	ND
RI-13[4]	RI-13 Soil-2	11/13/97	ND
RI-14	RI-14 Soil	11/05/97	ND
Waste Disposal Samples/Wastewater			(µg/L)[5]
RI-1	W-1	10/14/97	ND
RI-2	RI-2 Water	10/11/97	ND
RI-3	RI-3 Water	10/20/97	ND
RI-4	RI-4 Water	11/11/97	ND
RI-5	RI-5 Water	10/22/97	ND
RI-6	RI-6 Water	11/04/97	ND
RI-7	RI-7 Water	10/28/97	ND
RI-8	RI-8 Water	10/27/97	ND
RI-9	RI-9 Water	10/23/97	ND
RI-10	RI-10 Water	11/07/97	ND
RI-11	RI-11 Water	11/17/97	ND
RI-12	RI-12 Water	11/19/97	ND
RI-13	RI-13 Water	10/30/97	ND
RI-14	RI-14 Water	11/05/97	ND
Waste Disposal Samples/Development Water			(µg/L)
RI-1, 2, 4	DEV-1-112597	11/25/97	ND
RI-3, 4	DEV-2-112697	11/26/97	0.6
RI-10	RI10-DEV	11/18/97	ND
RI-3, 5, 6	DEV-2-120197	12/01/97	ND
RI-7, 11	DEV-1-112097	11/20/97	1.0
RI-13	DEV-2-112497	11/24/97	ND

Notes:

[1] µg/Kg = Micrograms per Kilogram
[2] ND = Non-Detect
[3] RI 13s and RI-13i
[4] RI-13d
[5] µg/L = Micrograms per Liter

Table CC
Groundwater PCE/TCE Analytical Data
Historical Summary - Adeline Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-1 (Upgradient)[1]	3/12/96	Maxim	ND	--
	7/11/96	Maxim	ND	--
	10/10/96	Maxim	ND	--
	2/7/97	Maxim	ND	--
	Results of YRRA RI			
	12/1/97	Ecology	0.4	ND
	3/1/98	Ecology	0.86	--
	6/1/98	Ecology	0.31	--
	8/31/98	Ecology	0.3	--
MW-2	3/12/96	Maxim	ND	--
	7/11/96	Maxim	ND	--
	10/10/96	Maxim	ND	--
	2/7/97	Maxim	ND	--
	Results of YRRA RI			
	12/1/97	Ecology	0.32	ND
	3/1/98	Ecology	0.38	--
	6/1/98	Ecology	0.31	--
	8/31/98	Ecology	0.3	--
MW-3 (Downgradient)[1]	3/12/96	Maxim	ND	--
	7/11/96	Maxim	2	--
	10/10/96	Maxim	2.9	--
	2/7/97	Maxim	25	--
	Results of YRRA RI			
	12/1/97	Ecology	4.9	0.12J
	12/1/97	SECOR	4.9	ND
	3/2/98	Ecology	16	--
	3/2/98	SECOR	15.6	ND
	6/1/98	Ecology	1.9	--
	6/1/98	SECOR	2.01	ND
	8/31/98	Ecology	1.8J	--
	8/31/98	SECOR	2.10	ND

Table CC
Groundwater PCE/TCE Analytical Data
Historical Summary - Adeline Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-4	3/12/96	Maxim	16	--
	7/11/96	Maxim	24	--
	10/10/96	Maxim	35	--
	2/7/97	Maxim	8	--
	Results of YRRA RI			
	12/1/97	Ecology	7.4	ND
	3/1/98	Ecology	7.2	--
	6/1/98	Ecology	59	--
	8/31/98	Ecology	21	--

Notes:

1 Groundwater flow direction fluctuates; see text for identification of upgradient and downgradient wells.

J = Concentration estimated below reporting limits.

-- = Not provided.

ND = Not detected at or above the laboratory reporting limit.

Table DD
Groundwater PCE/TCE Analytical Data
Historical Summary - Cameron Yakima Inc. Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification[1]	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-1 (Upgradient)[1W]	8/24/89	Delta	10	0.2
	6/16/93	Hart Crowser	3/3 [2]	ND
	3/95 to 4/95	Hart Crowser	9	ND
	6/95	Hart Crowser	ND	ND
	9/95	Hart Crowser	11	ND
	12/6/95	Hart Crowser	16	--
	Results of YRRA RI			
	12/01/97	Ecology	0.24	ND
	03/01/98	Ecology	17	--
	06/01/98	Ecology	16	--
	08/31/98	Ecology	19	--
MW-2	08/24/89	Delta	7.8	0.2
	06/16/93	Hart Crowser	6/3 [2]	ND
	3/95 to 4/95	Hart Crowser	NM	NM
	6/95	Hart Crowser	ND	ND
	9/95	Hart Crowser	7.5	ND
	12/6/95	Hart Crowser	14	--
	Results of YRRA RI			
	12/02/97	Ecology	17	0.42J
	03/01/98	Ecology	14	--
	06/01/98	Ecology	7.5	--
	09/01/98	Ecology	20	--
MW-3	08/24/89	Delta	16	0.3
	06/16/93	Hart Crowser	12/7 [2]	ND
	3/95 to 4/95	Hart Crowser	NM	NM
	6/95	Hart Crowser	11	ND
	9/95	Hart Crowser	9.2	ND
	12/6/95	Hart Crowser	15	--
	Results of YRRA RI			
	12/02/97	Ecology	6.7	0.21J
	03/01/98	Ecology	6	--
	06/01/98	Ecology	7.4	--
	08/31/98	Ecology	9.5	--

Table DD
Groundwater PCE/TCE Analytical Data
Historical Summary - Cameron Yakima Inc. Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification[1]	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-4 (Downgradient)[1W]	08/24/89	Delta	960	4
	06/16/93	Hart Crowser	120/93 [2]	21
	3/95 to 4/95	Hart Crowser	320	23
	6/95	Hart Crowser	71	4.1
	9/95	Hart Crowser	100	8
	12/6/95	Hart Crowser	120	7.8
	Results of YRRA RI			
	12/02/97	Ecology	13	0.74J
	03/01/98	Ecology	53	--
	06/01/98	Ecology	30	--
	09/01/98	Ecology	122	--
MW-101d (Upgradient)[1W]	03/15/95	Ecology [3]	10.6	0.53
	3/95 to 4/95	Hart Crowser	ND	ND
	6/95	Hart Crowser	ND	ND
	9/95	Hart Crowser	ND	ND
	Results of YRRA RI			
	12/01/97	Ecology	20	0.42J
	03/01/98	Ecology	ND	--
	06/01/98	Ecology	0.38	--
	09/01/98	Ecology	0.38	--
MW-102s (Downgradient)[1W]	03/15/95	Ecology [3]	7.7	0.86
	3/95 to 4/95	Hart Crowser	11	ND
	6/95	Hart Crowser	39	2.2
	9/95	Hart Crowser	67	3.7J
	12/6/95	Hart Crowser	10	--
	Results of YRRA RI			
	12/01/97	Ecology	11	0.47J
	03/01/98	Ecology	11	--
	06/01/98	Ecology	11	--
	08/31/98	Ecology	53	--
MW-103d (Downgradient)[1W]	03/16/95	Ecology [3]	3.8	1
	3/95 to 4/95	Hart Crowser	ND	ND
	6/95	Hart Crowser	6	ND
	9/95	Hart Crowser	ND	ND
	Results of YRRA RI			
	12/01/97	Ecology	2.6	ND
	12/01/97	SECOR	2.9	ND
	03/02/98	Ecology	3.3	--
	03/02/98	SECOR	3.08	ND
	06/01/98	Ecology	5	--
	06/01/98	SECOR	4.72	ND
	08/31/98	Ecology	3.9	--
	08/31/98	SECOR	3.28	ND

Table DD
Groundwater PCE/TCE Analytical Data
Historical Summary - Cameron Yakima Inc. Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification[1]	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-103s (Downgradient)[1W]	03/16/95	Ecology [3]	834	30.7
	03/16/95	Ecology [3]	1,110	430
	3/95 to 4/95	Hart Crowser	840	29
	6/95	Hart Crowser	700	18
	9/95	Hart Crowser	360	10
	12/6/95	Hart Crowser	470	18
	Results of YRRA RI			
	12/01/97	Ecology	26	1.2J
	12/01/97	SECOR	38	0.9
	03/02/98	Ecology	75	--
	03/02/98	SECOR	94.9	3.50
	06/01/98	Ecology	68	--
	06/01/98	SECOR	51.8	1.03
	08/31/98	Ecology	106	--
	08/31/98	SECOR	98.7	3.62
MW-104s	3/95 to 4/95	Hart Crowser	380	8
	6/95	Hart Crowser	66	2.3
	9/95	Hart Crowser	27	ND
	12/6/95	Hart Crowser	160	--
	Results of YRRA RI			
	12/02/97	Ecology	11	0.39J
	03/01/98	Ecology	24	--
	06/01/98	Ecology	50	--
	09/01/98	Ecology	39	--
MW-105s	3/95 to 4/95	Hart Crowser	7.6	ND
	6/95	Hart Crowser	ND	ND
	9/95	Hart Crowser	8.6	ND
	12/6/95	Hart Crowser	8.8	--
	Results of YRRA RI			
	12/02/97	Ecology	15	0.39J
	03/01/98	Ecology	12	--
	06/01/98	Ecology	7.6	--
	09/01/98	Ecology	19	--
MW-106s (Upgradient)[1W]	03/15/95	Ecology [3]	8.9	0.49
	3/95 to 4/95	Hart Crowser	6.8	ND
	6/95	Hart Crowser	7.2	ND
	9/95	Hart Crowser	ND	ND
	12/6/95	Hart Crowser	8.9	--
	Results of YRRA RI			
	12/01/97	Ecology	27	1.2J
	03/01/98	Ecology	12	--
	06/01/98	Ecology	8.8	--
	08/31/98	Ecology	8.3	--

Table DD
Groundwater PCE/TCE Analytical Data
Historical Summary - Cameron Yakima Inc. Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification[1]	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-107s[4] (Upgradient)[1E]	08/31/98	Ecology	18	--
MW-108s[4] (Downgradient)[1E]	09/01/98	Ecology	7.8	
MW-109s[4] (Downgradient)[1E]	09/01/98	Ecology	7.1	--
MW-110s[4] (Downgradient)[1E]	09/01/98	Ecology	8.3	--
MW-111s[4] (Downgradient)[1E]	09/01/98 09/01/98	Ecology Ecology	9.4 9.4	-- --
MW-112s[4,5]	09/01/98	Ecology	15	--
MW-113s[4,5]	09/01/98	Ecology	21	--
MW-113d[4,5]	09/01/98	Ecology	5	--
MW-114s[4,5]	09/01/98	Ecology	15	--

Notes:

[1E/W] Due to size of site, several upgradient and downgradient wells have been identified based on groundwater flow directions calculated by others: "1E" designates well as up/downgradient of eastern portion of site; "1W" designates well as up/downgradient of western portion of site.

[2] Results of unfiltered/filtered groundwater sample (i.e. 6/3)

[3] Sample result reported in database provided by Ecology.

[4] Wells installed in 8/98; therefore, only one quarter of data available.

[5] Wells MW-112s, 113s, 114s, and 113d, are off site to the south of the property

J = Concentration estimated below reporting limits.

-- = Not provided.

ND = Not detected at or above the laboratory reporting limit.

NM = Not Measured

Table EE
Groundwater PCE/TCE Analytical Data
Historical Summary - Frank Wear Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-1 (Downgradient February & December 1995)	02/22/95	Huntingdon	66	1.6
	04/20/95	Huntingdon	1140	7.0
	09/06/95	Maxim	23.9	ND
	12/26/95	Maxim	298	46.3
	07/11/96	Cayuse	61	3J
	11/14/96	Cayuse	18	4J
	06/12/97	ESS	110	4.0
	Results of YRRA RI			
	12/05/97	EES	400	9.0
	12/05/97	SECOR	310	ND
	03/04/98	Sage	830	48
	03/04/98	SECOR	927	ND
	06/04/98	Sage	690	13
	06/04/98	SECOR	768	13.1
	08/31/98	Sage	33	1
	08/31/98	SECOR	22.4	1.3
MW-2 (Upgradient)	02/22/95	Huntingdon	210.02	23.0
	04/20/95	Huntingdon	109	2.0
	09/06/95	Maxim	8.8	ND
	12/26/95	Maxim	60.5	4.2
	07/11/96	Cayuse	23	ND
	11/14/96	Cayuse	64	ND
	6/13/1997	ESS	23	ND
	Results of YRRA RI			
	12/05/97	EES	54	ND
	03/04/98	Sage	72	2
	06/04/98	Sage	110	ND
	08/31/98	Sage	39	ND

Table EE
Groundwater PCE/TCE Analytical Data
Historical Summary - Frank Wear Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-3	02/22/95	Huntingdon	150	6.5
	04/20/95	Huntingdon	5	ND
	09/06/95	Maxim	11.5	ND
	12/26/95	Maxim	1080	4.7
	07/11/96	Cayuse	16	ND
	11/14/96	Cayuse	44	ND
	06/12/97	ESS	15	ND
	Results of YRRA RI			
	12/05/97	EES	42	ND
	03/04/98	Sage	860	2
	06/04/98	Sage	16	ND
	08/31/98	Sage	29	ND
MW-4 (Downgradient April & September 1995)	02/22/95	Huntingdon	1.7	ND
	04/20/95	Huntingdon	18	ND
	09/06/95	Maxim	6	ND
	12/26/95	Maxim	332	48.3
	07/11/96	Cayuse	23	ND
	11/14/96	Cayuse	214	13
	06/12/97	ESS	21	ND
	Results of YRRA RI			
	12/05/97	EES	1,100	ND
	03/04/98	Sage	210	ND
	06/04/98	Sage	280	ND
	08/31/98	Sage	34	ND
MW-5 (Upgradient)[1]	06/12/97	ESS	7.4	ND
	Results of YRRA RI			
	12/05/97	EES	83	ND
	03/04/98	Sage	390	11
	06/04/98	Sage	120	ND
	08/31/98	Sage	17	ND

Notes:

[1] Groundwater flow direction fluctuates; groundwater as determined by previous reports

J = Concentration estimated below reporting limits.

-- = Not provided.

ND = Not detected at or above the laboratory reporting limit.

Table FF
Groundwater PCE Analytical Data
Historical Summary - Goodwill Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-1 (Upgradient)[1]	05/24/94	Huntingdon	12.0	--
	10/25/94	Huntingdon	4.0	--
	12/07/94	Huntingdon	5.6	--
	Results of YRRA RI			
	12/02/97	Ecology	1.4	0.18J
	03/01/98	Ecology	0.92	--
	06/01/98	Ecology	1.6	--
	08/31/98	Ecology	0.56	--
MW-2 (Downgradient)[1]	04/11/94	Huntingdon	46.0	--
	05/24/94	Huntingdon	14.0	--
	10/25/94	Huntingdon	10.0	--
	12/07/94	Huntingdon	8.3	--
	02/23/95	Huntingdon	18.1	--
	04/26/95	Huntingdon	10.4	--
	Results of YRRA RI			
	12/02/97	Ecology	9.8	ND
	12/02/97	SECOR	12	ND
	03/03/98	Ecology	12	--
	03/03/98	SECOR	11.9	ND
	06/01/98	Ecology	7.7	--
	06/01/98	SECOR	5.78	ND
	8/31/98[2]	Ecology	8.2	--
MW-3/HW-1	02/23/95	Huntingdon	5.6	--
	04/26/95	Huntingdon	3.8	--
	Results of YRRA RI			
	12/02/97	Ecology	1.8J	ND
	03/01/98	Ecology	1.9	--
	06/01/98	Ecology	4.8	--
	08/31/98	Ecology	3.4	--
MW-4/HW-4	02/23/95	Huntingdon	4.7	--
	04/26/95	Huntingdon	1.5	--
	Results of YRRA RI			
	12/02/97	Ecology	7	ND
	03/01/98	Ecology	1.9	--
	06/01/98	Ecology	7.3	--
	08/31/98	Ecology	99	--

Table FF
Groundwater PCE Analytical Data
Historical Summary - Goodwill Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
LW-1 (Off Site)	05/24/94	Huntingdon	ND	--
LW-3 (Off Site)	05/24/94	Huntingdon	ND	--
	10/25/94	Huntingdon	ND	--
	12/07/94	Huntingdon	ND	--
	02/23/95	Huntingdon	1.3	--
	04/26/95	Huntingdon	0.6	--
LW-4 (Off Site)	05/24/94	Huntingdon	ND	--

Notes:

[1] Groundwater gradient as determined by previous reports.
[2] No split sample analyzed due to laboratory error.
J = Concentration estimated below reporting limits.
-- = Not provided.
ND = Not detected at or above the laboratory reporting limit.

Table GG
Groundwater PCE/TCE Analytical Data
Historical Summary - Southgate Laundry Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-1 (Upgradient)[1]	04/09/96	Maxim	ND	ND
	07/15/96	Maxim	1	ND
	10/10/96	Maxim	1.4	ND
	02/05/97	Maxim	9.5	ND
	09/18/97	Maxim	ND	--
	Results of YRRA RI			
	12/03/97	Maxim	1.7	--
	03/06/98	PLSA	0.88	--
	06/03/98	PLSA	2.5	--
	09/03/97	PLSA	ND	--
MW-2	04/09/96	Maxim	9	ND
	07/15/96	Maxim	57	ND
	10/10/96	Maxim	52	ND
	02/05/97	Maxim	11.9	--
	09/18/97	Maxim	20	--
	Results of YRRA RI			
	12/05/97	Maxim	16	ND
	03/06/98	PLSA	9.6	--
	06/03/98	PLSA	28	--
	06/03/98 (dup)	PLSA	22	--
	09/03/98	PLSA	18.4	--
MW-3 (Downgradient)[1]	04/09/96	Maxim	45	ND
	07/15/96	Maxim	62	ND
	10/10/96	Maxim	62	ND
	02/05/97	Maxim	107	--
	09/18/97	Maxim	31	--
	Results of YRRA RI			
	12/03/97	Maxim	8.2	ND
	12/03/97	SECOR	4.2	ND
	03/05/98	PLSA	10.5	--
	03/05/98 (dup)	PLSA	8.6	--
	03/05/98	SECOR	5.03	ND
	06/01/98	PLSA	47	--
	06/01/98	SECOR	34.0	ND
	09/03/98	PLSA	41.3	--
	09/01/98	SECOR	67.0	ND

Table GG
Groundwater PCE/TCE Analytical Data
Historical Summary - Southgate Laundry Subfacility
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Sampled By	PCE Result (µg/L)	TCE Result (µg/L)
MW-4	04/09/96	Maxim	ND	ND
	07/15/96	Maxim	3.0	ND
	10/10/96	Maxim	2.6	ND
	02/05/97	Maxim	6.3	--
	09/18/97	Maxim	3.0	--
	Results of YRRA RI			
	12/03/97	Maxim	2.0	ND
	03/06/98	PLSA	1.8	--
	06/03/98	PLSA	2.4	--
	09/03/98	PLSA	1.3	--
	09/03/98	PLSA	1.2	--

Notes:

[1] Groundwater gradient as determined by previous reports.

-- = Not provided.

ND = Not detected at or above the laboratory detection limit.

Table XX
Groundwater PCE and PCE Daughter Products Analytical Data
RI Data - Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Analyte and Concentration (mg/L)					
		Sampled By	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di-chloroethene	Other
Adeline Property Subfacility							
MW-3	12/01/97	SECOR	4.9	ND	ND	ND	
	03/02/98	SECOR	15.6	ND	ND	ND	
	06/01/98	SECOR	2.01	ND	ND	ND	
	08/31/98	SECOR	2.10	ND	ND	ND	
Agri-Tech/Yakima Steel Fabricators Subfacility							
MW-4	12/03/97	SECOR	3.8	1.1	5.1	ND	0.7 [1]
	03/03/98	SECOR	4.70	1.0	1.7	ND	0.8 [1]
	06/03/98	SECOR	3.26	0.7	2.8	ND	0.8 [1]
	09/02/98	SECOR	3.84	1.0	4.1	ND	1.8 [1]
Burlington Northern Roundhouse Subfacility							
BNRR-d	12/04/97	SECOR	0.9	0.5	ND	ND	0.5 [1]
(Well WDOE-3d)	03/05/98	SECOR	0.771	1.4	0.5	ND	
	06/04/98	SECOR	0.634	1.5	ND	ND	6.0 DCA [3]
	09/02/98	SECOR	ND	1.3	ND	ND	4.8 DCA [3]
BNRR-s	12/04/97	SECOR	23	ND	ND	ND	0.9 DCA [3]/ 5.1 [1]/ 3.8 TCA [4]
(Well WDOE-3s)	03/05/98	SECOR	19.3	0.8	ND	ND	1.5 DCA [3]/6.9 [1]/5.6 TCA [4]
	06/04/98	SECOR	23.2	ND	ND	ND	
	09/02/98	SECOR	10.8	ND	ND	ND	
Cameron Yakima, Inc. Subfacility							
MW-103d	12/01/97	SECOR	2.9	ND	ND	ND	1.9 [1]
	03/02/98	SECOR	3.08	ND	ND	ND	
	06/01/98	SECOR	4.72	ND	ND	ND	
	08/31/98	SECOR	3.28	ND	ND	ND	
MW-103s	12/01/97	SECOR	38	0.9	2.4	ND	3.3 [1]/ 0.7 TCA [4]
	03/02/98	SECOR	94.9	3.5	11.1	ND	2.8 [1]/ 0.9 TCA [4]
	06/01/98	SECOR	51.8	4.0	50.3	ND	3.2 [1]
	08/31/98	SECOR	98.7	3.6	15.4	ND	6.2 DCA [3]/ 2.4 TCA [4]

Table XX
Groundwater PCE and PCE Daughter Products Analytical Data
RI Data - Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Analyte and Concentration (mg/L)					Other
		Sampled By	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di-chloroethene	
Fifth Wheel/Hahn Motors Subfacility							
MW-2	12/04/97	SECOR	9.8	ND	ND	ND	3.7 [1]
	03/05/98	SECOR	6.49	ND	ND	ND	
	06/02/98	SECOR	5.20	ND	ND	ND	
	09/01/98	SECOR	9.47	ND	ND	ND	
Frank Wear Cleaners Subfacility							
MW-1	12/05/97	SECOR	310	ND	ND	ND	
	03/04/98	SECOR	927	ND	5.0	ND	2.1 [1]
	06/04/98	SECOR	768	13.1	10.7	ND	1.4 [1]
	08/31/98	SECOR	22.4	1.3	1.9	ND	1.2 [1]
Goodwill Industries Subfacility							
MW-2[5]	12/02/97	SECOR	12	ND	ND	ND	
	03/03/98	SECOR	11.9	ND	ND	ND	
	06/01/98	SECOR	5.78	ND	ND	ND	
Nu-Way Cleaners Subfacility							
MW-2	12/01/97	SECOR	2.2	ND	ND	ND	1.3 [1]
	03/02/98	SECOR	3.86	ND	ND	ND	
	06/02/98	SECOR	ND	ND	ND	ND	
	08/31/98	SECOR	1.35	ND	ND	ND	
Paxton Sales Subfacility							
MW-3	12/05/97	SECOR	1.7	ND	ND	ND	1.1 [1]
	03/04/98	SECOR	2.51	ND	ND	ND	
	06/01/98	SECOR	2.07	ND	ND	ND	
	09/01/98	SECOR	0.637	ND	ND	ND	
Southgate Laundry Subfacility							
MW-3	12/03/97	SECOR	4.2	ND	ND	ND	1.0 [1]
	03/05/98	SECOR	5.03	ND	ND	ND	
	06/01/98	SECOR	34.0	ND	ND	ND	
	09/01/98	SECOR	67.0	ND	ND	ND	

Table XX
Groundwater PCE and PCE Daughter Products Analytical Data
RI Data - Subfacility Groundwater Monitoring Wells
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Analyte and Concentration (mg/L)					Other
		Sampled By	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di-chloroethene	
U-Haul/Yakima Valley Spray Subfacility							
YS-2	12/04/97	SECOR	0.6	ND	ND	ND	
	03/03/98	SECOR	ND	ND	ND	ND	
	06/02/98	SECOR	ND	ND	ND	ND	
	09/03/98	SECOR	ND	5.0	3.1	ND	
Westco Martinizing							
MW-2	12/02/97	SECOR	2.5	ND	ND	ND	4.5 [1]
	03/05/98	SECOR	1.20	ND	ND	ND	
	06/02/98	SECOR	66.8	25.5	31.1	0.9	1.6 [1]
	09/02/98	SECOR	6.45	0.9	2.5	ND	3.2 [1]
Woods Industries Subfacility							
W-8[6]	12/04/97	SECOR	2.7	ND	ND	ND	0.6 [1]
	03/05/98	SECOR	3.53	ND	ND	ND	
	09/02/98	SECOR	3.12	1.1	0.5	ND	0.9 [1]

Notes:
[1] Chloroform
[2] Methylene Chloride
[3] 1.1-Dichloroethane (DCA)
[4] 1.1.1-Trichloroethane (TCA)
[5] No September 1998 sample analyzed due to laboratory error.
[6] No June 1998 sample collected by subfacility consultant.

Table YY
PCE and Daughter Products
SECOR RI Data- Shallow Water-Bearing Zone
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Analyte and Concentration (ug/L)[1]							
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di-chloroethene	1,1,-dichloro-ethene	Vinyl Chloride	Bromodi-chloromethane	Other
RI-1s	12/02/97	ND	ND	ND	ND	ND	ND	ND	0.5 [2]
	03/02/98	ND	ND	ND	ND	ND	ND	ND	ND
	06/01/98	ND	ND	ND	ND	ND	ND	ND	0.587 [2]
	08/31/98	ND	ND	ND	ND	ND	ND	ND	0.756 [2] / 3.21 [3]
RI-2s	12/02/97	ND	ND	ND	ND	ND	ND	ND	0.6 [2]
	03/02/98	ND	ND	ND	ND	ND	ND	ND	0.584 [2] / 0.577 [4]
	06/01/98	ND	ND	ND	ND	ND	ND	ND	ND
	08/31/98	ND	ND	ND	ND	ND	ND	ND	ND
RI-3s	12/03/97	ND	ND	ND	ND	ND	ND	ND	18.0 [1]
	03/02/98	ND	ND	ND	ND	ND	ND	1.19	16.8 [1]
	06/01/98	0.5	ND	ND	ND	ND	ND	0.678	23.0 [1]
	08/31/98	0.603	ND	ND	ND	ND	ND	ND	17.7 [2] / 4.03 [3]
RI-4s	12/05/97	10.4	ND	ND	ND	ND	ND	ND	1.46 [2]
	12/05/97 (Dup)	6.9	ND	ND	ND	ND	ND	ND	1.7 [1]
	03/05/98	13.2	ND	ND	ND	ND	ND	ND	ND
	03/05/98 (Dup)	13.4	ND	ND	ND	ND	ND	ND	0.502 [2]
	06/03/98	11.6	ND	ND	ND	ND	ND	ND	ND
	06/03/98 (Dup)	11.9	ND	ND	ND	ND	ND	ND	0.804 [4]
	09/02/98	10.1	ND	ND	ND	ND	ND	ND	0.630 [2] / 3.12 [3]
	090/2/98 (Dup)	10.1	ND	ND	ND	ND	ND	ND	ND

Table YY
PCE and Daughter Products
SECOR RI Data- Shallow Water-Bearing Zone
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well [1] Identification	Date Sampled	Analyte and Concentration (ug/L) [1]							
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di-chloroethene	1,1,-dichloro-ethene	Vinyl Chloride	Bromodi-chloromethane	Other
RI-5s	12/01/97	ND	ND	ND	ND	ND	ND	ND	ND
	03/03/98	0.555	ND	ND	ND	ND	ND	ND	0.696 [2]
	06/01/98	0.732	ND	ND	ND	ND	ND	ND	0.946 [2]
	08/31/98	ND	ND	ND	ND	ND	ND	ND	0.822 [2] / 4.06 [7]
RI-6s	12/01/97	0.8	ND	ND	ND	ND	ND	ND	1.8 [2]
	03/05/98	0.604	ND	ND	ND	ND	ND	ND	2.38 [2]
	06/02/98	1.04	ND	ND	ND	ND	ND	ND	1.85 [2]
	09/02/98	1.49	ND	ND	ND	ND	ND	ND	2.02 [2]
RI-7s	12/03/97	ND	ND	ND	ND	ND	ND	ND	ND
	03/04/98	ND	ND	ND	ND	ND	ND	ND	ND
	06/02/98	ND	ND	ND	ND	ND	ND	ND	ND
	09/01/98	ND	ND	ND	ND	ND	ND	ND	ND
RI-8s	12/03/97	0.8	ND	ND	ND	ND	ND	ND	1.5 [2]
	03/04/98	0.753	ND	ND	ND	ND	ND	ND	1.51 [2] / 0.580 [4]
	06/02/98	ND	ND	ND	ND	ND	ND	ND	1.62 [2] / 2.99 [3]
	09/01/98	0.601	ND	ND	ND	ND	ND	ND	3.39 [2] / 7.4 [3]
RI-9s	12/03/97	1.5	ND	ND	ND	ND	ND	ND	ND
	03/04/98	1.25	ND	ND	ND	ND	ND	ND	0.784 [2] / 0.864 [5]
	06/02/98	1.41	ND	ND	ND	ND	ND	ND	0.958 [2]
	09/01/98	0.924	ND	ND	ND	ND	ND	ND	0.942 [2] / 6.26 [3]
RI-10s	12/03/97	1.3	ND	ND	ND	ND	ND	ND	1.0 [1]
	03/04/98	2.04	ND	ND	ND	ND	ND	ND	1.2 [2] / 0.665 [4]
	06/03/98	1.9	ND	ND	ND	ND	ND	ND	1.54 [2]
	09/01/98	1.71	ND	ND	ND	ND	ND	ND	1.69 [2] / 3.01 [3]

Table YY
PCE and Daughter Products
SECOR RI Data- Shallow Water-Bearing Zone
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well [1] Identification	Date Sampled	Analyte and Concentration (ug/L) [1]							
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di-chloroethene	1,1,-dichloro-ethene	Vinyl Chloride	Bromodi-chloromethane	Other
RI-11s	12/04/97	0.9	ND	ND	ND	ND	ND	ND	1.5 [2]
	03/05/98	1.03	ND	ND	ND	ND	ND	ND	1.34 [2] / 0.586 [4]
	06/03/98	ND	ND	ND	ND	ND	ND	ND	1.61 [2]
	09/02/98	0.577	ND	ND	ND	ND	ND	ND	2.12 [2]
RI-12s	12/04/97	ND	ND	ND	ND	ND	ND	ND	1.2 [2]
	03/04/98	ND	ND	ND	ND	ND	ND	ND	1.43 [2]
	06/03/98	ND	ND	ND	ND	ND	ND	ND	1.97 [2] / 2.59 [3]
	09/01/98	ND	ND	ND	ND	ND	ND	ND	1.99 [2] / 3.57 [3]
RI-13s	12/05/97	ND	ND	ND	ND	ND	ND	ND	0.7 [2]
	12/5/97 (Dup)	ND	ND	ND	ND	ND	ND	ND	0.8 [2]
	03/03/98	ND	ND	ND	ND	ND	ND	ND	0.519 [4]
	06/02/98	ND	ND	ND	ND	ND	ND	ND	3.52 [3]
	09/01/98	ND	ND	ND	ND	ND	ND	ND	1.36 [2] / 2.93 [3]
RI-14s	12/02/97	ND	ND	ND	ND	ND	ND	ND	1.8 [2]
	03/03/98	ND	ND	ND	ND	ND	ND	ND	2.49 [2]
	05/03/98	ND	ND	ND	ND	ND	ND	ND	2.89 [2]
	09/01/98	ND	ND	ND	ND	ND	ND	ND	3.52 [2] / 3.05 [3]

Notes:

[1] Halogenated volatile organics (HVOCs) analyzed using USEPA Methods 5030/8010 (for 12/97) and 8021B .Modified (for 3/98, 6/98, and 9/98). Results reported in micrograms per liter (ug/l).
[2] Chloroform
[3] Methylene Chloride
[4] Bromoform
[5] Chloromethane
ND = Analyte not detected at or above the laboratory reporting limit.
Dup = Duplicate sample.

Table ZZ
PCE and Daughter Products
SECOR RI Data-Deep Water Bearing Zone
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Analyte and Concentration (mg/L)[1]						
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di chloroethene	1,1,-dichloro ethene	Bromodi-hloromethan	Other
RI-1d	12/02/97	ND	ND	ND	ND	ND	ND	ND
	03/02/98	ND	ND	ND	ND	ND	ND	ND
	06/01/98	ND	ND	ND	ND	ND	ND	2.98 [2]
	08/31/98	ND	ND	ND	ND	ND	ND	ND
RI-2d	12/02/97	ND	ND	ND	ND	ND	ND	0.9 [3]
	03/02/98	ND	ND	NN	ND	ND	ND	ND
	06/01/98	ND	ND	ND	ND	ND	ND	ND
	08/31/98	ND	ND	ND	ND	ND	ND	ND
RI-3d	12/03/97	ND	ND	ND	ND	ND	ND	4.4 [3]
	03/02/98	ND	ND	ND	ND	ND	ND	3.84 [3]
	06/01/98	ND	ND	ND	ND	ND	ND	2.75 [3]
	08/31/98	ND	ND	ND	ND	ND	ND	1.33 [3]
RI-4d	12/05/97	1.73	ND	ND	ND	ND	ND	ND
	12/05/97 (Dup)	1.7	ND	ND	ND	ND	ND	ND
	03/05/98	ND	ND	ND	ND	ND	ND	0.693 [4]
	03/05/98(Dup)	ND	ND	ND	ND	ND	ND	0.763 [4] / 5.10 [2]
	06/03/98	ND	ND	ND	ND	ND	ND	ND
	6/3/1998 (Dup)	ND	ND	ND	ND	ND	ND	ND
	09/02/98	ND	ND	ND	ND	ND	ND	3.05 [2]
	9/2/1998 (Dup)	ND	ND	ND	ND	ND	ND	ND

Table ZZ
PCE and Daughter Products
SECOR RI Data-Deep Water Bearing Zone
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Analyte and Concentration (mg/L)[1]						
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di chloroethene	1,1,-dichloro ethene	Bromodi-hloromethan	Other
RI-5d	12/01/97	ND	ND	ND	ND	ND	ND	ND
	03/03/98	ND	ND	ND	ND	ND	ND	0.524 [3]
	06/02/98	ND	ND	ND	ND	ND	ND	ND
	08/31/98	ND	ND	ND	ND	ND	ND	4.29 [2]
RI-6d	12/01/97	ND	ND	ND	ND	ND	ND	ND
	03/05/98	ND	ND	ND	ND	ND	ND	7.86 [2]
	06/02/98	ND	ND	ND	ND	ND	ND	ND
	09/02/98	0.712	ND	ND	ND	ND	ND	ND
RI-7d	12/03/97	ND	ND	ND	ND	ND	ND	ND
	03/04/98	ND	ND	ND	ND	ND	ND	ND
	06/02/98	ND	ND	ND	ND	ND	ND	2.71 [2]
	09/01/98	0.702	ND	ND	ND	ND	ND	ND
RI-8d	12/03/97	ND	ND	ND	ND	ND	ND	ND
	03/04/98	ND	ND	ND	ND	ND	ND	ND
	06/02/98	ND	ND	ND	ND	ND	ND	3.31 [2]
	09/01/98	ND	ND	ND	ND	ND	ND	2.54 [2]
RI-9d	12/03/97	ND	ND	ND	ND	ND	ND	ND
	03/04/98	ND	ND	ND	ND	ND	ND	ND
	06/02/98	ND	ND	ND	ND	ND	ND	ND
	09/01/98	ND	ND	ND	ND	ND	ND	ND
RI-10d	12/03/97	ND	ND	ND	ND	ND	ND	ND
	03/04/98	ND	ND	ND	ND	ND	ND	0.540 [4]
	06/03/98	ND	ND	ND	ND	ND	ND	ND
	09/01/98	0.761	ND	ND	ND	ND	ND	1.32 [3] / 9.78 [2]

Table ZZ
PCE and Daughter Products
SECOR RI Data-Deep Water Bearing Zone
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Well Identification	Date Sampled	Analyte and Concentration (mg/L)[1]						
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	Cis-1,2,-Di-chloroethene	Trans-1,2,-Di chloroethene	1,1,-dichloro ethene	Bromodi-hloromethan	Other
RI-11d	12/04/97	ND	ND	ND	ND	ND	ND	0.7 [3]
	03/05/98	ND	ND	ND	ND	ND	ND	0.531 [3] / 0.500 [4]
	06/03/98	ND	ND	ND	ND	ND	ND	ND
	09/02/98	ND	ND	ND	ND	ND	ND	0.573 [3]
RI-12d	12/04/97	ND	ND	ND	ND	ND	ND	ND
	03/04/98	ND	ND	ND	ND	ND	ND	ND
	06/03/98	ND	ND	ND	ND	ND	ND	ND
	09/01/98	ND	ND	ND	ND	ND	ND	ND
RI-13d	12/05/97	ND	ND	ND	ND	ND	ND	1.0 [3]
	03/03/98	ND	ND	ND	ND	ND	ND	0.872 [3]
	06/02/98	ND	ND	ND	ND	ND	ND	ND
	09/01/98	ND	ND	ND	ND	ND	ND	3.713 [3] / 4.04 [2]
RI-14d	12/02/97	ND	ND	ND	ND	ND	ND	ND
	03/03/98	ND	ND	ND	ND	ND	ND	1.75 [3]
	06/03/98	ND	ND	ND	ND	ND	ND	0.711 [4] / 1.22 [3] / 2.91 [2]
	09/01/98	ND	ND	ND	ND	ND	ND	2.74 [3] / 3.14 [2]

Notes:

[1] Halogenated volitale organics (HVOCs) analyzed using USEPA Methods 5030/8010 (for 12/97) and 8021B Modified (for 3/98, 6/98, and 9/98) Results reported in micrograms per liter.

[2] Methylene Chloride

[3] Choroform

[4] Bromoform

Table 13
Summary of Subfacility Historical Operations and Site Conditions
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Name/Subfacility	Dates of Documentation Included in Ecology Files	Historical Operations	Site Conditions			
			Documented/Potential Releases[1]	Remediation[2]	Maximum Concentration of PCE in Groundwater from RI Sampling (µg/l)[3]	Potential On-Going Source of PCE to Groundwater[4]
Adeline Property 16 North First Street	1995 - 1996	Hotel, tavern, restaurant, mission, barbershop, parking lot, taxi company.	Liquid spills to surface/wastewater disposal to on-site drywells, possible "dumping" by off-site parties.	Removal of 103 tons of soil. Removal of drywell and 57 tons of soil. Source removal deemed complete.	59	Yes
Agri-Tech/Yakima Steel Fabricators 6 East Washington Avenue	1997 - 1998	Pesticide manufacturing.	Liquid spills to surface; wastewater disposal to on-site mixing pit.	None	75.6[5]	No
Burlington Northern Railroad Roundhouse (BNRR) South First Street	1998	Railroad maintenance facility.	Liquid spills to surface.	None	23.2	Unknown; further subfacility investigation required.
Cameron Yakima Inc. 1414 South First Street	1988 - 1999	Activated carbon recycling.	Long-term handling and storage of carbon containing PCE, disposal of wastewater/waste slurry disposal to unlined waste pit, disposal tanks, surface spills.	Removal of 250 cubic yards of soil, carbon transfer tank and wastewater sumps, and closure in place of wastewater conveyance trenches. Further soil removal pending.	122	Yes
Fifth Wheel/Hahn Motors 307 East Arlington Street/ 1201 South First Street	1989 - 1999	Truck maintenance and body repair.	Wastewater disposal to on-site sumps.	Removal of 120 yards of soil with TPH; removal of drywells/sumps. Source removal deemed complete.	9.5	Unknown; further subfacility investigation required.

Table 13
Summary of Subfacility Historical Operations and Site Conditions
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Name/Subfacility	Dates of Documentation Included in Ecology Files	Historical Operations	Site Conditions			
			Documented/Potential Releases[1]	Remediation[2]	Maximum Concentration of PCE in Groundwater from RI Sampling (µg/l)[3]	Potential On-Going Source of PCE to Groundwater[4]
Frank Wear Cleaners 106 South Third Avenue	1989 - 1997	Dry cleaners	PCE-containing fluid/sludge disposal to the surface, PCE spills from dry cleaning machines, ruptured sewer line.	Removal of 610 tons of soil. Ozone sparging of groundwater.	1,100	Yes
Goodwill Industries 222 South Third Street	1994 - 1995	Dry cleaners	Wastewater disposal to on-site underground sumps/floor drains.	Soil excavation/ off-site disposal. Source removal deemed complete.	99	Yes
Nu-Way Cleaners 801 South Third Street	1990 - 1996	Dry cleaners	Possible leaking solvent USTs; wastewater disposal to on-site sump.	Removal of 31 tons of soil around solvent UST and on-site sump.	4.4	No
Paxton Sales 108 West Mead Avenue	1988 - 1995	Machine Shop tooling and case-hardened parts.	Disposal of wastewater from manufacturing process into on-site dry well.	Sediment removal from drywell.	2.5	No
Southgate Laundry 1020 South Third Avenue	1989 - 1998	Dry cleaners	Potential UST leak; liquid spills to surface and on-site drywell; potential release.	Removal of 70 cubic yards of soil from inside and outside of building.	67.0	Yes

Table 13
Summary of Subfacility Historical Operations and Site Conditions
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Name/Subfacility	Dates of Documentation Included in Ecology Files	Historical Operations	Site Conditions			
			Documented/Potential Releases[1]	Remediation[2]	Maximum Concentration of PCE in Groundwater from RI Sampling (µg/l)[3]	Potential On-Going Source of PCE to Groundwater
U-Haul/Yakima Valley Spray/ 1108 South First Street	1991 - 1997	Pesticide manufacturing, wrecking yard, maintenance facility.	Liquid spills to surface; release from PCE tank and piping destroyed in fire.	None. CAP is pending.	34[4]	No
Westco Martinizing 812 Summitview Avenue	1994 - 1998	Dry cleaners	Potential wastewater disposal and liquid spills to surface.	130 tons of soil excavated/off-site disposal. Source removal deemed complete.	66.8[4]	No
Woods Industries 1 East King Street	1986 - 1993	Pesticide manufacturing	On-site disposal of wastewater to sumps, French drain, discharge lagoons.	Removal of sumps and subsurface drains. Source removal deemed complete.	5.6[4]	No

Notes:

[1] Potential releases icentified 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.
[4] While on-site PCE concentrations exceeded 5.0 µg/l, PCE concentrations in downgradient well(s) located on the subfacility property were detected at less than 5.0 µg/l during this RI.
[5] For the purposes of this RI, subfacility location assumed to be potential on-going source of PCE to regional groundwater flow in the YRRA if any downgradient well located on the property exceeded 5.0 µg/l during any quarterly monitoring event.

Table 13A
Subfacilities Identified as Potential On-Going Sources - Local Groundwater Flow and PCE Trends
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Name/Subfacility	Seasonal Trends in Local Groundwater Flow[1]		Historical Comparison of PCE Concentration Range (µg/l)		PCE Concentrations Trends[2]	
	During Non-Irrigation Period	During Irrigation Period	Historical (Prior to RI)	During RI	Trends in Historical and RI PCE Concentrations[2]	Trends in Seasonal PCE Concentration Fluctuations During RI
Adeline Property 16 North First St.	Northeast with east to southeast component in February and March 1996. Southeast in February 1997.	Southeast in May and July 1996.	ND (MW-1) to 35 (MW-4)	0.3 (MW-2) to 59 (MW-4)	PCE concentrations detected during RI generally consistent with historical PCE concentrations.	Higher concentrations detected during the irrigation season than the non-irrigation season.
Cameron Yakima Inc. 1414 South First Street	East-southeast in March 1995.	East in June 1993. East-southeast in June and September 1995.	ND (MW-1) to 1,110 (MW-103-s)	ND (MW-2) to 122 (MW-4)	Apparent decrease in PCE concentrations detected during this RI relative to historical concentrations detected in wells MW-4, MW-102s, and MW-103s, which are located downgradient of the transfer tank removed in 1995.	No discernable trends.
Frank Wear Cleaners 106 South Third Avenue	South in February and December 1995.	Southeast in April and September 1995. East-southeast in September 1997.	5 (MW-3) to 1,140 (MW-1)	16 (MW-3) to 1,100 (MW-4)	Slight decrease in PCE concentrations detected in downgradient wells after soil excavation was completed in 1995.	No discernable trends.

Table 13A
Subfacilities Identified as Potential On-Going Sources - Local Groundwater Flow and PCE Trends
Yakima Railroad Area Remedial Investigation
SECOR PN: 00378-001-03

Name/Subfacility	Seasonal Trends in Local Groundwater Flow[1]		Historical Comparison of PCE Concentration Range (µg/l)		PCE Concentrations Trends[2]	
	During Non-Irrigation Period	During Irrigation Period	Historical (Prior to RI)	During RI	Trends in Historical and RI PCE Concentrations[3]	Trends in Seasonal PCE Concentration Fluctuations During RI
Goodwill Industries 222 South Third Street	East from October 1994 to March 1995.	East from May to September 1994 and April 1995.	1.5 (MW-4) to 46 (MW-2)	1.4 (MW-1) to 99 (MW-4)	A slight decrease of PCE concentrations after soil removal. PCE concentrations detected during RI generally consistent with historical PCE concentrations.	No discernable trends.
Southgate Laundry 1020 South Third Avenue	Southeast from October 1996 to December 1997.	Southeast from April to September 1996.	ND (MW-1) to 107 (MW-3)	ND (MW-1) to 67 (MW-3)	PCE concentrations detected during RI generally consistent with historical PCE concentrations.	Higher concentrations detected during the irrigation season than the non-irrigation season during this RI.

Notes:

[1] Local groundwater flow direction identified by subfacility consultants, as documented in reports reviewed in Ecology files in August 1998 and March 1999. SECOR has not independently evaluated groundwater flow directions.

[2] PCE trends based on review of RI data and historical documentation from Ecology files in August 1998 and March 1999.

[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.