NW Natural ISS Lab Pilot Treatability Study Investigation
Gasco Sediments Site – Spring 2023
Field Change Request Form

Project Name: Gasco Sediments Site **Subconsultant:** Holt Drilling

Field Activity: Treatability study core collection **Request Number:** 4

To: Hunter Young, U.S. Environmental Protection Agency **Date:** July 24, 2023

Field Change Request (FCR) Title: Extension of Unconfined Compressive Strength Test Durations and Performance of Additional Phase II Testing at Location ISSTS-004

Description
The NW Natural Design Team has completed the Phase I and a portion of the Phase II bench scale treatability testing identified in the *Additional Revised In Situ Stabilization and Solidification Bench Scale Treatability Study Work Plan* (Work Plan) at the four subsurface sediment sampling locations (ISSTS-001 through ISSTS-004) within the Gasco Sediments Site Project Area (Project Area). This testing included unconfined compressive strength (UCS) and permeability for grout dosages ranging from 10% to 20% (wet weight of sediment/soil to dry weight of 40% Portland cement and 60% blast furnace slag cement admixture). To date, UCS testing results are available for 3-day, 7-day, and 14-day cure durations for all locations and 28-day cure duration for location ISSTS-003. Permeability results are available for each location for the 7-day cure duration. Consistent with the treatability study design objectives, the UCS results have generally increased as the duration increased, and the 50 pounds per square inch (psi) target has been achieved in several locations for a variety of grout dosages. For location ISSTS-003, a significant increase in UCS was identified between the 14-day and 28-day cure times, and all grout dosages achieved the 50-psi target. The 28-day cure time UCS results for the remainder of the locations are anticipated to be available in the next week. The Work Plan does not identify UCS testing for a 56-day cure time, and this information would provide additional information regarding strength increases over time. At the time the Work Plan was developed, the Design Team conservatively limited the sampling depths at all locations to 4-foot intervals based on limited assumed vertical mixing during in situ stabilization and solidification (ISS) implementation. Since development of the Work Plan, the Design Team has coordinated with the drilling manufacturer in Germany to design the specific ISS drill head to be used based on site-specific conditions in the Project Area. The design includes a mixing head that is 5.9 feet in height and 8 feet in diameter. Based on this height, coupled with mixing induced during travel downward and upward through the sediment column, the vertical extent of the mixing zone will be greater than 4 feet.

Recommended Change
The Design Team proposes the performance of additional UCS tests for a 56-day cure duration at all four sampling locations to provide a more accurate understanding of the long-term strength gains of the ISS-treated sediments to support remedial design. The samples to be tested at 56 days are extra cylinders cast at the same time as all the others tested for each of the grout dosages. Due to the greater vertical mixing that will be induced by the 5.9-foot mixing head, the Design Team proposes the collection of additional Phase II UCS and permeability testing on sediments composited from 0 to 12 feet below mudline in the ISSTS-004 sediment location. These additional data will provide an understanding of the progression of strength increases and permeability reductions over time for a larger vertical mixing interval relative to the testing results in the 4-foot (at locations ISSTS-002 and ISSTS-003) and 8-foot composite depth intervals (at location ISSTS-001). Consistent with the above recommend change, the Phase II testing will be performed at 3-day, 7-day, 14-day, 28-day and 56-day durations for UCS and 7-day and 28-day durations for permeability. Based on evaluation of the physical characteristics identified at each location throughout the core recovery depth, the sediments will be collected from location ISSTS-004

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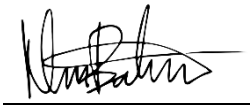
because the sediment profile contains contiguous depths of both higher fines (i.e., from 0 to 4 feet and greater than 8 feet) and higher sands (i.e., 0 to 8 feet) content. Therefore, the composite sample will be representative of the range of sediment types present in the Project Area. NW Natural is prepared to perform additional outreach to marine contractors and will attempt to expeditiously complete this additional core collection upon U.S. Environmental Protection Agency approval.

Nik Bacher		July 24, 2023
Respondent Field Coordinator (or Designee)	**Signature**	**Date**

Approval:

Ryan Barth		July 24, 2023
Respondent Project Lead	**Signature**	**Date**

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