IEc

MEMORANDUM | June 24, 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 "Interim Removal Action Measure Basis of Design Report" for the Gasco upland site, dated May 9, 2025

This memorandum, submitted on behalf of the Five Tribes,[1] reviews the draft *Interim Removal Action Measure Basis of Design Report* (IRAM BODR) for the Gasco upland site prepared by Anchor QEA, Sevenson Environmental Services, Inc., and Ede Environmental on behalf of NW Natural (Anchor QEA et al. 2025).

General Comments

1. Overall, the IRAM BODR meets the report's stated objectives. We do not have concerns with the conceptual design for the IRAM or the anticipated construction methods; we do, however, have several specific technical comments and recommendations for clarity provided below.

Specific Comments

2. Section 5.1.3.2.1, *Work Platform Location and Elevation - Method of Analysis*, discusses the construction of the work platform in the vicinity to the Centerline tank farm, including an oblique reference to the tank farm potentially not being present at the time of construction. We recommend that the report clarify whether or not there are plans to close down the tank farm. If plans are uncertain, we recommend that the future status of the tank farm be identified as a data gap.

3. Section 5.1.3.3.1, *Potential Future Breaching of Lateral and Vertical Boundaries – Method of Analysis*, describes construction of permeable gates in the event the barrier wall will eventually be breached. The gates are proposed to be excavated using a guar slurry to stabilize the excavation, with the plan that the guar will eventually degrade and leave a permeable gate for groundwater passage. We recommend that the report cite examples in which this technology has been used in the past and provide an estimate of the time for the guar to biodegrade.

4. There appear to be some inconsistencies in the discussion of subsurface debris. Section 5.1.3.5, *Construction Methods and Equipment*, indicates that the cutter wheel will simply grind through

[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.

debris with no mention of waste. In contrast, Section 5.1.3.7, *Waste Materials Management*, indicates that subsurface debris will be removed as a waste material. Section 6.3, *IRAM Barrier Wall and Nearshore Upland ISS [in situ stabilization and solidification] Area of Interest*, seems to defer decisions on large debris to the construction quality assurance plan. We presume that depending on the circumstances, either removal or grinding may be used. In any case, we recommend the report reconcile these potential inconsistencies.

5. With respect to grinding through debris, Section 5.1.3.5, *Construction Methods and Equipment*, includes wood logs among the types of debris. Shredded wood would seem to be an adverse addition to the ISS mix. We recommend the report specify whether there will be any testing or otherwise special consideration given to the types of debris that may remain.

6. Section 5.1.3.10.1, *Potential Implementation Risks – Method of Analysis*, lists a multitude of potential implementation risks, but offers an incomplete description of the methods to mitigate these risks. We recommend that the full list of implementation risks be addressed, even if only briefly.

7. Section 5.1.3.11.1, *Integration with the Final Remedy – Method of Analysis*, provides a list of evaluations to be performed with respect to integration of the IRAM with the final upland remedy. It is unclear what "ISS tie-ins to existing IRAM ISS areas" means. We recommend the report provide a more complete explanation for these "tie-ins."

8. Section 5.3.3.1.2, *Revised Groundwater HC&C [hydraulic control and containment] System – Design Elements –Extraction Wells vs Trenches in the Fill WBZ [water-bearing zone] – Data Requirements and Data Gaps*, discusses consideration of past experience with wells and trenches at the Gasco operational unit (OU) when evaluating future actions. We also recommend considering past experience at other sites, particularly within Portland Harbor, including the former Arkema facility, which is nearby, has similar geology, and has used similar technologies.

9. Section 5.3.3.2.1, *Extraction Well/Trench Locations – Methods of Analysis*, indicates that hydraulic control of groundwater can be achieved with only about half the groundwater extraction rate of the current HC&C system, a puzzling finding. We recommend that the report reiterate the reasons for this finding as given by Anchor QEA (2024a, Section 5.3).

10. Section 5.3.3.8.1, *Geotechnical Analysis – Method of Analysis*, states "The first step in the analysis will be to evaluate the maximum consolidation settlement induced by historical groundwater level fluctuations." We recommend providing more information; specifically, will this be a comparison with past ground-surface elevation measurements so as to measure actual subsidence, or a theoretical exercise to estimate past subsidence?

11. We support the relatively rapid schedule for the preliminary design deliverables laid out in Table 7-1, and we recommend that it also include an estimate for the start of construction.

12. Appendix C is a work plan for installing additional wells in Segment 3, but neither Section 3.3 of the main report nor Appendix C provides an explanation for the particular horizontal locations chosen and how the new locations relate to and will supplement existing wells. We recommend a brief discussion of these considerations.

13. Appendix D, Section 2.2, *Treatability Study Soil Sampling Locations*, describes the zones targeted for soil sample collection and indicates that "oil" is being targeted at borings ISSUTS-003, -004, and -005. The term "oil" (rather than "dense nonaqueous phase liquid" or "DNAPL") is inconsistent with the terminology used in other Gasco reports and in Table D-1. We recommend using the term "DNAPL" to avoid the impression that a different manufactured gas plant waste (MGP) is being targeted.

14. Figure D-3 shows six samples, but Appendix D, Section 2.2, *Treatability Study Sampling Locations*, indicates that three sampling intervals are targeted at each location, resulting in 18 samples. We recommend that Figure D-3 be modified to be consistent with the text.

15. We recommend that Appendix D, Section 3.5, *Phase II – Grout Dosage Testing*, provide additional detail on the criteria that will be used to select the six (out of 18) samples for Phase II testing.

16. Appendix D, Section 3.6.1, *Phase III Leachability Testing*, includes benzene and naphthalene but not the broader set of polynuclear aromatic hydrocarbons (PAHs) in the subset of contaminants of concern (COCs) to be tested for leachability. We recommend that the report describe the rationale for and sufficiency of this limited subset of MGP-associated compounds in assessing leachability.

17. Appendix E, Section 2.2, *Geotechnical Investigation*, indicates that the weathering profile of the top of bedrock will be assessed through geotechnical borings and that the information is "…critical for understanding installation equipment requirements and potential challenges during ISS barrier wall installation." Section 5.1.3.8 of the main report does not discuss this particular data requirement, and Section 5.1.3.8.2 is particularly lacking in detail. Please clarify the intent of assessing the bedrock weathering profile and whether it pertains to the ability to provide a tight seal at the interface between the ISS wall and the bedrock surface.

Editorial Comments

18. Section 5.1.3.2.1 makes reference to "…building out of a section of the alignment between the Centerline tank farm and the current top of bank…" As inferred from Figure 2-4a, this apparently refers to the placement of fill in the river to create a work platform on the river side of the HC&C System Corridor where the presence of the Centerline tank farm leaves inadequate space on the land side of the Corridor. We recommend that the text provide a more complete description than "building out."

19. A footnote to Section 5.1.3.4.2 states: "The results from the Gasco sediment ISS TS [treatability study] for Phase I (grout composition evaluation; Anchor QEA 2023) are being applied to the upland ISS TS due to the similarity in riverbank and upland material…" The footnote seems to imply the sediment TS has already been completed. The Preliminary Design Report for the sediment remedy (Anchor QEA, 2024b) similarly indicates portions of the TS have been completed. In neither case is a report on the results cited (the results are not provided by the cited reference Anchor QEA 2023). We recommend that a proper citation be included or, if the study has not yet been reported, an "in preparation" report be cited.

20. Figure 2-4b. We recommend that the Nearshore Upland ISS Area of Interest be labeled in the figure.

References

Anchor QEA. 2023. Final In Situ Stabilization and Solidification Bench Scale Treatability Study Work Plan. Gasco Sediments Cleanup Action. Prepared for U.S. Environmental Protection Agency, Region 10. Prepared on behalf of NW Natural. Anchor QEA, Portland, Oregon. November 30.

Anchor QEA. 2024a. Site-Wide Groundwater Flow Model Update and Feasibility Study Simulations. Gasco OU. Prepared for NW Natural. Anchor QEA, Portland, Oregon. December 16.

Anchor QEA. 2024b. Sediment Remedy Preliminary Design Report. Gasco Sediments Project Area. Prepared for U.S. Environmental Protection Agency, Region 10. Prepared on behalf of NW Natural. Anchor QEA, Portland, Oregon. September 6.

Anchor QEA, Sevenson Environmental Services, Inc., and Ede Environmental. 2025. Interim Removal Action Measure Basis of Design Report, Prepared for NW Natural. Anchor QEA, Portland, Oregon; Ede Environmental, LLC, Portland, Oregon; and Sevenson Environmental Services, Inc., Niagara Falls, New York. May 9.