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DEPARTMENT OF ECOLOGY
Southwest Region Office
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May 16, 2023

Brad Jackson
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Re: Further Action at the following Site:

- **Site Name:** Arco 05923 Masad Nicola
- **Site Address:** 116 US Hwy Chehalis, Lewis County, WA 98532
- **Facility/Site ID:** 97679498
- **Cleanup Site ID:** 11287
- **VCP Project ID:** SW1434

Dear Brad Jackson:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of the Arco 05923 Masad Nicola 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 necessary to clean up contamination at the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, chapter 70A.305 RCW, and its implementing regulations, Washington

[1] https://apps.ecology.wa.gov/publications/SummaryPages/9406.html
[2] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305

Administrative Code (WAC) chapter 173-340[3] (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 releases:

- Total petroleum hydrocarbons as gasoline range organics (TPH-G) into the soil.
- Total petroleum hydrocarbons as diesel range organics (TPH-D) into the soil and groundwater.
- Total petroleum hydrocarbons as oil range organics (TPH-O) into the soil and groundwater.
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) into the soil.
- Total lead into the soil and groundwater.
- Methyl tertiary-butyl ether (MTBE) into the groundwater.
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in the soil.

Basis for the Opinion

This opinion is based on the information contained in the documents listed in **Enclosure A**.

You can request these documents by filing a records request.[4] For help making a request, contact the Public Records Officer[5] or call 360-407-6040. Before making a request, check whether the documents are available on Ecology's Cleanup Site Search webpage.[6]

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

[3] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-340
[4] https://ecology.wa.gov/About-us/Accountability-transparency/Public-records-requests
[5] publicrecordsofficer@ecy.wa.gov
[6] https://apps.ecology.wa.gov/gsp/Sitepage.aspx?csid=11287

Analysis of the Cleanup

Ecology has concluded that **further remedial action** is necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. Characterization of the Site.

The Site is an active gas station with convenience store located at 116 US Highway 12 in Chehalis, WA, Lewis County Parcels 015092002003 and 015092002002. The Site is improved with three 10,000-gallon gasoline tanks and one 10,000-gallon diesel tank. In 1993, contaminated soil was discovered during an underground storage tank (UST) system and canopy upgrade, 1,156 yards of contaminated soil was removed for disposal.[7]

In 2009, the dispensers were upgraded to include under dispenser containment. Soil samples collected from beneath the dispensers indicated detectable or MTCA Method A screening level exceedances of lead, benzene, toluene, ethylbenzene, and total xylenes (BTEX), and total petroleum hydrocarbons as gasoline range organics (TPH-G). In 2010, three groundwater monitoring wells (AMW-1, AMW-2, and AMW-3) were installed to assess groundwater impacts at the Site. Four existing monitoring wells (MW-W, MW-X, MW-Y, and MW-Z) were also discovered. Total petroleum hydrocarbons as oil range organics (TPH-O) and total lead were detected at concentrations greater than the Method A screening Level at AMW-3 and AMW-1, respectively. Methyl-tertiary butyl ether (MTBE) was detected in groundwater from MW-W at concentrations greater than the Method A screening level.[8] In 2013, one additional soil boring was advanced west of the dispensers and one monitoring well was constructed (AMW-4) downgradient of MW-W to further evaluate groundwater.[9]

In 2018, four soil borings were advanced and three groundwater monitoring wells (AMW-5, AMW-6, and AMW-7) were constructed at the Site. Soil samples collected during soil boring advancement indicated TPH-O in excess of the Method A screening level. At two locations (AMW-7 and SB-3) polycyclic aromatic hydrocarbons (PAHs) also exceeded the Method A screening level. Total petroleum hydrocarbons as diesel range organics (TPH-D) were observed at concentrations exceeding the Method A screening level in groundwater collected from AMW-7.[10] Additional remedial investigation was conducted in 2021 which included three soil borings advanced via hand-auger, two soil borings advanced via hollow-stem auger, one monitoring well was decommissioned (HW-11), and a replacement monitoring well was constructed (HW-11R). One sample, SB-7 at 4 feet below ground surface (bgs), showed concentrations of carcinogenic polycyclic aromatic

[7] Emcon Northwest, Inc, *UST Decommissioning and Subsurface Assessment: ARCO facility 5923,* April 1, 1994.
[8] Delta, *Soil Sampling During Dispenser Upgrade Activities*, April 29, 2010.
[9] Antea, *Subsurface Investigation Report*, October 23, 2013.
[10] Arcadis, *Soil and Groundwater Investigation Summary and Semi-Annual Status Report,* October 15, 2019.

hydrocarbons (cPAHs) in exceedance of Method A cleanup levels. A toxic equivalent factor (TEF) was calculated for this sample and it did not exceed the Method A screening level.[11]

In October 2022, one soil boring was advanced, three groundwater monitoring wells (AMW-8, AMW-9, AMW-10) were constructed, and monitoring well MW-14 was decommissioned. Soil samples collected were analyzed for total petroleum hydrocarbons, BTEX, MTBE, PAHs, total organic carbon, total lead, and Resource Conservation and Recovery Act (RCRA) 8 metals. The calculated cPAH TEF for sample SB-12-3 exceeded the Method A screening level.[12] Contaminant detections in groundwater collected from AMW-8, AMW-9, and AMW-10 did not exceed the Method A screening levels.

The current groundwater monitoring well network is monitored semi-annually and includes AMW-1, AMW-2 AMW-3, AMW-4, AMW-5, AMW-6, AMW-7, AMW-8, AMW-9, AMW-10, HW-11R, MW-W, MW-X, MW-Y, and MW-Z.

Ecology provides the following comments on Site characterization.

a. Soil: Additional soil borings are needed to characterize soil at the Site sufficiently. Ecology recommends:

- One additional soil boring near TL1-3 to evaluate the southern extent of soil contamination between AMW-4 and AMW-6.
- Additional soil investigation south of AMW-7 to evaluate any soil impacts to the south of impacts observed at 6.5 feet.

b. Groundwater: Additional information is needed to adequately characterize the extent of groundwater contamination at the Site. Sufficient information has not been provided to evaluate the NWTPH-Dx analysis as two separate petroleum ranges. As such, Ecology has reviewed presented data as the sum of TPH-D and TPH-O concentrations. See Section 2 for additional information on cleanup levels. Ecology recommends additional groundwater investigation in the following areas:

- East of the UST nest and between AMW-1 and AMW-3. Given the contaminant concentrations found in AMW-3, further groundwater investigation to the east is needed.

[11] Antea, Subsurface Investigation Report, November 23, 2021.
[12] Antea, Subsurface Investigation Report, December 19, 2022.

- With the cleanup area extents shown by Antea in Figure 5 of the Report, AMW-8 and AMW-9 should also be monitored to sufficiently delineate the extent of groundwater contamination.

- Northwest of AMW-7 to evaluate the extent of the southwest lobe of groundwater contamination.

- Ecology needs to review additional groundwater data south of AMW-9. Methyl tertiary-butyl ether (MTBE) has been historically detected at concentrations exceeding the Method A screening level at MW-W, and at concentrations less than the Method A Screening level at AMW-4, HW-11, HW-11R, AMW-9, and MW-14. Given the highly mobile nature of MTBE, expanded investigation downgradient of AMW-9 is needed.

  Future analysis of tertiary butyl alcohol (TBA) may provide additional line of evidence that MTBE is naturally attenuating. Ecology recommends analyzing groundwater for TBA as it is a primary metabolite of MTBE.

c. Monitoring Well Construction: Clarification of monitoring well construction rationale and aquifer characteristics is needed.

Ecology has reviewed monitoring well construction logs[13], Site lithology, and groundwater level gauging data. Ecology observes monitoring well screen length employed at the site vary between 25 feet long to the most recently installed well screens limited to 10 feet. However, well screen lengths depicted in cross section appear to be limited to 10 feet and water level depicted well above the top of screen. After reviewing Table 3 and comparing approximate top of screen elevations to water level elevations, the screens appear to straddle the water table as is typically recommended. However, the extended screen lengths appear to enable water table straddling.

Due to the extended screen lengths Ecology has the following questions:

[13] Delta, *Subsurface Investigation Report*, December 29, 2010. Appendix B; Antea, *Subsurface Investigation Report,* October 23, 2013. Appendix B; *Arcadis, Soil and Groundwater Investigation Summary and Semi-Annual Status Report,* October 15, 2019. Attachment A; *Antea, Subsurface Investigation Report*, November 23, 2021. Appendix B; Antea, *Subsurface Investigation Report*, December 19, 2022. Appendix B.

- Provided pump intake depths, assumed specific gravity of Site contaminants, and extended screen lengths, are groundwater samples adequately characterizing the dissolved phase plume?

- If available, please provide observed construction detail collected during the June 3, 2013, down-well camera investigation of MW-W, MW-X, MW-Y, and MW-Z.[14] Specifically, Ecology believes the screened interval of these wells may be important to evaluate contaminant distribution in groundwater.

- Correct the perceived mis-scaled depiction of well screen length on cross sections.[15] Currently all screen lengths appear as though they are all 10 feet long and the observed average water level is well above the top of screen.

d. Preferential Pathways: It is unclear from the documentation provided if the storm drain drop inlet located west of AMW-4 has been investigated as a conduit of contamination. Information about this conveyance, such as where it outlets and analysis of the effluent may provide additional information on the distribution on contamination at the Site. Specifically, Ecology is concerned about the discontinuous Method A screening level exceedance at AMW-7 relative to the low to non-detectable concentrations of petroleum at AMW-4 and SB-12, which may indicate the storm sewer is leaking into the ground near or upgradient from MW-7

e. Wetland Delineation: As provided in Ecology's April 23, 2019, opinion letter, the wetland has been identified and mapped south of the Site.[16] Ecology suggests having the wetland delineated to ensure all pathways are accounted for. Please identify the delineated wetland on Site figures.

f. Conceptual Site Model: As requested in Ecology's April 23, 2019, opinion letter[21], please include a Conceptual Site Model (CSM) of the Site with the next opinion request. Delineation of the wetland should be completed prior to compiling the CSM.

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[14] Antea, *Subsurface Investigation Report*, October 23, 2013. Section 1.3.6.
[15] Antea, *Subsurface Investigation Report*, December 19, 2022. Figures 6 and 7.
[16] Ecology, *Further Action at the Following Site: ARCO 5923*, April 23, 2019. Section 1.d.
[21] Ecology, *Further Action at the Following Site: ARCO 5923*, April 23, 2019. Section 1.e.
[22] WAC-170-340-7490 "Simplified terrestrial ecological evaluation procedures."
[23] Ecology, *Determining Compliance with Method A Cleanup Levels for Diesel and Heavy Oil*, June 17, 2004.
[24] WAC 173-340-200 "Point of Compliance."
[25] WAC 173-340-200 "Cleanup level."
[26] WAC 173-340-200 "Applicable state and federal laws," WAC 173-340-700(3)(c).

g. Terrestrial Ecological Evaluation: A Site-specific Terrestrial Ecological Evaluation (TEE) is required[22] and has not been reviewed. Please complete a TEE after the wetland to the South has been physically delineated and Site contaminant disposition can be evaluated relative to the wetland.

2. Establishment of cleanup standards.

Reporting of heavy oil and diesel range hydrocarbons has thus far been done separately but it is not clear that this is appropriate. If you wish to evaluate TPH-D and TPH-O as separate contaminants, then you must provide chromatograms for each sample, product standards (that the lab used to identify the product), and the method blanks. These chromatograms will be used to determine if the reporting of separate values for these hydrocarbons is appropriate. Please review Implementation Memorandum Number #4[23] for further information regarding cleanup levels for TPH-D and TPH-O.

Ecology has determined the cleanup levels and points of compliance you established for the Site do not meet the substantive requirements of MTCA.

Cleanup Standards: Under MTCA, cleanup standards consist of three primary components; points of compliance,[24] cleanup levels,[25] and applicable state and federal laws.[26] Ecology will need you to propose specific:

- Applicable local, state, and federal laws.
- Points of compliance.
- Cleanup screening levels used for all hazardous substances detected at all points of compliance.
- Appropriate cleanup levels for all hazardous substances that exceeded cleanup screening levels.

Ecology suggests providing tables detailing the specific proposed cleanup standards.

Points of Compliance. Points of compliance, that you need to propose, are the specific locations at the Site where cleanup levels must be attained. For clarity, Ecology provides the following table of standard points of compliance:

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. *WAC 173-340-740 (6)(d)*
Soil- Protection of Groundwater	Based on the protection of groundwater, the standard point of compliance is throughout the Site. *WAC 173-340-747*
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. *WAC 173-340-7490(4)(b)*
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. *WAC 173-340-720(8)(b)*
Groundwater-Surface Water Protection	Based on the protection of surface water, the standard point of compliance is all locations where hazardous substances are released to surface water. *WAC 173-340-730(6)*
Air Quality	Based on the protection of air quality, the point of compliance is indoor and ambient air throughout the Site. *WAC 173-340-750(6)*
Sediment	Based on the protection of sediment quality, compliance with the requirements of 173-204 WAC. *WAC 173-340-760*

Cleanup Levels. Cleanup levels 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 unrestricted cleanup screening levels were used to evaluate contamination detected at the Site. MTCA Method A cleanup levels may be appropriate for the releases, depending on the results of the needed terrestrial ecological evaluation and the completion of the remedial investigation.

Applicable Laws and Regulations. In addition to establishing minimum requirements for cleanup standards, applicable local, state, and federal laws may also impose certain technical and procedural requirements for performing cleanup actions. These requirements are described in WAC 173-340-710. An online tool[27] is currently available to help you evaluate the local requirements that may be necessary.

All cleanup actions conducted under MTCA shall comply with applicable state and federal laws.[28] The person conducting a cleanup action shall identify all applicable local, state, and federal laws. The department shall make the final interpretation on whether these requirements have been correctly identified and are legally applicable or relevant and appropriate.[29]

There are three general groups of applicable local, state, and federal laws that need to be included:

1. **Chemical-Specific:** Examples of chemical-specific laws include promulgated concentrations from another rule that result in adjusting proposed cleanup levels. Method A is inclusive of these laws. For Methods B or C, additional evaluation of chemical-specific applicable state and federal laws is required.

2. **Action-Specific:** Examples of action-specific laws include requirements for obtaining local permits to excavate and/or dispose of contaminated soil, stormwater construction permits, or the requirement to notify local law enforcement in case human remains are discovered during excavation. All MTCA cleanups require evaluation of action-specific applicable state and federal laws.

3. **Location-Specific:** Examples of location-specific laws include specific requirements for working near wetlands or archeologically important areas. All MTCA cleanups require evaluation of location-specific applicable state and federal laws.

After you have identified appropriate applicable local, state, and federal laws, report to Ecology the applicable local, state, and federal laws applicable to this cleanup, and how those laws and regulations specifically effect the proposed cleanup.

3. Selection of cleanup action.

An independent interim action was conducted in 1993 to excavate petroleum contaminated soils associated with the former underground storage tanks located at the Site. Additional remedial investigation and reporting is necessary at the Site before selecting a cleanup action.

Cleanup actions at the Site to date have included removal of three USTs, associated piping, and dispensers. Approximately 1,115 cubic yards of soil was excavated and transported off Site for disposal. However, residual soil contamination remains at the Site. Several soil samples collected from the Site exceed soil screening levels and have not been addressed. In addition, groundwater samples analyzed for TPH-Dx from Site monitoring wells have exceeded groundwater screening levels.

At this time Ecology has not reviewed a feasibility study (FS) or disproportionate cost analysis (DCA). Despite this, the identified remedial alternative is natural attenuation.

Ecology recommends completing the remedial investigation and completing a FS/DCA to ensure the selected remedy achieves the requirements of WAC 173-340-360.

Ecology has reviewed available field data sheets with primary natural attenuation indicator parameters (pH, conductivity, oxidation-reduction potential, dissolved oxygen). To support the use or evaluate the magnitude of natural attenuation, please consider adding secondary geochemical indicator substances: sulfate, nitrate, ferrous iron, manganese, methane, and alkalinity.[31]

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(8) 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.305.170(6).

[31] Ecology, *Guidance on Remediation of Petroleum-Contaminated Ground Water By Natural Attenuation*, July, 2005. Chapter 4.1.1.

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 webpage.[32] If you have any questions about this opinion, please contact me at 564-669-4866 or thomas.praisewater@ecy.wa.gov.

Sincerely,

Thomas Praisewater
Toxics Cleanup Program
Southwest Region Office

TP:js

Enclosure(s): A – Basic for Opinion: List of Documents

cc by email: Wade Melton, BP remediation Management Services Company, wade.melton@bp.com
Jerome Lambiotte, Ecology, jerome.lambiotte@ecy.wa.gov
Ecology Site File

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Enclosure A

Basis for the Opinion: List of Documents

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List of Documents

1. Antea Group, *Subsurface Investigation Report*, December 19, 2022.
2. Antea Group, *Semi-Annual Status Report, Second Half 2022*, December 12, 2022.
3. Antea Group, *Semi-Annual Status Report, First Half 2022*, July 5, 2022.
4. Antea Group, *Semi-Annual Status Report, Second Half 2021*, January 26, 2022.
5. Antea Group, *Subsurface Investigation Report*, November 23, 2021.
6. Antea Group, *Semi-Annual Status Report, First Half 2021*, July 9, 2021.
7. Antea Group, *Semi-Annual Status Report, Second Half 2020*, October 20, 2020.
8. Antea Group, *Semi-Annual Status Report, First Half 2020*, August 18, 2020.
9. Arcadis U.S., Inc. (Arcadis), *Semi-Annual Status Report, First Half 2019*, October 15, 2019.
10. Arcadis U.S., Inc. (Arcadis), *Semi-Annual Status Report, Second Half 2018*, February 21, 2019.
11. Arcadis, *Semi-Annual Status Report, First Half 2018*, November 15, 2018.
12. Arcadis, *Soil and Groundwater Investigation Work Plan*, November 2, 2018.
13. Arcadis, *Semi-Annual Status Report, Second Half 2017*, May 16, 2018.
14. Arcadis, *Quarterly Status Report, Second Quarter 2017*, November 8, 2017.
15. Antea Group (Antea), *Semi-Annual Groundwater Monitoring Report, Second Half of 2016*, March 21, 2017.
16. Ecology, *Response to Request for Clarification*, May 24, 2016.
17. Antea, *Request for Clarification RE: Further Action Letter*, March 25, 2016.
18. Ecology, *Re: Further Action at the ARCO 5923 Site*, January 2016.
19. Antea, *Response to Partial Sufficiency and Further Action Letter*, October 2, 2015.
20. Antea, *Semi-Annual Groundwater Monitoring Report*, February 12, 2015.
21. Antea, *Voluntary Cleanup Program Application*, October 10, 2014.
22. Antea, *Semi-Annual Groundwater Monitoring Report*, December 19, 2013.

23. Antea, *Subsurface Investigation Report*, October, 2013.

24. Delta Consultants (Delta), *Subsurface Investigation Report*, December 29, 2010.

25. Delta, *Soil Sampling During Dispenser Island Upgrade Activities*, April 29, 2010.

26. Emcon Northwest, Inc., *UST Decommissioning and Subsurface Assessment*, April 1, 1994.

27. Environmental Associates, Inc., *Preliminary Hydrocarbon Evaluation*, May 13, 1993.