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OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

December 6, 1996

Mr. David Forsythe - Code 1822
Department of the Navy
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, VA 23511-2699

RE: Status Report: Q-Area Drum Storage Yard (QADSY) Groundwater Remediation Project
Norfolk Naval Station, Virginia
LANTDIV Delivery Order 0073
OHM Project # 17260

Dear Mr. Forsythe:

OHM Remediation Services Corp. (OHM) recently completed the field design test for air sparging/soil vapor extraction (AS/SVE) at the QADSY. The field design test was performed in a cooperative effort with Geraghty & Miller Inc. (G&M), OHM's teaming partner for the LANTDIV contract. This work was performed to evaluate the effectiveness of an AS/SVE system on removing volatile organic compounds (VOCs) from groundwater. Although a similar pilot test was previously performed by others, some design criteria was inadequate to design a full scale system. OHM and G&M performed the field design test on a larger scale in an effort to generate meaningful test parameters for the design of a full scale system.

Thirty-three wells were installed by OHM at area of concern 1 (AOC-1) and area of concern 2 (AOC-2) for the execution of the field design test. Four different types of wells were installed at each area of concern :

- 3 Air sparge wells - to introduce the air sparge bubbles beneath the zone of VOC-impacted groundwater.
- 2 SVE wells in AOC-1, 3 SVE wells in AOC-2 - to capture VOC-laden vapor being discharged as a result of the air-stripping caused by the air sparging.
- 4 Air sparge monitoring wells - to measure physical and geochemical parameters to evaluate the ROI from air sparging.
- 7 Vapor probes - to monitor induced vacuum as a result of the applied vacuum at the SVE well; used to determine vacuum ROI.

These wells were constructed and located so that they can be incorporated into the design of a full-scale system.

OHM mobilized a rotary vane, positive displacement blower to the site to apply vacuum to the SVE well(s). The blower was powered by a portable generator. A diesel-powered air compressor was used to inject air into the formation via the air sparge wells. Vacuum and pressure gauges, flow meters, and other required equipment monitored the operating conditions of the system throughout the tests. Many of the gauges, meters, and instrumentation used for the field design test can also be utilized in a full-scale system.

Two separate tests were conducted; one in AOC-1, and another in AOC-2. Each test consisted of three phases; phase 1 was performed to test the effectiveness of vertical SVE wells, Phase 2 to test the effectiveness of horizontal SVE wells, and Phase 3 to test the effectiveness of the complete AS/SVE system on a long term basis (3 days). Groundwater and vapor samples were collected at various intervals throughout the test to evaluate the mass removal of VOCs. The test setup was performed as specified in the work plan with the exception of installing a shallower AS well in the same borehole as the deep AS well. With minimal cost impact, the shallower well was installed as a contingency, in the case that air could not pass through the formation at the deeper designed depth. When performing the field design test, both the shallow and deep AS wells were tested at AOC-2. Only the deep AS well was tested at AOC-1 because the formation accepted the air flow at the greater depth at both AOC-1 and AOC-2.

A detailed summary of the test results will be presented to the Navy by December 20, 1996, in a Field Design Test Report. Preliminary interpretations of the test results indicate that the AS/SVE technology may be an appropriate method to reduce or eliminate the VOCs in groundwater at the QADSY site. Preliminary evaluation of radius of influence (ROI) induced from the vapor extraction wells indicate that the vertical wells are as effective at propagating vacuum ROI as the horizontal SVE wells. This has an important impact, as the vertical wells are much easier and more cost effective to install. While drilling the AS wells, continuous split-spoon soil samples were collected from the ground surface to the total depth of the well. Initial descriptions of soil samples collected between 30 and 40 feet suggested that because the soil appeared very hard and impermeable, air from a sparge well may not pass through the formation's soils. However, observations made during the tests indicated that ROI from the deep air sparge wells was favorable to a successful full scale AS/SVE system design. Specific information regarding AS and SVE ROI will be presented in the Field Design Test Report. A full-scale design work plan will be prepared at a later date, presumably in the first quarter of 1997.

If you have any questions regarding the technical aspects of this project, please contact me at (609)588-6332, or Phil Tully at (609)588-6348.

Sincerely,

D M. Miller

David M. Miller, P.G.
Project Hydrogeologist

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