Example Draft Workplan for an Air Sparging at the SMS Instruments Superfund Site
December 9, 2003

This document is provided as technical assistance at the request of Mark Dannenberg (site RPM) and Jennifer Griesert (OSRTI). This work was conducted by GeoTrans under subcontract to Dynamac, EPA Contract No. 68-C-02-092, WSR ST-1-15 as specified in Task 2 of that work service request. This document is provided as an example only and does not indicate the GeoTrans will provide the work described.

BACKGROUND

VOC contamination of the ground water at the site has decreased substantially since the Remedial Investigation. Much of this decrease is attributed to the removal of contaminated soil by the SVE system and the productive aquifer (augmented by injection of treated water between 1994 and 1998) that has flushed contaminated ground water toward EW-1 or even beyond EW-1 before it became operational. The following table provides representative ground water concentrations from the Remedial Investigation and the maximum concentrations from the April 2002 sampling event.

Contaminant Exceeding Standard	"Representative" Remedial Investigation Concentration (ug/L)	Maximum April 2002 Concentration (ug/L)
VOCs		
Chlorobenzene	568	39
1,2-Dichloroethane	530	<5
1,1-Dichloroethane	7	20
Ethylbenzene	215	13
Tetrachloroethene	20.8	<5
Trichloroethene	4,396	<5
Total xylenes	1,750	12
SVOCs		
1,3-Dichlorobenzene	22.5	<5
1,2- and 1,4-Dichlorobenzene	119.5	4.9
Napthalene	34.5	<5

As is evident from the table, most contaminant concentrations have decreased by over an order of magnitude from the time of the Remedial Investigation. For many of the chlorinated compounds, such as tetrachloroethene and trichloroethene, the decrease in concentration may also be due to dechlorination caused by microbial activity using the other organics as nutrients and the chlorinated compounds as electron acceptors. Concentrations of some VOCs, however, are not low enough to meet the cleanup standards and conditions have been nearly stable (with fluctuations) for approximately four years.

Although the current P&T system offers capture of the contamination on site, it is not accelerating site cleanup. The use of more aggressive remediation in the source area, such as air sparging, should further decrease concentrations and potentially reduce the amount of time to reach cleanup standards. A pilot test of aggressive remediation was recommended in an RSE report for the site dated December 9, 2003. The pilot test involves implementing oxygen releasing compound injections or air sparging, discontinuing the P&T system, and monitoring ground water concentrations. Monitoring would be used to indicate progress toward the cleanup standards as well as the potential for plume migration. The pilot test would end with either 1) restarting the P&T system due to unacceptable plume migration or 2) reaching cleanup levels.

It should be noted that some of the contamination detected on site is likely from an upgradient source. It appears that this contamination is predominantly 1,1-DCA and 1,1,1-TCA. These contaminants will likely continue to flow through the site even after site-related contamination has been successfully remediated. Therefore, the success of the pilot test, and SMS Instruments remedy in general, should not be influenced by the presence of these contaminants.

The following is an example scope of work for implementing an air sparging pilot test. Estimated costs are included. We assume that due to the low contaminant levels in groundwater, vapor collection by an SVE system will not be required.

SCOPE OF WORK

Development of a Health and Safety Plan

An appropriate site-specific health and safety plan will be developed for the following tasks.

Improved Characterization and Sparge Point Installation

Improved characterization will include approximately 10 direct-push borings at locations surrounding MW-6S and between EW-1 and EW-3. These borings will be completed to approximately 40 feet bgs. Prior to drilling, all underground utilities will be identified and cleared. The borings will be logged continuously for lithographic data and screened with a photoionization detector (PID). A ground water grab sample will be collected within 5 feet of the water table at each location and analyzed for VOCs (8260b). The analysis should be provided within a standard three-week turnaround time.

Based on the VOC analyses and lithographic data up to three sparge points will be installed(SP-1 through SP-3) to depths greater than or equal to the deepest observed contamination. These points will be constructed of 2-inch schedule 40 polyvinyl chloride (PVC). The lowest two feet will be screened with an appropriate slot size (determined in the field or from previous well construction information). These points will be finished flush with the surface and protected prior to completion of the sparge point vault. The annular space between the boring wall and the screen will be filled with appropriately graded clean sand (determined in the field or from previous well construction information) to approximately 2 feet above the screen followed by one foot of thick of bentonite seal. Cement grout or native fill will be added to within 3 feet of land surface.

The sparge points will be developed using an air compressor and tremmie pipe to air lift any fine sediment from the bottom of the well and to clean the screen interval. Soils and water generated during the drilling shall be properly disposed of.

In addition, up to four 2-inch piezometers (PZ-1 through PZ-4) will be installed for monitoring the radius of influence of the air sparging system. The piezometers will be constructed of schedule 40 polyvinyl chloride and finished with flush mounted traffic-rated covers. The piezometers will have ten feet of screen with an appropriate slot size (determined in the field or from previous well construction) and intersect the water table so that both the saturated and unsaturated zones can be monitored in the future.

Six additional days of drilling beyond the four days for characterization, is assumed for the installation of the sparge points and piezometers. Boring logs shall be prepared for each boring and sparge point, all points shall be presented on a site map to indicate the boring locations, and the work shall be documented in a brief report.

System Installation and Start-up

A 10 horsepower rotary vane compressor capable of a minimum of 40 cfm at 50 psi will be installed within the P&T compound in a shed enclosure. Appropriate piping, filters, instrumentation, and a control panel will also be installed. Items include, but are not limited to, an inlet filter, air bleed valve, air-to-air heat exchanger, coalescing and desiccant filter, and temperature indicator. For each sparge point, flow and pressure indicators will be included in underground vaults with traffic rated covers. Air lines between the sparge points and the compressor will be underground 3/4 to 1-1/2 inch diameter air lines rated for 100 psi minimum. A maximum pressure of 50 psi should be expected.

Prior to start-up the P&T system will be shut down for at least one month to allow ground water concentrations to adjust to non-pumping conditions, and one round of ground water sampling will be conducted as summarized in the RSE report to document baseline conditions for the air sparging pilot test. For convenience, the pilot test will be coordinated with the spring sampling event. This means that the P&T system should be shut down and properly moth-balled by mid to late February and that the spring sampling event in late March or early April will serve as the baseline sampling event.

Also prior to start-up, water levels will be recorded in PZ-1 through PZ-4, MW-6S, MW-6D, MW-05, EW-3, and EW-1. Because the P&T system will be shut down, the extraction wells will not be operating. A PID will also be used to obtain a baseline reading of air quality within nearby buildings. The air sparging system shall then be started with an initial flow rate of 2 scfm per sparge point and the following field measurements shall be collected at 20-minute intervals:

- pressure and flow at the sparge points.
- water levels at MW-2A and PZ-1 through PZ-4
- VOC concentrations at MW-6S, EW-3, EW-1, and PZ-1 through PZ-4 measured with a PID
- presence/absence of bubbles, foam, and/or odor at MW-6S, EW-3, EW-1, and PZ-1 through PZ-4

After 60 minutes, the sparge rate will increase to 4 scfm per sparge point and the above measurements shall be recorded. The above tests will also be repeated for flow rates of 10 scfm and 15 scfm per sparge point, if such flow rates are achievable. A PID will be used to screen indoor air quality of nearby buildings, and the readings will be compared to those that were collected prior to start-up. Evaluation of the readings will consider activities within the buildings that may influence the readings.

During the tests, the system will be trouble-shooted to eliminate operating problems. System documentation and appropriate as-built drawings will be provided.

System operation will be discontinued, reevaluated, or altered if any of the following occur:

1. PID screening within the buildings suggests degradation of air quality due to the pilot test

2. Excessive mounding of ground water (e.g., over 5 feet at the monitoring points).

3. Any other system hazards that create unnecessary hazards to human health or the environment.

Air Sparging O&M and Monitoring

Assuming the system is operational, routine O&M will consist of the weekly recording and reporting of pressure, flow, other sparge system parameters, and screening of indoor air. O&M of the sparging system is expected to occur for six months.

Groundwater monitoring for VOCs will be done in accordance with the recommendations in the RSE report. Water level measurements at MW-6S, MW-6D, MW-05, EW-1, EW-3, and PZ-1 through PZ-4 will also be done quarterly. The summer and fall 2004 sampling events will mark the first and second sampling events after pilot test start-up. The results of each event will be reported to EPA in a short quarterly letter report that replaces the current quarterly reports provided by the contractor. Significant mass removal and monitoring well concentration reductions should be apparent within these first two events. A review of the system performance, the potential system alterations including additional sparge points, and the potential for discontinuing sparging should be conducted after six months of operation.

ESTIMATED COSTS

Task	Estimated Cost
Capital Costs for Characterization, Design, Installation, and Start-up	
Appropriate Health and Safety Plan	$5,000
Improved Characterization and Sparge Point Installation	$25,000 driller, disposal, equipment, and materials $15,000 consultant oversight and sample analysis $5,000 reporting
System Installation and Start-up	$10,000 design $15,000 equipment $45,000 installation of compressor, controls, underground lines, well vaults $5,000 start-up (labor)
Total Capital Costs	**$125,000**
Annual O&M Costs*	
Air Sparging O&M and Monitoring	$8,000 per year (electricity) $30,000 per year (labor) $8,000 per year (additional sampling/monitoring/reporting) $8,000 per year (additional performance review/management)
Total Increase in Annual Costs	**$54,000 per year**

** The annual O&M costs provided above are in addition to approximately $100,000 per year that would be used for ground water monitoring, project management, technical support, and reporting as outlined in the RSE report. Therefore, the total annual cost for the site remedy with air sparging (and no P&T operation) would be approximately $154,000 per year.*