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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Southwest Region Office

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April 3, 2023

Keum Woo
6730 Troon Ln SE
Olympia, WA 98501
keumwoo@hotmail.com

Re: Opinion on Proposed Cleanup of the following Site:

- **Site Name:** Lacey Urban Center
- **Site Address:** 7131 - 7239 Martin Way E, Olympia, Thurston County, WA 98516
- **Facility/Site ID:** 67913
- **Cleanup Site ID:** 15414
- **VCP Project ID:** SW1745

Dear Keum Woo:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of the Lacey Urban Center facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the [Model Toxics Control Act \(MTCA\)](#),¹ [chapter 70A.305 Revised Code of Washington \(RCW\)](#).²

Issue Presented and Opinion

Ecology has determined that further remedial action is likely necessary to clean up contamination at the Site.

This opinion is dependent on the need to further evaluate the extent and magnitude of sub-slab tetrachloroethene (PCE) in sub-slab soil gas. As was presented in the prior Ecology opinion,³ further assessment of the sub-slab vapor should be accomplished via installation of a sub-slab monitoring network and pressure differential monitoring.

¹ <https://apps.ecology.wa.gov/publications/SummaryPages/9406.html>

² <https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305>

³ Ecology Opinion on Proposed Cleanup of Lacey Urban Center, September 14, 2021.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, chapter 70.105D RCW, and its implementing regulations, Washington Administrative Code (WAC) chapter 173-340 (collectively “substantive requirements of MTCA”). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following release:

- Tetrachloroethylene (PCE) into the soil, groundwater, and sub-slab soil vapor.
- Trichloroethylene (TCE) and vinyl chloride (VC) into sub-slab soil vapor.

The parcel(s) of real property associated with this Site are also located within the projected boundaries of the Asarco Tacoma Smelter Site (FSID: 89267963). At this time, we have no information that these parcel(s) are actually affected and as a result, this opinion does not apply to any contamination associated with the Asarco Tacoma Smelter Site facility.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. Envitechnology (Envitech), *Additional Phase II Subsurface Investigation, Lacey Urban Center, 7131-7269 Martin Way East, Olympia, Washington*, November 30, 2018.
2. Associated Environmental Group, LLC (AEG), *Remedial Investigation / Feasibility Study Report, Lacey Urban Center*, April 1, 2021.
3. AEG, *April 2021 Groundwater Sampling Results Report*, letter, addressed to Ms. Keum Woo, May 18, 2021.
4. AEG, *July 2021 Groundwater Sampling Results Report*, letter, addressed to Ms. Keum Woo, August 9, 2021.
5. AEG, *Lacey Urban Center Technical Memo – Vapor Mitigation System Installation 0301222*, addressed to Ms. Keum Woo, March 1, 2022.
6. AEG, *Vapor Assessment Report and NFA Request*, addressed to Ms. Keum Woo, November 8, 2022.

You can request these documents by filing a [records request](#).⁴ For help making a request, contact the Public Records Officer at publicrecordsofficer@ecy.wa.gov or call 360-407-6040. Before making a request, check whether the documents are available on [Ecology's Cleanup Site Search web page](#).⁵

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

The Site is located within Thurston County Tax Parcel 78801200000, a 4.66-acre lot improved with the Lacey Urban Shopping Center. A former dry cleaner operated from 1965 to 1997, in a slab-on-grade, single-story masonry building located in the western portion of the shopping center. The former dry cleaner space is now operated as Lacey Laundry, a coin-operated laundromat. Occupancy of the current multi-tenant shopping center has primarily been for retail, office, and service tenants, and have included a bank, barber shop, post office, donut shop, drapery shop, hair salon, drug store, restaurants, shoe repair, floral and gift shops, nail shops, bakery, dentist, and chiropractic center.

In July 2018, Envitech advanced 18 soil borings (B-1 through B-18) and collected 11 soil gas borings (SG1 through SG11) to determine whether a release had occurred from the former dry-cleaning operation. Soil samples were collected from each boring, soil gas samples were collected from ten borings (B-1 through B-8, B-10, and B-11), and groundwater was sampled from one boring (B-14) at about 26 feet below ground surface (bgs). Analytical results indicated the presence of PCE in soil and soil gas samples above MTCA Method A or Method B cleanup screening levels.

In July 2020, AEG advanced additional borings to complete the remedial investigation. Two borings (B-19 and B-20) were advanced inside the laundromat adjacent to borings B-3 and B-1, respectively, to define the vertical extent of PCE in soil. Borings B-21, B-22, and B-23, and monitoring well MW-1 were advanced on the south and southwest sides of the building to laterally define the extent of PCE in soil. Three soil gas borings (SG-1, SG-2, and SG-3) were advanced west of the former leach field to laterally define soil gas impacts in this area, and soil gas samples SG-4, SG-5, and SG-6 were collected from borings B-23, B-22, and B-21, respectively, on the south side of the building to laterally define soil gas impacts in this area.

Three monitoring wells (MW-1, MW-2, and MW-3) were installed to determine potential impacts to shallow groundwater. Groundwater was encountered at about 31 feet bgs, and the monitoring wells were screened from 25 to 35 feet bgs. All samples were submitted for analysis for PCE and daughter products. Laboratory results for all constituents analyzed in soil, groundwater, and soil gas samples were either non-detect or were detected below their respective MTCA Method A/B cleanup screening levels. In October 2020, AEG installed two deep monitoring wells (MW-4 and MW-5) to evaluate the potential

⁴ <https://ecology.wa.gov/About-us/Accountability-transparency/Public-records-requests>

⁵ <https://apps.ecology.wa.gov/gsp/Sitepage.aspx?csid=14894>

presence of dense non-aqueous phase liquid (DNAPL) that may not have been detected in shallow groundwater. Groundwater flow in the shallow groundwater unit was determined to be to the southwest, so the monitoring wells were installed on the south (MW-4) and west (MW-5) sides of the building. The well borings were advanced until a confining layer was encountered. A confining layer was encountered at about 75 to 80 feet bgs, and the monitoring wells were installed with 5 feet of screen. Soil samples collected and analyzed for PCE and daughter products were non-detect for all constituents.

In October 2020, AEG also completed a Tier II Vapor Assessment, which included sampling indoor air from two locations (Indoor-1 and Indoor-2), ambient air from one location outside and upwind (ambient), and sub-slab vapor from two locations (SS-1 and SS-2). The assessment was completed to determine if the PCE detected in the soil beneath the building is present and/or has the potential to migrate into the indoor air inside the Lacey Urban Center facility. Analytical results indicated PCE and daughter products were non-detect in the indoor and ambient air samples; however, PCE was detected above the MTCA Method B sub-slab screening level at both sampling locations (SS-1 and SS-2). All other daughter products were below the laboratory detection limits for each compound.

Concurrent with the installation of wells MW-1 through MW-3 in July 2020, AEG performed three rounds of groundwater monitoring at the site. Deep wells MW-4 and MW-5 were incorporated into the sampling during the January 2021 event. To date, neither PCE nor daughter products have been detected in the groundwater monitoring well network.

The aggregate RI/FS activities were summarized in AEG's Remedial Investigation and Feasibility Study report dated April 1, 2021. AEG proposed the following cleanup alternatives in their 2021 RI/FS:⁶

- Alternative 1: No Action
- Alternative 2: In-Situ Soil Treatment via Vapor Extraction.
- Alternative 3: Closure with Vapor Mitigation Installation and Environmental Covenant.

Based on the results of the Disproportionate Cost Analysis (DCA), Alternative 3 - Closure with Vapor Mitigation Installation and Environmental Covenant was proposed as the least costly and equally beneficial to Alternative 2. Sufficient information has been presented to Ecology for us to concur that the preferred remedial alternative is sufficient to meet the requirements of MTCA and is protective of human health and the environment.

On September 14, 2021, Ecology issued an opinion stating that upon completion of the proposed cleanup (installation of a vapor mitigation system and institutional controls memorialized by an environmental covenant), no further remedial action would likely be necessary to clean up contamination at the site. As part of the vapor mitigation system, Ecology recommended a network of sub-slab monitoring points should be installed so that differential pressure and sub-slab soil gas

⁶ AEG, *Remedial Investigation/Feasibility Study Report*, April 1, 2021.

concentrations can be measured over time to evaluate the effectiveness of the passive system and whether an active system would be needed. If an active system was determined to be needed, then these monitoring points could also be used to monitor its effectiveness. Indoor air concentrations would also need to be measured concurrently with sub-slab soil gas concentrations.

AEG subsequently submitted a technical memo on March 1, 2022, that summarized the vapor mitigation system installation activities conducted on December 8, 2021. The objective of the system was to mitigate potential vapor intrusion risk.

The vapor mitigation system was constructed as a sub-slab depressurization system (SSDS) and was located near the southwest corner of the building. It included the installation of two 2-inch-slotted, polyvinyl chloride, vapor mitigation points SSD-1 and SSD-2 to depths of 14 inches below the concrete floor within the laundromat. SSD-1 is located in southwest corner near boring B-11 while SSD-2 is located approximately 10 feet east of the former sub-slab vapor sample location SS-1. The point sumps were backfilled with clean pea gravel followed by a concrete seal and were located to i) provide a pressure differential (vacuum) using vertical collection points installed through the concrete floor and ii) connect the points to air conveyance piping via an outlet pipe on the building roof. The conveyance piping is connected to an in-line, weatherproof radial blower equipped with a condensation bypass, explosion-proof motor and control box with status display, and electrical power. The system exhaust stack terminates approximately 3 feet above the roof line.

AEG performed a follow-up round of indoor air sampling on October 12, 2022, to determine whether sub-slab vapor conditions had changed since the previous sampling rounds and confirm that PCE and its daughter products were still below MTCA cleanup levels. In addition, AEG also collected samples from the active SSDS at points SSD-1 and SSD-2. The sample analytical results indicated PCE in the indoor air sample at a concentration below the MTCA Method B cleanup level. PCE was also detected in both SSD-1 and SSD-2 system vapor samples at concentrations exceeding the Method B cancer sub-slab screening levels but below Method B sub-slab screening levels for commercial workers. All other constituents were non-detect.

Ecology has determined your characterization of the Site is sufficient to establish cleanup standards and select a cleanup action.

1. Characterization of the Site.

AEG has defined the Site for all media and demonstrated that all exposure pathways are incomplete except for air. The soil vapor and indoor air pathways were being mitigated using engineering controls in the form of the building slab and the active SSDS. Halogenated volatile organic compounds (HVOCs) are present in soil vapor beneath the building with PCE migrating to indoor air within the building but not at concentrations in excess of the cleanup level.

To evaluate what method of closure is most protective of the building occupant, Ecology needs additional sub-slab and indoor air data.

Summa Canister Quality Control

Indoor air sampling data collected both before (in 11/2019 and 10/2020) and after (in 3/2022 and 10/2022) installation of the SSDS in 2021 have not exhibited PCE above the respective MTCA Method B CULs for either indoor air (9.62 ug/m³) or the commercial worker receptor (44.9 ug/m³). Despite prior detections of TCE (in 8/2018 and 7/2020) and VC (in 7/2020) in sub-slab soil vapor below MTCA B CULs, no other HVOCs have been detected in indoor air to date.

However, based on sampling irregularities associated with indoor air samples collected during 2020 and 2022, Ecology does not concur with the conclusion that an incomplete pathway exists to receptors of concern by vapor intrusion (VI) from soil vapor. These irregularities include:

- 2020 summa canister samples SG-1, SG-2, SG-3, SG-4, and SS-2 were all returned to the laboratory with 0 inches of mercury (Hg). Sample Canisters for Indoor-1, Indoor-2, and Ambient were returned with negative (-)12 inches Hg.
- 2022 indoor air Summa canister initial pressure was 18 pounds per square inch (psi) and final pressure was 0 inches Hg.

Canister initial and final pressures are important indicators of sample period and flow rate. Specifically, when canisters are entirely voided (pressure is equal to or near ambient), the actual sample period is unknown^{7,8} and as such, it cannot be evaluated how long the sample was drawn at a constant rate. Specifically, due to normal pressure equilibration, the canister will draw air at a lower rate when vacuum is reduced below 5 inches Hg, which biases the data towards the beginning of the sample period. Canisters with final pressures greater than 10 inches Hg should also be noted as this suggests a greatly retarded sample draw with the sample flow rate likely not being representative of the desired sample period. Canisters with an initial vacuum of less than -25 inches

⁷ USEPA, *Compendium Method TO-15*, January 1999. Section 8.3.

⁸ ITRC, *Vapor Intrusion Pathway: A practical Guideline*, January 2007.

Hg should be avoided as this indicates potential leakage from the canister resulting in a potentially non-representative sample.⁹

Completion of the Vapor Intrusion Study

Based on the presence of 1,800 ug/m³ of PCE in the sub-slab vapor at boring B-3, Ecology concludes that this may be indicative of either PCE-impacted soil above the respective CUL or a potential undiscovered body of DNAPL. Given this potential and the presence of relatively impermeable silt/clayey silt deposits that occur as depicted on Figures 6, 7, and 8 of the AEG 2021 RI/FS Report¹⁰, it is reasonable that such deposits could contain such impacts. Ecology's prior opinion¹¹ discussed several components that should accompany the installation of either a passive (no blower) or an active (blower-initiated) vapor mitigation system at the site. These components included:

- Installation of a network of sub-slab monitoring points to measure differential pressure and sub-slab soil gas concentrations over time to evaluate and monitor the effectiveness of the system. Indoor air concentrations would also need to be measured concurrently with sub-slab soil gas concentrations.
- Differential pressures should be measured using a micro-manometer that is auto-zeroing and has a pressure differential sensitivity to 0.001 inches of water (such as a CLK-Zephyr II+ data logging micro-manometer). Differential pressures should be recorded using a data logger for at least 48 hours (preferably one week) prior to sampling to assess fluctuations (if any) of cross-slab differential pressure.

Only two active SSDS points SSD-1 and SSD-2 have been installed to date and connected to a blower to provide both depressurization and vapor extraction. However, as Ecology suggested, no surrounding sub-slab monitoring points were installed to assess subaerial sub-slab system coverage, performance, and effectiveness across the SSDS field. Further, no manometer data has been supplied to enable assessment of differential pressure fluctuations and operational effectiveness.

2. Establishment of Cleanup Standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA.

Cleanup Standards: Under MTCA, cleanup standards consist of three primary components; (a) points of compliance, (b) cleanup levels, and (c) applicable state and federal laws.

⁹ New Jersey Department of Environmental Protection, *Vapor Intrusion Technical Guidance*, May 2021. Appendix H.

¹⁰ Remedial Investigation/Feasibility Study Report – Lacey Urban Center; April 1, 2021; Associated Environmental Group, LLC

¹¹ Ecology Opinion on Proposed Cleanup of Lacey Urban Center, September 14, 2021

(a) Points of Compliance. Standard points of compliance listed below are being applied to the Site. Points of compliance are the specific locations at the Site where cleanup levels have been attained.

Media	Points of Compliance
Soil-Direct Contact	Based on human exposure via direct contact, the standard point of compliance is throughout the Site from ground surface to fifteen feet below the ground surface. ¹² <i>Standard met.</i>
Soil- Protection of Groundwater	Based on the protection of groundwater, the standard point of compliance is throughout the Site. ¹³ <i>Standard met via empirical demonstration.</i>
Soil-Protection of Plants, Animals, and Soil Biota	Based on ecological protection, the standard point of compliance is throughout the Site from ground surface to fifteen feet below the ground surface. ¹⁴ <i>Standard met by exemption.</i>
Groundwater	Based on the protection of groundwater quality, the standard point of compliance is throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site. ¹⁵ <i>Standard met with shallow and deep groundwater data to date.</i>
Air Quality	Based on the protection of air quality, the point of compliance is indoor and ambient air throughout the Site. ¹⁶ <i>Standard not met – require additional sampling information under proper sample collection protocols.</i>

The exposure pathways for the Site as Ecology currently understands them are:

Soil-Direct Contact: Ecology concurs that there is an incomplete pathway to receptors of concern by direct contact with subsurface soil. Subsurface soil remaining on the Site contains contaminants that are below the selected MTCA Method B CULs.

¹² WAC 173-340-740(6)(d)

¹³ WAC 173-340-747

¹⁴ WAC 173-340-7490(4)(b)

¹⁵ WAC 173-340-720(8)(b)

¹⁶ WAC 173-340-750(6)

Soil-Vapor: Ecology needs to review additional sub-slab data to better understand the current vapor intrusion risk and consider the unencumbered NFA request. Ensure canisters initial vacuum is greater than -25 inches Hg to begin sampling and no less than -5 inches Hg when sampling is completed.

Soil-Leaching to Groundwater/Groundwater: Ecology concurs that there are incomplete pathways of soil leaching to groundwater and to receptors of concern by groundwater. Shallow groundwater in wells MW-1 through MW-3 has not been impacted by PCE since October 2021 and then at levels less than both the MTCA Method B and Commercial Worker CULs. Deep wells MW-4 and MW-5 have not exhibited HVOC at or above the laboratory method reporting limits during sampling events conducted in January, April, and July 2021. Additionally, the area directly above the contaminated soil is covered by a building and most of the property is covered by buildings and asphalt. Ecology concurs the pathway is met by empirical demonstration.

Ecological: Ecology concurs that there is an incomplete pathway to ecological receptors of concern. No further evaluation is necessary under WAC 173-340-7492(2)(c), "no contaminant listed in MTCA Table 749-2 is, or will be present in the upper 15 feet at concentrations that exceed the values listed in the MTCA Table 749-2."¹⁷

(b) Cleanup Levels (CULs). CULs are the concentrations of a hazardous substance in soil, water, air, or sediment that are determined to be protective of human health and the environment.

At this site, MTCA Method A and B CULs are appropriate for the direct contact soil, sub-slab vapor, and indoor air exposure pathways. For air and of note, it has been demonstrated that the HVOCs present in soil vapor have not migrated into indoor air within the building at levels above the MTCA Method B CUL. Further, while groundwater is not a concern at this Site, the MTCA Method A and B CULs are included for reference. These cleanup levels are based on the most stringent values for each exposure pathway and are considered appropriate for the Site COCs. The proposed MTCA CULs for the Site COCs for the matrices of concern at the Site include:

¹⁷ WAC 173-340-900

Hazardous Substance	CAS #	Method A Soil (mg/kg)	Method A Groundwater (µg/l)	Method B Sub Slab Soil Gas (µg/m³)	Method B Indoor Air (µg/m³)
Tetrachloroethylene (PCE)	127-18-4	0.05	5	320	9.6*
Trichloroethylene (TCE)	79-01-6	0.03	5	11	0.33*
Cis-1,2-dichloroethene (cDCE)	156-59-2	160*	16*	NONE	NL
Trans-1,2-dichloroethene (tDCE)	156-60-5	1,600*	160*	610	18 (NL)
Vinyl chloride (VC)	75-01-4	0.67*	0.02	9.5	0.28*

mg/kg = milligrams per kilogram.

µg/m³ = micrograms per cubic meter.

NL = Not Listed; no cleanup/screening levels have been promulgated for these constituents. *Method B cleanup level (Method A cleanup level not established).

(c) Applicable Laws and Regulations. Applicable local, state, and federal laws were evaluated within the *AEG 2021 Remedial Investigation / Feasibility Study Report*. Ecology concurs that these requirements have been correctly identified and are legally applicable or relevant and appropriate.^{18,19}

3. Selection of Cleanup Action.

AEG proposed three cleanup alternatives and a Disproportionate Cost Analysis (DCA) in their 2021 RI/FS of which Alternative 3: Closure with Vapor Mitigation Installation and Environmental Covenant was selected. Sufficient information was presented to Ecology for us to concur that the preferred remedial alternative was/is sufficient to meet the requirements of MTCA and is protective of human health and the environment.

¹⁸ WAC 173-340-710(2)

¹⁹ Note – MTCA Method A includes ARARs and concentration-based tables (WAC 173-340-700(5)(a)) If MTCA Method A remains in use as proposed Site cleanup levels, identify non-concentration based technical and procedural requirements. If Method B or C cleanup levels are proposed, also include concentration-based requirements.

Limitations of the Opinion

1. Opinion Does Not Settle Liability with the State.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70A.305.040(4).

2. Opinion Does Not Constitute a Determination of Substantial Equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you performed is substantially equivalent. Courts make that determination. See RCW 70A.305.080 and WAC 173-340-545.

3. State is Immune from Liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. See RCW 70A.305D.180.

Contact Information

Thank you for choosing to clean up the Site under the Voluntary Cleanup Program (VCP). After you have addressed our concerns, you may request another review of your cleanup. Please do not hesitate to request additional services as your cleanup progresses. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our [Voluntary Cleanup Program web site](#).²⁰ If you have any questions about this opinion, please contact me at 360-407-6347 or nicholas.acklam@ecy.wa.gov.

Sincerely,



Joseph B. Hunt, LHG
Toxics Cleanup Program
Southwest Region Office

JBH:js

cc: Scott Rose, AEG, srose@aegwa.com
Ecology Site File

²⁰ <https://www.ecy.wa.gov/vcp>