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23 August 2018

Ruth Curley
Professional Engineer 1 (Environmental)
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway, 12th Floor
Albany, New York 12233

RE: LNAPL Extraction Work Plan
Enclave on 241st Street Development
714 East 241st Street
Bronx, New York
NYSDEC BCP Site No.: C203077
Langan Project No.: 140115301

Dear Ms. Curley:

Langan Engineering, Environmental, Surveying Landscape Architecture, and Geology, D.P.C. (Langan) has prepared the following light non-aqueous phase liquid (LNAPL) Extraction Work Plan for the property located at 714 East 241st Street in the Wakefield section of the Bronx, New York (the "Site").

BACKGROUND

During the completion of our Remedial Investigation (RI) of the Site in October 2015, approximately two inches of LNAPL was detected in one 1-inch diameter monitoring well (MW-29) with a Solinst Model 122 oil/water interface probe. A sample of the LNAPL was collected and submitted to York Analytical Laboratories (York). A gas chromatograph/flame ionization detector (GC/FID) fingerprint analysis (EPA method 8015D) completed on the LNAPL indicated that the pattern resembled weathered No. 2 fuel oil or diesel fuel.

During an April 2016 gauging of monitoring wells at the Site, Langan identified approximately 6 feet of apparent LNAPL within MW-29. A sample of the LNAPL was collected and submitted to York for analysis and the results were consistent with the previous sampling in October 2015, confirming a weathered No. 2 fuel oil or diesel. On 6 May 2016, Langan submitted a LNAPL Extraction Work Plan to New York State Department of Environmental Conservation ("the Department") in connection with the discovery. The work plan was approved on 9 May 2016.

In accordance with the May 2016 LNAPL Extraction Work Plan, Langan installed one 4-inch-diamater monitoring well directly over the well at MW-29 on 20 May 2016. Following the well installation activities, no measureable NAPL was observed in four consecutive gauging and monitoring events at MW-29 between 25 May and 15 June 2016.

During a groundwater gauging event at the Site on 18 June 2018, Langan notified the Department that an approximate 7-inch thick layer of LNAPL was measured at MW-29. In response to this finding, Langan performed two bailing and gauging events at the Site on 22 and 27 June 2018. Based on the slow rate of recovery of product in the monitoring well, Langan was only able to remove a total of about 1 ½ gallons of LNAPL from MW-29 during the two events.

As detailed in the Department-approved March 2016 Remedial Action Work Plan (RAWP), redevelopment of the Site will incorporate a large soil excavation program that will extend to a depth necessary to assure complete LNAPL removal, including in the area of MW-29. However, the Department has requested that the LNAPL source area be addressed now, prior to site-wide construction activities. As such, Langan has developed the following LNAPL Extraction Work Plan to address the remaining LNAPL in and around MW-29. It should be noted that the redevelopment will also include the emplacement of an oxygen release compound (ORC) to enhance groundwater remediation via aerobic bioremediation, after the impacted soils and LANPL are removed.

LNAPL EXTRACTION WORK PLAN

Introduction

Langan proposes to perform two LNAPL extraction events using Vacuum Enhanced Fluid Recovery (VEFR). VFER is a mobile dual/multi-phase extraction system that can effectively remove LNAPL from the subsurface with the use of high vacuum air/fluid extraction system. Each event will involve applying a vacuum (typically 10 to 25 inches of mercury [Hg]) to monitoring well MW-29 to create a pressure gradient that will induce the movement of LNAPL from the vadose zone, capillary fringe, and the saturated zone into the well. A down-hole apparatus will also be used to control the fluid elevation in the well. The system will be configured to operate in a manner to minimize the amount of groundwater recovery while maximizing the LNAPL recovery.

LNAPL Extraction and Handling

The LNAPL extraction events would be executed by accomplishing the following tasks:

- Prior to the start of the VEFR event, a photoionization detector (PID) reading will be collected at the well.
- LNAPL thickness will be gauged at the extraction well with a Solinst Model 122 oil/water interface probe (or equivalent).
- A PVC bailer will be used to bail the well and remove all measurable LNAPL.
- While the extraction well is recharging for a minimum of one hour; periodic depth to water and depth to product in the extraction well will be measured to track the rate of water recovery using an oil water interface probe. This will provide an estimate of the rate that LNAPL recharges into the extraction well.
- The LNAPL extraction activities will be conducted using a high vacuum multi-phase extraction system. Prior to the start of the VEFR event, a pre-fabricated stinger tube connected to vacuum hose will be inserted in the extraction well. The vacuum hose will be laid above ground and connected via a cam-lock fitting to a pre-fabricated manifold setup (as required). The line connected to the manifold will have a ball-valve and sight-tube. A mobile moisture separation tank (knock-out pot, KOP), will be utilized to assess real-time fluid recovery rates at MW-29. The manifold trunk will be fitted with a cam-lock fitting to allow connection of the vacuum-truck influent hose.
- The stinger tube assembly will skim LNAPL, if present, from the surface of the groundwater interface. Fluid is lifted by the vacuum and transported up and along the piping by entrained flow.
- Based on the subsurface conditions, the three types of VEFR extraction configurations for execution at the Site may include the following:
    - Low Vacuum Extraction (LVE) – A moderate vacuum (5 to 10 inches Hg) is applied through a down-well stinger tube to generate a slow but consistent total fluids recovery rate in an effort to enhance the migration of floating LNAPL to and out of the well. Applied vacuum and slurp tube depth can be adjusted to maximize LNAPL recovery rates.
    - Dual Phase Vacuum Extraction (DPVE) – A vacuum of greater than 10 inches Hg is applied to the extraction well through a stinger tube with the aim of exposing the entire well screen to the applied vacuum. DPVE is generally effective for extracting residual and/or trapped LNAPL from fine grained sediments.
    - Focused DPVE – A high vacuum (>15 inches Hg) is applied to an isolated interval along the well screen. A packer assembly can be used to isolate selected intervals based on observed smear zones and/or product thickness trends. Focused DPVE is generally effective for extracting residual and/or trapped LNAPL from tight fine grained sediments with narrow smear zones that have more permeable zones above

or below the targeted area. During this event the packer assemblies will be customized to the observed smear zone of the extraction well.

- The following parameters will be recorded during LNAPL extraction:
  - Extraction Time – After the initial evaluation of the response at MW-29, increased extraction time will be allotted to depth intervals that show the most efficient LNAPL recovery rates.
  - Recovery Rate Description – The characteristics of the recovered fluid will be observed through the clear extraction hose (sight tube) and based on the observations, the applied vacuum will be adjusted to maximize total fluid recovery rates.
  - Recovered LNAPL and Aqueous Phase Descriptions
  - Vapor Flow Rates – Applied vacuum to the extraction well will be monitored and recorded concurrently with approximate liquid flow rates. Langan will attempt to record vapor flow rates from the well using an in-line flow meter. If the extracted vapors are significantly below the lower explosive limit (LEL), Langan will record flow rates using a Veloci-Calc hand held flow meter, or equivalent device.
  - Vacuum Applied at the Extraction Well
- All extracted product and oily water will be transported off-site by the VEFR contractor at the end of each day.

At the end of the second LNAPL extraction event, Langan proposes to place an absorbent sock in MW-29. The absorbent sock will accumulate LNAPL that enters the well and further reduce the volume of LANPL in the subsurface around MW-29. The absorbent sock will be removed and replaced on a monthly basis until site-wide construction starts or until LNAPL is no longer observed on the sock for two consecutive events.

Reporting

Following each LNAPL extraction event, the data collected will be compiled into a letter report for discussion with NYSDEC documenting work completed and quantities of LNAPL recovered and an explanation of any notable site conditions.

CLOSING

Should you have any questions regarding the responses presented in this Work Plan, please feel free to call us at 203-784-3069.

Sincerely,
Langan Engineering, Environmental, Surveying, Landscape Architecture, and Geology, D.P.C.

Ryan Wohlstrom
Senior Project Manager

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Senior Associate/Vice President

cc. Jonathan Seplowitz, Michael Goldberg – Enclave on 241 Street LLC
Frank Pavia, Esq. – Harris Beach, LLP