MANAGEMENT APPROVAL FORM

Final Approval
Department of Environmental Quality
Western Region
Date: September 18. 2015

REPORT/DOCUMENT TYPE:

(Attached)
Record of Decision ____X____
Certification of Completion ______
Other (Describe)______________

Record of Decision: Evanite Fiber Corporation (former)
ECSI #40

Please review the attached document which describes a staff recommendation regarding an environmental cleanup activity. The approved preliminary recommendation has been advertised for public comment as required by ORS 465.320. The public comment period has expired. The attached document includes a discussion of public comments received (if any) and how those comments affected the final recommendation/decision.

FINAL APPROVAL:

Michael E. Kucinski [signature]
Michael E. Kucinski
Manager, Western Region Environmental Cleanup

9/21/2015
Date

Return completed form to: Seth Sadofsky
Western Region Environmental Cleanup

RECORD OF DECISION
FOR
EVANITE FIBER CORPORATION (former)

1115 Crystal Lake Drive, Corvallis, Oregon

T12S, R5W, Section 02,

Map CA, Tax Lots 100, 900, 1000, 1100, 1200, 1201 and Map D Tax Lot 100
Benton County

Corvallis, Oregon

ECSI 40

September 18, 2015

Introduction

Soil, and groundwater, are contaminated with trichloroethylene (TCE) associated with the former Evanite battery separator manufacturing facility on property at 1115 Crystal Lake Drive in Corvallis, currently owned by Hollingsworth and Vose Fiber (Figure 1). This Record of Decision (ROD) outlines the necessary remedial action for the site, which is necessary to meet the site remedial action objectives and protect human health and the environment.

Additional information on this site, including the full Staff Report to which this document refers, can be found at the following web site.

http://www.deq.state.or.us/lq/ecsi/ecsi.htm (site ID = 40)

Public Process

A 30-day public comment period on DEQ's recommended remedy was held during May of 2015, as required by ORS 465.320, Notice was published as a legal ad in the Corvallis Gazette-Times, in the Oregon Bulletin, and on DEQ's web site. Notice documents were also sent to all adjacent property owners. A link to this notice on DEQ's web site was published through DEQ's GovDelivery service to all who have registered interest in receiving Environmental Cleanup notices. A newspaper article about the site and proposed cleanup was published in the Gazette Times late in the public comment period.

Several citizens asked questions relating to the proposed remedy by telephone or email. One citizen of Corvallis, representing a group of people asked several detailed questions, and pointed out some errors regarding the tax lot maps. These are corrected in this document and the version in this document supersedes the versions in the staff report. Two additional citizens sent in written comments by email. These comments are supportive of our cleanup efforts and expressed other concerns regarding future development adjacent to the industrial site and other land use decisions that are beyond the scope of the cleanup program.

Summary of Site Investigation Activities

In 1978, Evanite estimated that 1,400 gallons of TCE had leaked from the treatment system carbon vessels onto an unpaved surface along the east side of the Submicro Building (Figure 2). In addition, Evanite discovered an annular opening in the wall of the Submicro wastewater sump in 1985 that likely resulted in a TCE release of unknown quantity. TCE was subsequently discovered in subsurface soil in August 1985 when a deep trench for the new millrace culvert was excavated just east of the Submicro Building. In mid-1986, TCE was also detected in groundwater samples collected from domestic irrigation wells located along the north side of Vera Avenue.

Evanite was advised to submit a RCRA Part B post-closure permit application to close the site of the 1978 TCE spill as a landfill and implement a corrective action program to remove TCE from soil and groundwater. The final permit application was submitted on June 9, 1988 and Evanite received a joint DEQ/EPA permit effective April 30, 1990.

The Evanite Facility then engaged in a continuous remedial action with EPA and DEQ approval starting April 30, 1990. In 2001, under an agreement between Evanite, DEQ, and EPA, DEQ's cleanup program took over the lead role in supervising the remediation of the Site and Evanite entered into a consent order with DEQ.

Groundwater

Prior to startup of remediation in 1991, TCE was present at near saturation concentrations in the source zone with greater than 100,000 micrograms per liter (μg/L) of TCE plume covering approximately ten acres. The original 100-μg/L TCE plume contour outline extended over approximately 25 acres.

TCE concentrations in groundwater above 100 μg/L now cover only 4.5 acres (Figure 3). This is the result of 23 years of continuous groundwater extraction and treatment, soil vapor extraction (SVE) in the near-surface Willamette Silt, and more recently, deeper SVE in the dewatered sections of the upper aquifer.

From the standpoint of applicable receptors, the site has been divided into five areas (Figure 4). The upgradient and Neighborhood Surface Water area plumes have been almost fully remediated. The size of the groundwater plume has been limited as a result of ongoing groundwater pumping and treatment. Eventually remediation is expected to progress to the point where groundwater containment is no longer needed. Additional groundwater and surface water monitoring will be required to evaluate the effects of reducing this hydraulic containment.

Soil

Soil contamination is present in the area of the site known as the DNAPL Source Zone. (DNAPL, or dense non-aqueous phase liquid, refers to a layer of a liquid chemical that settles along the bottom of an aquifer because it is heavier than water and has a low potential for dissolving in water.) As shown in Figure 4, the DNAPL Source Zone extends beneath portions of the Submicro building and Glass Plant 2. Outside of this area, some TCE contamination may have migrated as mobile DNAPL at the base of the aquifer, but significant soil contamination has never been detected. In the area of soil contamination, shallow soils are primarily silts with low hydraulic conductivity. Recent investigations suggest that there are still areas with high contaminant concentrations. Contaminated soil is currently covered by the Submicro building and the cap put in place during the early stages of cleanup (This is referred to in past documents as the "RCRA Cap"). These caps have prevented direct contact with contaminated soil.

Sediment and surface water

Investigations into sediment contamination have not shown TCE in sediment samples in the Marys or Willamette Rivers. However, pore water investigations, initiated in 2010 and conducted annually since then, have shown some TCE and associated chemicals in pore water within sediments in the discharge area of the site. TCE has not been detected in surface water.

Air

TCE vapors are present on site as a result of off-gassing from contaminated soils, as well as emissions from the treatment systems. Most recent sampling shows TCE in air throughout the site. However, these concentrations are below residential screening levels at the property boundary. Within the site, concentrations are below occupational screening levels in all areas except inside the Submicro building and treatment shed.

Summary of Pilot Tests and Interim Remedial Actions

Pumping

Groundwater extraction for hydraulic containment has been implemented since 1991 to maintain a capture zone that includes the Evanite property as well as surrounding neighborhoods. By the end of 2014, over 460 million gallons of contaminated groundwater had been extracted and treated through an air stripper tower. Currently, the extraction is focused on the heart of the DNAPL source zone. This creates inward radial flow from the dissolved phase plume edges. Over 82,000 pounds of dissolved phase TCE have been recovered to date from this groundwater extraction system. Dissolved phase concentrations have steadily declined as the plume area has been flushed several times. Over the past few years, the average concentration of water entering the treatment system has ranged from 7 to 10 mg/L. This compares to influent concentrations of over 100 mg/L in 1991. TCE concentrations in many of the wells in the dissolved phase edges of the original plume are now as low as a few micrograms per liter (μg/L) or even below detection limits.

DNAPL source removal through SVE and DNAPL pumping has been ongoing since 1991. Over 47,000 pounds of TCE is estimated to have been removed through the SVE system which targets the former TCE process area where spills and TCE handling occurred. The recovery was excellent in the early years of operation, and as new areas of the subsurface are opened up to the system there has generally been a period of high yield. DNAPL pumping to recover the mobile phase TCE from three source zone wells has yielded an estimated 24,553 pounds of DNAPL since 1991. DNAPL recovery rates were quite high when the system was first installed, with over 12,000 pounds recovered in 1991. However, these rates declined over time. No DNAPL has been recovered since 2007.

Cap

Following issuance of the post-closure permit in 1990, an engineered cap was constructed between the Submico Building and Glass Plant 2, including the area above the millrace culvert. This cap prevents direct exposure to contaminated soil by site workers and others.

Neighborhood water use

Following discovery of extensive groundwater contamination in the 1980s, six residences to the South of the Evanite Site that previously used groundwater were provided access to city water at Evanite's expense. Evanite (and now Hollingsworth and Vose) have been paying water bills for these residents ever since that time.

Submicro Sub-Slab depressurization

Following ambient and sub-slab air evaluations of the Submicro building between 2006 and 2009, a sub-slab depressurization system was installed to draw contaminated air beneath the floor slab into the treatment system. This system has been operating continuously since that time.

Enhanced Reductive Dechlorination

An enhanced reductive dechlorination (ERD) pilot test was conducted over a 25 week period in 2013. The layout of the test involved a substrate source injected into well pair MW-27 (consisting of deep well DMW-27 and intermediate well IMW-27), circulated through well pairs

MW-17 and MW-24, and extracted through well DMW-3. The groundwater was recirculated back to the injection wells where it was augmented and re-injected. This circulation cell provided hydraulic control and focused the ERD test to specific flow lines that originated in a relatively clean area on the upgradient end of the plume and circulated into the heart of the DNAPL source zone.

Remedial Action Objectives

Acceptable risk levels, as defined in OAR 340-122-115(1) through (6), and remedial action objectives were developed based on the identified beneficial uses, exposure pathways and the risk assessment.

Site-specific remedial action objectives (RAOs) were developed for groundwater, surface water, soil and air, for the purpose of achieving protection of human health, ecological receptors, and beneficial uses, as required by OAR 340-122-040. The RAOs for the site are as follows:

Short-Term Goals

For DNAPL source zone remediation, these goals involve the mitigation of immediate risks to humans or natural resources and the prevention of further expansion of the source zone. Often this goal is addressed through some form of mass removal or containment to minimize further mobilization of a DNAPL mass. Short-term goals for a source zone include:

1 Recovering mobile DNAPL.

2 Mitigating the potential for vapor intrusion.

3 Preventing further migration of DNAPL.

Short term goal #1 has been met through the groundwater and direct DNAPL pumping since 1991. Goal #2 is only applicable for the source zone area and is currently controlled through SVE and sub-slab depressurization. Goal #3 appears to have been achieved, though continued operation of the existing remedial measures will be needed.

Intermediate-Term Goals

These goals target the achievement of desired cleanup levels at a response boundary or, depending on the performance assessment methodology, a series of control planes. It may take a year (or several) to make a determination that the target cleanup level has been achieved at a response boundary. Long-term monitoring is required to ascertain that the cleanup levels are sustainable and are not subject to a rebound in groundwater contaminant concentrations once post-treatment equilibrium is established in the aquifer. Intermediate goals include:

1 Deplete the source sufficiently to allow for natural attenuation.

2 Reduce dissolved-phase concentrations outside the source zone.

3 Reduce the mass discharge rate or flux from the source.

4 Reduce the DNAPL source mass or volume to the extent practicable.

5 Prevent the migration of remediation fluids beyond the treatment zone.

The source depletion efforts applied over the past few years (primarily dewatering the aquifer at the source zone combined with aggressive SVE of the unsaturated zone) have proven efficient at reducing source zone concentrations toward Goal #1. This work will continue and will take several years to fully achieve. This goal also includes reduction of TCE concentrations in soil and shallow groundwater in the source zone to prevent unacceptable vapor intrusion into the overlying Submicro Building. The current SVE system has two components or targeted zones: a vapor mitigation SVE system in the sub-slab gravels beneath the Submicro building and a deeper SVE system utilizing wells screened in the unsaturated soils beneath and adjacent to the Submicro Building. Goal #2 has been partially achieved, as there are few exceedences of applicable screening levels outside of the source zone. A critical goal for this site is limiting the mass discharge from the Submicro Source Zone such that TCE does not reach the rivers at unacceptable concentrations (Goal #3).DNAPL Mass has been decreased in most accessible areas (Goal #4), continued pumping and SVE will help to remove accessible DNAPL and this will be documented by reductions in TCE concentrations in water below those associated with DNAPL. Goal #5 has been achieved and will be kept in mind as we move through various stages of cleanup..

Long-Term Goals

Long-term goals target the achievement of compliance with RBCs applicable to all contaminated media at the site (Table 1) with the exception of those pathways controlled through long-term engineering or institutional controls. For groundwater, achievement of regulatory criteria may lead to the discontinuation of the plume control measures and ultimately the monitoring program.

Hot Spots will be treated to the extent feasible, as specified in OAR 340-122-090(4). Hot Spots for several media are present in the DNAPL source zone as described above and on Figure 7.

Evaluation of Remedial Alternatives

Five potential remedies were outlined in the 2007 Feasibility Study. They are:

1 No Action
2 Engineering and Institutional Controls, Subslab Soil Venting, and Groundwater/DNAPL Extraction
3 Engineering and Institutional Controls, In-Situ Chemical Oxidation, and Groundwater Extraction
4 Engineering and Institutional Controls, Electrical Resistance Heating and Groundwater/DNAPL Extraction
5 Soil Excavation and Off-Site Disposal

These potential remedies were evaluated on the basis of protectiveness, long-term reliability, implementability, implementation risk, and reasonableness of cost, as well as the degree to which the remedies address identified hot spots according to OAR 340-122-090. Following the initial evaluation of potential remedies several pilot studies were implemented. At the completion of the pilot studies, an additional potential remedy was proposed.

Alternative 2am: Source Depletion with Soil Vapor/Groundwater/ DNAPL Extraction Followed by In-situ Bioremediation

A summary of the evaluation of alternatives is presented in Table 2.

Description of Selected Remedy

DEQ has selected remedial alternative No. 2am, the remedial action recommended in its Staff Report, as the final remedy for the site in accordance with Oregon Revised Statutes (ORS) 465.200 et. seq. and Oregon Administrative Rules (OAR) Chapter 340, Division 122, Sections 010 through 115. The recommended remedial action includes several measures to meet the above RAOs, including:

- Institutional controls and an Easement and Equitable Servitude (E&ES) preventing residential use of the tax lots with shallow soil contamination. These will include three tax lots that are underlain by the Submicro Source Area Hot Spot illustrated on Figure 5, Figure 6
- Continued DNAPL monitoring and extraction, if accumulations are observed. (As noted above, recoverable amounts of DNAPL have not been observed since 2007).
- Continued soil vapor extraction (SVE) in the DNAPL source zone to promote physical removal of TCE mass and mitigate potential vapor intrusion to the Submicro Building. (Currently SVE is being conducted using intermediate-depth wells in the DNAPL source zone.)
- Continued groundwater extraction to flush the DNAPL source zone, to expand the unsaturated zone within the source area to facilitate SVE mass removal, and maintain containment of impacted groundwater (Currently, groundwater is being extracted through wells DMW-2, 3, 23, 24, and 29, extraction points will vary throughout the cleanup for the most effective groundwater remediation and containment).
- Treatment of off-gas from the SVE system and air stripper as necessary. Currently, contaminated air is treated using catalytic oxidation. However, carbon adsorption may be used in the future as physical mass removal rates decline. Eventually, mass of TCE from pumping will be low enough that treatment is not needed.
- Enhanced reductive dechlorination (ERD) in-situ treatment of groundwater in the Glass Plant Plume and Submicro Source Areas.
- Continued monitoring of groundwater and air quality and remedial system performance.
- Follow active groundwater remediation (i.e., groundwater extraction and ERD) with conversion to passive groundwater remediation involving reduced mass flux from source area together with natural attenuation to protect surface water.

In the event of a land use change (allowable by the current zoning) the footprint of ERD application and/or timeframe for remediation of the Glass Plant Plume may increase. For example, if land were to be developed for residential uses, lower contaminant levels would be required than if the land remained industrial.

- Many of the technology components of this alternative have been in place at Evanite since 1991, when groundwater and soil vapor extraction and enhanced DNAPL recovery were first implemented. After more than 20 years of aggressive remediation, the existing technical components of this alternative have been optimized and modified to address current site contaminant conditions, as well as newly established cleanup criteria for the indoor air pathway in Oregon. The alternative is summarized in Figure 7.

RA-2am involves the following remedial action elements:

1. **Institutional and engineering controls**

Equitable Servitudes and Easement (ES&E) document will be put in place that prohibits residential use of the tax lots with shallow soil contamination. This will apply to two tax lots that are underlain by the Submicro Source Area Hot Spot illustrated on Figure 5. These tax lots will also require a soil management plan specifying conditions under which digging can take place for any future development and/or utility work. The integrity of the cap between the Submicro building and the millrace shall be maintained to prevent direct exposure to contaminated soils. Groundwater use will be prohibited for these three tax lots.

Potential future groundwater use will be evaluated for other tax lots currently owned by H&V as the site work progresses. Restrictions may be needed depending on future success of the remedy and future use of these tax lots.

If residents of the homes in the Neighborhood Area rehabilitate and use their wells in the future, then H&V will sample and analyze the wells for constituents of potential concern. If site-related contaminants are found above safe levels, an alternative water supply will be provided.

2. **Groundwater containment, pump-and-treat, and DNAPL pumping.**

Groundwater extraction will be continued to flush the DNAPL source zone, to expand the unsaturated zone within the source area to facilitate SVE mass removal, and to maintain containment of impacted groundwater (This is currently being done using wells DMW-2, 3, 23, 24, and 29; see Figure **2**). This groundwater will continue be treated in an air stripper and disposed of under a permit with DEQ.

DNAPL will continue to be monitored and will be extracted if accumulations are observed. (Historically wells MW-3, MW-16, and MW-17 were used for recovery of separate phase DNAPL. Recoverable amounts of DNAPL have not been observed since 2007).

The Responsible Party has conducted continuous remedial action with EPA and DEQ approval since April 30, 1990. Hydraulic containment through groundwater pumping at up to six site wells began in 1991 with over 460 million gallons of groundwater extracted and treated thorough January 2015. Evanite's hydraulic containment and groundwater monitoring system historically included six groundwater extraction wells, thirteen monitoring wells located onsite, and up to seventeen residential water wells in the adjacent neighborhood to the south. Additional source zone, dual purpose monitoring and treatment wells were installed in 2009, 2013, and 2014. Currently, the site well network includes 45 wells screened either at the top or base of the aquifer, and are designated as either intermediate or deep wells. The Evanite groundwater extraction and treatment system currently involves active pumping from five extraction wells (Wells DMW-2, DMW-3, DMW-23, DMW-24, and DMW-29) containing 10- or 20-gpm submersible pumps connected to a 2-inch diameter riser pipe. Approximately 35 to 40 gpm of groundwater total (combined from all wells) is currently pumped to an oil/water separator tank, then a surge tank, and ultimately to an air stripper rated at 100 gpm with 340 cubic feet per minute (cfm) and 99 percent removal efficiency.

3. Soil vapor extraction and sub-slab depressurization

SVE will continue to remove VOCs, much of which originate in the DNAPL source zone. This will mitigate potential vapor intrusion to the Submicro Building. (The SVE system currently includes wells IMW-3, 16, 24, 25, 26, 28, and 29).

Starting in 1991, Evanite operated six SVE wells that were screened in the Willamette Silts between depths of approximately 7 and 17 feet. These wells were plumbed to a common header leading to the SVE vacuum blower. The system was operated during summer months, when groundwater was low, between 1991 and 2008. Evanite reported an estimated 27,074 pounds of TCE were recovered from these wells between 1991 and 2008. However, nearly 75% of this TCE mass removal (approximately 19,000 pounds) occurred in the first three years of operation (1991 through 1993).

As noted above, intermediate and deep wells were installed in and around the source area in 2009 and 2013 to support the physical pilot testing activities. These wells allowed more aggressive groundwater extraction in the source area and resulted in greater drawdown of groundwater levels (particularly in the summer and fall months). This greater drawdown of groundwater facilitated pilot testing of more aggressive SVE in the upper portions of the aquifer leading to increased TCE mass removal. Since 2012, the SVE system has removed almost as much TCE mass (approximately 20,000 pounds) as was removed by SVE in the previous 20 years.

Sub-slab depressurization will continue beneath the Submicro building to ensure that contaminated vapors do not migrate into this building from the subsurface. Additional work will be done to remediate fugitive emissions into the Submicro building from contaminated building materials and/or the adjacent treatment shed. This is intended to reduce contaminant concentrations below the occupational RBC.

4. Off-gas treatment

Treatment of gas from the SVE system and air stripper will continue until the quantity of TCE (and decay products) being removed from the subsurface is below levels which would potentially cause unacceptable risk to site workers or nearby residents. This site's catalytic oxidation (CatOx) system is currently used for this treatment, but carbon adsorption might be used in the future if future contaminant levels drop to the point where this would be more cost-effective. As of December 2014, the CatOx system was treating an average influent TCE concentration of 170 mg/m^3 at a flow rate of 370 cfm. This includes contaminated vapor from both the groundwater air stripper and the SVE systems. The CatOx unit's TCE destruction efficiency, as measured by influent and effluent TCE air concentrations, has ranged from 96% to 99%.

5. Enhanced reductive dechlorination

In-situ ERD pilot testing was performed in 2013. The ERD pilot test was implemented over a 25 week period from May through October 2013. Enhanced in-situ bioremediation by reductive dechlorination, or ERD, involves stimulating bacteria to encourage the breakdown of chlorinated solvents. This process is often used in combination with other technologies or as a polishing step after the DNAPL source zone has been sufficiently depleted.

The ERD pilot testing was completed with the primary objective of determining if ERD is an applicable technology for full-scale implementation at the site. The data collected during the ERD pilot testing indicates that ERD is an appropriate technology for full-scale application, particularly in site areas where physical mass removal technologies and flushing from groundwater extraction have substantially reduced residual TCE mass (i.e., Submicro Source and Glass Plant Plume areas). As soon as substrate was delivered to subsurface in the pilot test area, the aquifer system started to migrate to anaerobic conditions and dechlorination was observed. Although mobile DNAPL had been historically present in the pilot test area, the historical combination of groundwater extraction and SVE was able to reduce TCE concentrations to a level in which existing microbes could thrive.

Based on the results of the pilot test, ERD will be included as part of this remedy.

6. Monitoring and monitored natural attenuation

Continued air and water monitoring and remedial system performance monitoring will be necessary parts of the remedial alternative. This information will be used to evaluate the success of the remedy and to determine when to transition from active groundwater remediation (i.e., groundwater extraction and ERD) to passive groundwater remediation involving monitored natural attenuation to protect surface water.

Following the ERD stage of work on the Source Zone, the groundwater monitoring program will be used to determine if groundwater containment is still needed. This will depend on the rate of TCE dissolution still ongoing after ERD concludes, and the ultimate use of the downgradient area so that receptors in the hardboard area, the downgradient area and surface water will still be protected from unacceptable levels of TCE (and decay products). Five monitoring wells (DMW-33, IMW-33, DMW-34, IMW-34, DMW-38) were installed in 2014 along the downgradient boundary of the Submicro DNAPL source zone to provide data along the leading edge of the DNAPL zone groundwater plume. These wells, together with DMW-2, DMW-11, and DMW-12, provide long-term monitoring locations downgradient of the DNAPL source zone.

The area downgradient of the source area is monitored using two rows of wells that are aligned perpendicular to the original plume flow direction (i.e., northeast migrating from the source zone toward surface water). As shown in Figure2, wells DMW-2, IMW and DMW-34, DMW-11, IMW and DMW-35 and DMW-12 form a row of wells at the leading edge of the highly concentrated groundwater plume. The other four wells (MW-6, DMW-15, DMW-13, and former well DMW-4) have served as sentinel wells to monitoring potential impacts to the Willamette River. These four wells were designated as near-shore wells. TCE concentrations in the first row of wells are now below 1,000 μg/L. TCE concentrations in the near-shore wells are below 15 μg/L. (Note that TCE concentrations were as high as 160,000 μg/L prior to the start of hydraulic containment in the early 1990s).

Unlike the other groundwater plume areas, TCE degradation has been strongly evident in these near shore wells with cis-1,2-DCE and trans-1,2-DCE comprising as much as 80% of the total VOC concentrations. For example, MW-15 (located north of the T&E Center and about 120 feet from the river) has routinely contained vinyl chloride and cis-DCE at much higher concentrations than TCE. In recent years, MW-6 (located northwest of MW-15) has demonstrated a similar relationship between vinyl chloride, cis-DCE and TCE concentrations.

Multiple lines of evidence indicate anaerobic degradation and natural attenuation are active in the area downgradient of the source area. Concentrations of TCE and TCE breakdown products are substantially below applicable screening levels in this area. Currently, all pore water and groundwater from near shore wells in the downgradient area are below the applicable pore water ecological screening values. In addition, these VOCs have not been detected in surface water samples collected in the Willamette and Marys Rivers.

Performance monitoring during implementation of RA-2am will include:

- Monitoring of the remedial system influent and effluent contaminant concentrations and flow rates to provide data to quantify the mass of TCE removed from the subsurface, evaluate the efficiency of the treatment system, and quantify the masses of TCE destroyed and TCE discharged by the Cat Ox/scrubber treatment system.
- Monitoring of the progress of SVE and groundwater extraction systems that are operated in a focused mode of aggressive mass reduction in the DNAPL source zone.
- Monitoring of the progress of the in-situ ERD groundwater treatment system to evaluate its contribution to mass reduction in the Source Area.
- Monitoring of groundwater contaminant concentrations in the TCE plume to evaluate the following:
  - Hydraulic containment.
  - Progress with plume cleanup through comparison of soil vapor, groundwater, and surface water concentrations to applicable cleanup standards.
  - Potential rebound of TCE concentrations.
  - Mass flux from the Source Area.
  - Natural attenuation in areas downgradient of the Source Area.

Details of the performance monitoring associated with RA-2am will be defined in a Remedial Design/Remedial Action Work Plan.

Residual Risk Assessment

OAR 340-122-084(4)(c) requires a residual risk evaluation of the recommended alternative that demonstrates that the standards specified in OAR 340-122-040 will be met, namely:

- Assure protection of present and future public health, safety, and welfare, and the environment
- Achieve acceptable risk levels
- For designated hot spots of contamination, evaluate whether treatment is reasonably likely to restore or protect a beneficial use within a reasonable time
- Prevent or minimize future releases and migration of hazardous substances in the environment

The selected remedy is expected to be protective of human health and the environment and to address all unacceptable risks either through treatment or engineering and institutional controls.

Risks from contaminated soil by direct contact, ingestion, and inhalation, and risks of excavation worker exposure to groundwater in the source zone will be addressed through maintenance of the concrete cap and through institutional controls. However, it is likely that soil concentrations that could pose unacceptable risks will remain in the source zone for the indefinite future and the institutional and engineering controls will be required.

Volatilization from soil in the source zone to outdoor air will be addressed through SVE and volatilization to indoor air will be addressed by sub-slab depressurization under the Submicro building. As contaminated soils are likely to remain in the source zone, it is expected that these controls may be needed for the indefinite future.

Tap water ingestion and inhalation in the Source Zone and the Hardboard Area will be addressed through institutional controls. TCE concentrations are not expected to be below drinking water screening levels and institutional controls preventing groundwater use for drinking are likely to be required into the future.

Tap water ingestion and inhalation in the neighborhood area is currently prevented controlled through an alternative water source. If any wells are to be used in the future, Hollingsworth and Vose will offer sampling of those wells and if needed, arrange an alternative supply. While vapor intrusion risks have been controlled in the neighborhood area, it is not currently known, the former domestic wells have not been sampled in several years due to their condition. The remedy will ensure that there is no use of domestic water exceeding applicable risk criteria.

Risks from outdoor air TCE concentrations will be addressed through SVE in the source zone, treatment of the gas collected by the SVE system, and continued upgrades and sealing of the treatment systems.

Potential risks to surface water users (swimmers, boaters, and anglers) and potential ecological risks to benthic organisms will be addressed through continued groundwater containment until concentrations have been remediated sufficiently so that hydraulic containment can be discontinued. Control of this risk pathway is expected to be one of the key measures in determining when the remedy has been completed.

Financial Assurance

Hollingsworth and Vose will provide a financial assurance mechanism to cover the cost of the remedial actions described above, in accordance with the requirements of 40 CFR § 264.143. Financial Assurance has recently been established through a trust account. This will be continued in the near future, or modified to another method in compliance with 40 CFR § 264.143.

Statutory Determination

The selected remedial action for TCE Contamination at the Evanite Site is considered to be protective, effective, reliable, and cost-effective. The selected remedy also treats the identified hot spots of contamination to the extent feasible in accordance with OAR 340-122-090. The selected remedy is consistent with the current and future anticipated use of the site and is protective of current and future anticipated beneficial water use within the site's locality of facility. The selected remedy, if properly implemented, will ensure that contaminant exposure is below acceptable risk levels.

Attached
Tables
Figures
Administrative Record

Table 1 - Numerical Remedial Action Objectives

Exposure Unit	Receptor	Media	Pathway	TCE	cis 1-,2-DCE	VC	Units
DNAPL Source Zone	Future Resident	Soil	Ingestion, direct contact, inhalation	6.4	160	0.34	mg/kg
	Future Resident	Soil	Volatilization to outdoor air	14	-	5.3	mg/kg
	Future Resident	Soil	Vapor Intrusion into buildings	0.13	-	0.043	mg/kg
	Future Urban Resident	Soil	Soil ingestion, direct contact, and inhalation	17	310	0.76	mg/kg
	Future Urban Resident	Soil	Volatilization to outdoor air	33	-	6.5	mg/kg
	Future Urban Resident	Soil	Vapor Intrusion into buildings	0.32	-	0.053	mg/kg
	Occupational Worker	Soil	Soil ingestion, direct contact, and inhalation	46	2,000	3.9	mg/kg
	Occupational Worker	Soil	Volatilization to outdoor air	96	-	89	mg/kg
	Occupational Worker	Soil	Vapor Intrusion into buildings	2.7	-	2.2	mg/kg
	Construction Worker	Soil	Soil ingestion, direct contact, and inhalation	120	620	30	mg/kg
	Excavation Worker	Soil	Soil ingestion, direct contact, and inhalation	12,000	17,000	830	mg/kg
	Future Resident	Groundwater	Tap water ingestion and inhalation	0.43	73	0.025	µg/l
	Future Resident	Groundwater	Volatilization to outdoor air	2,800	-	400	µg/l
	Future Resident	Groundwater	Vapor intrusion to buildings	160	-	18	µg/l
	Future Urban Resident	Groundwater	Tap water ingestion and inhalation	1.7	150	0.059	µg/l
	Future Urban Resident	Groundwater	Volatilization to outdoor air	6,600	-	500	µg/l
	Future Urban Resident	Groundwater	Vapor intrusion to buildings	380	-	22	µg/l
	Future Urban Resident	Groundwater	Tap water ingestion and inhalation	3.6	290	0.52	µg/l
	Occupational Worker	Groundwater	Volatilization to outdoor air	19,000	-	6,800	µg/l
	Occupational Worker	Groundwater	Vapor intrusion to buildings	3,300	-	910	µg/l
	Excavation Worker	Groundwater	Groundwater in excavations	430	24,000	1,200	µg/l
	Future Resident	Air	Inhalation	0.44	-	0.17	µg/m^3
	Future Urban Resident	Air	Inhalation	1	-	0.2	µg/m^4
	Occupational Worker	Air	Inhalation	2.9	-	2.8	µg/m^5
Hardboard Area	Future Resident	Groundwater	Tap water ingestion and inhalation	0.43	73	0.025	µg/l
	Future Resident	Groundwater	Volatilization to outdoor air	2,800	-	400	µg/l
	Future Resident	Groundwater	Vapor intrusion to buildings	160	-	18	µg/l
	Future Urban Resident	Groundwater	Tap water ingestion and inhalation	1.7	150	0.059	µg/l
	Future Urban Resident	Groundwater	Volatilization to outdoor air	6,600	-	500	µg/l
	Future Urban Resident	Groundwater	Vapor intrusion to buildings	380	-	22	µg/l
	Occupational Worker	Groundwater	Tap water ingestion and inhalation	3.6	290	0.52	µg/l
	Occupational Worker	Groundwater	Volatilization to outdoor air	19,000	-	6,800	µg/l
	Occupational Worker	Groundwater	Vapor intrusion to buildings	3,300	-	910	µg/l
	Excavation Worker	Groundwater	Groundwater in excavations	3,000	24,000	1,200	µg/l
	Future Resident	Air	Inhalation	0.44	-	0.17	µg/m^3
	Future Urban Resident	Air	Inhalation	1	-	0.2	µg/m^4
	Occupational Worker	Air	Inhalation	2.9	-	2.8	µg/m^5
Neighborhood Area	Resident	Groundwater	Tap water ingestion and inhalation	0.43	73	0.025	µg/l
	Resident	Groundwater	Volatilization to outdoor air	2,800	-	400	µg/l
	Resident	Groundwater	Vapor intrusion to buildings	160	-	18	µg/l
Downgradient Area	Future Resident	Groundwater	Volatilization to outdoor air	2,800	-	400	µg/l
	Future Resident	Groundwater	Vapor intrusion to buildings	160	-	18	µg/l
	Future Urban Resident	Groundwater	Volatilization to outdoor air	6,600	-	500	µg/l
	Future Urban Resident	Groundwater	Vapor intrusion to buildings	380	-	22	µg/l
	Occupational Worker	Groundwater	Volatilization to outdoor air	19,000	-	6,800	µg/l
	Occupational Worker	Groundwater	Vapor intrusion to buildings	3,300	-	910	µg/l
	River User	Surface Water	Consumption of organisms	3	-	0.24	µg/l
	Ecological Receptors	Pore Water	Ingestion	47	590	590	µg/l

Table 2

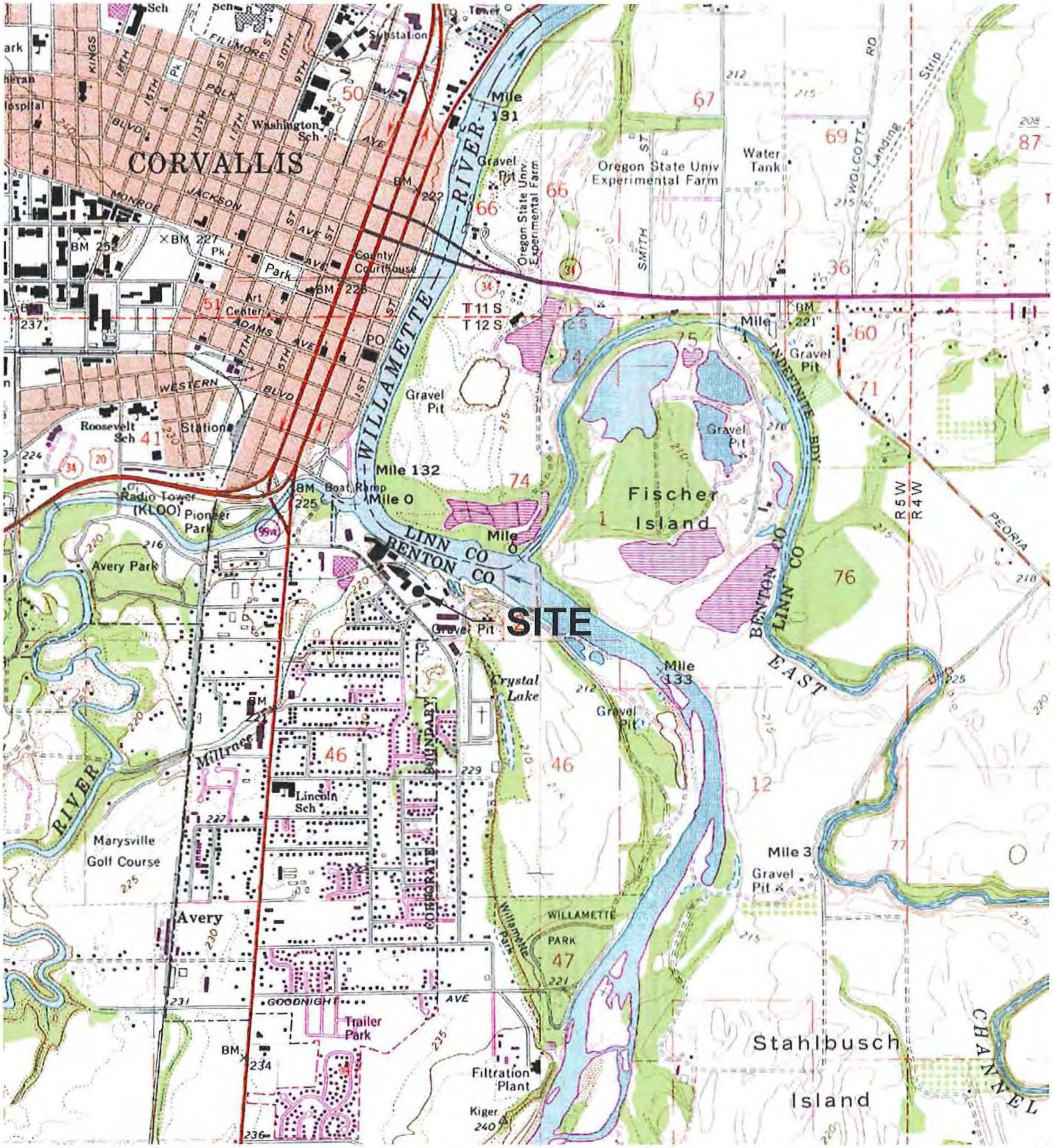
Detailed Evaluation of Alternatives Summary
Focused Feasibility Study
H&V Fiber Corporation
Corvallis, Oregon

ALTERNATIVE	PROTECTIVENESS	REMEDY BALANCING FACTORS					HOT SPOT TREATMENT
		Effectiveness	Long Term Reliability	Implementability	Implementation Risk	Cost Reasonableness	
RA-1 **No Action**	RA-1 does not meet RAOs. Protection of groundwater and the Willamette River from future migration of VOCs may not be achieved under the RA-1.	RA-1 is not effective at reducing VOC concentrations in site groundwater. The rate of VOC mass reduction is expected to be low with natural groundwater flushing.	RA-1 has relatively low reliability over the long term due to uncertainties regarding future migration potential and low VOC attenuation rates.	RA-1 is relatively easy to implement.	The implementation risk of RA-1 is relatively low.	No costs are associated with No Action.	The No Action Alternative does not actively treat hot spots.
RA-2 **Engr/Institutional Controls, Sub-slab Venting, and Groundwater and DNAPL Extraction**	RA-2 would continue to facilitate flushing of the DNAPL source area and contained dissolved phase VOCs and thereby be protective of groundwater quality. However, a relatively long time frame is expected to be required to meet the RAOs. Residual risks following implementation are expected to meet applicable standards.	Based on experience at this site, RA-2 would be effective at hydraulic control and provides mass removal through groundwater, vapor and DNAPL extraction; however, due to the relatively low permeabilities associated with the subsurface mass removal, RA-2 would occur over a relatively long period of time.	RA-2 is reliable over the long term (chlorinated VOCs are removed and contained).	RA-2 is easy to implement since it primarily entails continued operation of the existing extraction & containment system. Operational changes can be made to enhance source area flushing and VOC removal.	The implementation risks associated with RA-2 are relatively low.	The estimated present worth cost for RA-2 is $2,086,000 to $3,005,000. RA-2 has relatively good cost reasonableness compared to RA-3, RA-4 and RA-5.	RA-2 will enhance groundwater flushing through DNAPL and groundwater hotspots. Extracted DNAPL and contaminated groundwater will be recycled or treated to the extent practicable.
RA-2am (amended) **Engr/Institutional Controls, save, and Groundwater and DNAPL Extraction with enhanced reduction dechlorination**	RA-2am would continue to facilitate flushing of the DNAPL source area and contained dissolved phase VOCs and thereby be protective of groundwater quality. Additional mass removal and treatment through increased groundwater extraction and SVE and in-situ bioremediation will provide further protectiveness. However, a relatively long time frame is expected to be required to meet the RAOs. Residual risks following implementation are expected to meet applicable standards.	Based on experience at this site, RA-2am would be effective at hydraulic control and provides mass removal through groundwater, vapor and DNAPL extraction as well as in-situ bioremediation; however, due to the relatively low permeabilities associated with areas of the subsurface mass removal, RA-2am would occur over a relatively long period of time.	RA-2am is reliable over the long term (chlorinated VOCs are removed/treated and contained).	RA-2am is easy to implement since it primarily entails continued operation of the existing extraction & containment system. Operational changes can be made to enhance source area flushing and VOC removal. Additional infrastructure is required to expand the pilot tested in-situ bioremediation technology to full scale implementation.	The implementation risks associated with RA-2am are relatively low.	The estimated present worth cost for RA-2am is $5,999,000. RA-2am has relatively good cost reasonableness compared to RA-3, RA-4 and RA-5.	RA-2am will enhance groundwater flushing through DNAPL and groundwater hotspots. Extracted DNAPL and contaminated groundwater will be recycled or treated to the extent practicable. SVE will provide additional removal and treatment in the DNAPL source area. In-situ bioremediation will provide additional mass depletion as efficiency of physical mass removal technologies diminishes.
RA-3 **Engr/Institutional Controls, In Situ Chemical Oxidation, and Groundwater and DNAPL Extraction**	RA-3 would facilitate relatively rapid oxidation of a relatively large percentage of chlorinated VOCs in the subsurface and thereby be protective of groundwater quality. However, a relatively long time frame is expected to be required to meet the RAOs. Groundwater extraction following in-situ treatment would provide protectiveness until the RAOs are met.	Based on results at other sites, RA-3 is expected to be effective at reducing concentrations of chlorinated VOCs within a similar time frame as RA-2am. The relatively fine-grained materials dispersed throughout the subsurface present challenges to the distribution of oxidizing chemicals, and VOC concentration rebound is expected to require multiple applications.	RA-3 expected to be reliable in the long term in that the majority of DNAPL mass would be removed from the subsurface, and dissolved phase concentrations would be significantly reduced.	RA-3 is moderately easy to implement since it mainly entails use of push probe technology for injection of an oxidizing agent. Public comment would be required prior to implementation. Chemical injection would be difficult to implement. Some difficulties in implementation include relocation of the Submicro and Glass Plant operations, as well as demolition of the Submicro and Glass Plant buildings. Also, based upon experience with the technology at DNAPL source areas, VOC concentration rebound is expected to require multiple injection events.	RA-3 would involve the injection of hydrogen peroxide (i.e., Fenton's Reagent) using push probe technology and would have a relatively low potential to exacerbate migration of DNAPL. The implementation risks associated with RA-3 are relatively low. However, greater health and safety precautions are associated with handling of the oxidizing chemicals of RA-3.	The estimated present worth cost for RA-3 is $30,742,000. RA-3 has relatively poor cost reasonableness compared to RA-2 and RA-2am. Cost reasonableness is similar to RA-4 and RA-5.	RA-3 will treat DNAPL and groundwater hotspots. Although, some DNAPL and groundwater hotspots are expected to remain following treatment.

Table 2

Detailed Evaluation of Alternatives Summary
Focused Feasibility Study
H&V Fiber Corporation
Corvallis, Oregon

ALTERNATIVE	PROTECTIVENESS	REMEDY BALANCING FACTORS					HOT SPOT TREATMENT
		Effectiveness	Long Term Reliability	Implementability	Implementation Risk	Cost Reasonableness	
RA-4 **Electrical Resistance Heating (ERH) and Groundwater and DNAPL Extraction**	RA-4 would facilitate relatively rapid volatilization and recovery of a majority of chlorinated VOCs in the subsurface and thereby be protective of groundwater quality. However, a relatively long time frame is expected to be required to meet the RAOs. Groundwater extraction following in-situ treatment would provide protectiveness until the RAOs are met.	Based on results at other sites, RA-4 is expected to be effective at reducing concentrations of chlorinated VOCs within a similar time frame as RA-2am. The relatively fine-grained materials dispersed throughout the subsurface present challenges to the recovery of volatilized compounds. However, closer spacing of SVE recovery points is intended to address this challenge.	RA-4 expected to be reliable in the long term in that the majority of DNAPL mass would be removed from the subsurface, and dissolved phase concentrations would be significantly reduced.	The ERH technology has been implemented previously in Oregon with DEQ oversight. Public comment would be required prior to implementation. Electrical resistance heating would be relatively difficult to implement. Some difficulties in implementation include relocation of the Submicro and Glass Plant operations, as well as demolition of the Submicro and Glass Plant buildings.	Drilling of borings for electrodes and temperature probes in areas of potential DNAPL would need to be done using cased, telescoping techniques. "Hot walls" are intended to prevent migration of DNAPL, however, size of treatment area may require implementation in phases/cells which could create additional challenges to prevent migration of DNAPL. The implementation risks associated RA-4 are considered low to moderate.	The estimated present worth cost for RA-4 is $65,912,000. RA-4 has relatively poor cost reasonableness compared to RA-2. Cost reasonableness is similar to RA-3 and RA-5.	RA-4 will treat DNAPL and groundwater hotspots. Although, some DNAPL and groundwater hotspots are expected to remain following treatment.
RA-5 **Soil Excavation and Offsite Landfill Disposal**	RA-5 would protect groundwater, surface water, and air quality from further migration of VOCs. Groundwater extraction and soil excavation are expected to reduce risks following implementation and completion to levels that meet applicable standards.	RA-5 would be effective at mass removal through groundwater extraction and soil excavation. Mass removal using RA-4 would occur over a relatively short period of time.	RA-5 is reliable over the long term, and the period of remediation is expected to be shorter compared to RA-2, RA-2am, RA-3 and RA-4.	RA-5 is very difficult to implement. Some difficulties in implementation include relocation of the Submicro and Glass Plant operations, demolition of the Submicro and Glass Plant buildings, relocation and abandonment of existing utilities that service or pass through the excavation area, relocation of the Mill Race, as well as locating sufficient offsite landfill capacity for the contaminated soils removed from the site.	RA-5 would be implemented within the slurry wall installed around the area of excavation (relatively low potential to exacerbate DNAPL migration if slurry wall is located beyond limits of DNAPL). The implementation risks associated with RA-5 are relatively moderate. Since contaminated soil and groundwater are removed from the subsurface, managed onsite, and transported offsite, there are greater implementation risks associated with RA-5 than with RA-2, RA-2am, RA-3, and RA-4.	The estimated present worth cost for RA-5 is $107,370,000. RA-5 has relatively poor cost reasonableness compared to RA-2 and RA-2am. Cost reasonableness is similar to RA-3 and RA-4.	RA-5 will remove DNAPL and groundwater hotspots from the site. However, contaminants would not be destroyed but rather transferred to an offsite landfill facility.



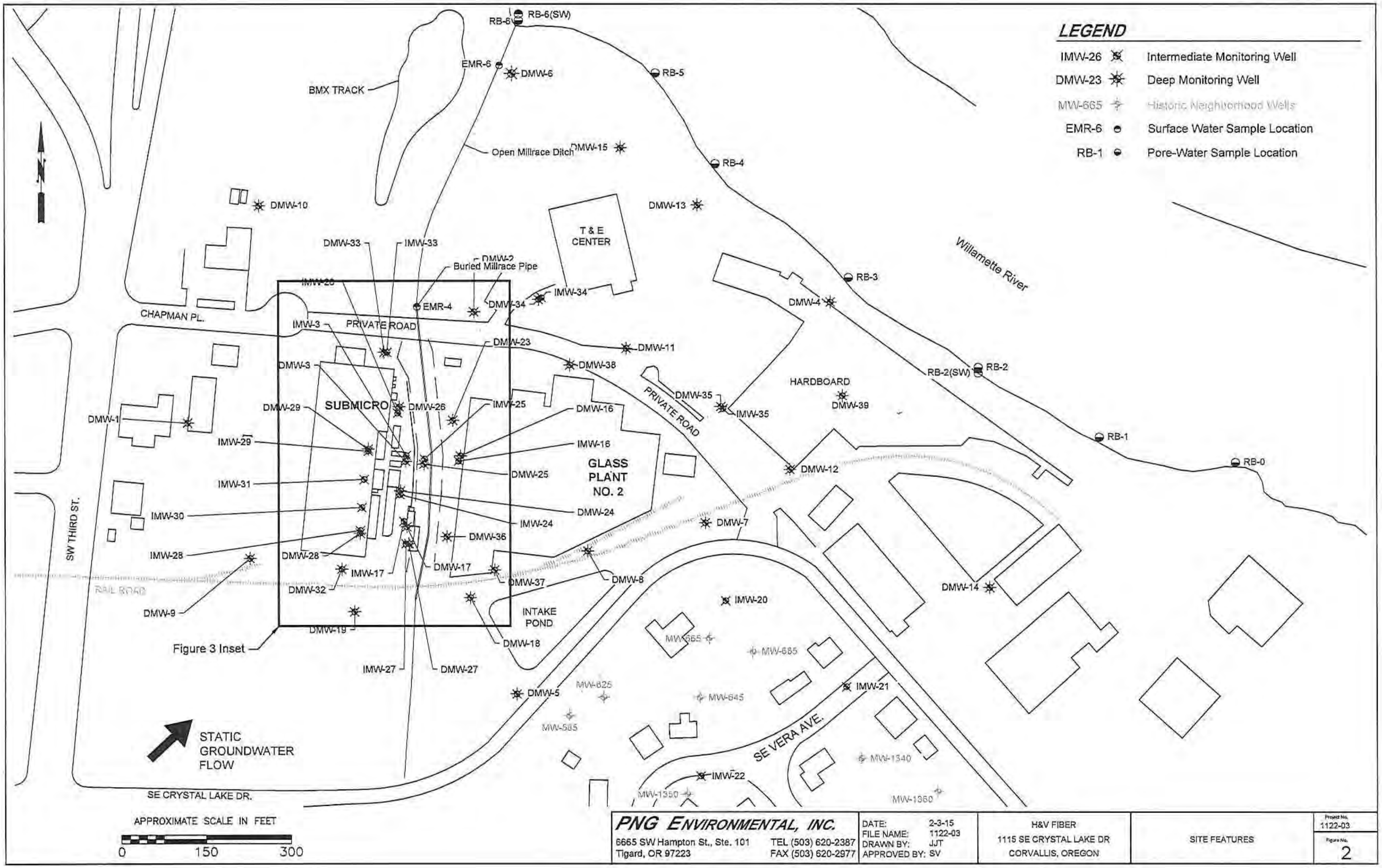
APPROXIMATE SCALE IN FEET

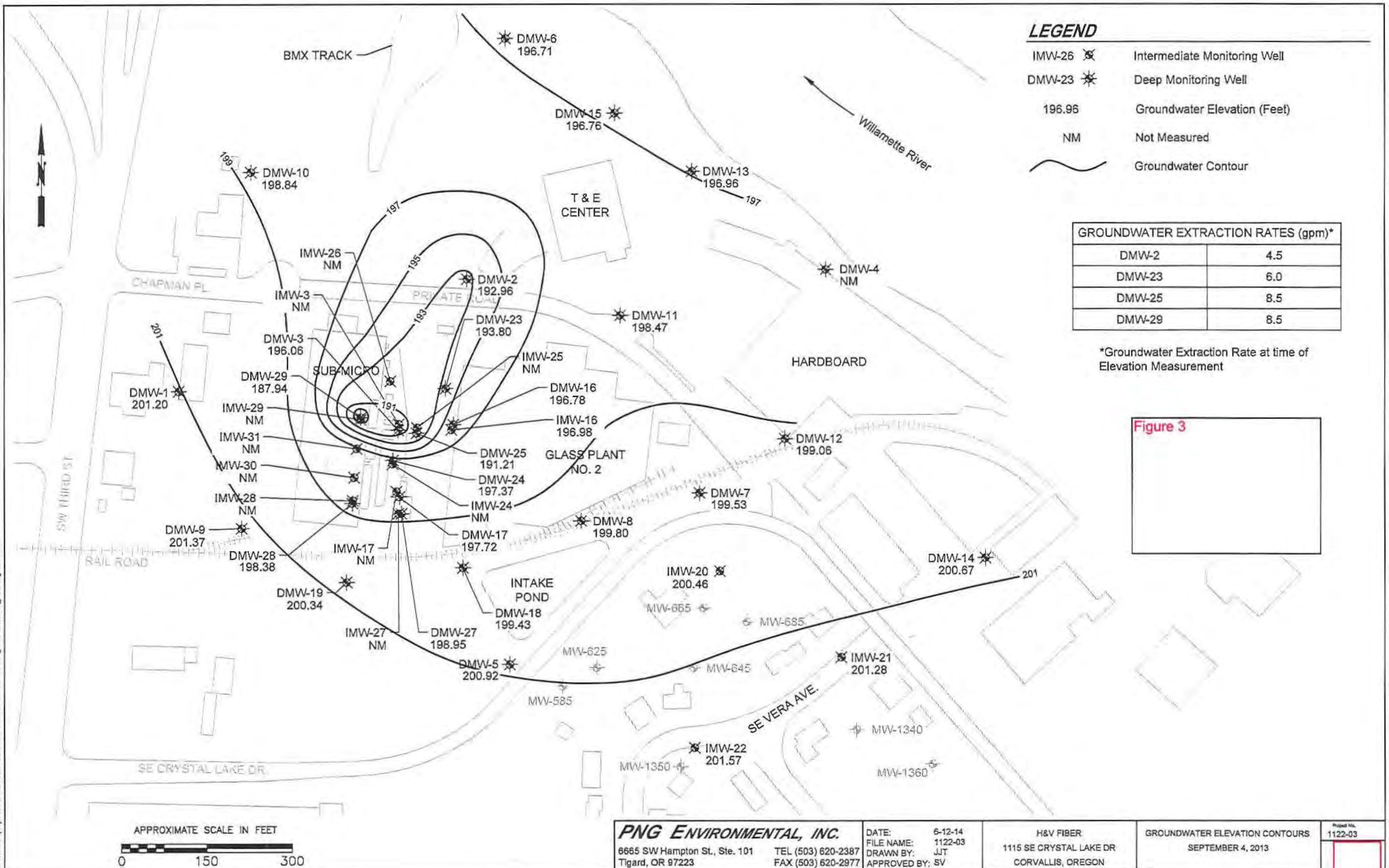
0 1000 2000 4000

NOTE:
USGS, Corvallis-Riverside Quadrangle
Oregon
7.5 Minute Series (Topographic)
Lat: 44°33'12.02"N, Long: 123°15'31.82"W

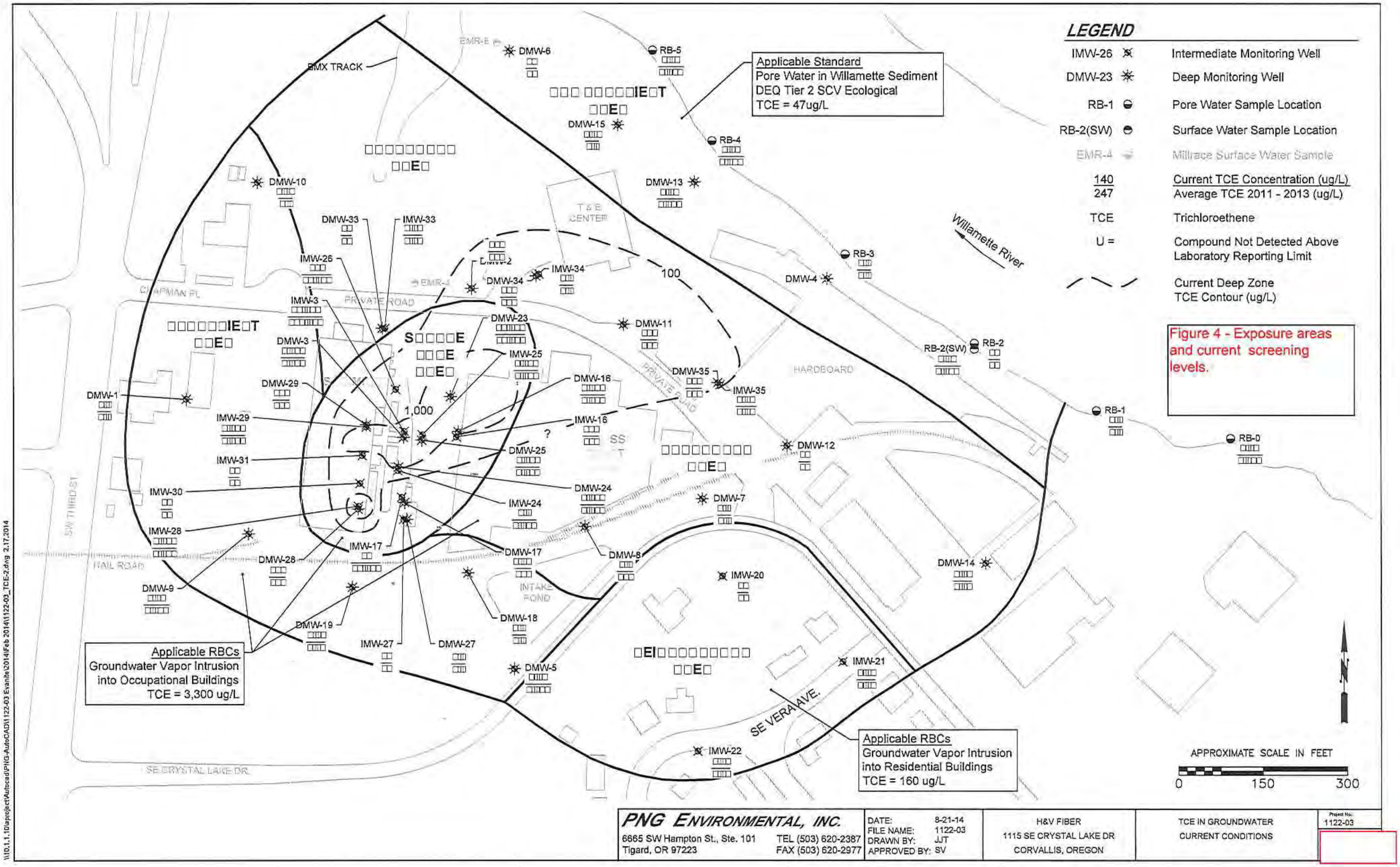
PNG ENVIRONMENTAL, INC.
6665 SW Hampton Street, Suite 101 Tigard, OR 97223
TEL (503) 620-2387
FAX (503) 620-2977

DATE: 6-12-14 FILE NAME: 1122-01 DRAWN BY: JJT APPROVED BY: SV	H&V FIBER 1115 SE CRYSTAL LAKE DR CORVALLIS, OREGON	SITE LOCATION MAP	Project No. 1122-03	Figure No. 1


LEGEND
IMW-26 Intermediate Monitoring Well
DMW-23 Deep Monitoring Well
MW-665 Historic Neighborhood Wells
EMR-6 Surface Water Sample Location
RB-1 Pore-Water Sample Location
RB-6 RB-6(SW)
EMR-6
DMW-6
RB-5
BMX TRACK
Open Millrace Ditch
DMW-15
RB-4
DMW-10
DMW-13
T & E CENTER
DMW-33
IMW-33
DMW-2
Buried Millrace Pipe
Willamette River
RB-3
IMW-34
DMW-34
EMR-4
DMW-4
CHAPMAN PL.
IMW-3
PRIVATE ROAD
DMW-23
DMW-11
DMW-38
DMW-3
HARDBOARD
RB-2(SW) RB-2
DMW-35
IMW-35
DMW-39
PRIVATE ROAD
DMW-29
SUBMICRO
DMW-26
IMW-25
DMW-16
DMW-1
IMW-29
IMW-16
RB-1
GLASS PLANT NO. 2
DMW-12
RB-0
DMW-25
IMW-31
SW THIRD ST.
IMW-30
DMW-24
IMW-24
DMW-7
DMW-36
IMW-28
DMW-28
DMW-17
IMW-17
RAIL ROAD
DMW-32
DMW-37
DMW-8
DMW-14
DMW-9
IMW-20
INTAKE POND
DMW-19
Figure 3 Inset
DMW-18
MW-665
MW-685
IMW-27
DMW-27
IMW-21
DMW-5
MW-625
MW-645
MW-585
STATIC GROUNDWATER FLOW
SE VERA AVE.
MW-1340
IMW-22
MW-1350
MW-1360
SE CRYSTAL LAKE DR.
APPROXIMATE SCALE IN FEET
0 150 300
PNG ENVIRONMENTAL, INC.
6665 SW Hampton St., Ste. 101
Tigard, OR 97223
TEL (503) 620-2387
FAX (503) 620-2977
DATE: 2-3-15
FILE NAME: 1122-03
DRAWN BY: JJT
APPROVED BY: SV
H&V FIBER
1115 SE CRYSTAL LAKE DR
CORVALLIS, OREGON
SITE FEATURES
Project No. 1122-03
Figure No. 2



GROUNDWATER EXTRACTION RATES (gpm)*	
DMW-2	4.5
DMW-23	6.0
DMW-25	8.5
DMW-29	8.5


LEGEND
IMW-26 Intermediate Monitoring Well
DMW-23 Deep Monitoring Well
RB-1 Pore Water Sample Location
RB-2(SW) Surface Water Sample Location
EMR-4 Millrace Surface Water Sample
140 Current TCE Concentration (ug/L)
247 Average TCE 2011 - 2013 (ug/L)
TCE Trichloroethene
U = Compound Not Detected Above Laboratory Reporting Limit
Current Deep Zone TCE Contour (ug/L)
Figure 4 - Exposure areas and current screening levels.
Applicable Standard
Pore Water in Willamette Sediment
DEQ Tier 2 SCV Ecological
TCE = 47ug/L
Applicable RBCs
Groundwater Vapor Intrusion into Occupational Buildings
TCE = 3,300 ug/L
Applicable RBCs
Groundwater Vapor Intrusion into Residential Buildings
TCE = 160 ugL
Willamette River
BMX TRACK
CHAPMAN PL
PRIVATE ROAD
RAIL ROAD
SW THIRD ST
SE CRYSTAL LAKE DR
SE VERA AVE.
T&E CENTER
HARDBOARD
INTAKE POND
100
1,000
APPROXIMATE SCALE IN FEET
0 150 300
PNG ENVIRONMENTAL, INC.
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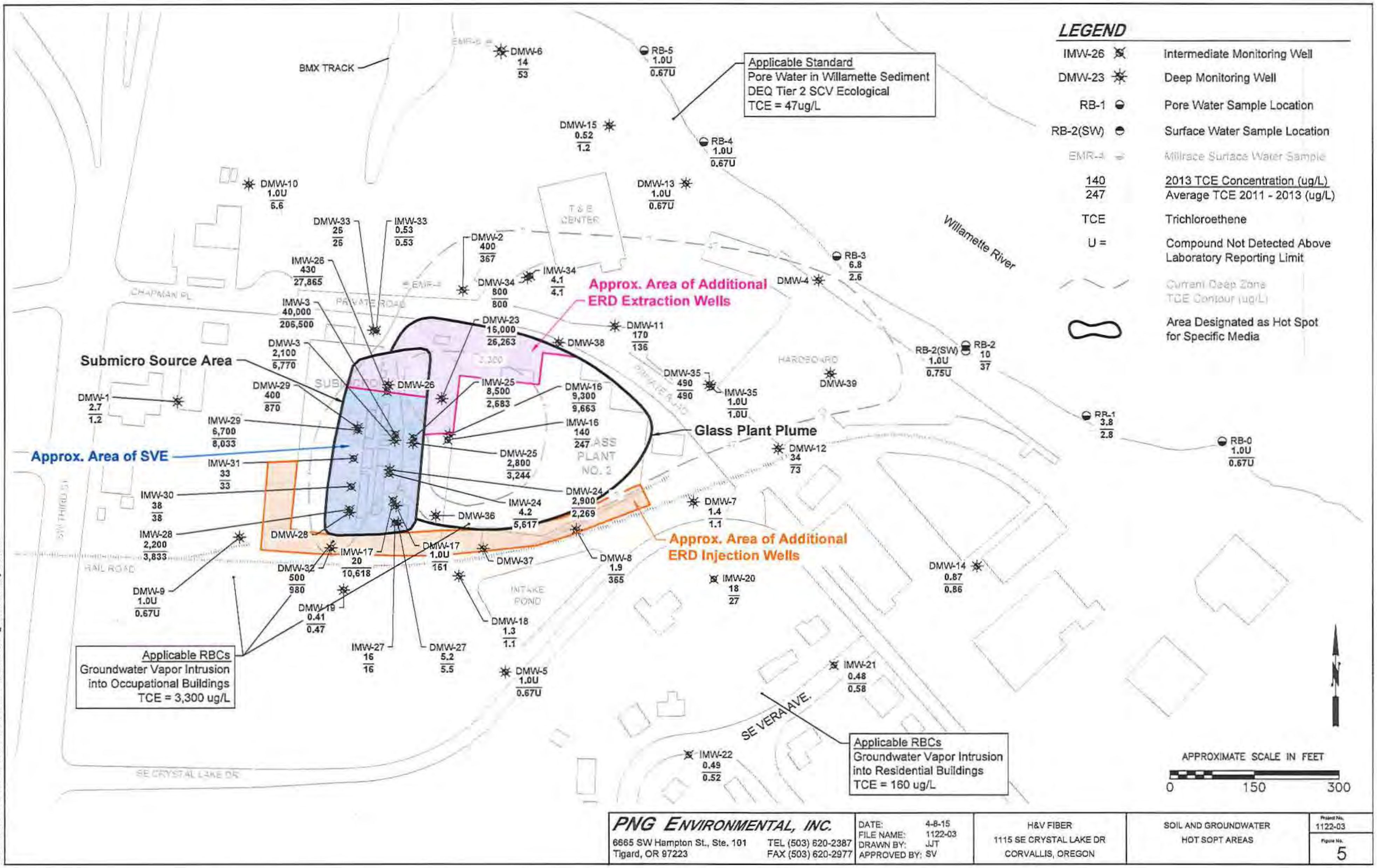
TEL (503) 620-2387
FAX (503) 620-2977
DATE: 8-21-14
FILE NAME: 1122-03
DRAWN BY: JJT
APPROVED BY: SV
H&V FIBER
1115 SE CRYSTAL LAKE DR
CORVALLIS, OREGON
TCE IN GROUNDWATER
CURRENT CONDITIONS
Project No. 1122-03



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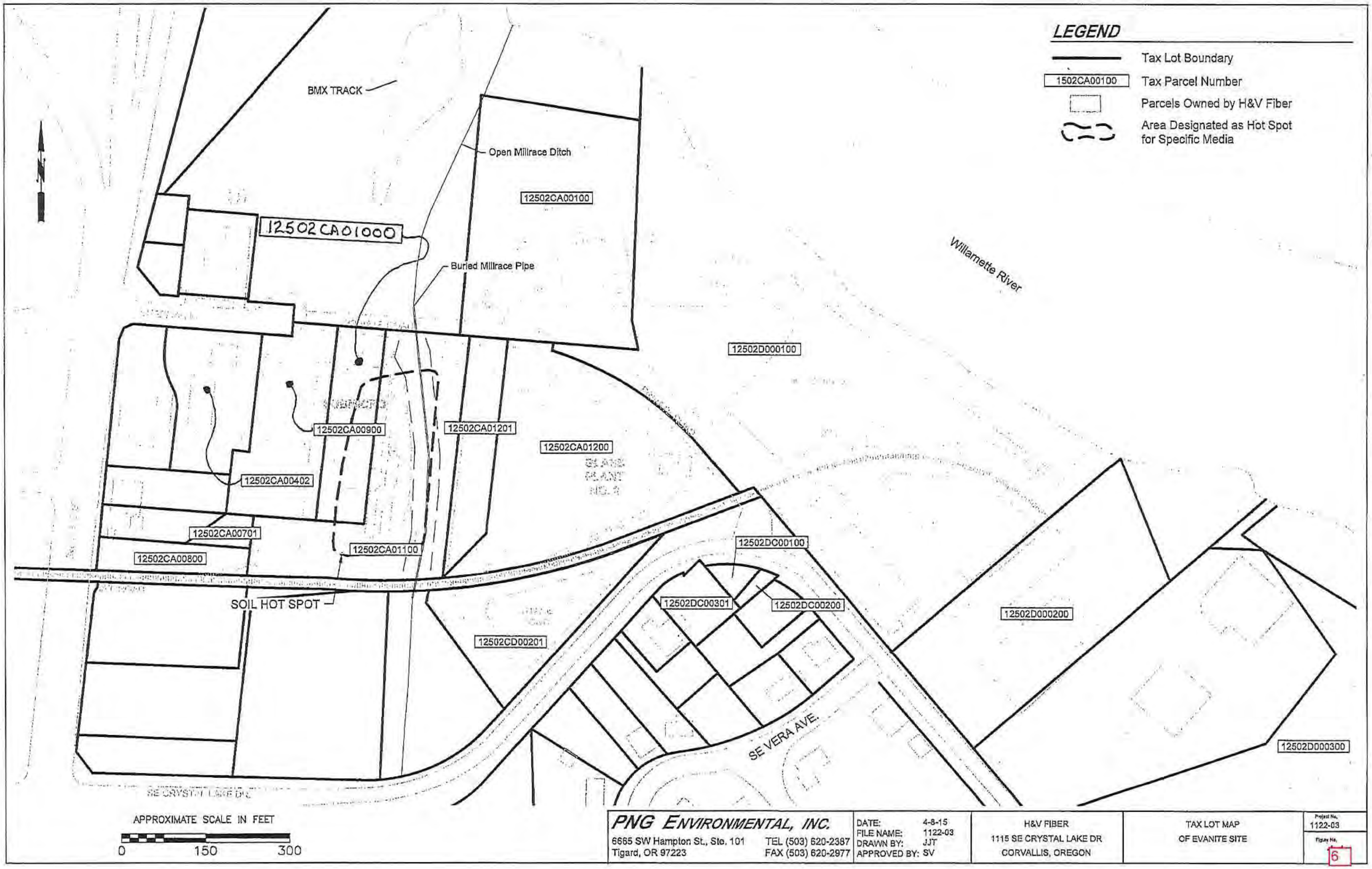
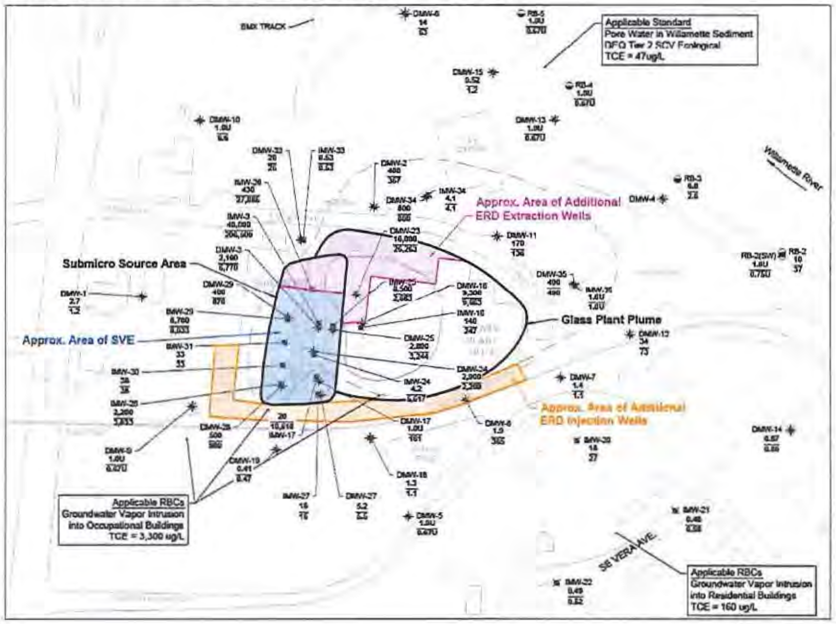


LEGEND
Tax Lot Boundary
1502CA00100
Tax Parcel Number
Parcels Owned by H&V Fiber
Area Designated as Hot Spot for Specific Media
BMX TRACK
Open Millrace Ditch
12502CA00100
12502CA01000
Buried Millrace Pipe
Willamette River
12502D000100
12502CA00900
12502CA01201
12502CA01200
12502CA00402
12502CA00701
12502CA00800
12502CA01100
12502DC00100
SOIL HOT SPOT
12502DC00301
12502DC00200
12502D000200
12502CD00201
SE VERA AVE.
12502D000300
APPROXIMATE SCALE IN FEET
0
150
300
PNG ENVIRONMENTAL, INC.
6665 SW Hampton St., Ste. 101
Tigard, OR 97223
TEL (503) 620-2387
FAX (503) 620-2977
DATE: 4-8-15
FILE NAME: 1122-03
DRAWN BY: JJT
APPROVED BY: SV
H&V FIBER
1115 SE CRYSTAL LAKE DR
CORVALLIS, OREGON
TAX LOT MAP
OF EVANITE SITE
Project No. 1122-03
Figure No. 6

Engineering & Institutional Controls; SVE with Offgas Treatment Groundwater/DNAPL Extraction with ERD (RA-2am)

Remedial Alternative RA-2am Description

- Institutional Controls
- Enhanced soil vapor extraction (SVE) in the DNAPL source area to promote source depletion of TCE mass and mitigate potential vapor intrusion to the Submicro Building (Currently SVE from Wells IMW-3, 16, 24, 25, 26, 28, and 29)
- Enhanced groundwater extraction to flush the DNAPL source area, to expand the unsaturated zone within the source area to facilitate SVE mass removal, and maintain containment of impacted groundwater (Currently Wells DMW-2, 3, 23, 24, and 29)
- Treatment of offgas from the SVE system and air stripper (Currently catalytic oxidation but carbon adsorption expected in the future as physical mass removal rates decline)
- Enhanced Reductive Dechlorination in-situ treatment of groundwater in the Glass Plant plume and Submicro Source areas as a polishing technique once source depletion becomes stagnant.
- Continued monitoring of groundwater and air quality and remedial system performance
- Follow active groundwater remediation with conversion to passive groundwater remediation involving reduced mass flux from source area together with natural attenuation to protect surface water.



CAPITAL COSTS

ITEM	UNIT COST	UNITS	QUANTITY	COST
Site Preparation & Remediation				
Installation of DNAPL/SVE Wells	$250,000	EA	1	$250,000
Installation of ERD Treatment Unit and Wells	$310,000	EA	1	$310,000
Infrastructure for SVE and ERD Systems	$190,000	EA	1	$190,000
Construction Subtotal				$750,000
Contingencies				
Bid Contingencies (10%)				$75,000
Scope Contingencies (40%)				$300,000
Construction Total				$1,125,000
Consulting and Engineering Services (ROD support, Design, System performance evaluation, Reporting, etc.)				$700,000
DEQ Oversight				$280,000
TOTAL CAPITAL COSTS				$2,105,000

OPERATIONAL & MAINTENANCE COSTS

ACTIVITY	AVERAGE ANNUAL COST	LENGTH OF OPERATION		PW¹ FACTOR 7%	PW¹ PROJECT LIFETIME
System Operation & Maintenance Costs	$120,000	20	Yr	10.59	$1,272,000
Groundwater and System Monitoring Costs	$160,000	30	Yr	12.41	$1,986,000
Offgas Treatment Costs (Soil vapor extraction & groundwater air stripper)	$60,000	20	Yr	10.59	$636,000
TOTAL O&M COSTS					$3,894,000

TOTAL PROJECT COSTS (Present worth)	**$5,999,000**

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DATE: 12-4-14
FILE NAME: 1122-03
DRAWN BY: SVB
APPROVED BY: BB

H&V FIBER
1115 SE CRYSTAL LAKE DR
CORVALLIS, OREGON

SUMMARY OF ALTERNATIVE 2-AMENDED

Project No. 1122-03
Figure No. 7

ADMINISTRATIVE RECORD INDEX

Evanite Site
Corvallis, Oregon

The Administrative Record consists of the documents on which the recommended remedial action for the site is based. The primary documents used in evaluating remedial action alternatives for the Evanite site are listed below. Additional background and supporting information can be found in the Evanite project file located at DEQ Western] Region Office, 165 E. 7th Avenue, Suite 100, Eugene, Oregon.

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