ENVIRONMENTAL CONSULTING & MANAGEMENT
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August 6, 2009

Mr. Shaun Bollers
Environmental Engineer
New York State Department of Environmental Conservation
Division of Environmental Remediation
47-40 21st Street
Long Island City, New York 11101

Re: Dual Phase (High Vacuum) Vacuum Extraction Pilot Study Work Plan
Sunnyside Yard, Queens, New York

Dear Mr. Bollers:

Roux Associates, Inc. (Roux Associates) and Remedial Engineering, P.C. (herein collectively referred to as Roux Associates) have prepared this letter work plan to describe the proposed dual phase (high vacuum) vacuum extraction (DPVE) pilot study for Operable Unit 3 (OU-3) of the Sunnyside Yard (Yard) located at 39-29 Honeywell Street, Queens, New York (Site). The use of DPVE has been proposed as an alternative remedial technology in lieu of open excavation below the water table in OU-3 to address the separate-phase hydrocarbon (SPH) plume. This work plan provides an objective of the DPVE pilot study, a description of DPVE pilot study system components, and procedures for data collection and monitoring.

DPVE is a known technology and has been applied to multiple sites by Amtrak and Roux Associates and is widely used in the remediation field. Recovery of SPH has been successful within OU-3 over the past year with over 1,000 gallons removed through extraction techniques performed in temporary recovery pits and monitoring wells.

Objective
The objective of the DPVE pilot study is to gather Site-specific performance parameters such that a DPVE system can be designed and installed in OU-3. The performance parameters to be determined include the number and spacing of recovery wells, vapor and water discharge rates, and vacuum and treatment requirements. The pilot study will also allow for estimating the SPH recovery rate and effectiveness of oil/water separation and recovered water treatment in meeting New York City Department of Environmental Protection (NYCDEP) sewer effluent standards.

DPVE Pilot Study System Configuration

The DPVE pilot study will consist of two proposed DPVE wells (DPVE-1 and DPVE-2), use of two existing monitoring wells (P-2 and P-4) as DPVE wells, existing monitoring wells (P-1 to P-16) used as observation points, and a dual phase extraction system from ProAct Services Corporation (ProAct). A specification sheet of the ProAct dual phase extraction system is provided as Attachment 1. The dual phase extraction system from ProAct includes a liquid ring pump (LRP), oil/water separator, bag filters, liquid and vapor phase carbon units and all the peripheral system components necessary to perform the DPVE pilot study. The LRP equipment will be housed in a treatment trailer enclosure.

The DPVE pilot study area will be focused in the area of the existing SPH plume and monitoring wells P-1 to P-16. The DPVE wells and monitoring network will allow for determination of how far and to what degree the effects of the high vacuum will be observed. The location of the proposed DPVE pilot study is shown on Figure 1.

As mentioned above, two DPVE wells will be installed for the pilot study. DPVE-1 will be located approximately 3 feet north of existing monitoring well P-5. DPVE-2 will be located approximately 12 feet east of P-13. The wells will be constructed of 4-inch diameter Schedule 40 polyvinyl chloride (PVC). The DPVE wells will be screened from approximately 2 to 5 feet below land surface (ft bls). As the proposed induced vacuum will tend to move fines into the well, the DPVE wells will be developed prior to the pilot study. The DPVE wells will be equipped with 1-inch diameter drop tubes that will extend to near the bottom of the well. The wellhead will be sealed to prevent leakage of the vacuum. A schematic of the DPVE well construction is shown on Figure 2. The typical DPVE wellhead detail is provided on Figure 3. The typical DPVE wellhead will also be installed on P-2 and P-4 when they are to be used as recovery wells.

The LRP system in the treatment trailer enclosure is sized to handle 300 actual cubic feet per minute (acfm) at a vacuum of 28 inches of mercury (in Hg). The seal liquid for the LRP will be oil. During LRP operation, the recovered vapor and water will enter the air/fluids separator prior to the LRP. The 120-gallon air/fluids separator will have three float switches to control the transfer pump. The recovered water will be pumped from the air/fluids separator to the oil water separator, followed by bag filters and two-200 pound liquid phase carbon units arranged in series prior to discharge to the combined sewer discharge location located in OU-3. The discharge to the sewer will utilize the existing temporary sewer connection permit. The groundwater treatment system has been designed to meet the NYCDEP effluent standards. The rate of fluid recovery will be measured with a totalizing water flow meter.

The recovered vapor will be sent to two-180 vapor phase carbon units arranged in series prior to discharge to the atmosphere. The vapor extraction rate will be measured with an in-line direct reading flow meter.

A process flow diagram of the DPVE pilot study system is shown on Figure 4.

DPVE Pilot Study Methodology

Following installation of the proposed DPVE wells, the pilot study will begin. It is anticipated that the pilot study will be conducted over a two week period. During the pilot study, sufficient measurements will be taken to provide accurate data representation to meet the objectives of the pilot study. The duration of the pilot study may be adjusted, if necessary, depending on the data generated. In addition, additional monitoring points may also be installed, as necessary, to ensure the collection of sufficient data. All field activities and measurements will be recorded in field notebooks and field forms. The details of the pilot study are outlined below.

The observation wells to be monitored during the pilot study will include, at a minimum, four to five existing monitoring wells surrounding the active extraction point. As discussed above, existing monitoring wells P-2 and P-4 will also be used as recovery wells. The existing monitoring wells will be fitted with sealed well caps containing a vacuum gauge and a port for water level measurement as shown on Figure 5. The water and SPH levels will be measured in the drop tube.

The DPVE phase of the pilot study will be performed and include vacuum extraction from the DPVE wells beginning with DPVE-1. The DPVE phase will include 30, 60 and 100 percent of the maximum vacuum at each DPVE well and subsequent monitoring. Each DPVE well and existing monitoring wells P-2 and P-4 will be tested over a sufficient period of time (i.e., eight hours). During each different flow regime, the rate of air extraction, vacuum at the extraction well head, and vacuum at the monitoring points will be monitored every 30 to 60 minutes. During the pilot study, the following measurements will be monitored and recorded:

- Vacuum readings at recovery test well;
- Vacuum readings at observation wells (existing monitoring wells);
- Groundwater and SPH levels in observation wells;
- Production rate of groundwater;
- Amount of SPH recovered from oil water separator;
- Monitoring of the extracted vapor before and after the vapor phase carbon with a photoionization detector (PID); and
- Vapor flow rate.

During the pilot study, samples of the recovered groundwater from the recovery test well will be collected from effluent of the liquid phase carbon units and analyzed for NYCDEP discharge standards from a minimum of two extraction locations. Select air samples will also be collected for laboratory analysis using USEPA Method TO-15 from the vapor stream.

Data Evaluation and Reporting

The performance monitoring data will be used to evaluate the impact of the high vacuum on the removal of the residual SPH. The results obtained during the performance monitoring will also be critical for determining the number and spacing of recovery wells for a full-scale system to address the residual SPH. In addition, critical operating performance information will be obtained to design a full-scale extraction and treatment system. A summary of the pilot study and documenting the data will be prepared and in a brief final report to be submitted to the New York State Department of Environmental Conservation (NYSDEC). Laboratory analytical reports will also be included.

Please call if you have any questions or if we can provide further assistance.

Sincerely,

ROUX ASSOCIATES, INC.

Glenn Netuschil

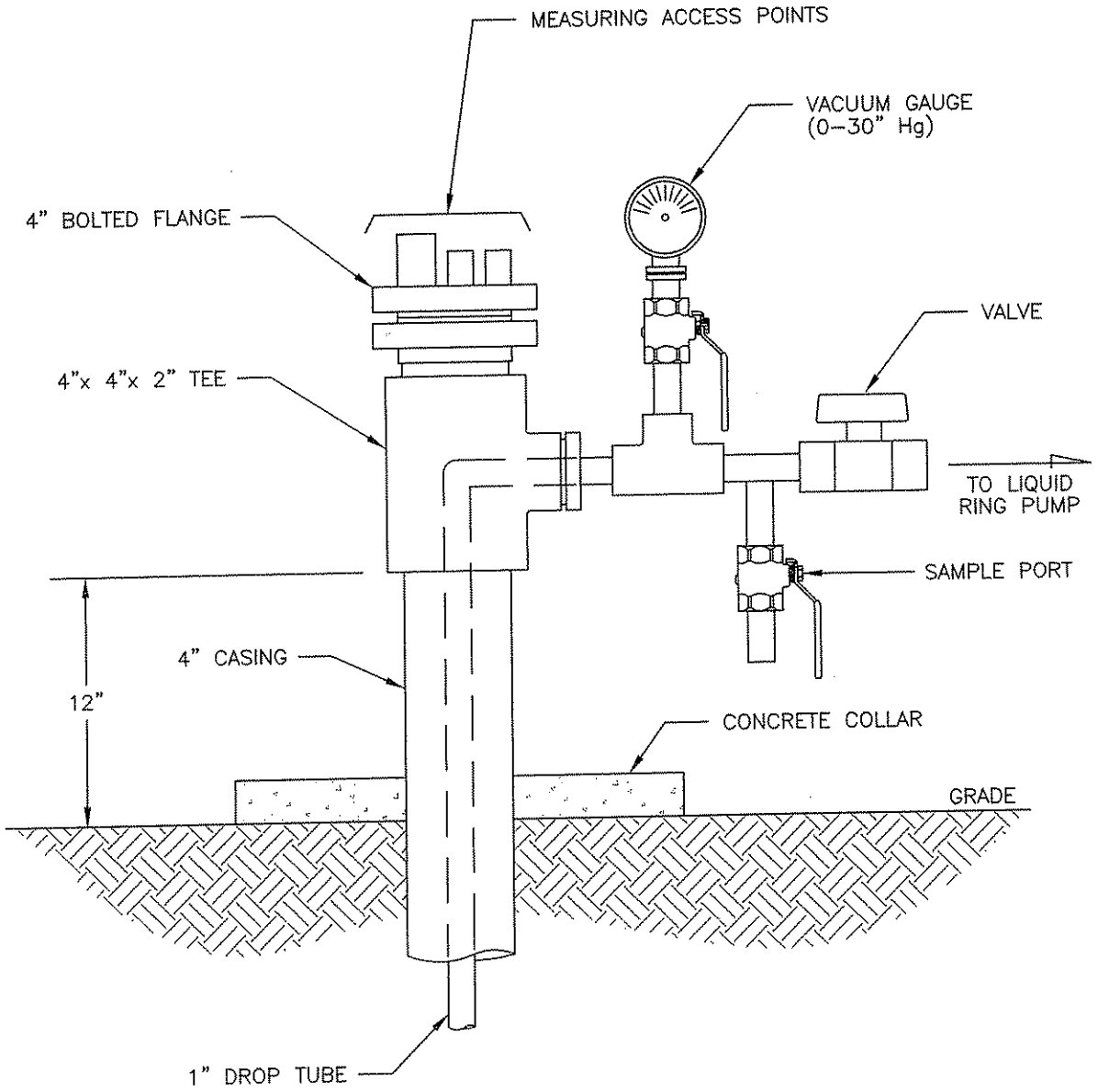
Glenn Netuschil, P.E.
Senior Engineer

REMEDIAL ENGINEERING, P.C.

Charles J. McGuckin, P.E.
Principal Engineer

Attachments

cc: J. O'Connell, NYSDEC
R. Mohlenhoff, P.E., Amtrak
C. Caldwell, Amtrak
M. Stern, Amtrak
M. Judd, NJT
C. Warren, Kramer Levin, et al.



Title:

PROPOSED DPVE WELL HEAD

SUNNYSIDE YARD, QUEENS, NEW YORK

Prepared For:

AMTRAK

Remedial REMEDIAL ENGINEERING, P.C. *ENVIRONMENTAL ENGINEERS*	Compiled by: G.N.	Date: 09JUL09	FIGURE 3
	Prepared by: G.N.	Scale: AS SHOWN	
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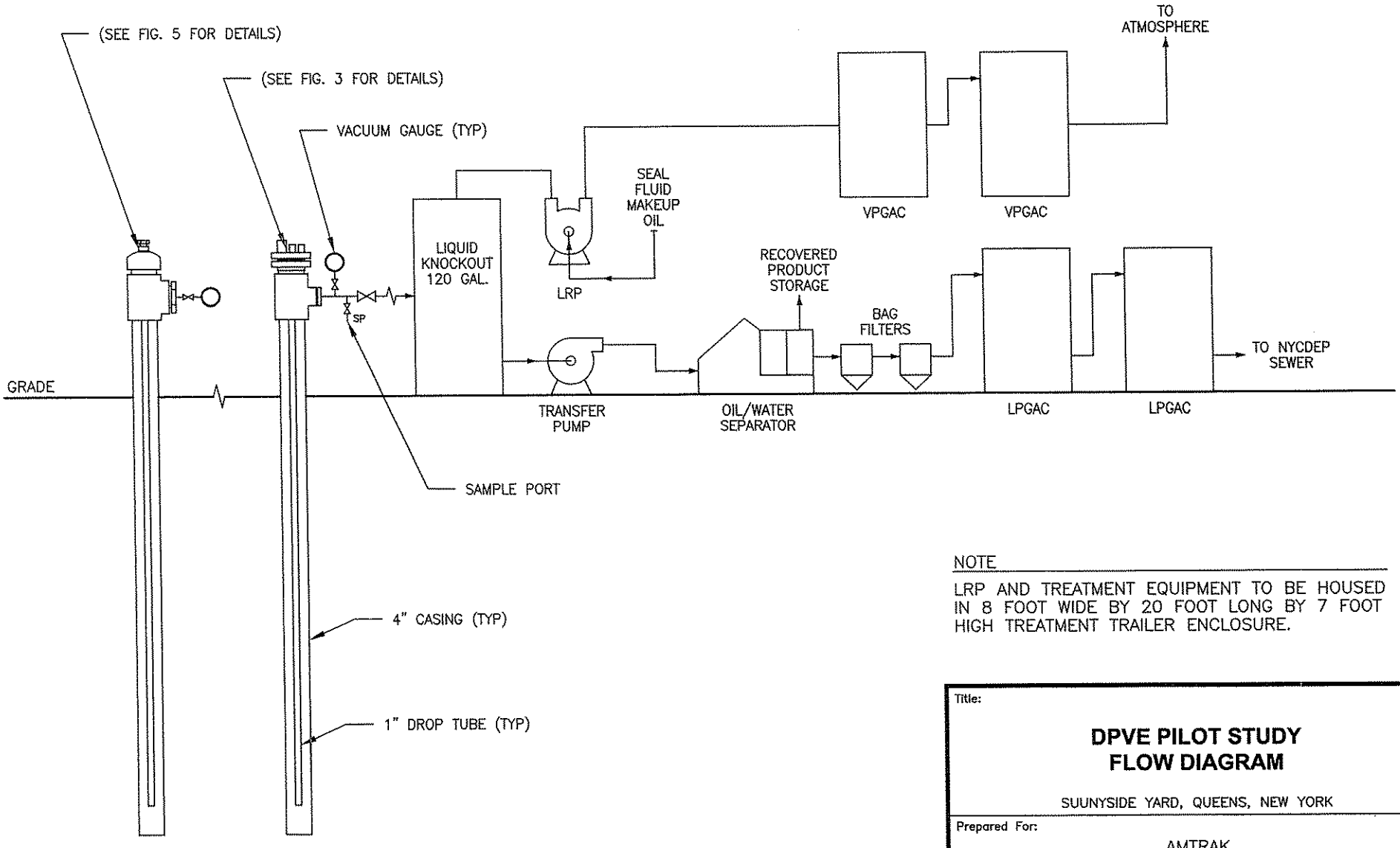

NOTE

LRP AND TREATMENT EQUIPMENT TO BE HOUSED IN 8 FOOT WIDE BY 20 FOOT LONG BY 7 FOOT HIGH TREATMENT TRAILER ENCLOSURE.

Title:

DPVE PILOT STUDY
FLOW DIAGRAM

SUUNYSIDE YARD, QUEENS, NEW YORK

Prepared For:

AMTRAK

Remedial REMEDIAL ENGINEERING, P.C. ENVIRONMENTAL ENGINEERS	Compiled by: G.N.	Date: 09JUL09	FIGURE
	Prepared by: G.M.	Scale: AS SHOWN	4
	Project Mgr: G.N.	Project: 05545Y	
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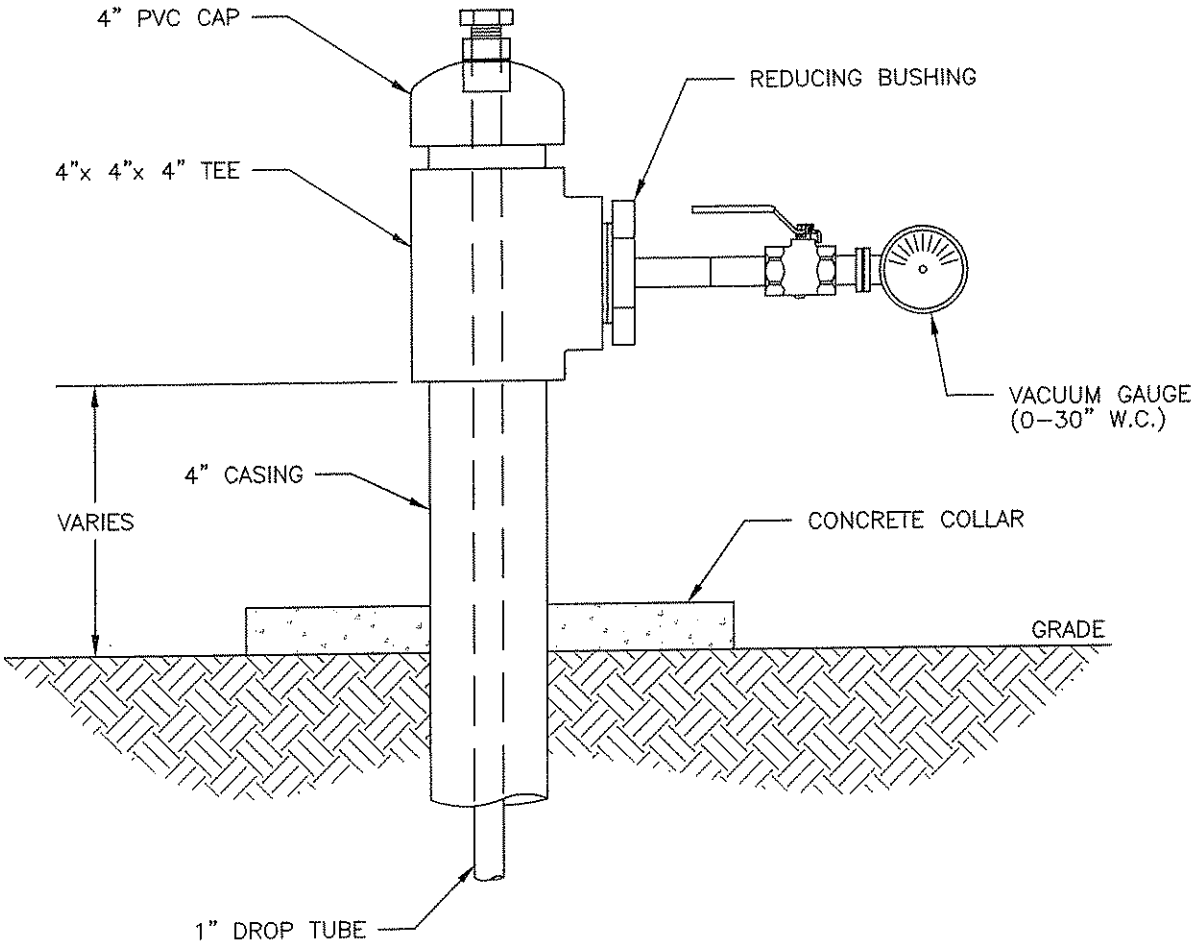

Title:

EXISTING MONITORING WELL HEAD CONFIGURATION

SUNNYSIDE YARD, QUEENS, NEW YORK

Prepared For:

AMTRAK

Remedial	Compiled by: G.N.	Date: 09JUL09	FIGURE
	Prepared by: G.N.	Scale: AS SHOWN	5
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