

Response to Comments

- **Periodic Review**

**Fox Ave Building Cleanup Site
Seattle, WA**

Toxics Cleanup Program

Washington State Department of Ecology

Northwest Regional Office

Shoreline, Washington

May 2022

Publication Information

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<https://apps.ecology.wa.gov/cleanupsearch/site/5082>

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- Clean-up site ID: 5082
- Facility site ID: 2282

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¹ www.ecology.wa.gov/contact

Department of Ecology's Regional Offices

Map of Counties Served



Southwest Region 360-407-6300	Northwest Region 206-594-0000	Central Region 509-575-2490	Eastern Region 509-329-3400
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Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

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DEPARTMENT OF
ECOLOGY
State of Washington

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Public Outreach Summary

The Fox Ave Building cleanup site (Site) located at 6900 Fox Ave S, Seattle, WA 98108, is continuing Washington State's [formal cleanup process](#)² as directed under the Model Toxics Control Act ([MTCA](#)³).

The Department of Ecology's public involvement activities related to this Site's 30-day comment period (Jan. 27 – Feb. 25, 2022) included:

- **Site Register:**
 - Publication of 3 notices in Ecology's Toxics Cleanup Site Register:
 - Comment Period Notice:
 - [Site Register notice](#) #1 Jan. 27, 2022
 - [Site Register notice](#) #2 Feb. 10, 2022
 - [Site Register notice](#) #3 Feb. 24, 2022
 -
 - Response Summary Notice:
 - Estimated date of publication Jun. 2, 2022
 - Visit [Ecology's Site Register website](#)⁴ to download PDFs.
- **Social Media:**
 - **Twitter:** Ecology – Northwest Region @ecyseattle posted a tweet⁵ on Jan. 27, 2022 connecting readers to the comment period including the cleanup site webpage and how to submit comments.
- **Websites:**
 - Ecology announced the public comment period and made the review documents available on [Ecology's Fox Ave Building webpage](#)⁶ and Ecology's [Public Inputs & Events webpage](#)⁷.
- **Ecology email list:**
 - A notice was included in the monthly Lower Duwamish Waterway email list⁸.
- **Document Repositories:**
 - The Northwest Regional Office offered in-person review of documents by appointment.

² <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-process>

³ <https://ecology.wa.gov/mtca>

⁴ <https://apps.ecology.wa.gov/publications/UIPages/PublicationList.aspx?IndexTypeName=Program&NameValue=Toxics+Cleanup&DocumentTypeName=Newsletter>

⁵ <https://twitter.com/ecyseattle/status/1486806444095655938/photo/1>

⁶ <https://apps.ecology.wa.gov/cleanupsearch/site/5082>

⁷ <https://10ecology.wa.gov/Events/Search/Listing>

⁸ https://public.govdelivery.com/accounts/WAECY/subscriber/new?topic_id=WAECY_37

Comment Summary

From Jan. 27 – Feb. 25, 2022, Ecology solicited public comments on a Periodic Review for the Fox Ave Building cleanup site.

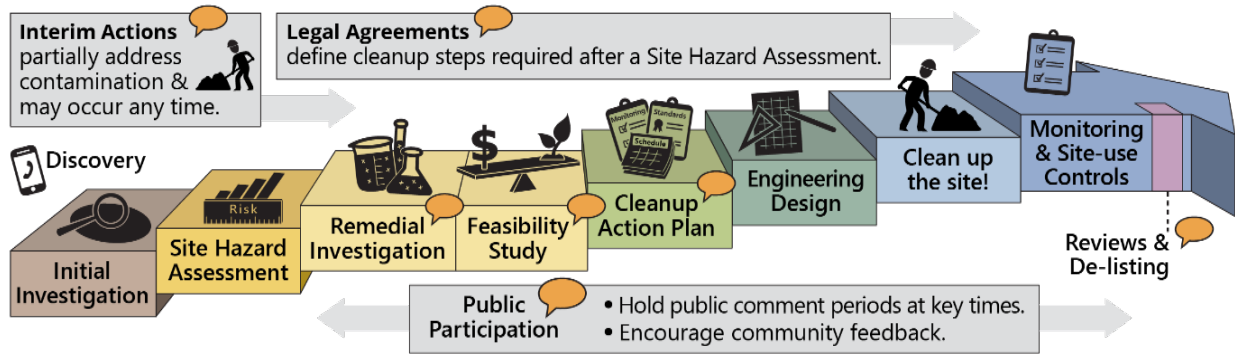
Ecology received 3 comments during the 30-day comment period.

Table 1: List of Commenters

	First Name	Last Name	Agency/Organization/Business	Submitted By
1	Teri	Floyd	Personal	Individual
2	John	Cooke	Seattle Boiler Works	Business
3	Bob	Code	Fox Ave Building, LLC, CALIBRE Systems, Inc., and Joyce Ziker Partners, PLLC	Business

Next Steps

Ecology has reviewed and considered the public comments received on the Periodic Review. Based on Ecology’s evaluation of the comments, no substantive changes were necessary in the documents, and they have been finalized. The cleanup is still in process and Ecology will continue to monitor conditions at the Site. See graphic below and visit Ecology’s [cleanup process webpage](#)⁹ to learn more about Washington’s formal cleanup process.



¹⁵ <https://apps.ecology.wa.gov/publications/SummaryPages/1909166.html>

⁹ <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-process>

¹⁵ <https://apps.ecology.wa.gov/publications/SummaryPages/1909166.html>

Comments and Responses

The public comments are presented below, along with Ecology's responses. Appendix A, page 19 contains the comments in their original format.

Comment from: Teri Floyd PhD, received via letter, submitted by electronic mail on February 24, 2022

Dear Ms. Welty,

Please accept these comments on the Periodic Review dated December 2021 and the on-going cleanup of the Fox Avenue Site (Site) in the Duwamish Corridor in Seattle, Wa. I had the opportunity of working on the cleanup of this Site from the late 1990s until I retired in 2017. I am pleased to see that the on-going remedial action continues to perform as designed and to be on a path to meeting predicted restoration timeframes overall.

In the late 1990s, this Site was a heavily contaminated solvent site with tidal influences from the adjacent waterway and a groundwater plume that extended to 80-ft below ground. A number of source control actions had already been performed by then owner/operator Great Western Chemical and more would continue over the next several years. These actions would remove approximately 12,000 lbs of solvents from the source area but would have limited effect on the groundwater plume outside of the source area or at depth in the source area.

In 2003, Fox Avenue Building, LLC (Fox Ave LLC) acquired the Site from Great Western Chemical. Great Western Chemical had already filed for bankruptcy and was unable to proceed with the cleanup. This was a very critical decision by Fox Ave LLC to purchase a historically contaminated site that would require extensive cleanup. Without this decision, the site might remain a contaminated brownfield (orphaned) site to this day.

Over the next couple of years, Fox Ave LLC made significant facility improvements including the decommissioning of below ground tanks and pipes, movement of operations to above ground, and completion of a new Remedial Investigation and Feasibility Study combining lessons learned from the Great Western Chemical work and filling numerous data gaps. We worked closely with Ecology during this time evaluating new state-of-the-art technologies and assessing their compatibility with site conditions and operations.

This work resulted in Ecology issuing a new Cleanup Action Plan for the Site in June 2012. The new plan would use three technologies:

- Enhanced reductive dichlorination (ERD) for the downgradient plume.
- Soil vapor extraction (SVE) in source areas
- Thermal treatment, specifically, Electrical Resistance Heating (ERH), to treat soil and groundwater in the source area down to 80-ft below ground surface.

The first two components were well-established technologies that would be optimized by the consulting team's experience at this Site and other sites in the Duwamish Valley. The use of large-scale thermal

treatment, however, was very new technology that had not been used at this scale in the Pacific Northwest. ERH, the thermal technique selected, acts to enhance the volatilization of solvents in the subsurface by passing an electrical current through the soil between subsurface electrodes throughout the treatment area. The electrical current heats the subsurface, and a vapor recovery and treatment system connected to a network of vapor recovery wells collects and treats the steam and solvent vapors generated by the ERH system. Thermal treatment system design, construction, and operation were completed by the TRS Group, Inc. (TRS), the vendor chosen by the Fox Avenue Trust to implement the thermal remedy.

The thermal remedy required installation of heating elements on a grid pattern throughout the facility and extensive support piping for vapor capture and electrical, installation of a new substation to supply the power, and significant disruption of the operating facility for close to a year. As I recall, the electrical bill alone was approximately \$500,000 for the five months of active treatment. Since this was new technology for the region, Ecology staff (Ching Pi Wand and Sunny Linn-Becker) worked closely with us throughout the remediation making visits to observe installation, operations, and monitoring. The thermal treatment was extremely effective, removing another approximately 12,000 lbs of chlorinated solvents and a similar amount of petroleum hydrocarbons. Calculations contained in the completion report indicated that approximately 98% of the contaminated source mass was removed.

Since the treatment of the source area in 2013, the remaining elements of the on-going cleanup are ERD injections to treat the downgradient plume and any rebound in the source area and monitoring. Current concentrations are orders of magnitude below historical values, and the source area is now meeting remediation levels at the conditional point of compliance along Fox Avenue. Monitoring and ERD injections are on-going and will continue to monitor the recovery of the downgradient plume and compliance with Site cleanup levels at the seeps into the Duwamish Waterway.

I continue to be very proud of the success of this cleanup action and very grateful to the Fox Ave Trust to fund an expensive cleanup of contamination that occurred before their time. Ecology's support, especially from Ching Pi Wang and Sunni Linn Becker, during the critical remediation years of 2008 to 2016 is also deeply appreciated and facilitated the use of the thermal treatment technology. It is satisfying to see the continued downgradient groundwater quality improvements that are occurring according to plan.

Thank you for the opportunity to comment on the Periodic Review of the Fox Avenue Site.

Sincerely,

Teri A. Floyd, Ph.D.
Retired Environmental Consultant

Ecology Response:

Hi Teri,

Thank you for taking the time to send us your comments, we appreciate your input. Ecology agrees that the ongoing cleanup actions have been effective in reducing concentrations of the contaminants of concern, and appreciates the effort and dedication of Fox Ave LLC and their consultants who have worked on this challenging site cleanup.

We made some clarifications to the wording in the periodic review report after the public comment period, but there weren't significant changes to the conclusions and recommendations. The final report is available under Documents on the Site's webpage:

<https://apps.ecology.wa.gov/cleanupsearch/site/5082>

Comment from: John Cooke submitted by electronic mail on February 25, 2022

Hello

I represent the owners of the Seattle Boiler Works property which has been impacted by the releases from the Fox Avenue Site. We continue to support Ecology's efforts to insure that cleanup levels are met at the Seattle Boiler Works property and surrounding areas. We request the Ecology continue to require sampling and, if necessary, further treatment of all impacted media until cleanup levels are achieved.

Thank you for considering these comments.

Ecology Response:

Hi John,

Thank you for taking the time to send us your comments, we appreciate your input. We made some clarifications to the wording in the periodic review report after the public comment period, but there weren't any significant changes to the conclusions and recommendations. The final report is available under Documents on the Site's webpage: <https://apps.ecology.wa.gov/cleanupsearch/site/5082>

Comment from: Fox Ave Building, LLC, CALIBRE Systems, Inc., and Joyce Ziker Partners, PLLC, received via letter dated February 25, 2022, submitted by electronic mail

Tamara Welty Periodic Reviewer & Site Manager
Washington Department of Ecology | Toxics Cleanup Program | Northwest Regional Office

Comments on the Draft Periodic Review Report for the Fox Ave Site

We appreciate the opportunity to provide comments on the draft Periodic Review Report for the Fox Avenue Building Site. The attached memo summarizes our comments and concerns regarding the Periodic Review Report for the Site dated December 2021.

We have worked closely with Ecology for nearly 20 years on this very challenging cleanup project. Based on the Site conditions and technical limitations of available remedial technologies, our team worked

with Ecology to develop a very aggressive remedial approach which Ecology approved in the Cleanup Action Plan (CAP) (2013). As described in the performance data with our attached comments, the cleanup has been very effective in substantially reducing contaminant concentrations in soil and groundwater throughout the entire Site and has prevented discharge of contaminants to the Duwamish Waterway. We are continuing to implement all remedial actions and monitoring required in the CAP. The CAP includes realistic performance criteria, points of compliance and expected time frames to meet these criteria. All performance criteria were developed based on Site conditions and the well-documented challenges associated with sites where DNAPLs are present. Based on current data, the Site is generally in compliance with all current remediation requirements and will likely achieve cleanup goals within the agreed 50-year restoration time frame.

The key issues identified based on our review of the Periodic Review Report include;

- Comparison of contaminant concentrations in recent groundwater data to required Site cleanup levels long before the established restoration periods required in the CAP. Additionally, contaminant concentrations are compared to remediation levels in wells upgradient of the designated conditional point of compliance.
- Use of sub-slab screening criteria rather actual empirical measurements of indoor air concentrations to evaluate the vapor intrusion pathway.
- Recommendations for greatly expanded sampling including many wells where prior sampling demonstrated that cleanup levels had been achieved and the sampling program had been modified, that is wells have been dropped from the program in consultation with the Ecology Project Managers.

As noted above, we have worked with Ecology every step of the way for this important cleanup project and plan to continue remediation activities in the future in order to meet project goals. However, some of the recommendations for additional work in the Periodic Review are not warranted based on current Site conditions. Please consider the attached comments to the Periodic Review for the Fox Ave Site. We look forward to further discussions with Ecology.

Sincerely,

Bob Code Member Fox Ave Building, LLC

Ecology Response:

The headings below match the headings outlined in the February 25, 2022 letter that was submitted to Ecology. Excerpts from the letter are included in this response document for context, but exclude tables and figures.

Comment 1: Conditional Point of Compliance

The Periodic Review Report states that the remediation level (RL) established for total chlorinated volatile organic compounds (total CVOCs) in groundwater has been achieved at the conditional point of compliance (CPOC). But the Periodic Review further states that the RL has not been achieved upgradient of the CPOC due to “recent” exceedances at MW-9, MW-18S, and R0-IW2D. Based on the exceedances

the Periodic Review states that “one of the expected [restoration] time frames has now been missed” and recommends extensive groundwater monitoring and further Enhanced Reductive Dechlorination (ERD) injections. It is important to note that while the Periodic Review references “recent” exceedances, the current data for this group of wells indicate total CVOCs significantly below the RL.

Fox Avenue disagrees with Ecology’s characterization that the restoration time frame for the RL for total CVOCs in groundwater has not been achieved. As provided in the Cleanup Action Plan (CAP) and consistent with MTCA, whether the RL is being achieved is measured at the CPOC, not upgradient of the CPOC. Based on the existing performance data, the remedial actions have achieved the RL for total CVOCs at the CPOC within the expected restoration time frame. An exceedance at upgradient wells does not change, modify, or alter this achievement.

Evaluating compliance with the RL at the CPOC, not at locations upgradient of the CPOC, is consistent with MTCA. Under section 173-340-440(e) of MTCA, the CPOC is established as the basis for measuring compliance at the site. Similarly, Section 3.5.2 of the Site CAP states that the CPOC for groundwater is along the downgradient property boundary of the Fox Avenue and (former) Whitehead properties (i.e., along the Fox Avenue South right-of-way). Section 3.6 of the CAP states that the groundwater RL is 250 micrograms per liter (µg/L) total CVOCs. Section 4.3 of the CAP states that the approximate time frame for achieving the remediation level measured at the CPOC is 10 to 15 years.

It is inconsistent with the requirements of MTCA and the CAP to assert that one of the restoration time frames is not being achieved based on concentrations of contaminants in wells upgradient from the CPOC. Accordingly, the recommendation to implement an extensive Site-wide groundwater monitoring program is based on an incorrect interpretation of the CAP.

Ecology Response to Comment 1:

The cleanup action plan (CAP) established remediation levels to indicate what concentrations of contaminants would be handled using the different cleanup methods. The CAP also indicates that the conditional point of compliance (CPOC) applies to both remediation levels and cleanup levels (with the exception of the embayment seeps and downgradient plume area). The language in the PR will be clarified. However, during a PR, it is still appropriate for Ecology to report on concentrations upgradient of the CPOC and throughout the site since cleanup levels for groundwater will need to be met at the CPOC, and concentrations upgradient of the CPOC are relevant for meeting cleanup levels at the CPOC. Cleanup levels are used to determine whether a remedial action is protective, not remediation levels. Groundwater monitoring generally continues for as long as cleanup levels are exceeded.

Ecology agrees that your ongoing cleanup actions have been effective in reducing concentrations of the contaminants of concern, and appreciates your effort and dedication. Ecology does not agree that remediation levels have been consistently achieved at the CPOC. PRs typically focus on the prior 5 years of data, and this PR included a review of your data through 2019. Due to the variability between monitoring events, multiple years of data should be evaluated to determine whether remediation levels and cleanup levels are being met, including trend analysis and evaluating for potential rebound. It is recommended that you include historical data tables in future monitoring reports. It would also be helpful to include full documentation for which wells Fox Avenue Building LLC considers to be the CPOC rather than upgradient in all future annual reports.

The recommendation to collect groundwater data from additional wells represents a point-in-time update to an overall understanding of current groundwater conditions at the site. Ecology understands that the current monitoring network was agreed upon between Fox Ave Building LLC and former Ecology site managers; however, it is the recommendation of the PR that the wells identified be resampled to give a more current picture of the entire site, and that the biopolishing plan be updated accordingly.

Comment 2: Vapor Intrusion and Indoor Air Sampling

Within the Periodic Review, added indoor air (IA) sampling is recommended because; “Leidos believes that additional assessment of VI potential is warranted on both the Cascade Columbia and Seattle Boiler Works properties. This conclusion is based on the most recent sub-slab soil vapor sampling results, which indicated that concentrations of PCE and TCE were present above MTCA sub-slab soil gas screening levels.”

The sub-slab screening levels noted are not compliance criteria but are intended for use in a Tier 1 vapor intrusion (VI) evaluation per Ecology’s VI Guidance . In both the RI/FS and the CAP, all soil gas data were evaluated and Fox Ave and Ecology concluded that the best approach to demonstrate compliance with cleanup levels was empirical IA sampling following a Tier 2 evaluation per Ecology’s VI Guidance¹. The Periodic Review notes that “Although the most recent indoor air sampling results for these properties were in compliance with Site CULs, the currently available data set does not provide a sufficient weight-of-evidence to demonstrate that a VI exposure pathway to indoor air is not present...”.

The IA sampling completed before and under the CAP included multiple sampling events over a season and multiple locations within the buildings. The sampling included events when large indoor/outdoor temperature differences existed in November and December 2012; all sample results in 2012 and 2013 were in compliance with the Site CULs (as noted in the Periodic Review). This same data set also demonstrates that these industrial/ commercial buildings have much higher vapor attenuation factors (VAFs) than the default values used to set sub-slab screening levels. This was expected based on the industrial/ commercial nature of the buildings.

It is important to note that a key part of the CAP included performance of soil and groundwater treatment to control the VI pathway. The performance monitoring data demonstrates successful treatment resulting in substantial COC concentration reductions since the 2011 Remedial Investigation/Feasibility Study in all monitoring wells in and around the buildings.

We have reviewed the Ecology guidance on short-term TCE exposures to be addressed in the VI assessment (Ecology’s 2019 Implementation Memorandum No. 22: VI Investigations and Short-Term TCE Toxicity). The Periodic Review presents a relative comparison of sub-slab data to screening criteria (as would be used in a Tier 1 evaluation) and recommends that TCE should be assessed as soon as possible. The existing empirical TCE data (Tier 2 data) measured the indoor air in 2009 in the Cascade Columbia building and in 2010 in Seattle Boiler building, this sampling was completed prior to the start of effective treatment. The measured Tier 2 data were all below the established TCE CULs including the MTCA Method C value, the modified Method B value

(established in the CAP based on the current industrial use of the property), and the short-term exposure established to protect women of childbearing age. The data noted above were collected prior to the start of the current remedial actions throughout the plume. Subsequent IA sampling after the start of the remedial measures under the CAP provide similar results.

The existing Site data (indoor air sampling demonstrating compliance with Site CULs, the empirical building-specific VAFs, and performance data demonstrating the progress of ongoing Site remedial actions in reducing contaminant concentrations in groundwater) provide ample weight-of-evidence demonstrating effective control of the VI pathway as required in the CAP.

The apparent discrepancy between Tier 1 screening levels for sub-slab vapor and the empirically measured Tier 2 indoor air levels below cleanup levels is likely due to the higher VAFs for the commercial/industrial buildings at the Site. The Site performance data confirm the rationale in the CAP to use Tier 2 empirical measurements to evaluate indoor air.

Ecology Response to Comment 2:

Ecology agrees that per the CAP, indoor air concentrations, not sub-slab screening levels, are the air compliance criteria. Exceedances of sub-slab screening levels are noted in the PR as a secondary line of evidence for the need for ongoing indoor air sampling during the remedy. However, secondary lines of evidence, including groundwater concentrations and sub-slab concentrations, indicate that additional confirmation sampling is needed to ensure that indoor air cleanup levels continue to be met at the site.

As written in the CAP, Section 3.2, "A groundwater cleanup level protective of indoor air was not calculated; instead, an empirical demonstration will be used to confirm that groundwater concentrations during and after active remediation are protective of indoor air..." The most recent indoor air sampling was conducted in 2013, 9 years ago. Because soil and groundwater cleanup levels (and remediation levels) are not calculated to be protective of indoor air, it is appropriate to continue to monitor indoor air throughout the remedy to ensure that the remedy is protective of human health. Furthermore, site uses can change over time and an evaluation that current site uses and building conditions are similar to when the indoor air sampling occurred is appropriate on at least a 5-year recurring basis, particularly since a covenant is not yet in place.

Indoor air sampling at the Seattle Boiler Works property in December 2012 (Vapor Intrusion Monitoring at Seattle Boiler Works, Floyd Snider 2013) detected TCE above the MTCA Method B cleanup level for indoor air. Concentrations in 2013 were reportedly ND; laboratory results were not provided within the CCR to verify that detection limits were below the cleanup level. At the Cascade Columbia property, indoor air concentrations of PCE and TCE declined from 2009 to 2013 with results in 2013 below MTCA Method C cleanup levels for indoor air. However, as noted in the PR, the 2013 samples were collected shortly after shutdown of the SVE system. Sub-slab concentrations in 2013 remained high and it is appropriate to verify that indoor air at the Cascade Columbia facility remains protective of human health.

Groundwater concentrations have decreased since indoor air was last sampled at the site; however, concentrations of TCE in groundwater in June 2021 were above Method B screening levels in some

wells located close to buildings. Compliance is based on indoor air sampling and not compliance with screening levels, but available evidence suggests that there is reason to be concerned about concentrations of CVOCs in indoor air. Thus, Ecology requests that you collect compliance samples to verify that indoor air still meets cleanup levels.

Comment 3: Additional ERD Injections

Fox Ave has continued to complete ERD injections in multiple areas of the Site even though the performance monitoring data demonstrate compliance with RLs at the CPOC. Fox Ave has elected to be proactive and continue these ERD injections in selected plume areas in order to accelerate the achievement of cleanup goals for the Site. The performance data from the source control and ERD treatment are depicted in Figures 1, 2 and 3. Figure 1 (copied from the RI) presents the baseline conditions of total CVOCs in groundwater before the Interim Actions and CAP were implemented. Figures 2 and 3 present the current conditions (based on most recent sampling) relative to the compliance criteria established in the CAP. The Periodic Review states that “The remedy is not protective of human health and the environment at this time”; Fox Ave believes that statement to be incorrect and in conflict with the performance monitoring data that has been submitted to Ecology.

The CAP notes that “all risk to human health and the environment will have been addressed following achievement of cleanup levels at the seeps and elimination of the downgradient vapor intrusion pathway”; performance monitoring data have been submitted to Ecology demonstrating that CULs at the seeps have been met and that indoor air concentrations are less than the indoor air CULs.

As we have done in the past, Fox Ave plans to continue ERD injections in areas where necessary and appropriate based on the CAP objectives and performance monitoring data collected. We have worked closely with the Ecology project managers to implement this project and believe the performance data (see Figures 2 and 3) clearly demonstrate the progress made in Site restoration and compliance with the performance goals in the CAP.

Ecology Response to Comment 3:

Ecology appreciates that you have continued ERD injections in multiple areas of the site. Performance data demonstrate the progress made at the site. Additional work is needed to meet the cleanup and remediation levels at the conditional point of compliance, in the downgradient plume area, and at the groundwater seeps. Continued ERD injections will also help decrease the restoration timeframe. Ecology supports continued ERD injections at the site.

Comment 4: Additional Groundwater/Seep Monitoring and Evaluation of ERD Performance

Fox Ave has continued to monitor groundwater conditions to demonstrate compliance with the CAP and remedial optimization of the remedies implemented. In the Periodic Review the authors state that variability in the vinyl chloride (VC) concentrations make it difficult to project when the CULs will be met; “Based on the uncertainty of timing for ERD to achieve compliance with the groundwater CVOC RL and for the VC CUL to be achieved in the downgradient areas between the

CPOC and the embayment seeps, a more comprehensive evaluation of groundwater conditions at the Site is warranted". As Ecology is fully aware, the ERD process necessarily generates VC in the degradation process. Meeting the VC CUL is a long-term requirement of the CAP and is one of the primary reasons the FS recommended and CAP selected a 50-year operating period as a rational and realistic remedy implementation period. The CAP establishes that the CULs in seeps are projected to be met within 10-15 years (between 2024-2029) and that meeting the CULs in the Site-wide groundwater may take up to 50 years (2064).

When evaluating the performance data for PCE and its degradation daughter products all of the data must be evaluated together. Looking solely at VC concentrations in one or many wells shows substantial variability and by itself it is not a reliable indication of progress. After the parent products in the degradation process are substantially depleted, the VC can be effectively treated and fully removed. The data used in this Periodic Review is too early in the treatment and degradation process to focus on the VC CUL. The simplest illustration of the ERD process and connection between PCE and daughter products is based on real Site data (from performance monitoring well B-64, as an example) in Table 1 below: (Table in original comments)

This type of performance is exactly what is expected in an ERD treatment process and this well now meets the VC CUL, in spite of the apparent variability in the VC concentrations until all of the parent CVOCs are depleted. A large number of wells in the performance monitoring network have demonstrated very similar results, see the wells and seeps designated with a blue marker in Figure 2. In fact, many of the wells meeting the CULs are also non-detect for VC (< 0.5 ug/L).

Fox Ave has worked closely with Ecology throughout this cleanup process including review of performance data and collecting all samples necessary for performance monitoring and remedial optimization in order to demonstrate compliance with the criteria established in the CAP. The Periodic Review includes a list of wells to consider for expanded sampling. That specific list (from the Periodic Review) is presented in Table 2 along with existing performance data added and the compliance status of each well as of the last time sampled.

Much of the sampling recommended in the Periodic Review appears to be targeted at predicting when the VC CUL may be achieved in the downgradient areas between the CPOC and the seeps. The Periodic Review recommends expanded Site-wide sampling to include 48 wells/locations. The existing performance monitoring data provided to Ecology demonstrates that all of the locations meet the RLS, 23 of the 48 were below the applicable CULs at the last time sampled, and 18 of the 48 were non-detect for VC. The CAP establishes that the restoration timeframe to meet the Site-wide CULs is 50 years. The existing performance data demonstrate significant progress towards meeting that goal and any reasonable interpretation of the performance monitoring data (see Figures 2 and 3, and Table 2) indicates the remedial actions implemented are on track to meet the CAP requirements.

As we have implemented for more than a decade, Fox Ave recommends that we meet with Ecology to review existing performance monitoring data and trends, compare with the time periods and compliance criteria in the CAP, and identify any other data required for remedial optimization of the actions implemented. From this we can plan for the wells to be sampled based on the defined project objectives and data needs.

The Periodic Review notes that groundwater cleanup levels based on protection of surface water have changed since the Agreed Order was signed in 2012. The interface between groundwater and surface water at the Site are the seeps that discharge to the Myrtle Street Embayment. Current data from the seeps shows compliance with the cleanup levels established in the 2012 Agreed Order. Contaminant concentrations are continuing to decline further and should achieve proposed revised cleanup levels within the targeted restoration time frame.

Ecology Response to Comment 4:

Ecology will continue to review degradation product concentrations with the goal of ensuring compliance with the CAP and site cleanup levels. The selected monitoring well sampling list is intended to be a point-in-time data collection effort to understand current concentrations and the potential for rebound of VC to help ensure that the remedy is on track and to guide any needed updates to the biopolishing plan. Ecology is not intending to look solely at VC but to interpret the results as an overall view of the site and progress towards achieving and maintaining concentrations below the cleanup level. The cleanup level, and not the remediation level, is what is considered protective.

Groundwater cleanup levels are based on protection of surface water; as the surface water quality standards have changed, it is appropriate to update the cleanup levels accordingly. Ecology understands your comments to mean that the updated cleanup levels will not have a detrimental effect on the restoration timeframe for the site and that you do not have any issues with updating the cleanup levels in an AO amendment.

Comment 5: Restrictive Covenant

Section Q of the 2012 Agreed Order requires Fox Avenue to record the Environmental Covenant on the properties within the Site “within ten (10) days of the completion of the active remedial action as detailed in the CAP.” As explained above, active remediation is ongoing via ERD injections.

Accordingly, the requirement to record the Environmental Covenant has not yet arisen. One of the conclusions in the Periodic Review is that because expected restoration time frames for groundwater have been missed, the requirement to record Environmental Covenants should be reevaluated. As discussed regarding the CPOC, the expected restoration time frames have not been missed, active remediation is ongoing, the Site is currently protective because people are not exposed to contamination, and thus there is no need to record Environmental Covenants prematurely.

Ecology Response to Comment 5:

The CAP indicates that institutional controls will be implemented when remediation levels are achieved. However, Ecology is concerned about the protectiveness of delaying institutional controls long-term, given the long restoration timeframes. Ecology may reevaluate this timeline at a future date.

Appendices

Appendix A. Public comments in original format

To Tamara Welty, Periodic Review Coordinator

Northwest Regional Office

Washington Department of Ecology **From** Teri A Floyd, Ph.D.

Retired Environmental Consultant

Bothell, Wa

Subject Periodic Review

Fox Ave Building

6900 Fox Ave S, Seattle, Wa 98108 Facility Site

ID: #2282

Dear Ms. Welty,

Please accept these comments on the Periodic Review dated December 2021 and the on-going cleanup of the Fox Avenue Site (Site) in the Duwamish Corridor in Seattle, Wa. I had the opportunity of working on the cleanup of this Site from the late 1990s until I retired in 2017. I am pleased to see that the on-going remedial action continues to perform as designed and to be on a path to meeting predicted restoration timeframes overall.

In the late 1990s, this Site was a heavily contaminated solvent site with tidal influences from the adjacent waterway and a groundwater plume that extended to 80-ft below ground. A number of source control actions had already been performed by then owner/operator Great Western Chemical and more would continue over the next several years. These actions would remove approximately 12,000 lbs of solvents from the source area but would have limited effect on the groundwater plume outside of the source area or at depth in the source area.

In 2003, Fox Avenue Building, LLC (Fox Ave LLC) acquired the Site from Great Western Chemical. Great Western Chemical had already filed for bankruptcy and was unable to proceed with the cleanup. This was a very critical decision by Fox Ave LLC to purchase a historically contaminated site that would require extensive cleanup. Without this decision, the site might remain a contaminated brownfield (orphaned) site to this day.

Over the next couple of years, Fox Ave LLC made significant facility improvements including the decommissioning of below ground tanks and pipes, movement of operations to above ground, and completion of a new Remedial Investigation and Feasibility Study combining lessons learned from the Great Western Chemical work and filling numerous data gaps. We worked closely with Ecology during this time evaluating new state-of-the-art technologies and assessing their compatibility with site conditions and operations.

This work resulted in Ecology issuing a new Cleanup Action Plan for the Site in June 2012. The new plan would use three technologies:

- Enhanced reductive dichlorination (ERD) for the downgradient plume.
- Soil vapor extraction (SVE) in source areas

- Thermal treatment, specifically, Electrical Resistance Heating (ERH), to treat soil and groundwater in the source area down to 80-ft below ground surface.

The first two components were well-established technologies that would be optimized by the consulting team's experience at this Site and other sites in the Duwamish Valley. The use of large-scale thermal treatment, however, was very new technology that had not been used at this scale in the Pacific Northwest. ERH, the thermal technique selected, acts to enhance the volatilization of solvents in the subsurface by passing an electrical current through the soil between subsurface electrodes throughout the treatment area. The electrical current heats the subsurface, and a vapor recovery and treatment system connected to a network of vapor recovery wells collects and treats the steam and solvent vapors generated by the ERH system.

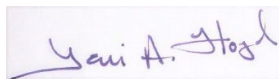
Thermal treatment system design, construction, and operation were completed by the TRS Group, Inc. (TRS), the vendor chosen by the Fox Avenue Trust to implement the thermal remedy.

The thermal remedy required installation of heating elements on a grid pattern throughout the facility and extensive support piping for vapor capture and electrical, installation of a new substation to supply the power, and significant disruption of the operating facility for close to a year. As I recall, the electrical bill alone was approximately \$500,000 for the five months of active treatment. Since this was new technology for the region, Ecology staff (Ching Pi Wand and Sunny Linn-Becker) worked closely with us throughout the remediation making visits to observe installation, operations, and monitoring. The thermal treatment was extremely effective, removing another approximately 12,000 lbs of chlorinated solvents and a similar amount of petroleum hydrocarbons. Calculations contained in the completion report indicated that approximately 98% of the contaminated source mass was removed.

Since the treatment of the source area in 2013, the remaining elements of the on-going cleanup are ERD injections to treat the downgradient plume and any rebound in the source area and monitoring. Current concentrations are orders of magnitude below historical values, and the source area is now meeting remediation levels at the conditional point of compliance along Fox Avenue. Monitoring and ERD injections are on-going and will continue to monitor the recovery of the downgradient plume and compliance with Site cleanup levels at the seeps into the Duwamish Waterway.

I continue to be very proud of the success of this cleanup action and very grateful to the Fox Ave Trust to fund an expensive cleanup of contamination that occurred before their time. Ecology's support, especially from Ching Pi Wang and Sunni Linn Becker, during the critical remediation years of 2008 to 2016 is also deeply appreciated and facilitated the use of the thermal treatment technology. It is satisfying to see the continued downgradient groundwater quality improvements that are occurring according to plan.

Thank you for the opportunity to comment on the Periodic Review of the Fox Avenue Site. Sincerely,



Teri A. Floyd, Ph.D.

Retired Environmental Consultant

From: noreply@smartcomment.com
To: jt@houlihan-law.com
Subject: Fox Ave Building Periodic Review comment
Date: Friday, February 25, 2022 2:01:48 PM

THIS EMAIL ORIGINATED FROM OUTSIDE THE WASHINGTON STATE EMAIL SYSTEM - Take caution not to open attachments or links unless you know the sender AND were expecting the attachment or the link

Thank you for your comments on the Fox Ave Building Periodic Review. Your comments have been received.

Name: John Cooke

Address: 100 N. 35th Street

City: Seattle

Province: Washington

Postal Code: 98103

Email: jt@houlihan-law.com

Fox Ave Building Periodic Review

Hello

I represent the owners of the Seattle Boiler Works property which has been impacted by the releases from the Fox Avenue Site. We continue to support Ecology's efforts to insure that cleanup levels are met at the Seattle Boiler Works property and surrounding areas. We request the Ecology continue to require sampling and, if necessary, further treatment of all impacted media until cleanup levels are achieved.

Thank you for considering these comments.