

Memorandum

March 26, 2020

To: Dana Bayuk, Oregon Department of Environmental Quality
From: John Renda, Anchor QEA, LLC
cc: Bob Wyatt, NW Natural; Patty Dost, Pearl Legal Group; Rob Ede, Hahn and Associates, Inc.;
Halah Voges, Mike Gefell, Ryan Barth, Anchor QEA, LLC
ECSI No. 84

Re: Fill WBZ Trench Interim Measure Field Investigation Plan

This memorandum discusses the field investigation plan to collect data needed to support the design of a Fill Water-Bearing Zone (WBZ) trench in response to increased concentrations of benzene detected downgradient of the NW Natural Gasco Site Liquefied Natural Gas (LNG) Basin following the lining of the LNG Basin in 2018.

Background

Two construction projects were completed within the Former Gasco Manufactured Gas Plant Operable Unit in 2018. NW Natural implemented one project, and its former tenant Koppers, Inc., performed another. These improvements are summarized as follows:

- In July 2018, Koppers completed demolition and decommissioning of its lease area, which included changes to stormwater management.¹
- NW Natural made modifications to the LNG Basin, including installation of an impermeable liner in the basin to eliminate seepage of groundwater into the basin and to separate groundwater from stormwater. Prior to the improvement, commingled groundwater and stormwater were pumped from a single sump located at the southeastern edge of the basin. Water was last pumped out of the unlined LNG Basin in October 2018.

These improvements are described in detail in the *LNG Basin and Koppers Basin Groundwater Evaluation Baseline Data Report* (Baseline Data Report; Anchor QEA 2019a).

The Oregon Department of Environmental Quality (DEQ) requested an assessment of the potential effects of these two projects on Fill WBZ groundwater hydrology and contaminant flux to the Willamette River. Anchor QEA, LLC, submitted a proposed groundwater monitoring program to DEQ

¹ Decommissioning activities impacting stormwater management included the removal of catch basins and piping so that stormwater can infiltrate through the ground surface into the Fill WBZ, rather than being directed to the Former Koppers Basin. Post-demolition, the only water that accumulates within the Former Koppers Basin is precipitation that falls directly into the basin and shallow Fill WBZ groundwater (during the wet season) that seeps into the basin from underlying fill soils.

on March 23, 2018, which included the installation of three monitoring wells (MW-47F, MW-48F, and MW-49F) downgradient of the LNG Basin and Former Koppers Basin, installation of pressure transducers in new and existing wells, and groundwater sampling and analysis (Anchor QEA 2018). DEQ conditionally approved the program in a May 2, 2018 email (Bayuk 2018), with the addition of several DEQ-requested modifications to the scope of work. The modifications included installing an additional monitoring well (MW-46F), adjusting some of the proposed monitoring well locations, installing transducers in additional wells, and installing a staff gage and piezometer in the Former Koppers Basin. The DEQ-requested changes were added to the monitoring program, which began in 2018.

The results of the baseline monitoring conducted in the second and third quarters of 2018 prior to the completion of the site improvements were reported in the Baseline Data Report (Anchor QEA 2019a). Results of monitoring conducted in the fourth quarter of 2018 (following site improvements) were provided to DEQ in February 2019 (Anchor QEA 2019b). The LNG Basin and Former Koppers Basin Groundwater Evaluation – First Quarter 2019, Second Quarter 2019, and Third Quarter 2019 memoranda were submitted to DEQ on June 28, 2019, October 31, 2019, and February 17, 2020 respectively (Anchor QEA 2019c, 2019d, 2020).

As discussed in the third quarter 2019 memorandum, benzene concentrations in some of the Fill WBZ monitoring wells directly downgradient of the LNG Basin and along the shoreline downgradient of the LNG Basin showed increases in benzene concentrations of one or two orders of magnitude within 1 year of when comingled water was last pumped out of the unlined LNG Basin. Anchor QEA recommended a Fill WBZ interim measure to offset changes in hydraulic conditions near the basin due to the improvement, which included the removal of the pump in the sump formerly located in the southeastern edge of the basin and cessation of associated pumping of water from the sump. NW Natural proposed to install a groundwater recovery trench in the general vicinity of wells MW-47F and MW-49F to capture contaminated Fill WBZ groundwater immediately downgradient of the LNG Basin and mitigate the change in hydraulic conditions caused by the improvements. Anchor QEA recommends a recovery trench because it is an optimal method for reducing benzene mass flux toward the shoreline wells.

Anchor QEA met with DEQ on February 19, 2020, to discuss the third quarter 2019 memorandum and the proposed Fill WBZ trench. A follow-up meeting was held with DEQ on March 5, 2020, to discuss the proposed trench alignment and length. Anchor QEA presented model simulation results, including estimated capture zones using particle tracking for a single Fill WBZ trench in the PacTerm Basin with lengths of 50 feet, 100 feet, and 150 feet. DEQ requested additional model runs to include a second Fill WBZ trench near MW-49F as well as evaluation of the amount of time it takes to reach steady-state capture zone. Another meeting was held with DEQ on March 11, 2020. Anchor QEA presented additional simulation results for two Fill WBZ trenches and evaluation of time to reach steady-state capture zone. DEQ requested changes to the model result presentations, which

Anchor QEA provided to DEQ on March 16, 2020. Anchor QEA and DEQ met again on March 19, 2020 to discuss the trench alignment, scope of pre-design data collection, and schedule. Anchor QEA is in discussions with DEQ evaluating a one-trench option and a two-trench option. Both options include a primary trench (Figure 1) located in the PacTerm Basin downgradient of the LNG Basin. Modeling shows that a 100- or 150-foot trench at this location should capture sufficient groundwater to replace the groundwater extraction previously maintained by the sump prior to lining of the LNG Basin and produce a capture zone that covers the entire footprint of the LNG Basin. The two-trench option includes an additional 50-foot trench segment (Figure 1) that DEQ requested be evaluated at the northern corner of the LNG Basin. This work plan includes data collection along both a 150-foot alignment in the PacTerm Basin and the additional 50-foot alignment.

It is important to note that these proposed trench alignments are considered an interim measure, and the upland Feasibility Study (FS) will include final remedial measures for the Fill WBZ and be integrated with the U.S. Environmental Protection Agency's selected in-water remedy for the riverbank area. The interim trench measure near the basin is intended to mitigate any contaminant transport changes that may have resulted from the LNG Basin and Koppers area improvements while NW Natural and DEQ work to complete the FS and select a final remedy.

Data Collection Needs

Anchor QEA has developed the following scope of work to support the design of the two Fill WBZ trench alignment options. In general, the work described in this investigation plan will follow similar procedures described in the *Upland Feasibility Study Data Gaps Investigation Work Plan* (Anchor QEA 2016).

For the proposed 150-foot alignment, five equally spaced borings will be advanced, and for the proposed 50-foot alignment, three equally spaced borings will be advanced, for a total of eight borings. The approximate locations of these borings are shown in Figure 1. Soil borings will be advanced using a rotosonic drill rig through the Fill WBZ and then into the silt layer at the base of the fill. Each boring will be advanced until the base of the silt unit is reached to assure the thickness of the silt unit at each location has been determined. A continuous core sample will be collected at each location. Core samples will be examined to develop a lithologic boring log. Sample color, structure, texture, mineral composition, moisture content, and percent recovery will be recorded in the field in general accordance with ASTM International (ASTM) method D2488. Samples will also be examined for evidence of possible contamination, including presence of anthropogenic material, chemical odor, and staining. Observations will be noted on boring logs.

Standard penetrometer tests (SPTs) will be completed at each boring starting at the ground surface and at 5-foot intervals. Three samples from the saturated zone will be collected from each boring for grain-size analysis by ASTM method D422—one sample representing the coarsest fill material, one sample representing the finest fill material, and a sample from the silt layer at the base of the fill. Up

to one sample from each borehole will be collected for Atterberg limit analysis by ASTM method D4318 to characterize the plasticity of the fine-grained layers, if encountered.

Boreholes will be decommissioned either with high solids bentonite grout or, if dense nonaqueous phase liquid (DNAPL) is observed in the borehole, an organoclay/bentonite slurry consisting of approximately nine parts sodium bentonite and one part organoclay by volume that will be placed by a tremie pipe.

Samples will be submitted to Core Laboratories for laboratory analysis under chain-of-custody procedures.

Anchor QEA is prepared to schedule a drill rig as soon as possible following DEQ approval of this scope of work.

References

Anchor QEA, (Anchor QEA, LLC), 2016. *Upland Feasibility Study Data Gaps Investigation Work Plan*. NW Natural Gasco Site. Prepared for NW Natural. May 13, 2016.

Anchor QEA, 2018. Letter to: Dana Bayuk, Oregon Department of Environmental Quality. Regarding: Groundwater Monitoring Program to Assess Effects of Upcoming Activities at the NW Natural LNG Tank Basin and Koppers Facility. March 23, 2018.

Anchor QEA, 2019a. *LNG Basin and Koppers Basin Groundwater Evaluation Baseline Data Report*. NW Natural Gasco Site. Prepared for NW Natural. February 8, 2019.

Anchor QEA, 2019b. Regarding: LNG Basin and Koppers Basin Groundwater Evaluation Data Tables and Figures. Email to: Dana Bayuk, Oregon Department of Environmental Quality, from Jen Mott, Anchor QEA, LLC. February 28, 2019.

Anchor QEA, 2019c. Memorandum to: Dana Bayuk, Oregon Department of Environmental Quality. Regarding: LNG Basin and Former Koppers Basin Groundwater Evaluation – First Quarter 2019. June 28, 2019.

Anchor QEA, 2019d. Memorandum to: Dana Bayuk, Oregon Department of Environmental Quality. Regarding: LNG Basin and Former Koppers Basin Groundwater Evaluation – Second Quarter 2019. October 31, 2019.

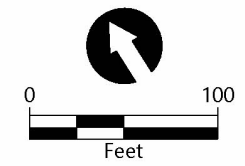
Anchor QEA, 2020. Memorandum to: Dana Bayuk, Oregon Department of Environmental Quality. Regarding: LNG Basin and Former Koppers Basin Groundwater Evaluation – Third Quarter 2019. February 17, 2020.

Bayuk, D., 2018. Regarding: NW Natural, LNG Basin and Koppers Tank Farm Groundwater Monitoring. Email to: John Renda (Anchor QEA). May 2, 2018.

Figure



- LEGEND:**
- █ Proposed Primary Trench Location
 - █ Additional Trench Segment Location
 - Proposed Trench Boring
 - ⊕ MW-3-26 Existing Monitoring Well, Observation Well, or Piezometer



HORIZONTAL DATUM: Oregon State Plane North NAD83 (International Feet)
VERTICAL DATUM: City of Portland
AERIAL SOURCE: Google Earth Pro, July 2018

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 Filepath: K:\Projects\0029-NW Natural Gas Co\Gasco Site Remedy\LNG Basin Retrofit_Koppers GW Eval\0029-RP-003 (Prop Trench and Borings).dwg Figure 1



Figure 1
Proposed Trench Alignments and Boring Locations

Fill WBZ Trench Interim Measure Field Investigation Plan
 NW Natural Gasco Site