EPA Comments on In Situ Stabilization and Solidification Laboratory Pilot Study Work Plan, Gasco Sediments Site Dated October 31, 2022

Comments dated January 18, 2023

The following are the U.S. Environmental Protection Agency's (EPA's) comments on the In Situ Stabilization and Solidification Laboratory Pilot Study Work Plan (ISSLPS Work Plan), prepared by Anchor QEA, LLC (Anchor) on behalf of NW Natural and dated October 31, 2022. The ISSLPS Work Plan has been prepared under the Administrative Settlement Agreement and Order on Consent (ASAOC; Docket No. CERCLA 10-2009-0255) and Statement of Work – Gasco Sediments Site (EPA 2009).

General Comments on ISSLPS WP:

1. **ISS as a Record of Decision (ROD) technology:** While EPA agrees that ISS is a remedial technology that is included in the ROD's selected remedy, the work plan and/or future design deliverables should clearly discuss the conditions under which ISS was retained in the Feasibility Study (FS) and included in the selected remedy (e.g., for areas where access and slope stability issues exist, and for principal threat waste (PTW) underneath and around pilings, docks, berthing or mooring dolphins, and other structures servicing active wharfs or shore-based facilities that remain intact). ISS was specifically retained as a technology for use in areas with PTW and where groundwater is affecting porewater, which EPA recognizes are significant issues at the Gasco Project Area.

2. **Consistency of the ISSLPS Work Plan with the Preferred Alternatives Report (PAR):** Any EPA comments (dated December 5, 2022) on the October 31, 2022 PAR relevant to the ISSLPS Work Plan should also be addressed in the ISSLPS Work Plan.

3. **Considerations for Sample Location Selection:** NW Natural should consider the following and reassess whether the number and location of proposed sediment sample locations are adequate:

   a. Sampling of sediment containing higher concentrations of benzene and chlorinated volatile organic compounds should be considered in order to evaluate long-term leachability of these contaminants from treated sediments and potentially inform design of a cap, if needed. Sediment known to contain higher concentrations of metals which are expected to be impacted by changes in pH should also be sampled to evaluate construction-related impacts to surface water and porewater quality.

   b. Sampling of sediment containing concentrations of naphthalene above PTW-not reliably contained (PTW-NRC) thresholds should be considered to evaluate long-term leachability of these contaminants from treated sediments and potentially inform cap design, if needed.

   c. Sampling of sediment containing non-mobile tar deposits since other forms of substantial product (i.e., residual dense nonaqueous phase liquid (DNAPL) and tar) also represent sources of highly concentrated contamination with the potential to contribute to long-term leaching.

4. **ISS performance in the field:** In addition to the performance targets discussed in the ISSLPS Work Plan, the scope of the ISSLPS or the field pilot study work plan should include consideration of other testing criteria based on the implementability of ISS at full-scale. EPA recommends including

additional discussion in the ISSLPS Work Plan or a future design deliverable regarding parameters that represent technology-specific or site-specific implementation limitations, such as ability of grout to flow through injector heads of an auger, application of ISS in limited access areas (i.e., underneath the dock), the effect of study parameters (including unconfined compressive strength, swell, etc.) on the use, maintenance, or function of functional structures (e.g., the dock), and the ability to vary grout mixes through sediments with different physical and chemical characteristics.

5. **Advective Flux:** In multiple sections of the ISSLPS Work Plan, it is suggested that the target permeability performance criteria of 10^{-6} centimeters per second (cm/s) will eliminate advective flux through the ISS treatment area. EPA expects that the testing results and subsequent remedial design (RD) evaluations will be used to verify that the permeability performance criteria of 10^{-6} cm/s will be sufficient to minimize or eliminate advective flux. Revise the ISSLPS Work Plan text as needed to address this expectation.

6. **Stabilizer/Binding Agent effects on Geochemistry:** The ISSLPS Work Plan should consider how the various stabilizers/binding agents may affect the geochemistry of the sediment and porewater, and how those geochemical changes may affect mobilization of contamination. The ISSLPS Work Plan should also acknowledge that the water used during leachability tests may not be representative of the groundwater and porewater at the site and discuss how actual field conditions may differ from laboratory conditions.

7. **Grout Blend Design:** The grout blend designs tested as part of the ISSLPS should consider amendments and/or additives (e.g., organophilic clays, activated carbon, etc.) to evaluate the potential to further improve reduction of contaminant leachability.

8. **Supporting Criteria for Proceeding at Each Step:** The ISSLPS Work Plan should specifically identify the quantitative criteria for determining next steps at every relevant decision-making point. Examples where such criteria should be developed include the following (NW Natural should review the document for other areas that could also benefit from criteria development):

    a. Justify the specific physical testing results that will be considered to constitute "perform[ing] well" enough to warrant continuing to the Phase I leachability testing (e.g., as stated in Appendix A, Section 5.4.1). ISSLPS Work Plan Section 1.3.1 presently provides a justification for the permeability target but not for the proposed strength target;

    b. Identify the Phase I leachability testing criteria (if any) that must be met to justify conducting the Phase II testing;

    c. Identify quantitative criteria on which the decision will be made about whether to pursue Phase III testing; and

    d. Identify clear, specific, quantitative criteria for determining whether it is appropriate to proceed with work plan development for a pilot-scale field investigation of ISS, based on the results of this laboratory pilot study. It is important that such criteria be developed prior to implementation of work described in the ISSLPS Work Plan, not thereafter.

9. **Pilot Study Schedule:** NW Natural should consider the following concerning the pilot study schedule:

    a. EPA understands that NW Natural plan is to implement a field pilot study during the 2023 work window. The feasibility of a 2023 field pilot should be explained given that all laboratory testing results will not be available by Fall 2023.

b. The proposed reporting schedule indicates that the ISSLPS may not be completed until after the Interim Design (EPA assumes that the "Interim Design" is equivalent to the "50% Design"). EPA believes it is critical for NW Natural to complete the ISSLPS and report all testing results, including a recommended final grout blend design, in the Interim Design.

10. **Remedy Monitoring:** EPA reiterates General Comment 5 on the PAR as it is also relevant to the ISSLPS WP: "The PAR suggests that the "Full Dredge and ISS Design" alternative would not require capping and would have reduced monitoring requirements compared to capping. The laboratory pilot study treatability testing results should be used to inform the need for capping subsequent to ISS implementation. Monitoring of the in-river remedy will still be required for the ISS remedy and these capping and monitoring requirements should be evaluated during future design stages."

11. **Consideration of EPA Guidance:** EPA's guidance for conducting treatability studies (EPA 1992) [see Sections 3.5 and 3.5.15] states that work plans should include the projected costs for completing the study. Potential cost categories include, but are not limited to, labor, administrative costs and fees, equipment and reagents, site preparation and utilities, permitting and regulatory fees, and sample transportation and analysis. NW Natural should consider this guidance to provide relative costs as appropriate.

Specific Comments on ISSLPS WP

1. **Section 1 Introduction and Objectives, last paragraph, page 1:** The text should be revised to accurately reflect EPA General Comment 1 on the PAR which stated that (particularly with regard to EPA "selecting" the preferred Full Dredge and ISS Alternative): "The PAR bases its conclusions on mostly conceptual approaches that will need to be verified during the pilot studies and/or future stages of design. EPA recommends future design deliverables clearly distinguish conceptual design concepts from design evaluations already conducted. Supporting evaluations are expected in the forthcoming revised Basis of Design Report (BODR). EPA agrees with the general approach of ISS treatment at the Gasco Project Area with the caveat that site-specific details of the approach will need to be further developed in collaboration with EPA during design of the ISS remedy." It is premature to state that EPA is selecting the Full Dredge and ISS Alternative without completing the laboratory and field pilot studies to evaluate the efficacy of an ISS remedy.

2. **Section 1.1 Background, last paragraph, page 2:** Revise the first sentence as follows: "Only one design alternative ***is anticipated to*** fully achieve~~s~~ all of EPA's design objectives and prevents sediment recontamination." (***Emphasis added***). EPA believes both alternatives presented in the PAR can be protective and would satisfy the requirements of the ROD, with the understanding that the two design alternatives included in the PAR have tradeoffs between other balancing factors that may favor one approach over another. In addition, text related to comparison of design alternatives should be removed from the ISSLPS Work Plan as this information was evaluated in the PAR.

3. **Section 1.1 Background, page 3:** Whether ISS reduces or eliminates contaminant transport depends on the application. Until the pilot studies are completed it is premature to state that contaminant transport will be fully eliminated via any transport mechanism. Future design deliverables should note that ISS has the potential to eliminate contaminant transport via ebullition and advective flux, and this is contingent on the final design.

4. **Section 1.2 ISS Description, first paragraph page 4:** Provide citations to support the following statement: "This physical and chemical modification of the impacted materials has been proven to

be effective for NAPL [nonaqueous phase liquid] and a variety of contaminants in environmental media."

5. **Section 1.2 ISS Description, last paragraph, page 4:** The text states that: "ISS has been effectively used for decades at hundreds of sites around the country, many of which are manufactured gas plant sites like Gasco." Revise the text to clarify if these applications have been mostly associated with upland remedial actions.

6. **Section 1.3 Laboratory Pilot Study Objectives, pages 4 and 5:** EPA has the following comments on this section and the ISSLPS Work Plan should be revised accordingly:

    a. Revise the text to cite a few examples of the "numerous other sites with similar contaminants and conditions" where ISS has been used to achieve remedial objectives and clearly distinguish sediment remediation sites.

    b. It is understood that the admixtures used to achieve stabilization will include cementitious materials such as slag or cement that are not ideal components of a natural habitat, and will change the nature of the substrate as well as potentially leach chemicals into the overlying water. These properties of the stabilization material may adversely affect the ability of the completed remedy to support habitat improvements. The ISSLPS Work Plan should provide clarification regarding potential adverse impacts to habitat due to the ISS admixtures.

7. **Section 1.3.1 Physical Property Testing Objectives and Evaluation Criteria, second paragraph, page 4:** The text defines the strength target as being "limited to placement of cover materials". Provide further definition of the cover materials, for example, whether it includes cover materials related to habitat restoration.

8. **Section 1.3.1 Physical Property Testing Objectives and Evaluation Criteria, third paragraph, page 4:** Revise the text to provide additional clarification regarding the last two sentences of this paragraph. Presumably, the chemical fate and transport evaluations will inform the determination of advective flux. EPA expects that the testing results and subsequent RD evaluations will be used to verify that the permeability performance criteria of 10^{-6} cm/s will be sufficient to minimize or eliminate advective flux.

9. **Section 1.3.2 Leachability Testing Objectives and Evaluation Criteria, second paragraph, page 5:** Revise the text to clarify how NW Natural intends to verify that DNAPL in the ISS treated materials will be immobile. Also include citations for studies to support this assumption.

10. Footnote 6 states that locations and depths of previous PTW-NAPL observations were used to help identify target sample locations and depths, but the presence of PTW-NAPL is not considered an essential criterion for ISSLPS sample materials. EPA believes that the ISSLPS would be incomplete without definitively evaluating grout blend designs for PTW-NAPL impacted sediments. Modify footnote 6 for clarification.

11. **Section 3.2 Initial Characterization of Untreated Samples, second paragraph, pages 9:** The untreated samples should be analyzed for contaminants with ROD Table 17 groundwater and riverbank soil/sediment CULs. Total organic carbon should also be analyzed as organic content can have significant influence on pozzolanic action of cementitious admixtures. Revise the text to include these analyses.

12. **Section 3.3 Grout Component Testing, pages 9 and 10:** EPA has the following comments on this section and the text should be revised accordingly:

a. Revise the text to specify the type of Portland cement to be used. Additionally, analytical characterization of proposed admixtures (i.e., blast furnace slag cement (BFSC) and Portland cement (PC)) should be documented either through test results provided by vendor(s) or through independent analytical testing of cementitious materials.

b. There is no explanation or justification for the chosen BFSC to PC ratios or for the grout dosages. Sufficient literature citations should be added to support these grout blend compositions. This comment also applies to Appendix A, Section 5.2.

c. Provide clarification whether the selection of cementitious materials is based on ISS implementation at the sites mentioned in Section 1.2. If so, describe whether long-term monitoring has occurred at these sites to evaluate how leachability or habitat interactions may be impacted over longer time spans. Based on the timeline provided, Phase I-II will take place over the course of a year. Describe how long-term effects will be monitored and evaluated.

13. **Section 3.4 Strength and Permeability Testing, second paragraphs, pages 10 and 11:** EPA has the following comments on this section and the text should be revised accordingly:

    a. Revise the text to clarify why a grout dosage of 10% will be used for both sediment and soil in the grout testing phase but a 10% grout dosage is not considered for soils during the strength and permeability testing stage.

    b. Revise the text to provide additional detail describing the method for determining when assessing the effective solubility of the NAPL is needed. It should be noted that additional supernatants/gels, leachates etc. may be produced during the curing process, in addition to NAPL. All of these observations should be recorded.

    c. Text in the second paragraph states that sediment has higher moisture content and percentage of fines content compared to soil, which may affect the strength and permeability. This statement should include a more detailed description of the directional effect on strength and permeability (i.e., stronger/weaker and more/less permeable).

14. **Section 3.5.1 Leachability Testing Design, page 11:** EPA has the following comments on this section and the text should be revised accordingly:

    a. Chemical analysis of the leachate generated in both Phase I and Phase II leachability testing should include all contaminants with ROD Table 17 groundwater and riverbank soil/sediment CULs. EPA recognizes that some of these contaminants are not driving the design at the Gasco Project Area; however, at this stage of the ISSLPS all contaminants with ROD Table 17 groundwater and riverbank soil/sediment CULs should be analyzed for leachability testing in addition to the currently proposed analysis of PAHs, volatile organic compounds (VOCs), and arsenic.

    b. Clarify why the American Nuclear Society (ANS) test method ANS 16.1 recommended by the ITRC (2011) and used in the Gowanus Canal ISS leachability testing is not being used.

15. **Section 3.5.1.2.1 Phase II Leachability Testing, page 12:** Specify the equilibration time that the untreated sediment and treated cylinder will be allowed to equilibrate for the estimation of equilibrium aqueous concentrations.

16. **Section 3.5.1.3 Phase III, page 13:** EPA has the following comments on this section and the text should be revised, if needed:

    a. Due to the methods for leachability testing requiring modifications to make them more applicable to testing of ISS monoliths, EPA strongly encourages Phase III column testing be conducted. However, EPA agrees that this decision can be made after reviewing the Phase II leachability testing results.

    b. Phase III testing would be important in areas where habitat layers are anticipated to be placed above the stabilized material. This can be addressed during development of the Phase III testing protocol in coordination with EPA.

17. **Figures 2-2a through 2-2c:** A similar figure series showing the locations of PTW-NRC observations should be added to the ISSLPS WP.

Editorial Comments on the ISSLPS Work Plan:

1. **Document Title:** The document ideally should be referred to as 'Bench Scale Treatability Study' in accordance with commonly used terminology and EPA, 1992 instead of 'Laboratory Pilot Study'.

2. **Figures 2-1a through c and Figures 2-2a through c:** Specifically identify and highlight (e.g., by using a different color for the station's label) those stations proposed for sample collection.

To Be Considered Comments on the ISSLPS Work Plan:

1. **Compressive Strength Performance Target:** EPA recommends that the ISSLPS Work Plan also set a maximum strength target to ensure that the selected mix design can accommodate various future use scenarios. The maximum strength should be measured at 28 days of curing.

2. **Sample Location Selection:** The ISSLPS Work Plan should be revised to include sediment sampling for treatability testing across the full depth of potential ISS application. It is anticipated that ISS treatment will extend more than 30 feet below the sediment surface in some areas.

3. **Sample Size:** The ISSLPS Work Plan should provide more justification for the proposed number of samples to be tested in each phase of testing. For example, the ISSLPS Work Plan provides only one sampling location per soil sample type ("One sampling location and depth interval was selected from each WBZ [water bearing zone]"—i.e., the Fill WBZ, upper alluvium, and lower alluvium) and only two sampling locations for each of two in-water sediment sample depths. NW Natural should confirm that the number and type of samples will be sufficient to select the most representative grout blend design.

4. **Statistics:** The ISSLPS Work Plan should identify (and justify) the specific methods that will be used to analyze the laboratory testing results, including all comparisons that will be made and the targeted level of statistical power, as applicable. Absent this information (and a sufficient sample size), the results of the study may not be sufficiently reliable for future decision-making, including any decision to proceed with field-scale pilot testing.

5. **Section 2.1 In-Water Sediment Sample Locations and Depths, page 6:** The second item describes reviewing grain size data across three depth intervals, 0-4 feet, 4-8 feet, and 8-16 feet. However, the samples shown on Figure 2-3 are all less than 8 feet deep. Explain if it is or is not necessary to assess deeper sediments.

6. **Section 2.1 In-Water Sediment Sample Locations, page 6 and Depths and 2.2 Soil Sample Locations and Depths, page 7:** These sections should provide a more quantitative justification as to the representativeness of the soil and sediment sampling locations. More specifically, the ISSLPS Work Plan should include histograms or similar representations of grain size (for locations with PTW-NAPL, and within the project area more generally) and should indicate where, within these distributions, the selected locations fall.

7. **Section 3.2 Initial Characterization of Untreated Samples, page 9:** EPA recommends the homogenization of the samples be completed at the laboratory on undisturbed samples collected from the field.

8. **Section 3.3 Grout Component Testing, pages 9 and 10:** The ISSLPS should be expanded to measure and evaluate VOCs in headspace (off-gassing), temperature, pH, and material phase separation (NAPL mobilization, formation of precipitates and/or other gels/supernatant during setting). In addition, underwater application should consider grout blend designs that are specifically developed for underwater applications (e.g., plasticizers).

9. **Figures 2-1a through 2-1c:** These figures show PTW-NAPL observations between 0 and 16 feet below the sediment surface. Additional figures should be added to show the full depth of PTW-NAPL observations (i.e., EPA recommends that this figure series extend to the known depth of remedial action level (RAL) exceedances).

10. **Figures 2-2a through 2-2c**: These figures show grain size distributions between 0 and 16 feet below the sediment surface. Additional figures should be added to show grain size distributions representative of the full depth of RAL exceedances.

11. The Yakama Nation provided the following questions and comments they would like to have considered in the ISSLPS and explored further in future discussions and design documents:

    - Will the ISS method, including the treatment barrier wall, impede future habitat restoration efforts in nearshore and upland areas – for example, once in place does the ISS barrier result in a no work or no modification zone?

    - How does the ISS method, including the treatment barrier wall, allow for natural physical and biological processes to occur below and above the ordinary high water?

    - What impacts may occur to ESA listed and tribally important aquatic species and terrestrial species and habitats, including the biologically active zone?

    - What additives will be used for the ISS method? Will an evaluation of potential impacts to habitat and species of these additives be conducted?

    - The Yakama Nation would like more specific information on how the ISS method allows for optimum design of habitat improvements – including input from habitat restoration

experts and tribes. Also, they would like more information on how the ISS method improves habitat on its own without mitigation or restoration.

- What will the treatment barrier wall and other areas incorporating the ISS method look like? There are photos in the 8/23/2022 presentation but they do not show how a wall will look in the environment.

General Comments on ISSLPS Work Plan, Appendix A, In Situ Stabilization and Solidification Laboratory Pilot Study Field Sampling Plan:

1. **ISS as a ROD technology:** While EPA agrees that ISS is a remedial technology that is included in the ROD's selected remedy, the ISSLPD Work Plan and/or future design deliverables should clearly discuss the conditions under which ISS was retained in the Feasibility Study (FS) and included in the selected remedy (e.g., for areas where access and slope stability issues exist, and for PTW underneath and around pilings, docks, berthing or mooring dolphins, and other structures servicing active wharfs or shore-based facilities that remain intact). ISS was specifically retained as a technology for use in areas with PTW and where groundwater is affecting porewater, which EPA recognizes are significant issues at the Gasco Project Area.

Specific Comments on ISSLPS Work Plan, Appendix A, In Situ Stabilization and Solidification Laboratory Pilot Study Field Sampling Plan:

1. **Section 3.1 PTW-NAPL Identification, page 3:** According to the EPA-approved Revised Pre-Remedial Design Data Gaps Work Plan (Anchor QEA 2019), if PTW-NAPL is identified then the homogenized samples should be subjected to shake tests. This also applies to soil samples with PTW-NAPL.

2. **Section 4.4.1 Management of Investigation-Derived Waste, pages 16 through 18:** Investigation-derived waste characterization should include total solids/percent dry weight, per Table 3-1 of the Contaminated Material Management Plan (Anchor QEA, LLC and Hahn and Associates, Inc. 2021). In addition, Oregon State Department of Environmental Quality should be copied on the transmittal of the waste profile package to the selected disposal facility requesting acceptance of the waste for disposal.

3. **Section 5 Chemical and Physical Testing, pages 19 through 26:** Clarify why free liquid testing similar to the Gowanus Canal Treatability Study was not considered.

4. **Section 5.1.1 In-Water Sediment Sample Baseline Testing, second bullet, page 20:** Organic content testing of sediment samples should be included as organic content can have significant influence on pozzolanic action of cementitious materials. Atterberg Limit testing should also be considered to measure plasticity of cohesive sediment, along with sediment moisture content. Also include relevant ASTM Standards or EPA methods for all the listed laboratory tests in this section.

5. **Section 5.1.2 Soil Sample Baseline Testing, page 20:** Organic content testing of sediment samples should be included as organic content can have significant influence on pozzolanic action of cementitious materials. Atterberg Limit tests should also be considered to measure plasticity of cohesive sediment, along with soil moisture content. Also include relevant ASTM Standards or EPA Methods for the listed laboratory tests in this section.

6. **Section 5.2 Grout Component Testing, pages 20 and 21:** Grout component testing should be conducted on more than one sediment sample location. Separate grout component testing should be

conducted for sediments composed of different grain size distributions. EPA recommends at least one test be conducted on sediment that is predominantly fine-grained, and one test be conducted on sediment that is predominantly sand.

7. **Section 5.4.1 Phase I, pages 22 through 23:** EPA has the following comments on this section and the text should be revised accordingly:

    a. If DNAPL is present in the leachate sample, it can similarly be leaching from treated sediment under field conditions. Filtering the sample is likely to result in leachate concentrations that are biased low. Therefore, both filtered and unfiltered leachate samples should be analyzed.

    b. Chemical analysis of the leachate should include all contaminants with ROD Table 17 groundwater and riverbank soil/sediment CULs.

    c. Oxidation reduction potential (ORP) and conductivity measurements of the leachate should be included.

8. **Section 5.4.2.1 Phase II Leachability Testing, pages 23 through 24:** EPA has the following comments on this section and the text should be revised accordingly:

    a. Chemical analysis of the leachate should include all contaminants with ROD Table 17 groundwater and riverbank soil/sediment CULs.

    b. ORP and conductivity measurements of the leachate should be included.

9. **Section 5.4.2.2 Equilibrium Aqueous Concentration Assessment, last bullet, page 24:** Revise the text to include a citation for the 8-week equilibration time for assessment of aqueous concentrations.

10. **Section 5.4.2.3 Microscale Characterization and Pore Size Distribution Measurement, pages 24 and 25:** Specify the test method for the scanning electron microscopy (SEM) analysis.

To Be Considered Comments on the ISSLPS Work Plan, Appendix A, In Situ Stabilization and Solidification Laboratory Pilot Study Field Sampling Plan:

1. **Section 5.2, Grout Component Testing, 2nd paragraph, page 21 and Section 5.4.1 Phase I, 1st bullet, page 22:** The text states that after blending grout with sediments or soil, the mixture will be poured into a cylindrical mold, "tamped to eliminate air, and the top surface will be leveled… and capped with a plastic air-tight lid"; moreover, they will be cured "at room temperature until further testing." The Phase I leachability testing is stated to occur under static conditions, which the ISSLPS Work Plan asserts "will further mimic field conditions." This presents a concern that many of these conditions (e.g., curing temperature, curing within a mold, an absence of water flow) do not, in fact, mimic field conditions. The ISSLPS Work Plan should more carefully discuss, with appropriate evidence, how well these conditions do or do not comport with expected field conditions to which ISS-stabilized soils or sediments would be subject, and should consider modifications, as needed, to represent likely field conditions more accurately. The ISSLPS Work Plan should also address how results will be interpreted, in light of disparities between laboratory and field conditions.

2. **Section 5.4.2.3, Microscale Characterization and Pore Size Distribution Measurement, pages**

24 and 25: This section addresses microscale characterization and pore size distribution measurements. It seems likely that these characteristics could differ considerably for sediments under field conditions as compared to lab conditions, as sediments under field conditions would be subject to higher levels of pressure (e.g., from overlying sediments and water). Consider expanding this section to address this issue and explain the relevance of the proposed laboratory tests for field conditions.

General Comments on ISSLPS Work Plan, Appendix B, In Situ Stabilization and Solidification Laboratory Pilot Study Quality Assurance Project Plan:

None.

Specific Comments on ISSLPS Work Plan, Appendix B, In Situ Stabilization and Solidification Laboratory Pilot Study Quality Assurance Project Plan:

1. **Approval Page, page i.:** The EPA Region 10 Quality Assurance Manager is Cindy Fields and she should be listed on the Approval Page. Various Region 10 quality assurance staff are designees who can approve quality assurance project plans (QAPPs) and sign for the Quality Assurance Manager.

2. **Distribution List, page ii.:** The specific ALS Environmental laboratory that will be used should be provided.

3. **Section 1, Introduction, page 1:** It is stated that the goal of the QAPP is to ensure that data of sufficiently high quality are generated to support the project data quality objectives. The project data quality objectives should be stated or summarized here.

4. **Section 2.6.2, Preparation and Analytical Chemistry Records, page 6:** It is stated that laboratory data packages will contain information necessary to perform a Stage 4 data validation, per EPA guidelines. It also states that Stage 2B validation will be performed for all data except geotechnical and DNAPL mobility data. State the reason for the data packages including information needed for Stage 4 data validation even though Stage 4 data validation will not be conducted. It should be stated if issues with data will trigger a higher level of validation to be performed.

5. **Section 3.5.1.4, Field Quality Assurance Sampling, pages 16 and 17:** State what type of water will be used for rinsate blanks.

6. **Section 3.5.2, Laboratory Quality Control, pages 16 through 18:** The section should state how the results will be reported; e.g. state whether results will be reported down to the reporting limits or method detection limits and how detections will be reported between the method detection limit and the reporting limit.

7. **Figure B-1, Project Organization Chart:** Change the EPA Region 10 Quality Assurance Manager from Don Matheny to Cindy Fields.

8. **Tables B-2 through B-5:** It should be clearly stated who will perfrom the leaching tests and the laboratory that is doing each analysis.

9. **Table B-6, Field and Laboratory Quality Control Sample Analysis Frequency:** There are no references in the Table for notes 3 and 4. EPH is not defined in the table notes.

10. **Table B-8, Guidelines for Solid Handling and Storage:** Define the acronyms PDMS and VOCs in the acronym list at the bottom of the table.

11. **Attachment 1: Standard Operating Procedures:**

    a. Please confirm that unless a modification is called out in the standard operating procedures, methods 1312 and 1315 will be followed as written in the standard EPA methods.

    b. EPA Method 1315 states that this method "is a characterization method and does not provide a solution considered to be representative of eluate under field conditions". EPA expects that leachability will be evaluated under field conditions during the field pilot study.

12. **Attachment 2: In Situ Stabilization and Solidificaion Laboratory Pilot Study Data Management Plan:** Add a statement to Section 1.2 (Data Management Objectives) that any Data Management Plan revisions will be transmitted to EPA in with redline/strikethrough format for review.

General Comments on ISSLPS Work Plan, Appendix C, In Situ Stabilization and Solidification Laboratory Pilot Study Health and Safety Plan:

1. Note that EPA does not approve Performing Party health and safety plans but reviews for completeness.

Specific Comments on ISSLPS Work Plan, Appendix C, In Situ Stabilization and Solidification Laboratory Pilot Study Health and Safety Plan:

1. **Liability Waiver, pages L-1 through L-2:** Some of the language, particularly in points 1, 2, and 4, seem to conflict with OSHA's General Duty Cause and the employer's obligation to provide a workplace free of recognized hazards likely to cause serious physical harm. Also, the language may appear contradictory to an employee's right to worker's compensation claims for valid, work-related incidents. Consider rewording.

2. **Emergency Contact Information, Table A, page v:** Client contact phone numbers are the same; update as needed.

3. **Section 3.1, Project Scope of Work, page 4:** Laboratory activities are covered under this HASP; update accordingly.

4. **Section 4.4, Project Field Team, page 8, last paragraph:** Remove "(preferably an individual with HAZWOPER Supervisor training)". A Supervisor with HAZWOPER Supervisor Training must provide the described training.

5. **Section 7.5, Field Communication, Table 7-1, page 22:** Confirm that a compressed air horn will be onsite or adjust the communication device within this table accordingly.

6. **Section 9.6, Hazardous Waste Operations Training, page 28:** This is general company Hazard Communication (HAZCOM) procedures. It is not explicitly clear that personnel on this project will be HAZCOM trained. To achieve this, update the appropriate job safety analyses (JSA's) to identify when HAZCOM training is required for this project.

7. **Attachment B, Job Safety Analysis Documents:** Identify contaminant inhalation hazard and controls including monitoring in the appropriate JSA's.

8. **Attachment C, Safety Data Sheets:** Not all the safety data sheets conform with the Globally Harmonized System Standards (e.g., Diesel #2, Liquinox); update accordingly.

References

Anchor QEA, 2019. Revised Pre-Remedial Design Data Gaps Work Plan. Gasco Sediments Cleanup Action. Prepared for U.S. Environmental Protection Agency, Region 10. Prepared on behalf of NW Natural. September 11, 2019.

Anchor QEA, LLC and Hahn and Associates, Inc., 2021. Contaminated Materials Management Plan. NW Natural Gasco Site. Prepared for NW Natural. November 19, 2021.

EPA, 1992. Guidance for Conducting Treatability Studies under CERCLA, EPA/540/R-92/071a. October 1992.

EPA, 2009. Statement of Work – Gasco Sediments Site. U.S. Environmental Protection Agency Region 10. September 9, 2009.

EPA, 2019. Guidance for River Bank Characterizations and Evaluations at the Portland Harbor Superfund Site. August 27, 2019.

ITRC (Interstate Technology and Regulatory Council), 2011. Development of Performance Specifications for Solidification/Stabilization. July 2011.