IEc

MEMORANDUM | March 27, 2025

TO	Wes Thomas and David Lacey, Oregon Department of Environmental Quality (DEQ)
FROM	Peter Shanahan, HydroAnalysis LLC (HALLC); Jennifer Hart and Gail Fricano, Industrial Economics, Inc. (IEc)
SUBJECT	Five Tribe review of "Revised Deep Lower Alluvium WBZ Source Control Evaluation," dated February 28, 2025

This memorandum, submitted on behalf of the Five Tribes,[1] reviews the *Revised Deep Lower Alluvium WBZ Source Control Evaluation* (revised SCE) prepared by Anchor QEA; Ede Environmental, LLC; and Sevenson Environmental Services, Inc. on behalf of NW Natural (Anchor QEA et al. 2024). Two prior versions of this report (Anchor QEA 2022, 2023) were provided for the Five Tribes' review as attachments or appendices to other documents.

General Comments

1. The revised SCE continues to assert that source control is not necessary for the Deep Lower Alluvium Water-Bearing Zone (WBZ) based on the assumption that the contamination detected in the Deep Lower Alluvium WBZ is the result of cross-contamination introduced during drilling, and that it is not contamination that migrated from upper layers with flowing groundwater. Following our review of the 2022 version of this SCE (Anchor QEA 2022), we offered the following comment (IEc 2022, Comment #7), which we maintain is still relevant:

   > "Page 9 of Appendix A [from Anchor QEA 2022] makes the argument that the contamination detected in the Deep Lower Alluvium WBZ is the result of cross-contamination introduced during drilling and not contamination that migrated from upper layers with flowing groundwater. Experience at other sites indicates that this is certainly possible; however, the data do not sufficiently support that conclusion at this site. For this reason, we do not believe the following statement on page 5 of the main text is supported: "This evaluation demonstrates that groundwater in the Deep Lower Alluvium WBZ does not represent a current or potential future risk to the river, confirming that source controls are not necessary for that WBZ" (Anchor QEA 2022, page 5).
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   > We recommend that NW Natural install a "clean" monitoring well to confirm their theory that the Deep Lower Alluvium WBZ is not contaminated other than by localized cross-contamination at monitoring wells. Such an installation would entail using telescoping casing in which a larger

[1] The five tribes are the Confederated Tribes of the Grand Ronde Community of Oregon, the Nez Perce Tribe, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Warm Springs Reservation of Oregon.

diameter borehole is drilled through the zone of contaminated soil and then casing is installed and carefully grouted to seal the borehole. This is then followed by drilling a smaller diameter borehole through the grout seal and advancing to the next horizon, to which a smaller diameter casing is installed and carefully grouted. This process is repeated with increasingly smaller diameter casings until the final casing and well screen are installed in the Deep Lower Alluvium WBZ. By carefully sealing each horizon along the way, a monitoring well free of contamination could be installed and sampled to determine if there is mobile groundwater contamination in the Deep Lower Alluvium WBZ."

Based on review of the DEQ comment set (DEQ 2022), it is unclear whether our comment above was provided to NW Natural. We continue to find the contention that the contamination detected in the Deep Lower Alluvium WBZ is the result of cross-contamination less than fully convincing. While we still recommend that a "clean" monitoring well be installed, we recommend at minimum that the available data be more fully exercised to support the contention of cross-contamination. Specifically, we recommend the following:

1.1. That conditions encountered during the installation of each monitoring well be discussed and supported by appended well logs.

1.2. That the drilling and installation be described more fully. Was a single continuous borehole drilled at each well? What measures, if any, were taken to prevent cross-contamination during drilling? The potential for drilling to cause cross-contamination at dense non-aqueous phase liquid (DNAPL) sites was well known at the time the Deep Lower Alluvium WBZ wells were drilled—see for example Pankow and Cherry (1996, pages 423-425). It is hard to believe that measures were not taken in the field to prevent cross-contamination.

1.3. That the correlations between the level of contamination at each Deep Lower Alluvium monitoring well and the prevalence of DNAPL in the overlying layers be evaluated. The revised SCE (Anchor QEA 2025, page 4) points to well RP-11-160 as a well that was not drilled through overlying DNAPL and thus not cross-contaminated. This sort of correlation should extend on a gradation to other wells also. We note that naphthalene is regularly detected in well WS-12-161 despite well logs showing shallow soil contamination very similar to that at RP-11-160.

1.4. That the concentrations of polynuclear aromatic hydrocarbons (PAHs) in the contaminated wells be demonstrated to have decreased over time. Section 5.6 states that "Concentrations of PAHs in groundwater samples collected from these six wells are expected to continue to decrease gradually over time." It would add weight to the theory that PAHs are present due to cross-contamination if it was demonstrated that concentrations of PAHs in groundwater samples have decreased over time, for example by showing plots of concentration versus time. We note that the highest concentrations of PAHs at MW-19-180 were found in the most recent sample taken at this well (9/19/2022, Table 3-1), suggesting that the hypothesized decrease over time may not be occurring.

1.5. That vertical patterns of groundwater quality be shown to support the contention that contaminants in the Deep Lower Alluvium WBZ were carried by cross-contamination from overlying units. In at least some instances, the Deep Lower Alluvium WBZ is screened over 100 feet below shallow DNAPL, an implausibly long distance to carry cross-contamination. However,

wells with shallower screens are typically co-located with the Deep Lower Alluvium well. In those instances, shallower wells should also show evidence of cross-contamination.

Specific Comments

2. Section 2.3 states "These relatively soluble compounds [benzene and naphthalene] have already been depleted at the subject well locations due to preferential dissolution from DNAPL or desorption from soil and degradation in the aqueous phase." The data in Table 3-1 do not appear to support this statement. In particular, naphthalene is present at low but fluctuating levels in several wells, but without a clear downward trend that would be consistent with "preferential dissolution…or desorption…"

3. Section 5.6 provides estimates of travel times without citing a source. We recommend that a more complete explanation of (unretarded) groundwater travel times be provided along with cited sources.

4. Sections 5.5 and 5.6 make reference to "average offshore groundwater." We recommend this term and the derivation of its value be described in detail.

References

Anchor QEA. 2022. NW Natural Gasco Site, Source Control Addendum Report, Prepared for NW Natural. November 10.

Anchor QEA. 2023. Revised Source Control Addendum Report, Prepared for NW Natural. November 2.

Anchor QEA. 2025. Revised Deep Lower Alluvium WBZ Source Control Evaluation, Prepared for NW Natural. February 28.

Industrial Economics, Inc. (IEc). 2022. Five Tribe review of "NW Natural Gasco Site Source Control Addendum Report," dated November 10, 2022. Memorandum from Peter Shanahan, Jennifer Hart, and Gail Fricano, IEc, to Wes Thomas and David Lacey, DEQ. December 9.

Oregon Department of Environmental Quality (DEQ). 2022 Re: DEQ Comments on the Source Control Addendum Report, Former Gasco Manufactured Gas Plant Operable Unit, Portland, Oregon, ECSI# 84, ECSI# 183. Letter from Wesley A. Thomas, Project Manager, NWR Cleanup Section, DEQ to Bob Wyatt, NW Natural. December 23.

Pankow, J. F., and J. A. Cherry. 1996. *Dense chlorinated solvents and other DNAPLs in groundwater.* Waterloo Press, Portland, Oregon.