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INTERIM CORRECTIVE MEASURE IMPLEMENTATION REPORT
TRIUMVIRATE ENVIRONMENTAL (NYC), LLC
42-14 19TH AVENUE
ASTORIA, QUEENS, NEW YORK
F/K/A CHEMICAL WASTE DISPOSAL CORPORATION
EPA ID #NYD077444263

Prepared on Behalf of:

John F. McQuillan, Jr., President
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For Submittal to:

Mr. Vimal Minocha, P.E.
Environmental Engineer
Bureau of Solid Waste & Corrective Action
Division of Solid & Hazardous Waste
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7258

RECEIVED

Prepared by:

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***SAGE* Project #R036**

MAY 2005

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May 31, 2005

Mr. Vimal Minocha, P.E.
Environmental Engineer
Bureau of Solid Waste & Corrective Action
Division of Solid & Hazardous Waste
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7258

RE: Interim Corrective Measure Implementation Report
42-14 19th Avenue
Astoria, Queens, New York

Dear Mr. Minocha:

SAGE Environmental, Inc. submits this report to document the installation, start-up and monitoring of the Soil Vapor Extraction (SVE) and Air Sparge (AS) at the referenced property. The SVE and AS systems were installed as part of an Interim Corrective Measure (ICM) in an effort to remediate subsurface impact identified during a RCRA Facility Investigation of the Site.

Should you have any questions pertaining to this information, please do not hesitate to contact the undersigned. We appreciate the opportunity to have provided our services.

Sincerely,
SAGE Environmental, Inc.

Thomas C. Saccoccio
Environmental Scientist

Rick Mandile
Project Manager/Principal

TCS/RM:car

Attachment

c: Tim Mooney, Triumvirate Environmental, Inc.
Keith Gronwald, New York State Department of Environmental Conservation
Rachel Chaput, United States Environmental Protection Agency
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CERTIFICATION

I certify that I have reviewed the submitted documentation, "Interim Corrective Measure Implementation Report, Triumvirate Environmental, LLC (NYC), 42-14 19th Avenue, Astoria, Queens, New York, F/K/A Chemical Waste Disposal Corporation, EPA ID # NYD077444263." This document and all attachments were reviewed in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete.

STATE OF NEW YORK
MARTHA L. MONSERRATE
074574-1
LICENSED PROFESSIONAL ENGINEER

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1.0 INTRODUCTION

1.1 Background

This report summarizes the installation, start-up and operation and maintenance activities associated with the soil vapor extraction (SVE) and air sparging (AS) system which are part of the Interim Corrective Measure (ICM) associated with the Resource Conservation and Recovery Act (RCRA) Facility Investigation of the property located on 19th Avenue between 42nd and 43rd Streets in Astoria, New York (Site). The Site and immediately surrounding areas are exclusively industrial and commercial. A site locus map is provided as **Figure 1**.

The Site is currently owned and operated by Triumvirate Environmental, LLC (NYC) (hereinafter, TE). TE purchased the facility in 2003. The Site was formerly owned by Chemical Waste Disposal Corporation (CWDC). The Site operated as a dry cleaning solvent distribution and recovery facility from 1964 until the mid-1980s. During the mid-1980's, the facility was permitted as a hazardous waste treatment, storage, and disposal facility (TSDF) under the then new RCRA. Site operations continue through the present. Over the years of operation by CWDC, releases of various chemicals have impacted soil and groundwater beneath the property.

In June 1985, during construction for a major sewer line project beneath 19th Avenue, strong solvent vapors were detected within the open street excavation in front of the CWDC facility. Preliminary testing indicated that the vapors consisted of volatile organic compounds (VOCs). A subsurface investigation report conducted for the New York City Department of Environmental Protection in late 1985 served to characterize the contaminants and hydrogeology of the Site and offered the opinion that the CWDC facility was the most likely source of VOCs encountered under 19th Avenue.

As a TSDF, the property and its hazardous waste operations are regulated under RCRA. Consequently, releases requiring assessment and clean-up at the Site are performed under RCRA corrective action rather than under New York State Department of Environmental Conservation (NYSDEC) regulations. As the State of New York is an authorized state under RCRA, the NYSDEC maintains regulatory authority for the Site along with oversight by the United States Environmental Protection Agency (EPA).

In 1993, a Consent Order between CWDC (the previous property owner), and the NYSDEC and EPA was entered into requiring, among other things, the assessment and eventual remediation of on-Site release areas and downgradient impacted environmental media. Since 1993, a number of environmental assessments have occurred both on and off-Site, approximating the nature and extent of impacts. Phase I and Phase II RFI reports for the Site dated January 1995 and February 1996, respectively, served to further characterize Site soils and the Site hydrogeology.

As part of construction of a new "outer facility warehouse" (see Figure 2 - Site Plan), the old hazardous waste storage units and concrete pad associated with the former CWDC operations were removed and replaced with a six inch thick concrete floor slab with secondary containment constructed over two high-density polyethylene (HDPE) liners and a clay layer. According to Mr. Gary Krack, CWDC's Operations/General Manager at the time of construction of the outer warehouse, approximately 300 cubic yards of soil were excavated, transferred to one-cubic-yard shipping containers, and transported to the EQ Hazardous Waste Disposal facility in Michigan during construction of the grade beams which provide support for the outer warehouse floor. According to Mr. Krack, the typical excavated depth during grade beam construction was approximately four feet below grade. This 300 cubic yard soil volume represents approximately 25 percent of the total volume of soil beneath the entire area of the outer warehouse floor to a depth of four feet, and as such, constitutes a significant source removal effort. Research to identify documentation confirming disposal quantities is currently being conducted by TE. During construction, vertical and horizontal vent wells and air sparge wells were installed beneath the outer warehouse by Geologic Services Corporation (GSC). In addition to the SVE/AS components, soil borings were advanced around the perimeter of the outer warehouse and backfilled with gravel in order to prevent the migration of sparge air to areas outside the building footprint during operation of the AS component of the ICM. Details regarding subsurface components of the SVE/AS system installed by GSC are summarized in the following sections.

As indicated previously, TE purchased the facility in 2003 and engaged *SAGE* Environmental Inc. (*SAGE*) to provide environmental services on its behalf. Prior to *SAGE*'s involvement with this facility, the most recent round of groundwater monitoring was conducted in August 25, 1995. In an effort to gain an understanding of current Site conditions, *SAGE* installed additional monitor wells to complement the existing groundwater monitor well network and performed quarterly groundwater monitoring between February 2004 and January 2005. Locations of monitor wells are depicted on the Site Plan included as **Figure 2**.

In June 2004, September 2004 and January 2005, eleven additional monitor wells were installed at the Site as part of the on-going Phase III RCRA Facility Investigation. The wells were installed in an effort to further define the extent and magnitude of impacted soil and groundwater in the vicinity of the Site. As additional monitor wells were installed, the quarterly groundwater monitoring scope was expanded to include sampling and laboratory analysis of groundwater samples collected from the newly installed monitor wells. A summary of Site monitor wells, well diameters and installation dates is included in **Table 1**.

Table 1
Site Monitor Wells

Well ID	Date Installed	Well Diameter (in)	Total Depth (ft)	Well Screen Length (ft)	Riser Length (ft)	Drilling Method	Environmental Consultant	Other Identifications
MW-5	10/16/85	4	20	15	4	HSA	NEPCCO	W-5
MW-6	10/16/85	4	20	15	4	HSA	NEPCCO	W-6
MW-7	10/17/85	4	20	15	4	HSA	NEPCCO	W-7
MW-12S	10/16/91	2	14	NA	NA	HSA	Eder	MW-12
MW-12I	7/11/95	4	16	NA	NA	HSA	D&B	
MW-13S	10/16/91	2	14	NA	NA	HSA	Eder	MW-13
MW-19S	6/28/95	4	10.5	6	4.5	HSA	D&B	
MW-19I	6/28/95	4	16	5	10.5	HSA	D&B	
MW-20S	7/11/95	4	15	10	4	HSA	D&B	
MW-20D	9/3/04	2	24	5	19	Geoprobe	*SAGE*	
MW-22S	7/12/95	4	NA	NA	NA	HSA	D&B	
MW-23R	12/17/03	2	14	10	4	Geoprobe	*SAGE*	
MW-24	12/16/03	2	12	10	2	Geoprobe	*SAGE*	
MW-25	12/17/03	2	17	10	7	Geoprobe	*SAGE*	
MW-26	12/16/03	2	18	10	8	Geoprobe	*SAGE*	
MW-27	1/30/04	2	19	10	9	Geoprobe	*SAGE*	
MW-28S	6/18/04	2	15	10	5	Geoprobe	*SAGE*	MW-28
MW-28D	9/3/04	2	23	5	18	Geoprobe	*SAGE*	
MW-29S	6/18/04	2	20	10	10	Geoprobe	*SAGE*	MW-29
MW-29D	9/7/04	2	27	5	22	Geoprobe	*SAGE*	
MW-30	9/7/04	2	10	5	5	Geoprobe	*SAGE*	
MW-31	9/7/04	2	10	5	5	Geoprobe	*SAGE*	
MW-32	9/7/04	2	10	5	5	Geoprobe	*SAGE*	
MW-33	9/7/04	1	9	5	4	Geoprobe	*SAGE*	
MW-34	9/7/04	1	8	5	3	Geoprobe	*SAGE*	
PZ-1	7/24/95	4	14.5	10	4	HSA	D&B	
APMW-1	12/23/04	2	15	12	3	Geoprobe	*SAGE*	
APMW-2	12/23/04	2	15	12	3	Geoprobe	*SAGE*	

ft = feet

in = inches

HAS = Hollow Stem Auger

D&B = Dvirka and Bartilucci, Consulting Engineers

Eder = Eder Associates Consulting Engineers

SAGE = *SAGE* Environmental Inc.

NEEPCO = New England Pollution Control Company

Quarterly Groundwater monitoring events were conducted at the Site in February, May, July, August and September 2004 and January 2005. A summary of monitor wells sampled and analytical parameters measured for samples collected during each groundwater monitoring event is included as **Table 2.**

Table 2
Quarterly Groundwater Monitoring Summary
February 5, 2004 through January 19, 2005

Monitor Well	February 5 and 6, 04	May 17, 04	July 14, 04	July 29, 04	September 16, 04	January 19, 05
MW-5	NL	NL	NL	NL	VOC, WQ	VOC
MW-6	NL	NL	NL	NL	VOC, WQ	VOC
MW-7	VOC, PP-13	VOC	NS	VOC	NS	VOC
MW-12S	VOC, SVOC, PCB, Pest, PP-13	VOC	NS	VOC	VOC, WQ	VOC
MW-12I	VOC, SVOC, PCB, Pest, PP-13	VOC	NS	VOC, PCB, Pest, TPH	VOC, WQ	VOC
MW13S	VOC, PP-13	VOC	NS	VOC	NS	VOC
MW-16	VOC, SVOC, PCB, Pest, PP-13	VOC	NS	VOC	NS	VOC
MW-19S	VOC, PCB, Pest, PP-13	VOC	NS	VOC	NS	VOC
MW-19I	VOC, PCB, PP-13	VOC	NS	VOC	NS	VOC
MW-20S	VOC, SVOC, PCB, Pest, PP-13	VOC	NS	VOC, PCB, Pest	VOC, WQ	VOC
MW-20D	NI	NI	NI	NI	VOC, WQ	VOC
MW-22S	VOC, SVOC, PCB, Pest, PP-13	VOC	NS	VOC	NS	VOC
MW-23R	VOC, SVOC, PCB, Pest, Herb, PP-13	VOC	NS	VOC	NS	VOC
MW-24	VOC, SVOC, PCB, Pest, Herb, PP-13	VOC	NS	VOC	NS	VOC
MW-25	VOC, SVOC, PCB, Pest, Herb, PP-13	VOC	NS	VOC	NS	VOC
MW-26	VOC, SVOC, PCB, Pest, Herb, PP-13	VOC	NS	VOC	NS	VOC
MW-27	VOC, SVOC, PCB, Pest, Herb, PP-13	VOC	NS	VOC, PCB, Pest	NS	NS
MW-28S	NI	NI	VOC, TPH	VOC	VOC, WQ	VOC
MW-28D	NI	NI	NI	NI	VOC, WQ	VOC
MW-29S	NI	NI	VOC	VOC, TPH	VOC, WQ	VOC
MW-29D	NI	NI	NI	NI	VOC, WQ	VOC
MW-30	NI	NI	NI	NI	VOC, WQ	VOC
MW-31	NI	NI	NI	NI	VOC, WQ	VOC
MW-32	NI	NI	NI	NI	VOC, WQ	VOC
MW-33	NI	NI	NI	NI	VOC	VOC
MW-34	NI	NI	NI	NI	VOC	VOC
PZ-1	VOC, PCB, Pest, PP-13	VOC	NS	VOC	NS	VOC

NL – Not Located
NI – Not Installed
NS – Not Sampled
Pest – Pesticides (8081A)
Herb – Herbicides (8151A)
VOC – Volatile Organic Compounds (8260B)
TPH – Total Petroleum Hydrocarbons (8100M)
WQ – Water Quality Parameters
PCB – Polychlorinated Biphenyls (8082)
PP-13 – Priority Pollutant 13 Metals (dissolved)

Laboratory analysis of quarterly groundwater samples collected from Site monitor wells identified exceedances of New York Department of Environmental Conservation (NYSDEC) Groundwater Quality Standards (6 NYCRR Part 703). Analytical results for samples collected during quarterly groundwater monitoring were summarized in a report entitled *Groundwater Monitoring Report for the Approximate Period February 2004 through January 2005* dated May 2005. Results for VOC analysis of groundwater samples collected in February 2004 and January 2005 for wells proximate to the Outer Warehouse were reviewed to evaluate data trends for Site monitor wells during a 1-year period of operation of the ICM. Based on VOC analytical results, reduced concentrations of total VOCs were identified in monitor wells MW-7, MW-19S, MW12S, MW-20S, MW25 and MW-26. Reductions in concentrations of total VOCs for groundwater samples collected from these monitor wells ranged from approximately 1 percent at monitor well MW-20S to approximately 64 percent at monitor well MW-19S. During the same period, concentrations of total VOCs were observed to increase in monitor wells MW-19I (approximately 24 percent), MW-12I (approximately 50 percent) and MW-22S (approximately 37 percent). Analytical results for VOC analysis of quarterly groundwater samples collected from monitor wells MW-6, MW-20D, MW-27, MW-29S/29D, MW-33 and MW-34 were not included in the evaluation due to the limited number of quarterly groundwater monitoring events performed for each well.

Implementation of the ICM consisting of SVE and AS (an effort to remediate remaining VOC impacted soil and groundwater beneath the outer warehouse) has been approved by the EPA and NYSDEC and was initiated at the Site in November 2003. The AS system was activated in May 2004 and the combined SVE/AS system has remained in continuous operation since that time. A summary of ICM activity is present in the following sections.

2.0 SVE/AS PILOT TESTING

To determine the suitability of SVE/AS for implementation as in ICM, pilot testing was performed at the Site. Prior to designing a full scale SVE/AS system for installation, GSC conducted pilot testing in July 21, 1999 using a limited number of temporary vapor extraction and air sparge points. In September 2003, *SAGE* performed pilot testing of SVE/AS technology using vapor extraction and air sparge points installed by GSC during the construction of the Outer Warehouse. The vapor extraction wells and sparge points utilized during *SAGE*'s pilot testing activities were installed by GSC for full-scale system implementation. Results of the pilot testing activities are presented below.

2.1 GSC Pilot Testing

On July 21, 1999, GSC conducted SVE/AS pilot testing at the Site. A copy of a document entitled *Report on Pilot Testing Activities*, dated August 1999 which was prepared by GSC to document the results of the pilot testing activities is included as **Appendix 1**.

Vapor extraction, monitoring and air sparge points utilized for the pilot test reportedly included one vapor extraction well (SVE-1), one air sparge well (AS-1) and four monitoring points (MP-1, MP-2, MP-3 and MW-11). Monitoring points MP-1, MP-2, MP-3 and MW-11 were identified as being located at distances of 20.9, 22.9, 5 and 20.2 feet, respectively, from vapor extraction well SVE-1.

During initial pilot testing activities, vacuum was applied to the vapor extraction well (SVE-1), which consisted of a 4-inch diameter well screened from 2 to 12-feet below grade (bg), using a 7.5 horsepower rotary lobe blower. During the SVE-only pilot test, steady state vacuum at extraction well SVE-1 was reported to be 24.5 inches of water with airflow of 120 standard cubic feet per minute (scfm). GSC reported that vacuum influence (0.1 inches of water or greater) was observed in monitoring point MP-2, located 22.9 feet from SVE-1, which GSC reported as the observed radius of influence for the vacuum-only pilot test. Based on data obtained during the pilot test, GSC calculated an "effective" radius of influence of 15.3 feet from SVE-1, which GSC indicated should be used for the design of the ICM system. GSC reported photoionization detector (PID) results ranging from 280 to 560 parts per million (ppm) on effluent from the blower during the vacuum-only pilot test. Analytical results for an air sample collected from the blower effluent during pilot testing activities and analyzed for volatile organic compounds (VOCs) via EPA Method TO-14 revealed total VOCs at a concentration of 1,148.4 ppm(v).

After completing the vacuum-only pilot test, GSC conducted an air sparge test using one 2-inch diameter injection well (AS-1). GSC reported that injection well AS-1 was screened at a depth ranging from 17 to 19 feet bg and noted that the well screen was below the peat layer beneath the Site. GSC reported that steady state pressure during the test was 11.5 pounds per square inch (psi) with an airflow of 5.5 scfm. Monitoring performed during the test indicated that pressure influence was observed at a distance of 20.3 feet from the injection well, which GSC identified as the radius of influence. Based on the air sparge pilot test, GSC concluded that no significant pressure influence was observed in the vadose zone indicating a lack of vertical air migration. The lack of influence was attributed to the injection well being screened beneath the peat layer, which likely restricted upward air flow.

Based on the SVE/AS pilot testing, GSC concluded that SVE technology appeared to be an effective tool for Site remediation and with an "effective" radius of influence of 15.3 feet. GSC further concluded that the inclusion of an air sparge component into the system design would increase the effectiveness of Site remediation by removing high concentrations of VOCs in soil and groundwater and would enhance bioremediation by increasing dissolved oxygen in groundwater. GSC recommended using a low vacuum vapor extraction system, capable of producing an airflow of 200 to 300 scfm under a vacuum of 16 to 20 inches of water. GSC indicated that the installation of an ICM using SVE technology would be efficient for extracting vapors from the area of vadose zone impact. GSC also concluded that use of an air sparge system consisting of an oil-less compressor capable of injecting 30 to 50 scfm would also assist in Site remediation by distributing oxygen throughout the saturated zone of impact. GSC recommended that based on concentrations of VOCs detected through PID screening and laboratory analysis of effluent during the pilot test, a catalytic oxidizer would be necessary to treat effluent from the system.

2.2 *SAGE* Pilot Testing

On September 11, 2003, *SAGE* conducted performance evaluations using subsurface components of the SVE system installed by GSC on behalf of CWDC. According to historic Site documentation, a series of horizontal and vertical SVE wells and AS wells were installed during the construction of the outer warehouse. A series of seven, 4-inch diameter PVC stubs located adjacent to the western wall of the secondary containment vaults in the Outer Warehouse were determined to be connected to seven horizontal SVE wells (HSVE-1 through HSVE-7) installed beneath the Outer Warehouse. Eight 2-inch diameter PVC pipes extending through the floor of the Outer Warehouse, adjacent to the western side of the secondary containment vaults were determined to be connected to eight vertical SVE wells (SVE-1 through SVE-8). In addition, six 1-inch diameter PVC pipes extending through the floor of the outer warehouse were determined to be connected to air sparge wells installed by GSC. The layout of subsurface components installed by GSC, as determined by *SAGE* based on historical photographs of the Site during the construction of the Outer Warehouse and field activities conducted by *SAGE,* is included as **Figure 3**. Subsurface components of the system are further discussed in Section 4.0.

Pilot testing was performed by sequentially connecting each 4-inch diameter horizontal well stub-out to a regenerative blower. A Rotron Model EN 454 with a capacity of 100 scfm was utilized during the *SAGE* pilot testing activities. The horizontal SVE wells were each tested at the maximum flow rate of the blower for periods ranging from 21 to 56 minutes. Blower vacuum readings and VOC concentrations in the blower discharge were recorded periodically throughout each test. VOC monitoring of blower discharge was conducted using a PID calibrated to 100 parts per million by volume (ppmv) of isobutylene. SVE discharge vapors from each SVE well test were directed through a 200-pound drum of vapor phase GAC prior to discharge to the atmosphere. Data sheets generated during the pilot test activities are included as **Appendix 2**. The horizontal well testing indicated that nearly all of the horizontal SVE wells operate at over 100 scfm with less than 7 inches of water vacuum. Relatively low levels of vacuum were detected in nearby vertical SVE wells used as vacuum monitoring points during the various tests, indicating that the horizontal wells are installed within very permeable backfill material. At one well (HSVE-3), water was extracted immediately upon starting the test indicating that water was present in the well, possibly due to the well screen being located within the saturated zone.

VOC concentrations measured with the PID at the various horizontal SVE wells ranged from 65 ppmv to 542 ppmv. SVE discharge vapor samples were collected from horizontal SVE wells HSVE-4, HSVE-5 and HSVE-7 during the test and analyzed for VOCs at a fixed-base laboratory using TO-14 methods. A summary of laboratory analyses of effluent samples collected during *SAGE* pilot testing activities is included as **Table 3**. Laboratory certificates of analysis and chain-of custody documentation for the effluent samples are included as **Appendix 3**.

Table 3
Laboratory Analytical Results - VOCs
Horizontal Vent Wells

Sample/ Date	Concentration ug/m^3		
Analyte	HSVE-4 9/11/2003	HSVE-5 9/11/2003	HSVE-7 9/11/2003
Volatiles TO-14			
Vinyl chloride	429	<11979	<11979
1,1-Dichloroethene	468	<18582	<18582
Freon 113	<708	<35914	<35914
Trans-1,2-Dichloroethene	895	<18580	<18582
1,1-Dichloroethane	4650	<18967	<18967
cis-1,2-Dichloroethene	259000	217000	67300
1,1,1,-Trichloroethane	14400	<25570	<25570
Trichloroethene (TCE)	403000	293000	136000
Toluene	371	<17662	<17662
Tetrachloroethene (PCE)	3860000	2590000	976000

<x: Indicates analyte concentration not detected at or above specified laboratory quantitation limit (x)

Laboratory analysis of air samples collected from horizontal SVE wells detected concentrations of total VOCs ranging from 1,179,300 $\mu g/m^3$ (HSVE-7) to 4,543,213 $\mu g/m^3$ (HSVE-4). Laboratory analysis indicates that the majority of compounds detected through TO-14 analysis consisted of chlorinated VOCs. Analytical results detected the greatest concentration of total VOCs in HSVE-4 which is located beneath the southwestern corner of the Outer Warehouse. Laboratory results for samples collected from HSVE-5 and HSVE-7 detected lower concentrations of total VOCs than in the sample collected from HSVE-4. Analytical data appear to be consistent with the results of previous Site assessments that indicate the area of most adverse impact is located on the southwestern corner of the property near the location of the former solvent reclamation area.

3.0 SYSTEM DESIGN

In a report entitled *Interim Remedial Action Plan*, dated October 1999, GSC proposed a conceptual design for an SVE and AS system to remediate soil and groundwater at the Site. A copy of the report is included as **Appendix 4**.

The SVE design included the installation of eight 4-inch diameter soil vapor extraction wells. The wells would be constructed using 2-feet of 4-inch diameter PVC well screen installed to depths ranging from approximately 4 to 6 feet below grade. Two-inch diameter solid PVC pipe would then be utilized to bring the wells to grade level. The system design then called for the construction of manifolds to align the wells in two groups consisting of four wells each. Laterals from each manifold would then extend to an 18-inch by 18-inch junction/control vault. Control valves were proposed for each of the wells to allow the wells to be turned on and off to maximize system efficiency.

In addition to the vertical SVE wells, GSC proposed the installation of four horizontal vent laterals consisting of 20-feet of 4-inch PVC well screen. The horizontal vent laterals were proposed for installation at depths of approximately 2 feet bg. The layout of the vent laterals was designed to remediate soils in the vadose zone and to recover injected sparge air which may migrate from groundwater into vadose zone soils and into the gravel area beneath the concrete slab floor of the facility. GSC indicated that the laterals would be connected to the remedial system by 4-inch diameter PVC pipe, with each lateral equipped with an isolation valve. The valves were proposed in order to isolate sections of the horizontal well screens to maximize recovery from different locations of the facility. A 12-inch vault was proposed for installation over the isolation valve on each of the horizontal SVE wells.

The GSC design also included the installation of six 1-inch diameter AS wells beneath the floor of the Outer Warehouse. GSC indicated that each AS well would be constructed to include 1 foot of 1-inch diameter PVC well screen installed to depths ranging from 13 to 16 feet bg. The riser for each AS well would then be piped to the remedial system enclosure via 1-inch diameter PVC pipe. According to GSC, the locations of AS wells were designed to maximize the distribution of injected air to facilitate volatilization of VOCs dissolved in groundwater and adsorbed to saturated and unsaturated soils within the known area of impact.

The remedial design stated that all remediation equipment would be housed inside a 10-foot by 20-foot enclosure on the northern portion of the Site. An explosion proof rotary lobe blower capable of producing 100 scfm at 80 inches of water would be utilized for the SVE component of the system. An explosion proof compressor capable of producing 80 scfm at 15 PSI was slated for the AS component of the system. A moisture separator would be installed between the vapor extraction wells and the blower. Effluent from the blower would be piped to a catalytic oxidizer for treatment prior to discharge to the atmosphere. The system will also be equipped with vacuum and pressure gauges to monitor system efficiency, and automated circuitry to shut down the system in the event of a system failure.

4.0 SVE/AS WELL INSTALLATIONS AND PIPING

During construction of the outer warehouse in 1999, GSC installed a series of SVE and AS wells and buried manifold pipe. A general description of the remediation well network is provided in a document produced by GSC entitled *Remediation System Operation and Maintenance Plan* (O&M Plan) dated January 2000, a copy of which is included as **Appendix 5.**

According to the O&M Plan six vertical air injection wells were installed beneath the concrete slab of the Outer Warehouse. According to the GSC O&M Plan, the AS wells were constructed of 1-inch diameter, schedule 80 PVC screen (0.02-inch slot) installed from 13 to 16 feet below grade, with solid 1-inch riser pipe utilized to bring the wells to grade. The AS wells appear to have been piped horizontally with solid PVC pipe to the northwestern corner of the Outer Warehouse. Following installation of the PVC laterals, the concrete floor slab of the outer warehouse was installed over the laterals and around the riser pipes for the AS wells which are located in the northwestern corner of the Outer Warehouse. Based on visual observations and field testing, it was determined that the six, 1-inch diameter PVC stubs extending through the floor of the Outer Warehouse, adjacent to the western wall of the secondary containment vaults were AS wells installed by GSC. Limited information regarding the exact location of the AS wells within the footprint of the outer warehouse and details regarding the installation of the AS wells were included in Site documentation compiled by GSC. Locations of AS wells installed by GSC, as determined by *SAGE* through a review of historical photographs of the Site and field testing, are depicted on **Figure 3**.

According to the GSC O&M Plan, the SVE system was designed to include four horizontal SVE wells, each consisting of four 20-foot sections of 4-inch diameter, schedule 80 PVC screen (0.02-inch slot). Plans developed by GSC depicted that the horizontal wells were oriented lengthwise from west to east and were evenly spaced from north to south beneath the Outer Warehouse. Seven, 4-inch diameter, PVC pipes observed exiting through the floor adjacent to the Secondary Containment vaults near the northwestern corner of the Outer Warehouse suggest that the GSC design was modified during the installation of the horizontal SVE wells. Based on field observations and performance evaluations performed by *SAGE*, it appears that each of the seven 4-inch diameter stubs extending through the floor of the Outer Warehouse were connected to a horizontal SVE well. Based on photographs depicting the installation of subsurface piping, it appears that in place of three horizontal vent wells with two 10-foot sections of screen installed in series beneath the central and southern portions of the Outer Warehouse, each of the three horizontal wells was divided into two individual 4-inch diameter horizontal wells with 10 feet of PVC well screen. Horizontal vent wells installed beneath the central and southern portions of the Outer Warehouse are referred to as HSVE-2 through HSVE-7. The vent wells were apparently installed in this configuration to prevent the need for valves to isolate SVE wells beneath the eastern portion of the facility. The northern horizontal vent well appears to have been installed as designed by GSC with two 10-foot lengths of 4-inch diameter PVC well screen installed in series. The vent well beneath the northern portion of the Outer Warehouse is referred to as HSVE-1. The horizontal SVE wells appear to have been installed consistent with the GSC system design, in four rows beneath the Outer Warehouse between grade beams installed to support the Outer Warehouse. Locations of horizontal SVE wells installed by GSC, as determined by *SAGE* through a review of historical photographs of the Site and field testing, are depicted on **Figure 3**.

The GSC O&M Plan detailed the installation of eight 4-inch diameter vertical SVE wells. The GSC design called for the eight vertical SVE wells to be connected by manifolds into two groups consisting of four vertical wells each. However, eight 2-inch diameter PVC pipes exiting the floor of the Outer Warehouse suggest that the GSC design was modified during the construction of the Outer Warehouse. Based on historical photographs, field observations and pilot testing performed by *SAGE*, it was determined that the eight 2-inch diameter PVC stubs extending through the floor of the Outer Warehouse are connected to individual vertical SVE wells installed by GSC. During the installation of the vertical SVE wells, it appears that each 4-inch diameter vertical SVE well was reduced from 4-inch diameter PVC to 2-inch diameter PVC and subsequently piped using 2-inch diameter horizontal laterals. The laterals appear to have been piped above grade to the northern portion of the Outer Warehouse, adjacent to the western wall of the secondary containment structures. Following installation, the concrete floor of the Outer Warehouse was installed over the vertical SVE wells and associated laterals, and the floor was installed around the 2-inch diameter riser pipes for the vertical SVE wells. Locations of vertical SVE wells installed by GSC, as determined by *SAGE* through a review of historical photographs of the Site and field testing, are depicted on **Figure 3**.

Although the general location of AS and SVE wells is shown in the O&M Plan (Figures 4 and 5, respectively), very little information is provided with respect to the basis of the well design and spacing. Historical photographs were utilized to determine the locations of horizontal and vertical SVE wells and AS wells as installed during the construction of the Outer Warehouse. Based on the photographs, it appears that the grade-beams supporting the Outer Warehouse span the length and width of the structure and extend from the bottom of the existing concrete floor slab to a depth of approximately two feet below grade. The photographs also depict that piping passages for PVC manifold pipes were formed when the grade-beams were constructed, suggesting that the SVE/AS points were installed in conjunction with the construction of the floor of the outer warehouse. Based on historical photographs and performance evaluations performed at the Site, it was possible to approximate the locations of the vent and air sparge wells. Since none of the laterals to the SVE and AS wells were labeled and direct access to the wells is not available, the exact location of the wells cannot be verified without cutting up the floor.

5.0 ABOVE GRADE PIPING AND COMPONENT INSTALLATION

Prior to the initiation of SVE operation, above grade components were installed on the system by *SAGE*. During November 2003, surficial components of the SVE system were installed and on November 12, 2003, operation of the SVE component of the system was initiated using only horizontal vapor extraction wells. On January 30, 2004, the SVE component of the system was modified to extract vapors from vertical vapor extraction wells only. Above grade equipment included a rotary SVE blower, an air sparge compressor, a knock-out drum to remove water from the vent lines prior to reaching the blower, isolation valves and failsafe equipment to automatically terminate system operation. During April 2004, surficial components of the AS system were installed and on May 3, 2004, operation of the AS system was initiated. All above grade equipment for the SVE and AS systems, excluding the carbon treatment train, was installed in the northwest corner of the Outer Warehouse. The primary and secondary granular activated carbon vessels were installed on the exterior of the facility, in the secure breezeway between the Interior Storage Area and the TE offices. Information pertaining to equipment installed on the SVE/AS system is included as **Appendix 6**. Photographs of above-grade system components are included in the **Photography Appendix**.

In October 2003, above grade piping was installed on the laterals connected to the horizontal and vertical SVE wells. Piping was installed by a licensed plumber. The 4-inch diameter PVC laterals utilized to extend the seven horizontal vent wells (HSVE-1 through HSVE-7) through the floor of the Outer Warehouse were reduced to 2-inch diameter pipes above grade. Isolation valves were installed on each horizontal vent lateral and each of the seven laterals were piped to a single manifold. Risers extending through the floor of the Outer Warehouse from the eight vertical SVE wells were also extended with 2-inch diameter PVC pipes and isolation valves were installed on each lateral from the vertical SVE wells. Down-stream of the isolation valves, the eight vertical SVE wells were manifolded into one 2-inch diameter pipeline. A pressure switch was installed at the SVE manifold pipe to detect an SVE system failure. A sample port was installed on each lateral from the vertical and horizontal SVE wells prior to the manifold to allow effluent from each extraction well to be tested individually. Isolation valves were then installed to cease flow through either the horizontal wells or vertical wells or both.

Effluent from the horizontal and vertical SVE wells were then connected together into one 3-inch diameter PVC pipe. The combined effluent from the vent wells was then directed through a 55-gallon knock-out drum. The knock-out drum was equipped with a float switch to terminate operation of the blower should the drum become filled with water. Effluent from the knock-out drum was piped through a particulate filter to the vacuum port of the blower which was mounted on the roof of the secondary containment vaults in the northwestern corner of the Outer Warehouse.

The GSC design was modified to use granular activated carbon (GAC) vessels instead of a catalytic oxidation unit for off-gas control (see Section 6.0). Blower effluent was piped via 3-inch diameter PVC through the wall of the Outer Warehouse and into a 1,000-pound vapor phase GAC vessel. Effluent from the 1,000-pound (Primary) carbon vessel was piped to a 200-pound drum of GAC. Treated effluent from the 200-pound (Secondary) carbon vessel was then piped up the exterior wall of the Interior Storage Building where it is discharged to atmosphere. Sample ports were installed on the influent line to the 1,000-pound carbon vessel, in the transfer line between the carbon vessels, and on the effluent line from the 200-pound carbon vessel. In addition, an isolation valve was installed prior to the primary carbon vessel to terminate flow to the GAC vessels. Due to spatial limitations, remedial equipment exclusive of the primary and secondary GAC vessels was installed in the northwestern corner of the Outer Warehouse, rather than in a separate remedial enclosure as specified in the GSC design.

The air sparge system was connected to AS well laterals using 3/4-inch diameter sweated copper pipe. The use of 90° elbows was minimized during the installation of the AS system to prevent pressure loss in the system. A small rotary-vane compressor, directly driven by a 3-phase, 3.0 horsepower, wide-range voltage motor was installed to provide pressurized air to the AS system. The air compressor was mounted on the roof of the secondary containment vaults in the Outer Warehouse to provide pressurized air to the AS wells at a flow rate of approximately 10 cfm. The air compressor was connected to the blower with an automatic switch to terminate the operation of the compressor should the blower malfunction. Air from the compressor was directed through a pressure relief valve and a solenoid valve prior to separating into two air streams. The two resultant air streams were then manifolded through a series of 1-inch diameter copper pipe to provide pressurized air to the AS wells. The air stream to each of the risers for the AS wells were piped through an isolation valve to cease flow to individual AS wells and each lateral was equipped with a flow meter, a pressure gauge, and a check valve. Each grouping of 3 AS wells was also piped through a pressure relief and a normally closed solenoid valve.

An in-line timer was installed on the AS system to control the solenoid valves to allow for automatic switching between the 2 groups of AS wells. The timer is automatically set to switch between the two groups of AS wells at approximate 1-hour intervals. The switches were set to ensure that 1 group of AS wells is always open to allow for continuous air flow. The system was also installed to accommodate expansion should it become necessary to install additional groupings of AS wells. The motors on the blower and compressor units have been interlocked so that the compressor would shut down should operation of the blower be interrupted. All wiring and electrical connections were completed by a licensed electrician and were performed consistent with the NFPA class required for the facility.

A warning light installed in the TE offices was also connected to the system to notify TE personnel of a system malfunction. Manual switches were installed at ground level and on the roof of the Secondary Containment Vaults next to the blower to terminate system operation from either location, should it be necessary.

6.0 OFF-GAS CONTROL

System design specifications developed by GSC proposed the installation of a catalytic oxidizer unit for treating system effluent. An evaluation of air permitting and off-gas control requirements associated with SVE system discharges was performed by *SAGE*. A summary of these efforts is presented below.

On October 3, 2003 *SAGE* discussed the design of the SVE system and expected air emissions during a telephone conversation with Mr. Samuel Lieblitch of the NYSDEC, Division of Air Resources in Region 2. Based on the plan for the SVE system operation, Mr. Lieblitch indicated that the SVE system operation is expected to be considered a *trivial activity* and as such, is exempt from the Title V air permit requirements outlined in Chapter III, Subchapter A, Subpart 2001-3 of NYSDEC's Air Resources Regulations. As such, it was determined that a Title V facility permit application would not be necessary for the SVE system. However, it was indicated that appropriate equipment would be necessary to control VOC emissions from the SVE system based on good engineering practices as required in Subpart 2001-3.3 (b) of the NYSDEC's Air Resource Regulations.

In an effort to control VOC emissions from the SVE system, it was determined that an interim off-gas control system consisting of GAC as opposed to a catalytic oxidizer would be sufficient to remove VOC vapors prior to atmospheric discharge of system effluent. GAC usage was determined based on a 100-scfm air flow rate and the average concentrations of total VOCs detected through TO-14 analyses of vapor samples collected on September 11, 2003 from horizontal SVE wells HSVE-4, HSVE-5 and HSVE-7 during pilot testing. Results of the evaluation indicated that one 1,000-pound GAC vessel would be suitable for off-gas control and a second smaller 200-pound GAC vessel placed in series would provide polishing of VOCs if breakthrough of the 1,000-pound GAC vessel is detected. Carbon breakthrough calculations are provided in **Appendix 7**. Initial data indicated that breakthrough of the primary GAC vessel was not expected to occur for a minimum period of 1 month of continuous system operation. Based on weekly PID screening of influent to the primary GAC vessel, between the primary and secondary GAC vessels and on effluent from the secondary GAC vessel, GAC from the primary vessel was replaced on July 16, 2004 following approximately 8 months of operation of the SVE system and approximately 2 months of AS system operation. Replacement of GAC from the primary and secondary vessels also occurred in October 2004 and March 2005.

GAC replacement was completed by vacuuming the spent GAC into DOT-approved drums for off-site disposal. Fresh reactivated GAC was then used to refill the vessels. Additional GAC replacement will be completed as necessary based on weekly PID field screening results.

Off-gas controls will continue to be evaluated during system operation to ensure that the GAC remains effective in removing VOCs from the system effluent prior to discharge. Off-gas controls will be evaluated in accordance with a February 28, 2003 memorandum from the NYSDEC Division of Remediation describing guidance for achieving "substantive compliance with air requirements" for remediation systems that are not otherwise subject to Title V permit requirements. The memorandum lists 0.5 pounds per hour of total VOCs as the emission threshold for deploying controls. The memorandum also recommends using NYSDEC Division of Air Resources *Guidelines for the Control of Toxic Ambient Air Contaminants* (DAR-1) to estimate short term and annual emissions and any associated air quality impact.

7.0 SEALING OF POTENTIAL VAPOR PATHWAYS TO FACILITY

In July 2004, the entire facility was inspected for visible pathways for potential vapor intrusions. Potential pathways for vapor intrusion identified in the Outer Warehouse, the Inner Warehouse and in the Office Area were sealed. Areas sealed included junctions between the concrete floor slab and a manway to access subslab utilities, spacing between risers for the vent laterals associated with the SVE system and the concrete floor slab, and around utility conduits extending through the concrete floor slab. Sealing was conducted using concrete and industrial floor sealer. Photographs depicting of areas sealed are included as **Appendix 8**. No other potential vapor migration pathways were identified during an inspection of the facility.

8.0 SYSTEM PERFORMANCE MONITORING

Since the start of operation of the ICM, system performance has been evaluated using a combination of PID screening results and laboratory analysis. PID screening results have been collected from the influent to the primary GAC vessel, between the primary and secondary GAC vessels and from the effluent from the secondary GAC vessel prior to discharge to the atmosphere. Laboratory analyses were performed on samples collected from the influent to the primary GAC vessel. In addition, system operating criteria have been monitored and recorded to ensure the SVE and AS systems are operating as intended. Results of screening activities are presented below.

8.1 Photoionization Detector Screening - Carbon Influent/Middle/Effluent

Following start-up of the SVE system, daily photoionization detector (PID) screening of effluent from the system to the primary granular activated carbon vessel was performed. In addition, screening was performed on sample ports between the primary and secondary carbon vessels and after the secondary carbon vessel prior to discharge to the atmosphere. Following the first week of SVE operation, the frequency of PID screening was reduced to twice weekly, and was further reduced to weekly screening after the first month of operation of the SVE system and continues to be performed on a weekly basis. The frequency of PID screening events were increased following modifications and the activation of the AS component of the system. PID screening results are summarized in **Table 4**. Copies of Operation and Maintenance Checklists, including PID screening results for the influent to the primary carbon vessel are included as **Appendix 9**.

Table 4
PID Screening Results
SVE Influent to Primary GAC Vessel
42-14 19th Avenue
Astoria, New York

Date	PID Readings (ppmv) – GAC		
	Influent	Intermediate	Effluent
11/12/03	PID Malfunctioned		
11/13/03	PID Malfunctioned		
11/14/03	PID Malfunctioned		
11/17/03	PID Malfunctioned		
11/18/03	PID Malfunctioned		
11/19/03	Not Measured		
11/20/03	Not Measured		
11/21/03	Not Measured		
12/4/03	Not Measured		
12/12/03	Not Measured		
12/19/03	0	0	0
12/22/03	0	0	0
12/29/03	0	0	0
1/5/04	0	0	0
1/14/04	0	0	0
1/21/04	0	0	0
1/30/04	0	0	0
2/2/04	0	0	0
2/3/04	0	0	0
2/4/04	0	0	0
2/5/04	0	0	0
2/6/04	0	0	0
2/13/04	0	0	0
2/17/04	0	0	0
2/27/04	0	0	0
3/30/04	0	0	0
4/29/04	0	0	0
5/13/04	33	Not Recorded	
5/14/04	33	0	0
5/17/04	31.5	0	0
5/21/04	31.5	0	0
5/28/04	31	0	0
6/4/04	26	0	0
6/11/04	26	0	0
6/14/04	Not Measured		
6/21/04	2	0	0
7/14/04	737	1000	9.7
7/16/04	175	32	0
7/23/04	6	0	0

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Table 4 (continued)
PID Screening Results
SVE Influent to Primary GAC Vessel
42-14 19th Avenue
Astoria, New York

Date	PID Readings (ppmv) – GAC		
	Influent	Intermediate	Effluent
7/30/04	6	0	0
8/6/04	5	0	0
8/12/04	5	0	0
8/20/04	5	0	0
8/27/04	0	0	0
9/3/04	Not Measured		
9/10/04			
9/17/04			
9/25/04	256	320	0
10/4/04	480	260	415
10/5/04	System down for carbon changeout		
10/8/04	System restarted after carbon changeout		
10/12/04	520	45	10
10/19/04	425	8	0
10/25/04	54	0	0
11/1/04	28.6	15.8	13.1
11/1/04[1]	29	12	4
11/9/04	15.7	2.3	1.9
11/16/04	9.2	3.2	2.3
11/23/04	11.4	2.7	1.4
11/30/04	8.0	2.2	1.4
12/8/04	8.4	4.1	3.3
12/14/04	6.9	1.7	1.5
12/22/04	8.0	4.2	4.0
12/29/04	6.8	4.2	3.8
1/5/05	9.5	4.3	4.0
1/12/05	7.6	4.1	3.8
1/19/05	7.2	4.7	3.6
1/28/05	Sample Ports Frozen		
2/2/05	Sample Ports Frozen		
2/8/05[2]	7.6	4.1	3.7
2/16/05	5.9	3.2	1.9

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Table 4 (concluded)
PID Screening Results
SVE Influent to Primary GAC Vessel
42-14 19th Avenue
Astoria, New York

Date	PID Readings (ppmv) – GAC		
	Influent	Intermediate	Effluent
2/23/05	5.6	3.6	2.6
3/2/05	6.3	3.8	2.8
3/9/05	5.7	1.8	1.6
3/16/05	5.7	2.2	1.8
3/18/05	System Down for Carbon Changeout		
3/29/05	5.9	0.7	0.5
4/6/05	5.2	3.3	2.4
4/14/05	6.5	4.0	3.1
4/20/05	8.0	4.3	4.2
4/27/05	25.0	12.5	18.3

[1]Second set of readings collected using rental PID prior to return of TE unit for repair and recalibration
[2]Secondary carbon drum changed on 2/9/05 following determination that carbon was saturated with water

8.2 Laboratory Analysis - Carbon Influent

On May 4, July 14, October 21, December 10, 2004 and March 14, 2005 samples of the influent to the primary carbon vessel were collected for VOC analysis at a New York State-certified laboratory. The samples were collected in summa-canisters and were submitted for analysis using chain-of-custody protocols. A summary of analytical results for VOC analysis of the influent to the carbon is included at **Table 5**. Laboratory analytical reports, including chain-of-custody documentation are included as **Appendix 10**.

Table 5
Laboratory Analytical Results
Influent to Primary Carbon Vessel
42-14, 19th Avenue
Astoria, New York

Sample / Date	Concentration µg/m³				
	SVE Inf.[1]	GAC-inf.[1]	GAC-inf.[2]	GAC-inf.[2]	GAC-inf.[1]
Analyte	5/4/04	7/14/04	10/21/04	12/10/04	3/14/05
Volatiles by TO-14A (µg/m³):					
Freon 12	<20.3	<2.03	**4.9**	**5.3**	<2.03
Chloromethane	<16.3	**3.35**	<1.63	<1.63	<1.63
Vinyl chloride	**6190**	**385**	**31**	**25.6**	**3.73**
Freon 11	<31.5	18.1	<3.15	**66.9**	**27.6**
Chloroethane	<63.5	<2.98	<2.98	**3.19**	<2.98
1,1-Dichloroethene	**113**	**39.6**	**11**	**8.99**	**7.76**
Freon 113	**1220**	**99.6**	**33.1**	**16.8**	**23.5**
cis-1,2-Dichloroethene	**257000**	**8643**	**6660**	**5990**	**3180**
1,1-Dichloroethane	<16.6	**439**	**74.5**	**78.8**	<1.64
Chloroform	<23.8	**282**	**63.3**	**94.5**	<2.38
1,1,1,-Trichloroethane	**3260**	**6370**	**5550**	**4570**	**2370**
1,2-Dichloroethane	<18.2	**29.3**	**10.5**	**7.18**	**4.33**
Benzene	**169**	**28**	<1.23	**4.57**	**3.39**
Carbon Tetrachloride	<40.9	**13**	<4.09	<4.09	**9.07**
1,2-Dichloropropane	<17.6	**18.2**	<1.76	<1.76	<1.76
Trichloroethene (TCE)	**3620**	**6570**	**6050**	**4760**	**2480**
1,1,2-Trichloroethane	<21.8	**26.4**	<2.18	**4.3**	**4.41**
Toluene	**90.8**	**16.9**	**3.65**	**5.88**	**4.93**
Tetrachloroethene (PCE)	**29000**	**23500**	**21000**	**17000**	**10100**
Chlorobenzene	**31.4**	**115**	**5.96**	<2.03	<2.03
Ethylbenzene	**34.7**	**6.76**	**3.47**	**17.8**	<2.34
m,p-Xylene	**62.9**	**7.33**	**10.4**	**70.9**	**11.1**
o-Xylene	<19.9	**4.42**	**4.99**	**18.9**	<1.99
1,3,5-Trimethylbenzene	<31.4	**7.31**	<3.14	<3.14	<3.14
1,3-Dichlorobenzene	<46.9	**17.1**	<4.69	<4.69	<4.69
Total VOCs	**300,791.80**	**46,639.37**	**39,516.77**	**32,749.61**	**18,229.82**

[1] Laboratory analysis via method TO-15
[2] Laboratory analysis via method TO-14A
<x: Indicates analyte concentration not detected at or above specified laboratory quantitation limit (x)

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Laboratory analysis of air samples collected from the influent to the primary granular activated carbon vessel detected total VOCs at concentrations ranging from of 300,791.80 parts per billion (ppb) (May 4, 2004) to 32,559.61 ppb (December 10, 2004). Chlorinated VOCs were detected at a concentration of 299,214 $\mu g/m^3$, 46,437 $\mu g/m^3$, 39,456 $\mu g/m^3$ and 32,539 $\mu g/m^3$, respectively. Concentrations of chlorinated VOCs detected in the samples were found to account for approximately 99 percent of the total VOCs detected through laboratory analysis. Given that the May 4, 2004 sample was collected in conjunction with the initiation of AS component of the ICM, it is assumed that the high concentrations detected through laboratory analysis of the sample are the result of the initial surge of contaminants from vadose zone soils at the initiation of sparge air injection. A graph depicting total VOCs detected through laboratory analysis of air samples collected from the influent to the primary GAC vessel is included as **Appendix 11**.

Total VOC concentrations summarized in **Table 5** are based on VOCs include on the TO-14 analyte list. As identified in the summary table, samples collected in May and July 2004 and March 2005 were laboratory analyzed for VOCs via Method TO-15. Samples collected in October and December 2004 were analyzed for VOCs via Method TO-14 with a request for the laboratory to report tentatively identified compounds (TICs). No TICs were identified through laboratory analysis of the October and December 2004 samples. TO-15 analysis of the March 2005 sample did not identify concentrations of any VOCs which are not included on both the TO-15 and TO-14 analyte lists. TO-15 analysis of the July 2004 detected concentrations of compounds which are included on the TO-15 analyte list but are not included on the TO-14 analyte list. The addition of the TO-15 analytes would increase the concentration of total VOCs detected in the July 2004 sample by approximately 10 percent. The increased concentrations detected through TO-15 analysis of the July 2004 sample did not significantly impact the daily removal rate for total VOCs calculated for the ICM based on the July 2004 analytical results.

Laboratory results for analysis of air samples collected from the influent of the SVE system to the primary GAC vessel were utilized to estimate the mass of contaminants removed. A summary of estimated mass removed based on three sampling events for the effluent from the SVE system to the primary GAC vessel is included as **Table 6**.

Table 6
Estimated Mass Removed
SVE/AS System

Date Sampled	**5/4/04**	**7/14/04**	**10/21/04**	**12/10/04**	**3/14/05**
Pounds/Day Total VOCs	2.71	0.42	0.36	0.30	0.16

To estimate the mass of total VOC impact beneath the Outer Warehouse analytical data for comprehensive soil sampling performed by New England Pollution Control Company (NEPCCO), Eder Associates Consulting Engineers (Eder) and Dvirka and Bartilucci (D&B) prior to the construction of the Outer Warehouse were utilized to calculate average total VOC concentrations beneath the structure. VOC laboratory analysis of soil samples collected from 2 soil borings advanced by NEPCCO in January 1986, 4 soil borings advanced by Eder in October 1991, and 16 soil borings advanced by D&B in 1996 were utilized to calculate the average total VOC concentrations for the 2-foot depth intervals ranging from 0 to 10 feet bg. Analytical results for VOC analysis of a total of 42 soil samples were utilized to calculate average concentrations within the 5, 2-foot soil horizons ranging from depths of 0 to 10 feet below grade. In addition, 1 soil sample collected at a depth interval of 20 to 22 feet bg was utilized to estimate the total VOC concentration at that depth interval beneath the Outer Warehouse. Due to the lack of analytical data for soil ranging from depths of 10 to 20 feet bg, the average VOC concentration for that horizon was extrapolated using analytical results for the soil horizons immediately above and below the 10 to 20 foot bg interval. Based on the analytical results, the total mass of VOC contamination was calculated to be approximately 2,200 pounds beneath the Outer Warehouse. Calculations utilized to estimate the total mass of VOC impact are included in **Appendix 11**.

As indicated in **Section 1.1**, a limited removal excavation was performed during the construction of the Outer Warehouse to facilitate the installation of grade beams. The excavation effort was reported to extend to a total depth of 4 feet bg and excavated soil was shipped off-site for disposal. To account for the removal of impacted soil during the construction of the Outer Warehouse, average concentrations of total VOCs were utilized to estimate that approximately 200 pounds of total VOC impact were effectively excavated and shipped of site for disposal during the removal effort.

Based on analytical data for 5 samples collected from the influent to the primary GAC vessel during the first year of operation of the combined SVE/air sparge system, an estimated removal rate of 0.54 pounds of total VOCs per day was achieved. At this removal rate, an estimated total of 193 pounds of total VOCs were removed by the ICM during the first year of operation. The total mass of VOCs removed during the first year of ICM operation was calculated using data for a sample collected from the influent to the primary GAC vessel on May 4, 2004 on the first day of using the combination of SVE and air sparging technologies. As indicated in **Table 6**, the concentration of total VOCs detected in the May 2004 sample is considerably higher than concentrations of total VOCs detected through laboratory analysis of 4 additional samples collected during the first year of ICM operation, likely due to the stripping of VOCs from vadose zone soil during initial operation of the air sparge system.

Analytical data for the samples collected from the influent to the primary GAC vessel were utilized to estimate the total cleanup time for VOC impact beneath the Outer Warehouse. Due to the elevated concentration of total VOCs detected in the May 2004 sample, analytical results for samples collected in July, October and December 2004 and November 2005 were utilized in an effort to determine a conservative estimate for total VOC removal. Based on the analytical results, an estimated cleanup time of approximately 17 years was calculated for total VOC removal by the ICM operating in its current configuration. It should be noted that although a substantial reduction in the concentration of total VOCs present is expected for the Site, it is likely that no remedial technology would achieve complete VOC removal. It is expected that removal rates will decline as the duration of ICM operation increases. Although analytical results for the March 2005 sample exhibited a decrease of approximately 50% in the concentration of total VOCs detected in the influent to the primary GAC vessel, it is likely that total VOC removal rates will fluctuate considerably with changes in the elevation of the groundwater table beneath the Site.

8.3 PID Screening – Individual Vapor Extraction Wells

During system operation, effluent from each vapor extraction well is periodically screened using a PID. Results of PID screening performed on individual vapor extraction wells are summarized in **Table 7**.

Table 7 (concluded)
PID Screening Results
Vapor Extraction Wells

Date	PID Readings (ppmv) - Vertical SVE Wells									PID Readings (ppmv) - Horizontal SVE Wells							
	SVE-1	SVE-2	SVE-3	SVE-4	SVE-5	SVE-6	SVE-7	SVE-8	Main Pipe	HSVE-1	HSVE-2	HSVE-3	HSVE-4	HSVE-5	HSVE-6	HSVE-7	Main Pipe
9/3/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	45	NS
9/10/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	45	NS
9/17/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	44	NS
9/25/04	22.1	450	4	8	19	7.6	13.4	8	16	176	145	35.2	28	27	20.3	8.4	6.51
10/4/04	67	85	60	85	86	92	106	130	70	73	81	75	120	100	110	90	55
10/12/04	70	118	73	90	105	83	193	235	51	325	97	150	260	545	580	450	115
10/19/04	59	131	122	86	163	161	176	208	134	202	102	204	416	273	360	340	164
10/25/04	17	20	25	12	38	107	64	67	33	2	0	4	16	0	8	5	8
11/1/04	26.6	18.3	27.3	12.1	32.4	68.7	52.1	66.1	43.5	14.5	11.4	18.3	30.6	19.7	24.8	9.7	14.7
11/1/04	52	50	52	46	86	108	93	117	83	29	33	146	87	81	53	62	69
11/9/04	13.5	13.6	28	11	78.1	86	52	85	54	9.4	7.8	111	72	41	17	22	NM
11/16/04	9.3	10.8	19.0	6.1	25.9	65.2	35.3	62.2	21.5	6.8	3.9	13.1	23.3	9.8	14.7	3.0	13
11/23/04	12.4	9.6	22.4	11.3	32.6	60.1	43.7	59.9	23.2	7.7	5.5	18.2	17.4	6.2	18.6	9.6	18.1
11/30/04	8.8	10.1	15.7	3.2	25.5	28.3	30.3	57.3	22	4.7	1.4	6.5	21.9	6.8	14.6	1.6	8.2
12/8/04	8.0	7.3	9.8	3.2	28.6	12.9	31.0	59.2	20.3	5.7	2.1	7.3	21.9	4.6	13.6	0.8	7.5
12/14/04	8.2	6.4	16.0	3.2	22.8	6.7	30.5	52.1	19.5	4.6	1.9	6.2	17.8	3.5	11.2	0.5	6.0
12/22/04	11.7	8.2	22.3	4.2	23.9	61.9	38.7	56.2	43.2	5.1	2.8	6.9	18.3	3.8	12.3	1.0	6.6
12/29/04	4.0	10.8	20.3	3.9	21.8	54.0	35.8	51.9	37.0	5.8	3.3	6.6	18.5	5.0	12.2	1.4	6.8
1/5/05	12.8	13.2	28.1	8.6	24.8	59.1	44.2	6.9	41.2	7.3	3.0	7.8	22.6	8.4	14.2	1.1	7.9
1/12/05	13.1	10.8	16.1	4.1	22.9	52.5	38.7	38.7	40.3	7.2	3.0	8.1	21.8	13.0	11.1	1.3	7.1
1/19/05	11.3	11.6	18.8	3.2	21.1	55.3	39.1	4.2	42.1	5.8	2.7	8.6	22.0	16.0	10.7	1.6	6.8
1/28/05	11.3	10.4	17.2	6.2	19.1	58.4	38.2	6.3	41.8	6.1	3.4	8.0	21.2	14.4	11.2	1.3	6.9
2/2/05	12.3	10.8	22.7	5.4	21.8	54.0	40.2	8.9	41.8	5.9	3.3	8.1	21.8	13.1	12.0	1.1	6.7
2/8/05	20.6	29.7	19.6	23.3	21.4	54.7	28.0	18.3	55.8	9.1	3.1	7.5	21.4	15.6	10.7	1.3	8.5
2/16/05	7.3	22.7	55.6	7.8	3.5	68.7	15.8	46.2	67.1	4.2	3.5	8.8	23.4	17.5	13.6	1.8	9.4
2/23/05	30.1	22.3	37.5	22.3	23.8	54.3	18.5	28.5	54.1	7.9	3.0	7.9	21.3	16.4	12.7	2.1	8.5
3/2/05	29.8	29.2	38.5	18.5	28.8	54.4	31.5	18.7	53.9	15.5	3.2	10.5	24.5	23.7	20.6	3.3	8.8
3/9/05	38.6	50.6	54.9	31.5	37.4	57.5	45.9	28.8	57.2	7.2	3.3	7.8	20.6	14.9	10.5	1.5	8.5
3/16/05	41.1	50.5	52.8	50.6	42.8	58.2	48.7	39	53.2	8.2	3.4	9.2	20.9	14.8	11.0	1.5	9.0
3/29/05	15.4	26.3	4.8	1.1	15.9	45.9	2.3	0.9	45.2	5.3	2.8	5.7	15.9	8.5	13.2	1.4	6.5
4/6/05	4.9	29.3	26.8	31.4	8.4	31.6	26.0	23.7	33.1	6.3	2.9	6.9	22.2	9.3	13.9	1.6	9.0
4/14/05	8.2	30.7	18.6	40.0	12.2	23.2	24.7	23.9	35.4	9.8	3.0	5.2	23.4	4.5	15.0	1.7	9.7
4/20/04	8.4	45.5	48.9	40.1	33.5	49.3	41.2	30.8	50.8	4.7	2.4	6.6	19.7	6.7	12.3	1.4	7.5
4/27/05	51.2	52.1	56.1	48.9	49.1	53.4	53.8	48.8	53.2	6.5	3.0	6.4	22.4	9.7	18.4	2.6	7.2

NS – Not Screened

Table 7
PID Screening Results
Vapor Extraction Wells

Date	PID Readings (ppmv) - Vertical SVE Wells									PID Readings (ppmv) - Horizontal SVE Wells							
	SVE-1	SVE-2	SVE-3	SVE-4	SVE-5	SVE-6	SVE-7	SVE-8	Main Pipe	HSVE-1	HSVE-2	HSVE-3	HSVE-4	HSVE-5	HSVE-6	HSVE-7	Main Pipe
11/19/03	Not Venting									0	0	0	0	200	0	0	NS
11/20/03	Not Venting									0	0	0	0	130	0	0	NS
11/21/03	Not Venting									0	0	0	0	100	0	0	NS
12/4/03	Not Venting									0	0	0	0	100	0	0	NS
12/12/03	Not Venting									0	0	0	0	100	0	0	NS
12/19/03	Not Venting									0	0	0	0	40	0	0	NS
12/22/03	Not Venting									0	0	0	0	40	0	0	NS
12/29/03	Not Venting									0	0	0	0	0	0	0	NS
1/5/04	Not Venting									0	0	0	0	0	0	0	NS
1/14/04	Not Venting									0	0	0	0	0	0	0	NS
1/21/04	Not Venting									0	0	0	0	0	0	0	NS
1/30/04	0	0	0	0	0	0	0	NS	NS	Not Venting							
2/2/04	0	0	0	0	0	0	0	0	NS	Not Venting							
2/3/04	0	0	0	0	0	0	0	0	NS	Not Venting							
2/4/04	0	0	0	0	0	0	0	0	NS	Not Venting							
2/5/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
2/6/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
2/13/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
2/17/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
2/27/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
3/30/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
4/29/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
5/13/04	58	39	20	22	21	37	175	145	NS	11	10	18	27	2	16	6	NS
5/14/04	55	35	17	20	18	35	171	142	NS	11	10	18	27	2	16	6	NS
5/17/04	55	35	17	20	18	35	171	142	NS	11	10	18	27	1	16	6	NS
5/21/04	54	34.9	16.8	20.4	18.1	34.4	171	143	40	11.3	10.1	18	26.8	1.5	15.5	6	17
5/28/04	53	25	17.5	19	18.5	32	180	145	40	14	10	19.5	29	1	13.4	0.4	16
6/4/04	45.8	23.5	20.2	15.6	20.8	36	167	112	42.1	10.4	12.2	22.1	27.5	1.1	14.3	0.5	17.1
6/11/04	32.1	0.5	23	14.5	0.4	54.7	167	102	35.1	11.2	10.2	2.3	31	1	17.5	0.6	19
6/14/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	0	NS
6/21/04	32	0.5	2	4	0	34	167	102	NS	11	10	2.3	31	1	17	0.6	NS
7/23/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	52	NM
7/30/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	50	NS
8/6/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	49	NS
8/12/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	50	NS
8/20/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	51	NS
8/27/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	46	NS

9.0 CONCLUSIONS

Data generated during performance monitoring of the SVE and AS components of the ICM indicates that the combination of SVE and AS technologies are effective in removing VOCs from the area of subsurface impact beneath the Outer Warehouse. SVE system performance monitoring indicates that the horizontal SVE wells produce greater concentrations of total photoionizable compounds than vertical vapor extraction wells during the use of SVE technology only. However, it should be noted that the SVE system was initially operated using horizontal SVE wells only and the removal efficiency may be exaggerated by the evacuation of vapors built up in the gravel layer located under the impermeable liner installed below the concrete slab floor of the Outer Warehouse. Based on performance monitoring conducted during the operation of the AS component of the ICM, it appears that removal efficiency is increased when AS is utilized in conjunction with SVE technology. Using the AS component of the system in conjunction with the SVE component, it appears that vertical SVE wells produce greater concentrations of total VOCs than the horizontal SVE wells.

Between November 12, 2003 and January 30, 2004, the SVE component of the ICM was operated using horizontal SVE wells HSVE-1 through HSVE-7. Performance monitoring conducted during operation of the SVE system in this configuration indicates that concentrations of total VOCs were removed for a period of approximately 7 weeks after system start-up. The operation of the SVE system in this configuration produced concentrations of total photoionizable VOCs ranging from 200 ppmv to 0 ppmv. PID screening performed on the individual extraction wells indicated that horizontal vent well HSVE-5 produced the majority of impacted vapors during venting through the horizontal wells only. Performance monitoring performed after the initial 7 weeks of operating the SVE component of the ICM on horizontal SVE wells indicates that concentrations of total photoionizable compounds declined to 0 ppmv based on PID screening of effluent from the vapor extraction wells. Continued operation of the SVE system while configured to extract vapors from horizontal SVE wells only did not reveal increased concentrations of total photoionizable VOCs between December 29, 2003 and January 30, 2004.

Between January 30 and May 13, 2004, the SVE component of the ICM was utilized to extract vapors from vertical vapor extraction wells SVE-1 through SVE-8. PID screening results of the influent to the primary GAC vessel and the vapor streams produced from the individual vertical SVE wells appear to indicate that minimal removal of total photoionizable compounds was observed during the operation of the SVE system in this configuration. The lack of effectiveness of the vertical SVE wells in removing VOCs is likely attributable to the shallow groundwater table elevation in the vicinity of the Site.

Data generated since the initiation of the AS component of the system on May 3, 2004 indicates that the AS component of the system was effective in increasing the removal rate of total VOCs by the SVE system. Total photoionizable compounds were detected in effluent from the individual horizontal vapor extraction wells at concentrations ranging from 0.5 ppmv to 31 ppmv and in effluent from the individual vertical SVE wells at concentrations ranging from 0 ppmv to 180 ppmv. PID screening of effluent from each of the individual SVE wells further indicates that each horizontal and vertical well was producing concentrations of total photoionizable compounds during operation of the combined SVE and AS system. Performance monitoring performed during the operation of the combined SVE/AS system appears to indicate that the addition of the AS component of the system had a greater influence on the removal efficiency of total photoionizable compounds in the vertical SVE wells than in the horizontal SVE wells. Performance monitoring indicates that concentrations of total photoionizable VOCs declined considerably during the first 8-weeks of system operation, however, concentrations again increased following 2 additional weeks of system operation.

Laboratory analysis of influent to the primary GAC vessel was performed via EPA Method TO-15 on samples collected on May 5, July 14, October 21, December 10, 2004 and March 14, 2005. Analytical results for the samples detected total VOCs at concentrations of 300,791.80 $\mu g/m^3$ and 18,229.82 $\mu g/m^3$, respectively. Laboratory results indicate that chlorinated VOCs were detected at concentrations ranging from 299,214 $\mu g/m^3$ in the sample collected on May 4, 2004 to a concentration of 18,150.23 $\mu g/m^3$ in the sample collected on December 10, 2004. Concentrations of chlorinated VOCs detected in the samples were found to account for approximately 99 percent of the total VOCs detected through laboratory analysis.

10.0 RECOMMENDATIONS

Based on performance monitoring conducted to date, it appears that the use of the combined SVE and AS system as an ICM is an effective method of removing VOCs from the subsurface of the Site, beneath the Outer Warehouse. *SAGE* recommends that operation of the combined SVE/AS system continue while configured to extract vapors from both the horizontal and vertical SVE well networks. *SAGE* further recommends that additional performance monitoring be conducted to evaluate long-term VOC removal rates during seasonal fluctuations of the groundwater table elevation beneath the Site. Performance monitoring should include a combination of PID screening and laboratory analysis of influent to the primary GAC vessel using EPA Method TO-15. Data generated during the performance monitoring activities should be utilized to further refine the operating parameters of the ICM and maximize the recovery of total VOCs. In addition, *SAGE* recommends that SVE pilot testing be performed along the perimeter of the facility adjacent to 19^{th} Avenue to determine if SVE technology would be effective in removing VOCs beneath the Inner Warehouse of the facility and control migration of VOC compounds in vadose zone soils.

11.0 LIMITATIONS

Data obtained from public agencies, site inspections, and data mapping sources was used in the characterization of this site. The accuracy of the conclusions derived from these data is based solely on the accuracy of the data reported and or supplied. Should information be made available concerning the site which is not included in this report, it should be reported to *SAGE* Environmental, Inc. (*SAGE*) so that findings, conclusions, and/or recommendations can be altered and modified (if necessary).

Events occurring on the site after on site inspection are beyond the scope of this report. As such, *SAGE* makes no expressed or implied representations, warranties or guarantees regarding any changes in the condition of the premises after the date of the on-site inspection.

Any qualitative or quantitative information regarding the site, which was not available to *SAGE* at the time of this assessment, may result in modification(s) to the conclusions and/or representations made in this report.

Due to the fact that geological and soil formations are inherently random, variable, and indeterminate (heterogeneous) in nature, the professional services and opinions provided by *SAGE* under our agreement are not guaranteed to be a representation of complete site conditions, which are variable and subject to change with time or as the result of natural or man-made processes. Although our services are extensive, opinions, findings, and conclusions presented are limited to and by the data supplied, reported, and obtained. Additionally, unless specified or otherwise included herein, this assessment did not include an evaluation of business environmental risk and non-scope considerations. Such non-scope considerations include, but are not limited to, evaluation of: asbestos-containing materials, radon, lead-based paint, lead in drinking water, wetlands, regulatory compliance, industrial hygiene, health and safety, OSHA compliance, cultural and historic resources, ecological resources, endangered species, indoor air quality, electromagnetic fields, formaldehyde, high-voltage power lines, non-point sources or best management practices for silviculture. Under the terms of the agreement no attempt was made to determine the compliance or regulatory status of present or former owners or operators of the site with respect to federal, state, municipal, environmental, and land use laws or regulations.

SAGE has retained a copy of this report. No deletions or additions are permitted without the written consent of *SAGE*. This report, including the data, maps, and figures contained herein, are not suitable for use in its present form, for any ongoing or pending litigation. Use of this report in whole or in part by parties other than those authorized by *SAGE* is prohibited.

Table 7
PID Screening Results
Vapor Extraction Wells

Date	PID Readings (ppmv) - Vertical SVE Wells									PID Readings (ppmv) - Horizontal SVE Wells							
	SVE-1	SVE-2	SVE-3	SVE-4	SVE-5	SVE-6	SVE-7	SVE-8	Main Pipe	HSVE-1	HSVE-2	HSVE-3	HSVE-4	HSVE-5	HSVE-6	HSVE-7	Main Pipe
11/19/03	Not Venting									0	0	0	0	200	0	0	NS
11/20/03	Not Venting									0	0	0	0	130	0	0	NS
11/21/03	Not Venting									0	0	0	0	100	0	0	NS
12/4/03	Not Venting									0	0	0	0	100	0	0	NS
12/12/03	Not Venting									0	0	0	0	100	0	0	NS
12/19/03	Not Venting									0	0	0	0	40	0	0	NS
12/22/03	Not Venting									0	0	0	0	40	0	0	NS
12/29/03	Not Venting									0	0	0	0	0	0	0	NS
1/5/04	Not Venting									0	0	0	0	0	0	0	NS
1/14/04	Not Venting									0	0	0	0	0	0	0	NS
1/21/04	Not Venting									0	0	0	0	0	0	0	NS
1/30/04	0	0	0	0	0	0	0	NS	NS	Not Venting							
2/2/04	0	0	0	0	0	0	0	0	NS	Not Venting							
2/3/04	0	0	0	0	0	0	0	0	NS	Not Venting							
2/4/04	0	0	0	0	0	0	0	0	NS	Not Venting							
2/5/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
2/6/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
2/13/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
2/17/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
2/27/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
3/30/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
4/29/04	0	NS	0	0	0	0	0	NS	NS	Not Venting							
5/13/04	58	39	20	22	21	37	175	145	NS	11	10	18	27	2	16	6	NS
5/14/04	55	35	17	20	18	35	171	142	NS	11	10	18	27	2	16	6	NS
5/17/04	55	35	17	20	18	35	171	142	NS	11	10	18	27	1	16	6	NS
5/21/04	54	34.9	16.8	20.4	18.1	34.4	171	143	40	11.3	10.1	18	26.8	1.5	15.5	6	17
5/28/04	53	25	17.5	19	18.5	32	180	145	40	14	10	19.5	29	1	13.4	0.4	16
6/4/04	45.8	23.5	20.2	15.6	20.8	36	167	112	42.1	10.4	12.2	22.1	27.5	1.1	14.3	0.5	17.1
6/11/04	32.1	0.5	23	14.5	0.4	54.7	167	102	35.1	11.2	10.2	2.3	31	1	17.5	0.6	19
6/14/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	0	NS
6/21/04	32	0.5	2	4	0	34	167	102	NS	11	10	2.3	31	1	17	0.6	NS
7/23/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	52	NM
7/30/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	50	NS
8/6/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	49	NS
8/12/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	50	NS
8/20/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	51	NS
8/27/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	46	NS

Table 7 (concluded)
PID Screening Results
Vapor Extraction Wells

Date	PID Readings (ppmv) - Vertical SVE Wells									PID Readings (ppmv) - Horizontal SVE Wells							
	SVE-1	SVE-2	SVE-3	SVE-4	SVE-5	SVE-6	SVE-7	SVE-8	Main Pipe	HSVE-1	HSVE-2	HSVE-3	HSVE-4	HSVE-5	HSVE-6	HSVE-7	Main Pipe
9/3/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	45	NS
9/10/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	45	NS
9/17/04	0	0	0	0	0	0	0	0	NS	0	0	0	0	0	0	44	NS
9/25/04	22.1	450	4	8	19	7.6	13.4	8	16	176	145	35.2	28	27	20.3	8.4	6.51
10/4/04	67	85	60	85	86	92	106	130	70	73	81	75	120	100	110	90	55
10/12/04	70	118	73	90	105	83	193	235	51	325	97	150	260	545	580	450	115
10/19/04	59	131	122	86	163	161	176	208	134	202	102	204	416	273	360	340	164
10/25/04	17	20	25	12	38	107	64	67	33	2	0	4	16	0	8	5	8
11/1/04	26.6	18.3	27.3	12.1	32.4	68.7	52.1	66.1	43.5	14.5	11.4	18.3	30.6	19.7	24.8	9.7	14.7
11/1/04	52	50	52	46	86	108	93	117	83	29	33	146	87	81	53	62	69
11/9/04	13.5	13.6	28	11	78.1	86	52	85	54	9.4	7.8	111	72	41	17	22	NM
11/16/04	9.3	10.8	19.0	6.1	25.9	65.2	35.3	62.2	21.5	6.8	3.9	13.1	23.3	9.8	14.7	3.0	13
11/23/04	12.4	9.6	22.4	11.3	32.6	60.1	43.7	59.9	23.2	7.7	5.5	18.2	17.4	6.2	18.6	9.6	18.1
11/30/04	8.8	10.1	15.7	3.2	25.5	28.3	30.3	57.3	22	4.7	1.4	6.5	21.9	6.8	14.6	1.6	8.2
12/8/04	8.0	7.3	9.8	3.2	28.6	12.9	31.0	59.2	20.3	5.7	2.1	7.3	21.9	4.6	13.6	0.8	7.5
12/14/04	8.2	6.4	16.0	3.2	22.8	6.7	30.5	52.1	19.5	4.6	1.9	6.2	17.8	3.5	11.2	0.5	6.0
12/22/04	11.7	8.2	22.3	4.2	23.9	61.9	38.7	56.2	43.2	5.1	2.8	6.9	18.3	3.8	12.3	1.0	6.6
12/29/04	4.0	10.8	20.3	3.9	21.8	54.0	35.8	51.9	37.0	5.8	3.3	6.6	18.5	5.0	12.2	1.4	6.8
1/5/05	12.8	13.2	28.1	8.6	24.8	59.1	44.2	6.9	41.2	7.3	3.0	7.8	22.6	8.4	14.2	1.1	7.9
1/12/05	13.1	10.8	16.1	4.1	22.9	52.5	38.7	38.7	40.3	7.2	3.0	8.1	21.8	13.0	11.1	1.3	7.1
1/19/05	11.3	11.6	18.8	3.2	21.1	55.3	39.1	4.2	42.1	5.8	2.7	8.6	22.0	16.0	10.7	1.6	6.8
1/28/05	11.3	10.4	17.2	6.2	19.1	58.4	38.2	6.3	41.8	6.1	3.4	8.0	21.2	14.4	11.2	1.3	6.9
2/2/05	12.3	10.8	22.7	5.4	21.8	54.0	40.2	8.9	41.8	5.9	3.3	8.1	21.8	13.1	12.0	1.1	6.7
2/8/05	20.6	29.7	19.6	23.3	21.4	54.7	28.0	18.3	55.8	9.1	3.1	7.5	21.4	15.6	10.7	1.3	8.5
2/16/05	7.3	22.7	55.6	7.8	3.5	68.7	15.8	46.2	67.1	4.2	3.5	8.8	23.4	17.5	13.6	1.8	9.4
2/23/05	30.1	22.3	37.5	22.3	23.8	54.3	18.5	28.5	54.1	7.9	3.0	7.9	21.3	16.4	12.7	2.1	8.5
3/2/05	29.8	29.2	38.5	18.5	28.8	54.4	31.5	18.7	53.9	15.5	3.2	10.5	24.5	23.7	20.6	3.3	8.8
3/9/05	38.6	50.6	54.9	31.5	37.4	57.5	45.9	28.8	57.2	7.2	3.3	7.8	20.6	14.9	10.5	1.5	8.5
3/16/05	41.1	50.5	52.8	50.6	42.8	58.2	48.7	39	53.2	8.2	3.4	9.2	20.9	14.8	11.0	1.5	9.0
3/29/05	15.4	26.3	4.8	1.1	15.9	45.9	2.3	0.9	45.2	5.3	2.8	5.7	15.9	8.5	13.2	1.4	6.5
4/6/05	4.9	29.3	26.8	31.4	8.4	31.6	26.0	23.7	33.1	6.3	2.9	6.9	22.2	9.3	13.9	1.6	9.0
4/14/05	8.2	30.7	18.6	40.0	12.2	23.2	24.7	23.9	35.4	9.8	3.0	5.2	23.4	4.5	15.0	1.7	9.7
4/20/04	8.4	45.5	48.9	40.1	33.5	49.3	41.2	30.8	50.8	4.7	2.4	6.6	19.7	6.7	12.3	1.4	7.5
4/27/05	51.2	52.1	56.1	48.9	49.1	53.4	53.8	48.8	53.2	6.5	3.0	6.4	22.4	9.7	18.4	2.6	7.2

NS – Not Screened

9.0 CONCLUSIONS

Data generated during performance monitoring of the SVE and AS components of the ICM indicates that the combination of SVE and AS technologies are effective in removing VOCs from the area of subsurface impact beneath the Outer Warehouse. SVE system performance monitoring indicates that the horizontal SVE wells produce greater concentrations of total photoionizable compounds than vertical vapor extraction wells during the use of SVE technology only. However, it should be noted that the SVE system was initially operated using horizontal SVE wells only and the removal efficiency may be exaggerated by the evacuation of vapors built up in the gravel layer located under the impermeable liner installed below the concrete slab floor of the Outer Warehouse. Based on performance monitoring conducted during the operation of the AS component of the ICM, it appears that removal efficiency is increased when AS is utilized in conjunction with SVE technology. Using the AS component of the system in conjunction with the SVE component, it appears that vertical SVE wells produce greater concentrations of total VOCs than the horizontal SVE wells.

Between November 12, 2003 and January 30, 2004, the SVE component of the ICM was operated using horizontal SVE wells HSVE-1 through HSVE-7. Performance monitoring conducted during operation of the SVE system in this configuration indicates that concentrations of total VOCs were removed for a period of approximately 7 weeks after system start-up. The operation of the SVE system in this configuration produced concentrations of total photoionizable VOCs ranging from 200 ppmv to 0 ppmv. PID screening performed on the individual extraction wells indicated that horizontal vent well HSVE-5 produced the majority of impacted vapors during venting through the horizontal wells only. Performance monitoring performed after the initial 7 weeks of operating the SVE component of the ICM on horizontal SVE wells indicates that concentrations of total photoionizable compounds declined to 0 ppmv based on PID screening of effluent from the vapor extraction wells. Continued operation of the SVE system while configured to extract vapors from horizontal SVE wells only did not reveal increased concentrations of total photoionizable VOCs between December 29, 2003 and January 30, 2004.

Between January 30 and May 13, 2004, the SVE component of the ICM was utilized to extract vapors from vertical vapor extraction wells SVE-1 through SVE-8. PID screening results of the influent to the primary GAC vessel and the vapor streams produced from the individual vertical SVE wells appear to indicate that minimal removal of total photoionizable compounds was observed during the operation of the SVE system in this configuration. The lack of effectiveness of the vertical SVE wells in removing VOCs is likely attributable to the shallow groundwater table elevation in the vicinity of the Site.

Data generated since the initiation of the AS component of the system on May 3, 2004 indicates that the AS component of the system was effective in increasing the removal rate of total VOCs by the SVE system. Total photoionizable compounds were detected in effluent from the individual horizontal vapor extraction wells at concentrations ranging from 0.5 ppmv to 31 ppmv and in effluent from the individual vertical SVE wells at concentrations ranging from 0 ppmv to 180 ppmv. PID screening of effluent from each of the individual SVE wells further indicates that each horizontal and vertical well was producing concentrations of total photoionizable compounds during operation of the combined SVE and AS system. Performance monitoring performed during the operation of the combined SVE/AS system appears to indicate that the addition of the AS component of the system had a greater influence on the removal efficiency of total photoionizable compounds in the vertical SVE wells than in the horizontal SVE wells. Performance monitoring indicates that concentrations of total photoionizable VOCs declined considerably during the first 8-weeks of system operation, however, concentrations again increased following 2 additional weeks of system operation.

Laboratory analysis of influent to the primary GAC vessel was performed via EPA Method TO-15 on samples collected on May 5, July 14, October 21, December 10, 2004 and March 14, 2005. Analytical results for the samples detected total VOCs at concentrations of 300,791.80 $\mu g/m^3$ and 18,229.82 $\mu g/m^3$, respectively. Laboratory results indicate that chlorinated VOCs were detected at concentrations ranging from 299,214 $\mu g/m^3$ in the sample collected on May 4, 2004 to a concentration of 18,150.23 $\mu g/m^3$ in the sample collected on December 10, 2004. Concentrations of chlorinated VOCs detected in the samples were found to account for approximately 99 percent of the total VOCs detected through laboratory analysis.

10.0 RECOMMENDATIONS

Based on performance monitoring conducted to date, it appears that the use of the combined SVE and AS system as an ICM is an effective method of removing VOCs from the subsurface of the Site, beneath the Outer Warehouse. *SAGE* recommends that operation of the combined SVE/AS system continue while configured to extract vapors from both the horizontal and vertical SVE well networks. *SAGE* further recommends that additional performance monitoring be conducted to evaluate long-term VOC removal rates during seasonal fluctuations of the groundwater table elevation beneath the Site. Performance monitoring should include a combination of PID screening and laboratory analysis of influent to the primary GAC vessel using EPA Method TO-15. Data generated during the performance monitoring activities should be utilized to further refine the operating parameters of the ICM and maximize the recovery of total VOCs. In addition, *SAGE* recommends that SVE pilot testing be performed along the perimeter of the facility adjacent to 19th Avenue to determine if SVE technology would be effective in removing VOCs beneath the Inner Warehouse of the facility and control migration of VOC compounds in vadose zone soils.

11.0 LIMITATIONS

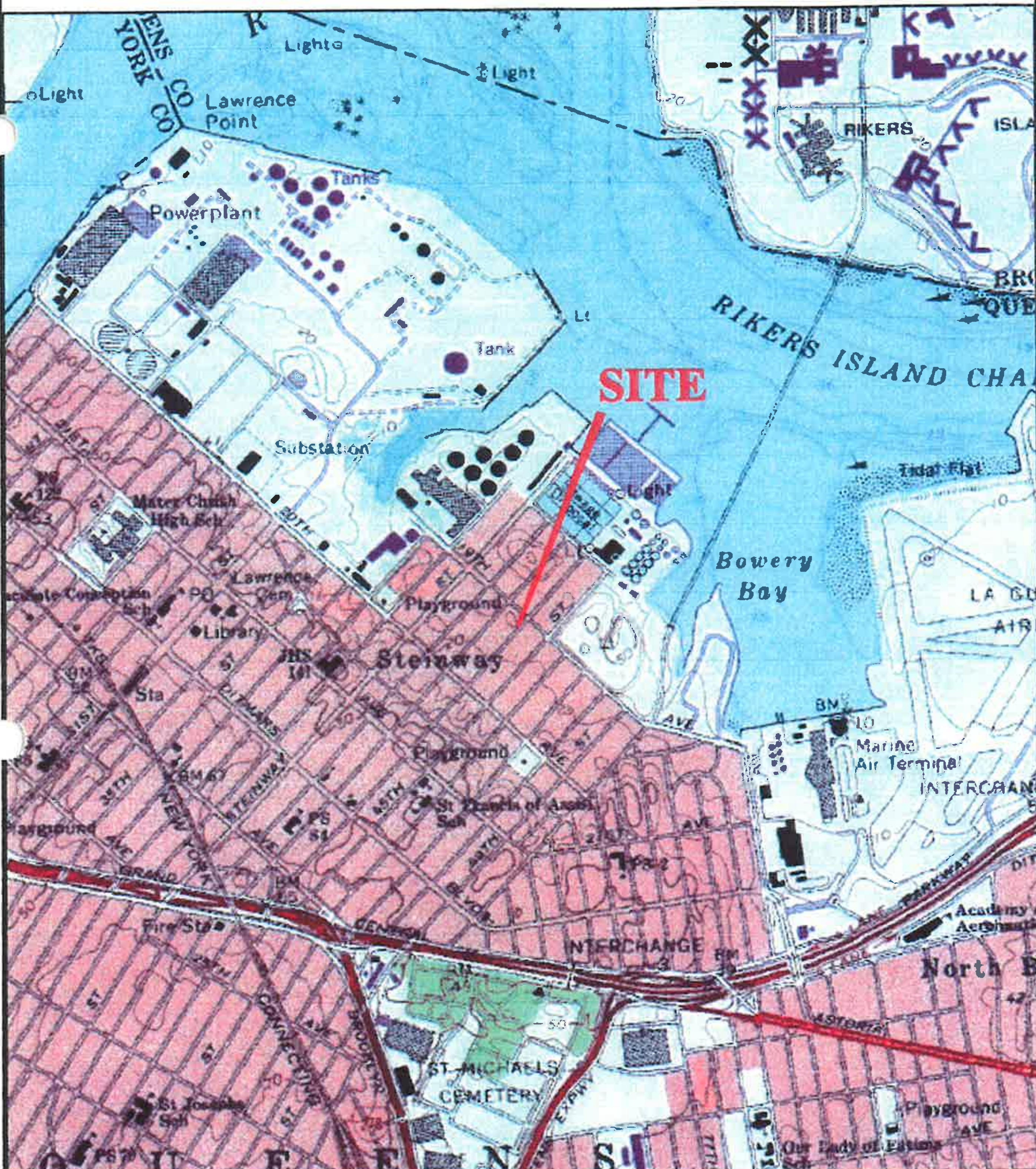
Data obtained from public agencies, site inspections, and data mapping sources was used in the characterization of this site. The accuracy of the conclusions derived from these data is based solely on the accuracy of the data reported and or supplied. Should information be made available concerning the site which is not included in this report, it should be reported to *SAGE* Environmental, Inc. (*SAGE*) so that findings, conclusions, and/or recommendations can be altered and modified (if necessary).

Events occurring on the site after on site inspection are beyond the scope of this report. As such, *SAGE* makes no expressed or implied representations, warranties or guarantees regarding any changes in the condition of the premises after the date of the on-site inspection.

Any qualitative or quantitative information regarding the site, which was not available to *SAGE* at the time of this assessment, may result in modification(s) to the conclusions and/or representations made in this report.

Due to the fact that geological and soil formations are inherently random, variable, and indeterminate (heterogeneous) in nature, the professional services and opinions provided by *SAGE* under our agreement are not guaranteed to be a representation of complete site conditions, which are variable and subject to change with time or as the result of natural or man-made processes. Although our services are extensive, opinions, findings, and conclusions presented are limited to and by the data supplied, reported, and obtained. Additionally, unless specified or otherwise included herein, this assessment did not include an evaluation of business environmental risk and non-scope considerations. Such non-scope considerations include, but are not limited to, evaluation of: asbestos-containing materials, radon, lead-based paint, lead in drinking water, wetlands, regulatory compliance, industrial hygiene, health and safety, OSHA compliance, cultural and historic resources, ecological resources, endangered species, indoor air quality, electromagnetic fields, formaldehyde, high-voltage power lines, non-point sources or best management practices for silviculture. Under the terms of the agreement no attempt was made to determine the compliance or regulatory status of present or former owners or operators of the site with respect to federal, state, municipal, environmental, and land use laws or regulations.

SAGE has retained a copy of this report. No deletions or additions are permitted without the written consent of *SAGE*. This report, including the data, maps, and figures contained herein, are not suitable for use in its present form, for any ongoing or pending litigation. Use of this report in whole or in part by parties other than those authorized by *SAGE* is prohibited.

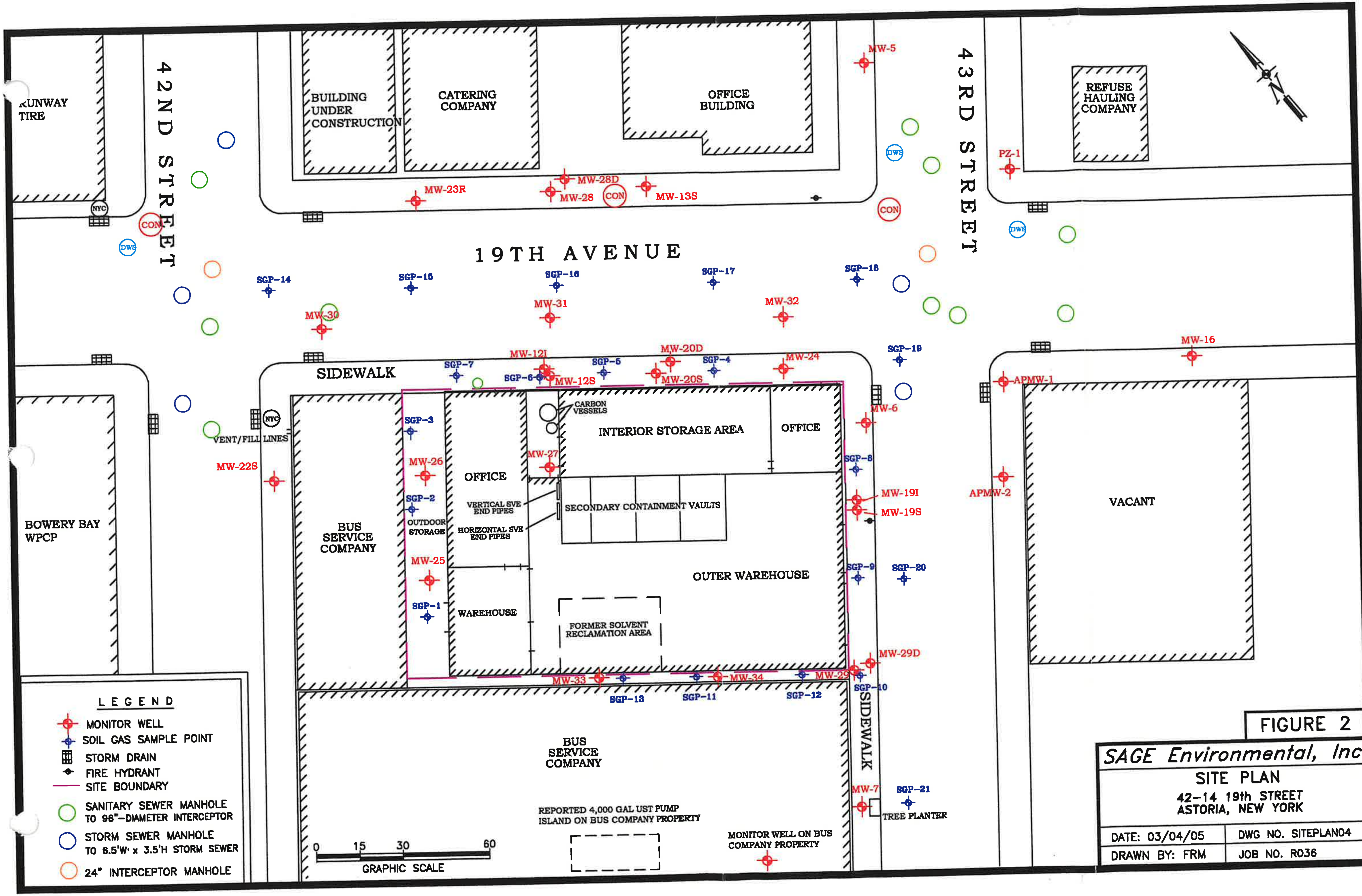


SAGE Environmental, Inc. **FIGURE 1**

Original Drawing Date: 06/23/03

USGS SITE LOCATION MAP
42-14, 19th AVENUE
ASTORIA, NEW YORK

SAGE Job #:	S1760	Created By:	RWL
SAGE Drawing #:	S1760USGS		



RUNWAY TIRE
BUILDING UNDER CONSTRUCTION
CATERING COMPANY
OFFICE BUILDING
REFUSE HAULING COMPANY
42ND STREET
43RD STREET
19TH AVENUE
MW-5
PZ-1
MW-23R
MW-28D
MW-28
MW-13S
CON
NYC
DWS
SGP-14
SGP-15
SGP-16
SGP-17
SGP-18
SGP-19
MW-30
MW-31
MW-32
MW-16
MW-12I
MW-20D
MW-24
SGP-7
SGP-6
MW-12S
SGP-5
MW-20S
SGP-4
APMW-1
SIDEWALK
VENT/FILL LINES
CARBON VESSELS
INTERIOR STORAGE AREA
OFFICE
MW-6
SGP-3
MW-26
MW-27
MW-22S
SGP-8
SGP-2
VERTICAL SVE END PIPES
HORIZONTAL SVE END PIPES
OUTDOOR STORAGE
SECONDARY CONTAINMENT VAULTS
MW-19I
MW-19S
APMW-2
VACANT
BOWERY BAY WPCP
BUS SERVICE COMPANY
MW-25
OUTER WAREHOUSE
SGP-9
SGP-20
SGP-1
WAREHOUSE
FORMER SOLVENT RECLAMATION AREA
MW-29D
MW-33
MW-34
MW-29
SGP-10
SGP-13
SGP-11
SGP-12
REPORTED 4,000 GAL UST PUMP ISLAND ON BUS COMPANY PROPERTY
MONITOR WELL ON BUS COMPANY PROPERTY
MW-7
SGP-21
TREE PLANTER
0 15 30 60
GRAPHIC SCALE
LEGEND
MONITOR WELL
SOIL GAS SAMPLE POINT
STORM DRAIN
FIRE HYDRANT
SITE BOUNDARY
SANITARY SEWER MANHOLE TO 96"-DIAMETER INTERCEPTOR
STORM SEWER MANHOLE TO 6.5'W x 3.5'H STORM SEWER
24" INTERCEPTOR MANHOLE
FIGURE 2
SAGE Environmental, Inc
SITE PLAN
42-14 19th STREET
ASTORIA, NEW YORK
DATE: 03/04/05
DWG NO. SITEPLAN04
DRAWN BY: FRM
JOB NO. R036

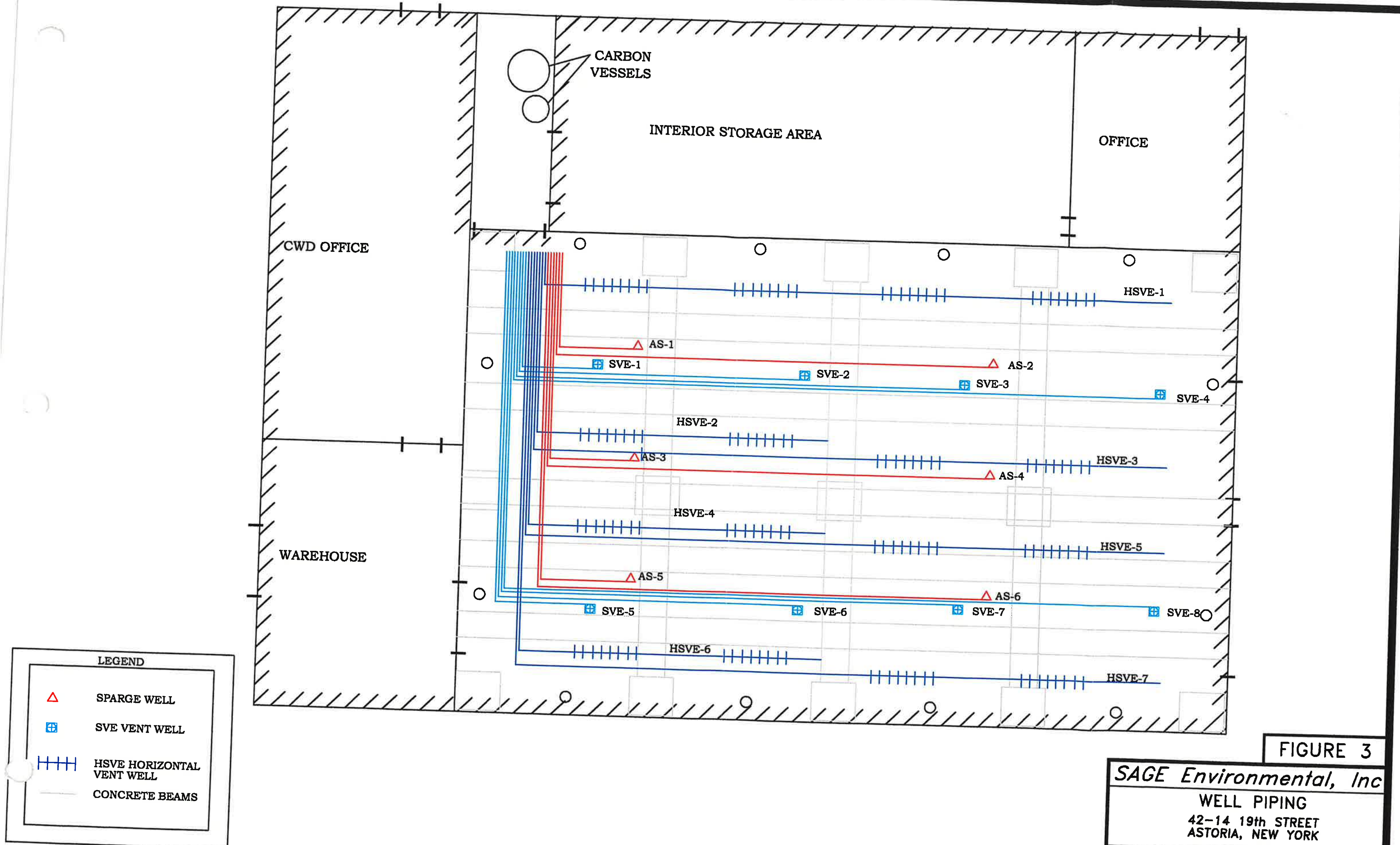


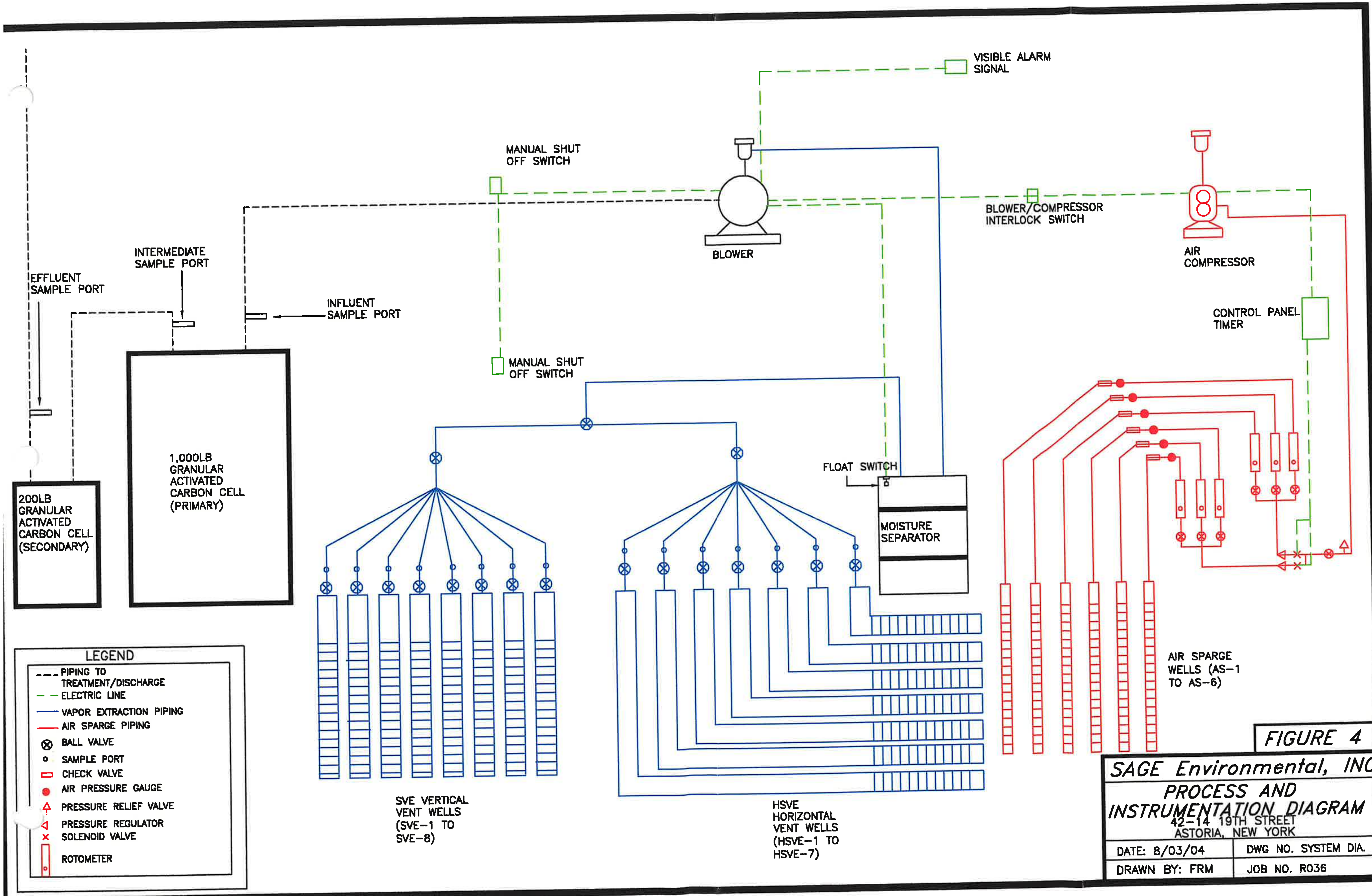
FIGURE 3

SAGE Environmental, Inc

WELL PIPING

42-14 19th STREET
ASTORIA, NEW YORK

DATE: 08/05/04	DWG NO. WELL PIPING
DRAWN BY: FRM	JOB NO. R036


VISIBLE ALARM SIGNAL
MANUAL SHUT OFF SWITCH
BLOWER
BLOWER/COMPRESSOR INTERLOCK SWITCH
AIR COMPRESSOR
INTERMEDIATE SAMPLE PORT
EFFLUENT SAMPLE PORT
INFLUENT SAMPLE PORT
CONTROL PANEL TIMER
MANUAL SHUT OFF SWITCH
1,000LB GRANULAR ACTIVATED CARBON CELL (PRIMARY)
200LB GRANULAR ACTIVATED CARBON CELL (SECONDARY)
FLOAT SWITCH
MOISTURE SEPARATOR
AIR SPARGE WELLS (AS-1 TO AS-6)
LEGEND
PIPING TO TREATMENT/DISCHARGE
ELECTRIC LINE
VAPOR EXTRACTION PIPING
AIR SPARGE PIPING
BALL VALVE
SAMPLE PORT
CHECK VALVE
AIR PRESSURE GAUGE
PRESSURE RELIEF VALVE
PRESSURE REGULATOR
SOLENOID VALVE
ROTOMETER
SVE VERTICAL VENT WELLS (SVE-1 TO SVE-8)
HSVE HORIZONTAL VENT WELLS (HSVE-1 TO HSVE-7)
FIGURE 4
SAGE Environmental, INC
PROCESS AND INSTRUMENTATION DIAGRAM
42-14 19TH STREET
ASTORIA, NEW YORK
DATE: 8/03/04
DWG NO. SYSTEM DIA.
DRAWN BY: FRM
JOB NO. R036

APPENDIX 1

REPORT ON PILOT TESTING ACTIVITIES

Chemical Waste Disposal Corporation
42-14 19th Avenue
Astoria, New York

August, 1999

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GSC Project No. 9907401

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Figure 4	Soil Vapor Extraction Graphical Radius Influence Plot
Figure 5	Steady State Pressure/Dissolved Oxygen Influence

1.1.2 Site Geology

The site is located in the Atlantic Coas

geology consists of unconsolidated sand, silt, c

bedrock. These layers dip to the southeast and

surface. From oldest (deepest) to youngest (sh

divided into a series of hydrogeologic units: th

the Magothy aquifer and the Upper glacial aqu

The Upper Glacial aquifer can be divic

Pleistocene age. The Holocene deposits are th

silt, clay, organic mud, peat, loam, and shells.

artificial fill, salt-marsh and swamp deposits, s

in thickness from five to 50 feet (Kilburn and I

are moraine (till), composed of unsorted clay,

contain outwash deposits of stratified brown sa

and clay. The average horizontal hydraulic co

and the average vertical hydraulic conductivity

The immediate subsurface in the vicin

16 feet below grade (fbg), which is overlain by

between 4 and 8-fbg and groundwater flow is t

GSC personnel gauged observation we

pilot test start-up on July 21, 1999. Table 1 di

1.0 INTRODUCTION

Geologic Services Corporation (GSC) wa

Corporation (CWD) to conduct a soil vapor extra

42-14 19th Avenue, Astoria, New York (Figure 1)

Previous investigations revealed the presence of v

subsurface soil and groundwater of the subject pr

assess the feasibility of SVE/IAS as an effective r

1.1 Site Conditions

1.1.1 Site Features

The subject location consists of approxim

waste storage and transport facility (Figure 2). Th

office building, and a storage yard. The storage b

various chemical wastes. Within the yard, drums

storage containers. Wells existing on-site that we

SVE well (SVE-1), one air sparge well (AS-1), an

and MW-11). The majority of the site is concrete

surrounding AS-1, and the northern and southern

The area surrounding AS-1 contains fractured con

and southern corners of the eastern boundary of th

excavations that expose the fill material present be

Table 1

Well Gauging Data
Chemical Waste Disposal Corporation
42-14 19th Avenue
Astoria, New York
July 21, 1999

Well Identification	Depth to Water from top of casing (ft)
MP-1 (shallow)	4.46
MP-1 (intermediate)	7.33
MP-1 (deep)	7.51
MP-2 (shallow)	Dry
MP-2 (intermediate)	7.53
MP-2 (deep)	7.54
SVE-1	10.60
MW-11	12.43

1.1.3 Historical Analytical Data

Site investigation activities conducted on-site have included drilling soil borings and installing monitoring wells. Laboratory analyses of soil and groundwater from the site have revealed detection of VOCs, inorganic constituents, pesticides, herbicides, and (PCBs). The primary constituents of concern are VOCs.

2.0 PILOT TEST METHODOLOGY

Pilot testing proceeded by applying a vacuum to SVE-1 utilizing a 7.5-horsepower (HP) rotary lobe blower to extract soil vapor. Following the initial SVE only feasibility test data collection, air injection was initiated into AS-1 utilizing an oil-less 4-HP air compressor to begin the IAS phase of the test. Testing procedures are outlined in detail in GSC's standard operating procedures for SVE/IAS pilot testing (Appendix A). Pilot testing activities were conducted over a 6.6-hour time period.

2.1 SVE Pilot Test

2.1.1 SVE Extraction Well (SVE-1)

SVE-1 has a well diameter of 4 inches with a screened interval from 2 to 12 feet below grade.

2.1.2 Observation Points

Observation wells MP-1, MP-2, MP-3, and MW-11 located at distances of 20.9, 22.9, 5, and 20.2 feet, respectively, from the extraction well were used as observation points for obtaining pressure, oxygen (O_2) and volatile organic compound (VOC) data. Available boring logs for the observation points are presented in Appendix B.

Monitoring points, MP-1 and MP-2, each contain three 1-foot long screens at varying depths. MP-1 is screened at depths of 19.5, 9.5, and 4.5 fbg. MP-2 is screened at depths of 15, 10, and 5 fbg. These multiple screen depths enable vacuum, O_2, and VOCs to be monitored at different depths with the subsurface at the same lateral distance from the extraction well.

2.2 SVE Steady State Test Results/Data Evaluation

Pressure data obtained from the SVE only pilot test conducted at SVE-1 is presented in Table 2 and on the field data sheets included in Appendix C. For purposes of SVE evaluation, data was collected to facilitate vadose zone monitoring from the shallow screened intervals of each monitoring point.

Table 2
Vacuum Measured at Well Heads During SVE Test
Chemical Waste Disposal Corporation
42-14 19th Avenue
Astoria, New York

July 21, 1999

Elapsed Time (minutes)	MP-1 (S) [20.9 ft]	MP-2 (S) [22.9 ft]	MP-3 [5 ft]	MW-11 [20.2 ft]	SVE-1 Applied Vacuum [0 ft]
0	0	0	0	0	0
10	0	0.13	0.32	0.06	24.5
40	0	0.15	0.32	0.04	24.5
75	0	0.14	0.37	0.07	24.5
95	0	0.14	0.33	0.05	24.5
130	0	0.17	0.34	0.06	24.5
180	0	0.13	0.30	0.06	24.5

All vacuum data in inches of water column

(S) = Shallow depth screen interval

[22.9] = Distance from vapor extraction well

2.2.1 Observed Radius of Influence (ROI)

Steady state vacuum at the extraction well was 24.5 inches of water with airflow of 120 standard cubic feet per minute (SCFM). Effective vacuum influence, (0.1 inches of water or greater), was observed in MP-3 at a distance of 5 feet from the extraction well, and in MP-2, at a distance of 22.9 feet from the extraction well. Monitoring point MP-1, which lies at a distance of 20.9 feet from the extraction well exhibited no vacuum influence. This may be due to short-circuiting caused by the fractured concrete between MP-1 and the extraction well. Slight vacuum influence was observed in MW-11, at a distance of 20.2 feet from the extraction well. The screen depth of MW-11 is unknown, and may be below the vadose zone preventing vacuum monitoring. MP-2 was the monitoring point most distant from the extraction well at which effective vacuum influence was observed. Its distance, 22.9 feet, will be accepted as the observed radius of vacuum influence (Figure 3). ?

2.2.2 Mathematical "Zero Vacuum" ROI Evaluation

A mathematical equation developed by Johnson, et al (1990) was utilized to calculate a "zero vacuum" ROI at which the vacuum achieved in the subsurface would be equal to zero under ideal homogeneous conditions. The equation was used to calculate the zero vacuum radius of influence using pressure data from MP-1 through MP-3, and MW-11, and their corresponding distances. The equation and the calculations for each observation point are presented in Appendix D. Discrepancies in the results of the calculations are due to limitations of the mathematical equation and the heterogeneity of the subsurface. The average mathematical "zero vacuum" radius of influence was calculated to be 17.6 feet.

2.2.3 Graphical "Effective" ROI Evaluation

Vacuum influence typically has a semi-logorithmic relationship to radial distance from the extraction well. The vacuum data collected during the pilot test was analyzed using a semi-log plot (Figure 4) of normalized vacuums (monitoring point vacuum divided by the extraction well vacuum) on the logarithmic scale (y - axis) and radial distance from the extraction well on the arithmetic scale (x - axis). A best-fit line was drawn through the data using an exponential method. The radial distance corresponding to the log value of 0.01 for each line yields the estimated effective radius of vacuum influence at which observed vacuums are 1% of the applied vacuum. The 1% value is an arbitrary yet conservative estimate of the projected vacuum needed to provide adequate site coverage. This method of data evaluation yielded an "effective" ROI of 15.3 feet, which is also illustrated on Figure 3.

The graphically determined ROI is considered to be more accurate than the mathematically determined ROI because it extrapolates using the vacuum data from all the monitoring points, whereas the mathematically determined ROI extrapolates using vacuum data from a single monitoring point and assumes a homogeneous media.

2.3 Soil Vapor Analysis

Soil vapor samples were collected from the extraction well during the pilot test and screened in the field with a Gastec organic vapor analyzer meter. VOC concentrations ranged from 280 to 560 parts per million (ppm). A sample of extracted vapor was collected and submitted to Accutest, Inc. (Accutest) of Dayton, New Jersey for analysis. The preliminary laboratory results are included in Appendix E.

Soil Vapor Screening Results (At test start-up, SVE-1)

Total VOCs	>1,000 ppm(v)

Soil Vapor Analytical Results (Sample collected 180 minutes into pilot test, SVE-1)

Total VOCs	1,148.4 ppm(v)

2.4 IAS Pilot Test (AS-1)

The in situ air sparge pilot test was conducted at location AS-1. The test commenced 180 minutes into the SVE pilot test and concluded 400 minutes into the test.

2.4.1 Injection Well

The injection well, AS-1, has a well diameter of 2 inches and a screened interval from 17 to 19 feet fbg. The screen interval lies below the peat layer. A 1/4-inch diameter air supply line was used to connect the well to the air compressor.

2.4.2 Observation Points

Four monitoring points, MP-1, MP-2, MP-3, and MW-11 at distances form the injection well of 12.0, 20.3, 4.5, and 27.5, respectively, were used to monitor pressure, vacuum, and dissolved O_2 in groundwater. MP-1 and MP-2 each contained three separate screened intervals that enabled pressure, vacuum, and O_2 monitoring of different depths at the same lateral distance from AS-1. No dissolved oxygen measurements were taken from MW-11 and MP-1 (intermediate screen zone) due to the presence of separate phase liquids above the water table, and the risk of damaging the dissolved oxygen meter with these liquids.

2.5 Steady State Test Results/Data Evaluation

Data obtained from the pilot test conducted at AS-1 is summarized in Table 3 and presented on the field data sheets included in Appendix C. The data in Table 3 represent steady state conditions achieved prior to shutdown.

Table 3
In-Situ Air Sparge Pilot Test Steady State Results
Chemical Waste Disposal Corporation
42-14 19th Avenue
Astoria, New York

July 21, 1999

Total Time Elapsed (Min)	Applied Pressure (PSI)	Air Flow Rate (CFM)	Observed Pressure in Inches of Water/Dissolved Oxygen (% Increase) Influence							
			MP-1(S) [12.0 ft]	MP-1 (M) [12.0 ft]	MP-1 (D) [12.0 ft]	MP-2 (S) [20.3 ft]	MP-2 (M) [20.3 ft]	MP-2 (D) [20.3 ft]	MP-3 [4.5 ft]	MW-11 [27.5 ft]
400	11.5	5.5	0/Dry	1.6/*	9.46/ 93	-0.17/Dry	0.97/97	0.65/46	-0.36/**	-0.08/*

(S)	=	Shallow screen interval
(M)	=	Intermediate screen
(D)	=	Deep screen interval
(min)	=	Minutes
(PSI)	=	Pounds per square inch
(CFM)	=	Cubic feet per minute
[12.0]	=	Distance from injection well
*	=	Measurement not taken due to presence of separate phase liquid above water surface.
**	=	Measurement not taken due to risk of causing short-circuiting.

2.5.1 Observed ROI

Steady state pressure at the injection well was 11.5 pounds per square inch (psi) with an airflow of 5.5 cubic feet per minute (CFM). The maximum distance from the injection well at which pressure influence was observed was 20.3 feet (MP-2). At a distance of 27.5 feet from the injection well (MW-11), no pressure influence was observed. The observed pressure ROI lies at approximately 20.3 feet from the injection well.

Significant dissolved oxygen influence (47 to 96 percent increases) was observed at a maximum distance of 20.3 feet from the injection well, which represents the observed radius of dissolved oxygen influence. The observed pressure and dissolved oxygen ROI is illustrated in Figure 5.

No significant pressure influence was observed in the vadose zone indicating a lack of vertical air migration. The screen interval of AS-1 is located below the peat layer, and it is likely that the peat layer restricted upward airflow.

3.0 REMEDIATION SYSTEM DESIGN CONSIDERATIONS

3.1 Vacuum ROI

During the SVE pilot test conducted on SVE-1, a vacuum of 24.5 inches water was applied with a resulting flow rate of 120 SCFM. Based on data collected during a three hour test, the observed ROI was 22.9 feet, the mathematical "zero vacuum" computation indicated an average ROI of 17.6 feet, and the graphical "effective" ROI evaluation was determined to be approximately 15.3 feet. The graphical effective radius of influence of 15.3 feet should be used for design consideration.

Based on the radius of influence results from the SVE pilot test, it appears this technology would be an effective tool for site remediation.

3.2 Pressure/O_2 ROI

Pressure influence was observed at a maximum distance of 20.3 feet from the extraction well. Dissolved oxygen concentrations were observed to increase from 46 to 97 percent to a maximum distance of 20.3 feet.

Based on the results of the air sparge pilot test, it appears that the inclusion of air sparging to an SVE system would increase the effectiveness of site remediation. In addition to removing high concentrations of VOCs in the soil and groundwater, air sparging will also enhance bioremediation by increasing dissolved oxygen in groundwater. Air sparge injection points should be installed above the peat layer to ensure pressure response in the vadose zone.

3.3 Remedial System Equipment

Based upon pilot testing, a low-vacuum, vapor extraction system capable of 200 to 300 SCFM under a vacuum of 16 to 20 inches of water should be sufficient to extract vapor from the area of vadose zone impact. In addition, a sparge system capable of injecting 30 to 50 SCFM utilizing an oil-less compressor should be sufficient to distribute oxygen throughout the saturated zone of impact. Based on total VOC effluent of 1,148.4 ppm(v), a catalytic oxidizer is necessary to treat effluent gasses.

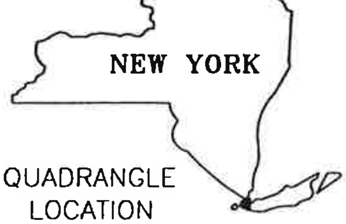
FIGURES

Figure 1

Locus Plan

UTM COORDINATES: 45 14 344 N
5 93 004 E

LATITUDE: 40° 46' 36" N
LONGITUDE: 73° 53' 52" W



QUADRANGLE LOCATION

0 4000

Scale in feet

FIGURE 1 – SITE LOCUS	
CHEMICAL WASTE DISPOSAL CORPORATION 42–14 19TH AVENUE ASTORIA, NEW YORK	
GSC REF.: 9907401	DATE: 8–98
DRAFTED BY: dc	CHECKED BY:
SOURCE: USGS 7.5' TOPOGRAPHIC MAP CENTRAA PARK, NY QUADRANGLE	

LOCUS.DWG

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Bohemia, NY 11716 (516) 218-6956

Figure 2

Site Plan

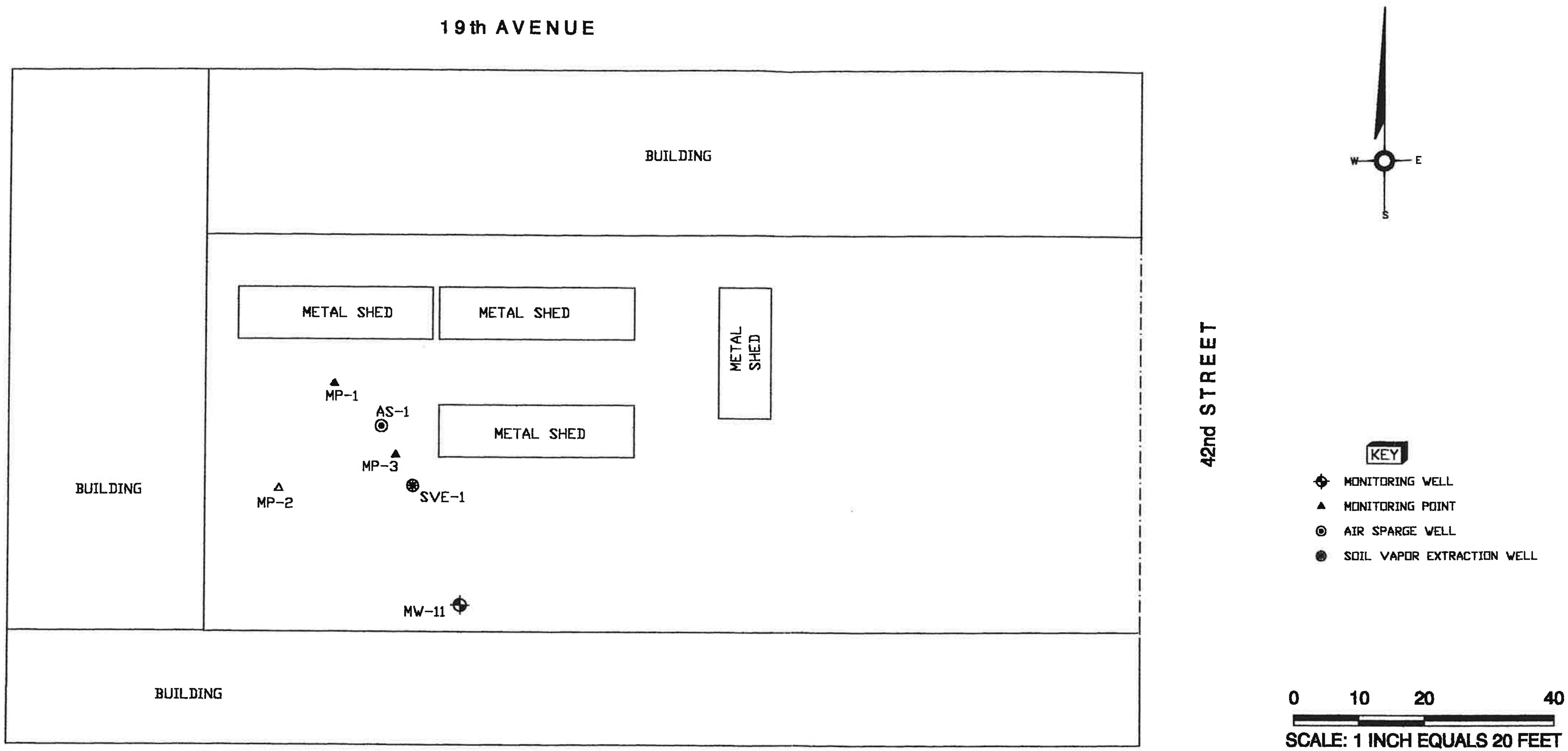


FIGURE 2 SITE PLAN

CHEMICAL WASTE DISPOSAL CORPORATION
42 - 41 19th AVENUE
ASTORIA, NEW YORK

GSC REFERENCE: 9907401/02SITE.dwg	
DRAFTED BY: SETH	DATE: 8/99
REVISED BY: dc	CHECKED BY:
SOURCE: GSC FIELD RECONNAISSANCE	

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Suite 6 Bohemia, New York 11716 (516) 218 - 6956

Figure 3

Soil Vapor Extraction Radii of Influence

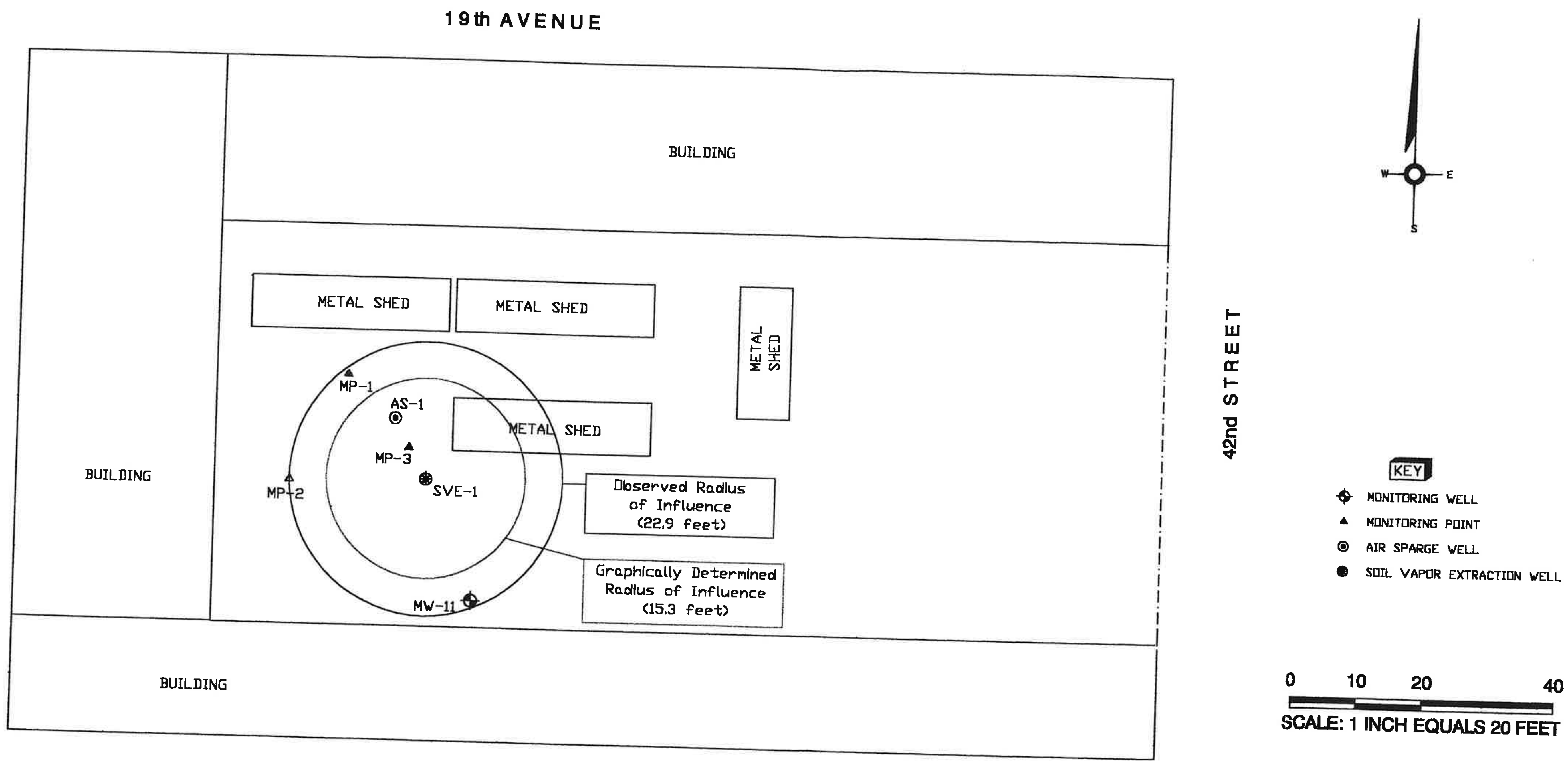


FIGURE 3
SOIL VAPOR EXTRACTION RADII OF INFLUENCE

CHEMICAL WASTE DISPOSAL CORPORATION
42 - 14 19th AVENUE
ASTORIA, NEW YORK

GSC REFERENCE: 9907401/02SITE.dwg	
DRAFTED BY: SETH	DATE: 8/99
REVISED BY: dc	CHECKED BY:
SOURCE: GSC FIELD RECONNAISSANCE	

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Suite 6 Bohemia, New York 11716 (516) 218 - 6956

Figure 4

Soil Vapor Extraction Graphical Radius of Influence Plot

FIGURE 4
Soil Vapor Extraction Graphical Radius of Influence Plot
Chemical Waste Disposal Corporation
42-14 19th Avenue
Astoria, New York
July 21, 1999

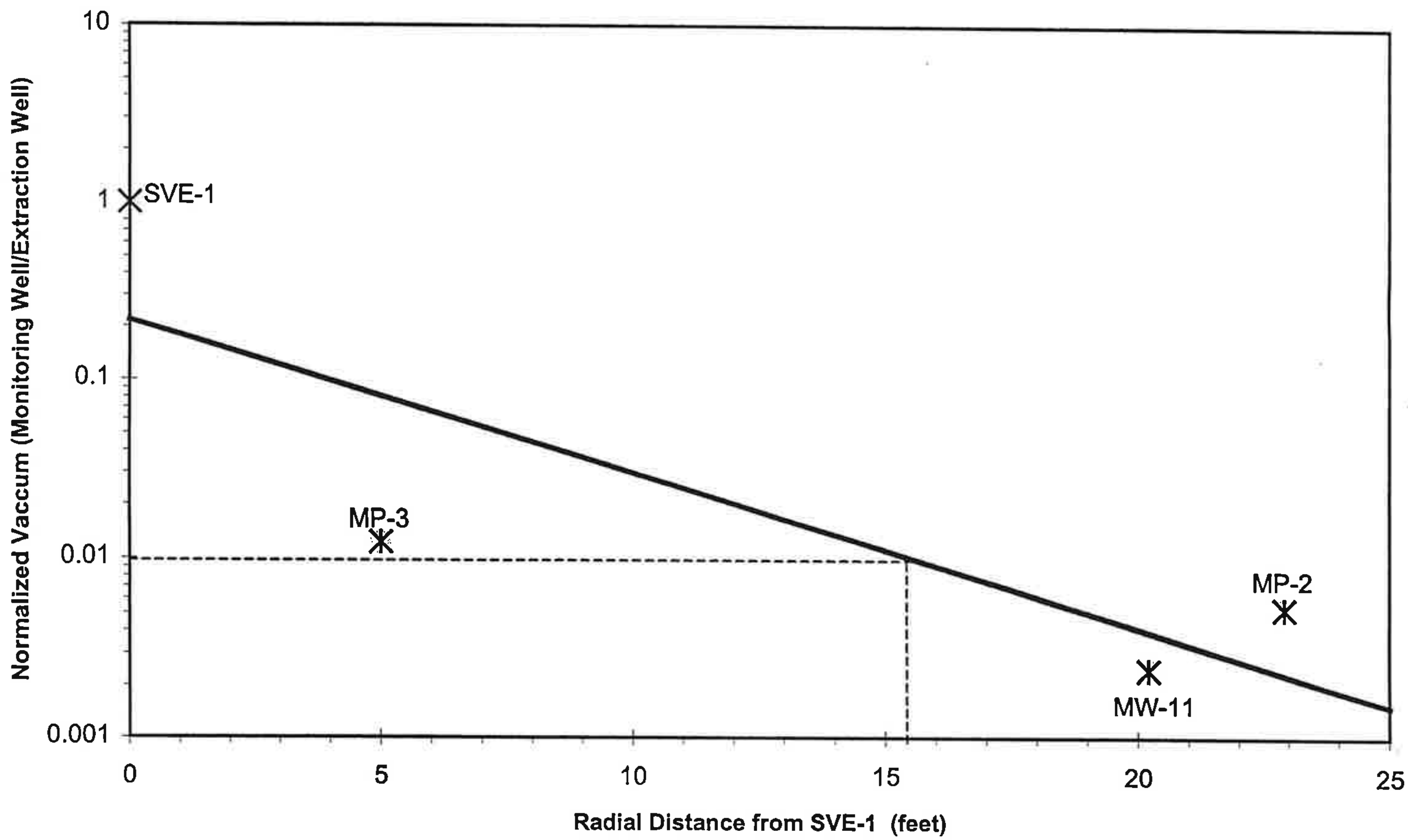


Figure 5

Steady State Pressure/Dissolved Oxygen Influence

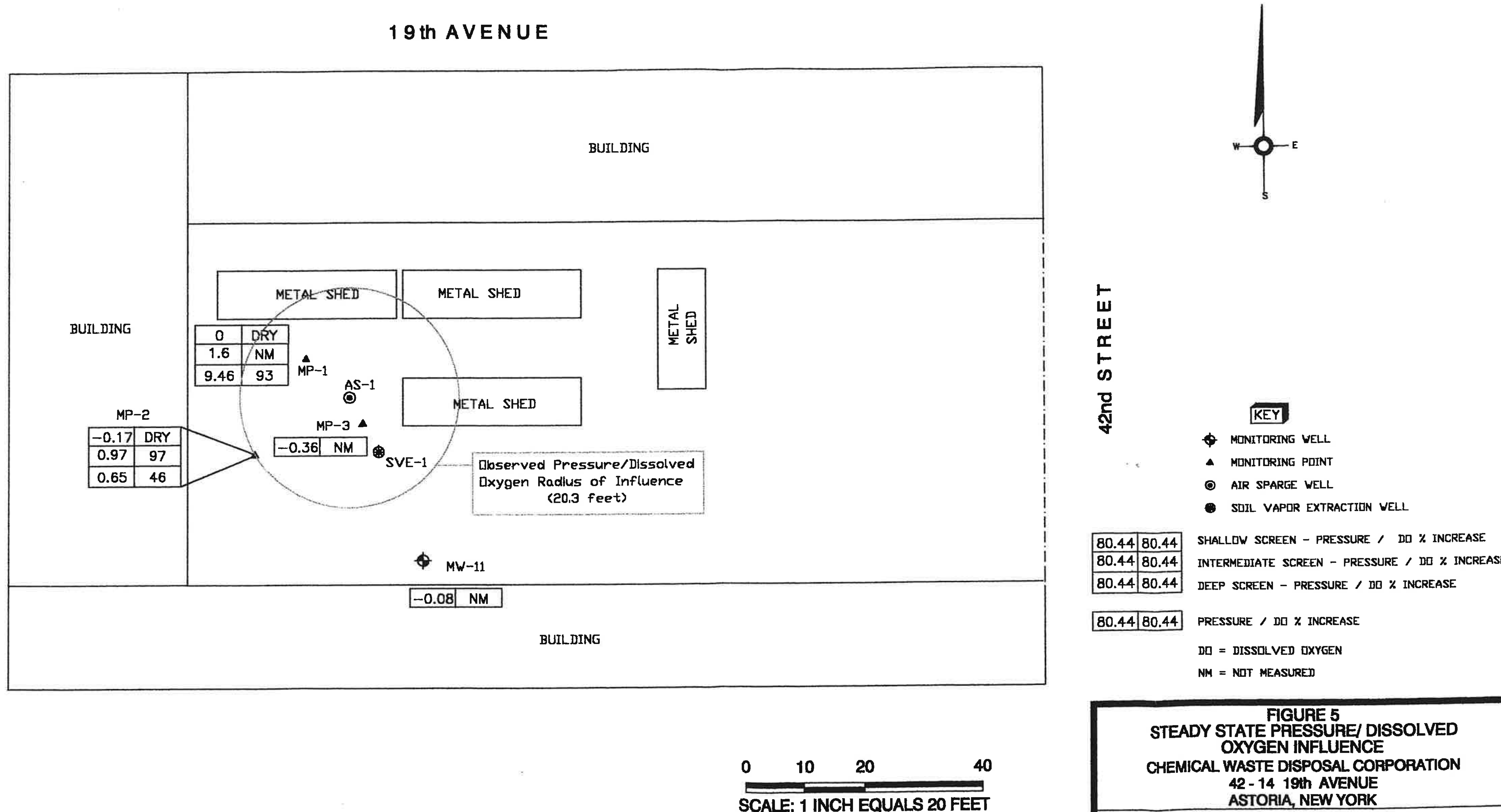


FIGURE 5
STEADY STATE PRESSURE/ DISSOLVED OXYGEN INFLUENCE
CHEMICAL WASTE DISPOSAL CORPORATION
42 - 14 19th AVENUE
ASTORIA, NEW YORK

GSC REFERENCE: 9907401/02SITE.dwg	
DRAFTED BY: SETH	DATE: 8/99
REVISED BY: dc	CHECKED BY:
SOURCE: GSC FIELD RECONNAISSANCE	

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Hydrogeologists and Environmental Scientists
1401 Church Street Suite 6 Bohemia, New York 11716 (516) 218 - 6956

APPENDICES of Appendix 1

Appendix A

GSC Standard Operating Procedures (SOP)-
Soil Vapor Extraction (SVE)/ in situ Air Sparge (IAS)
Pilot Testing

Geologic Services Corporation Standard Operating Procedures
Soil Vapor Extraction (SVE) Pilot Testing

Design Considerations

- Review all available site background information, including the site plan, soil boring logs, field soil screening (PID/FID) data, groundwater level data, water level fluctuation data, groundwater analytical data, soil type and relative permeability, and previous pilot testing data (if available).

- Based upon this information, the pilot test will be conducted on the well(s) best suited to the test; typically, the well(s) with the highest level of hydrocarbons in soil based upon PID readings or lab analyses will be selected. Ideally, the test well(s) will be centrally located and have other nearby wells for monitoring radius of influence (ROI). The test will be completed on a maximum of two extraction wells. If sufficient information is obtained from testing the first well, a second test may not be necessary, particularly if the two test wells are relatively close, show similar boring log data, and influence is noted in the "other" extraction well when testing the first well.

- In the event that no soil analytical/screening data is available for the site, the well(s) with the greatest level of groundwater impact will be selected for testing. In no case should a previously clean well be used as a test well when there is an adjacent plume.

- Determine which wells will be used as monitoring points. If adequate monitoring points are not located near enough (within 10 feet) to the extraction well to monitor vacuum influence, temporary monitoring points will be installed. Three monitoring points located along a line within the anticipated ROI and 2-3 discrete points located in different directions from the extraction well is ideal.

- Provisions must also be made for proper treatment of extracted vapors. Extracted vapors will typically be treated with vapor phase granular activated carbon (GAC).

- 2 air samples will be collected and analyzed for BTEX, C_1-C_5 hydrocarbons, C_1-C_{10} hydrocarbons, and chlorinated hydrocarbons

Field Procedures/Data Collection

Prior to test start-up, groundwater levels in all site wells will be gauged and recorded. Distances between the extraction well and all monitoring points will also be measured and recorded accurately for inclusion in the scaled site plan. In addition, potential short-circuiting areas such as landscapes, pavement breaks, etc..., on the site's surface should be noted and sketched on the site plan.

To facilitate vacuum extraction, the extraction well will be retrofitted with an airtight well cap. Each of the surrounding monitoring wells will also be retrofitted with air tight caps. Each monitoring well cap will be equipped with a vacuum gauge or quick-connect fitting for use with a digital manometer (accurate to 0.1 inches of water) for monitoring observed vacuum. Applied vacuum at the extraction well will be measured with vacuum gauges on the SVE unit.

If site boring logs indicate relatively heterogeneous and impermeable soil and monitoring wells are not located within 10 feet of the extraction well(s), temporary monitoring points will be installed. The points should be installed with a rotary hammer type drill. These temporary monitoring points will also be equipped with an airtight fitting at the surface to allow for measurement of observed vacuum utilizing a vacuum gauge or manometer.

A photoionization detector (PID) will be used to monitor influent (pre-GAC) and effluent (post-GAC) vapor stream concentrations. The PID will be calibrated prior to use. An O_2/LEL meter will also be utilized to monitor oxygen content and percent LEL in the influent vapor stream; the O_2/LEL meter will be calibrated prior to use.

Air flow measurements will be made utilizing an averaging pitot tube installed on the SVE unit. Actual cubic feet per minute (ACFM) and standard cubic feet per minute (SCFM) air discharge rates will be determined in the field using the calculations on the attached sheet.

The SVE unit will be started with the air dilution valve fully open and the pitot tube valves closed. The dilution valve is then closed over a period typically not to exceed one minute and the pitot tube valves opened immediately after startup. Once the dilution valve is closed and the pitot tube valves open, the following data will be collected from the extraction well/SVE unit and the monitoring points:

- Elapsed time of each reading;
- Vacuum applied to the extraction well, both before (V_1) and after (V_2) the manual air dilution valve;
- Temperature of the influent vapor stream, both before (T_1) and after (T_2) the SVE unit;
- Pressure of the influent vapor stream (measured between the SVE unit and the vapor phase GAC drum);
- PID reading of the influent vapor stream (pre-GAC);
- % O_2 of the influent vapor stream;
- % LEL of the influent vapor stream;
- Differential pressure across the pitot tube, as measured with a gauge or manometer;
- PID reading of the effluent vapor stream (post-GAC);
- Observed vacuum at the temporary monitoring points, and;
- Observed vacuum at the monitoring wells.

These parameters will be measured on a regular basis throughout the pilot test, including startup (within 5 minutes of closing the air dilution valve and opening the pitot tube valves), at 15 minutes, at 30 minutes, at 45 minutes, at 60 minutes, and at 30-minute intervals thereafter until the pilot test is terminated. In addition to the above parameters, ACFM and SCFM will be calculated at each measurement interval using the influent pressure, pitot tube differential pressure, and the attached calculations (Attachment A).

The test should be conducted for a minimum of two hours. The test will not be terminated unless steady state conditions are observed in the surrounding monitoring points (as indicated by minimal fluctuation in vacuum levels for a least 30 minutes) or 3 to 4 hours have elapsed and no effect is observed at the nearest monitoring point. If this is the case, additional temporary monitoring point may be installed between the extraction well and nearest monitoring point.

In the event that no influence is noted in a monitoring point or temporary monitoring point after 3 or 4 hours, and another suitable extraction well is available with different soil lithologies, the test will be aborted and another test completed on the alternative well. If all the alternative wells are constructed in materials similar to the current extraction well (i.e., a similar minimal ROI expected regardless of the extraction well), then the test on the first well should be continued for up to 8 hours.

Samples of extracted soil vapor will be collected during the test and submitted to a certified laboratory for analysis. A minimum of three air samples (2 Tedlar bags per sample) will be collected during the test: one as soon as possible after start-up, one at an elapsed time of 30 minutes, and one at an elasped time of 60 minutes. An influent PID reading will be taken at the time of sample collection. The sample corresponding to the highest PID reading will be submitted for BTEX, C_1-C_5, C_1-C_{10}, and chlorinated hydrocarbon analyses.

Data Analysis

The SVE pilot test should be completed such that all data pertinent to the design of an SVE system is obtained. At a minimum, evaluation of this data should result in the following information:

- Soil vapor radius of influence (ROI) determined by observed vacuums in monitoring points and confirmed by at least one additional technique (graphical/mathematical);

- Maximum achievable air flow rate;

- Soil vapor hydrocarbon concentrations (and any fluctuations noted during the test) and VOC removal rates;

- An estimate of vapor-phase GAC consumption for an SVE system installed on the extraction well(s);

This information will initially be utilized to determine if vacuum extraction is a feasible remedial option for the site. If the data indicate a SVE system is feasible, the information will be further utilized to design a complete extraction system, including well design, well spacing and location, and selection of an appropriate off-gas treatment method.

ATTACHMENT A
SVE PILOT TEST ACFM - SCFM CALCULATIONS

$Q = 128.8K\sqrt{P}$ P/T+460

Where:

Q $\rightarrow$ Flow rate for air through a pipe (in SCFM)
K = 0.586 for a 2" diameter, 0.670 for 4" diameter
P $\rightarrow$ Static line pressure (PSIA)(Add 14.7 to gauge reading)
P $\rightarrow$ Differential pressure ("H_2O)(measure with manometer or Magnehelic from pitot tube)
T $\rightarrow$ Temperature above pitot tube (^oF)

ACFM = SCFM (14.7/(14.7 + PSIG))(460 + ^oF/520)

Where:

ACFM $\rightarrow$ Actual cubic feet/minute
SCFM $\rightarrow$ Standard cubic feet/minute
PSIG $\rightarrow$ Pressure reading of gauge above holding tank (PSI)
^oF $\rightarrow$ Temperature above pitot tube

$[((P^2w - P^2atm)\ \ln(Rw/r))/(P^2(r) - P^2w)] + \ln(Rw)R_1 = e$

Where:

R_1 $\rightarrow$ Radius of influence (feet)
Pw $\rightarrow$ Pressure at extraction well (atm).
P(r) $\rightarrow$ Pressure at observation point (atm.)(As Above)
Patm $\rightarrow$ Atmospheric Pressure (1 atm.)
Rw $\rightarrow$ Radius of extraction well (feet)
r $\rightarrow$ Distance from extraction well to observation point

Geologic Services Corporation
Standard Operating Procedures
Air Sparge (AS) Pilot Testing

Design Considerations

- Review all available site background information, including site plan, soil boring logs, field soil screening (FID/PID) data, groundwater level data, water level fluctuation data, groundwater analytical data, soil type and relative permeability and any previous pilot test data.

- Assuming the background data review reveals conditions that are suitable for air sparging (i.e. soil permeability greater than 10^{-9} cm^2 and no confining layers of low permeability between the air injection point and air extraction point), the AS pilot test set up may continue. If the background data reveals soil permeabilities less than 10^{-9} cm^2 or confining layers between the air injection point and air extraction point, alternative remedial methods should be explored.

- Air sparging requires a specific type of well and it is likely that one will have to be installed in order to complete the AS pilot test. The well should be installed in an area of known hydrocarbon impact. This location may be based on background information or, if sufficient data is not available, a soil boring/sampling program.

- Once the location has been chosen, a one inch to two inch diameter well should be installed. The well should have a maximum of two feet of 0.010 inch slot screen, the top of which should be ten (10) feet below the lowest seasonal water table or a minimum of five (5) feet below the deepest known vertical extent of hydrocarbon impact. Driven wells may also be used if lithology allows advancement to proper depths with this drilling method.

- The annulus of the borehole should be filled with an approximately sized silica sand pack (#1 sand) to the top of the screen. The sand pack will be followed with a one to two foot thick bentonite clay seal and then completed to the surface with a pressure injected bentonite-cement grout seal. Refer to the attached diagram of a completed AS well.

- Determine which wells will be used as monitoring points. If adequate points are not located near the sparge well (within five to ten feet) to monitor pressure influence or water table elevation, additional monitoring points should be installed. A greater number of monitoring points would supply greater data, but a minimum of three monitoring point should be used (existing, newly installed or a combination of both) at different distances from the AS well. Discrete monitoring points in vadose zone (driven by KV type system or similar) may also be installed if present monitoring well array is not sufficient. Radial distances of five, ten and 15 to 20 feet can be used for many soil types. Closer well spacings may be required in soil where the permeability approached 10^{-9} cm^2.

- The AS pilot test will always be conducted in conjunction with a Soil Vapor Extraction (SVE) pilot test. This policy must be strictly followed in order to eliminate any unnecessary chances of uncontained vapors from migrating to potential environmental receptors such as building basements, utility pipelines and vaults, etc.

- A SVE well should be positioned in the immediate vicinity of the AS well. A nested AS/SVE well couplet may be installed but proper construction is crucial to ensure the pilot test and/or future system integrity.

- The monitoring wells used for the AS pressures and water table monitoring will also be used to monitor the SVE system. Additional groundwater monitoring wells may also be used to determine the SVE radius of influence, generally greater than that of an AS system.

Field Procedures/Data Collection

Prior to test startup, groundwater levels in all site wells will be gauged and recorded. Dissolved oxygen (DO) concentrations of the groundwater will also be collected and recorded in all wells (AS, SVE and monitoring). Distances between the AS well, SVE well and monitoring points will be measured and recorded. In addition, potential short-circuiting areas such as landscaping, pavement breaks, etc..., on the sites surface should be noted and sketched on the site plan.

All wells will be equipped with air tight well caps and vacuum/pressure gauges or quick connect fittings to be used with gauges or manometers.

A calibrated photoionization detector (PID) and a calibrated O_2/LEL meter will be used to screen offgas control influent and effluent air streams (sparge air contained by the SVE system). In addition, all well headspaces will be monitored for volatile organic compounds with a PID, and percent oxygen content with the O_2/LEL water.

Air flow measurements will be made using averaging pitot tubes installed on the AS and SVE systems. Actual cubic feet per minute (ACFM) and standard cubic feet per minute (SCFM) air injection (removal rates will be determined in the field using the calculations on the attached sheet.

The SVE unit will be started and operated alone for at least one hour or until operating conditions equilibrate, if a SVE pitot test was previously conducted on the site. If no SVE pilot testing was previously conducted, the SVE pilot test should be conducted for a minimum of four hours, in order to collect sufficient data to and in final system design. The SVE pilot portion of the AS pilot test will be conducted as outlined in GSC's Standard Operating Procedures for Soil Vapor Extraction Pilot Testing whether the SVE test is conducted for one hour or four hours. GSC's SVE SOP is attached.

SVE operating parameters will be measured on a regular basis throughout the pilot testing, including startup (within five minutes of system startup), at 15, 30, 45, 60 minutes and at 30 minute intervals thereafter until the pilot test is terminated. AS operating parameters will also be measured on a regular basis throughout the pilot testing. The AS portion of the pilot testing should last for a minimum of four hours.

The following data will be collected in addition to the data outlined in the SVE SOP:

- elapsed time of each reading
- air injection pressure
- air injection differential pressure (for flow calculation)
- changes in surrounding SVE vacuum influence caused by pressurized air
- changes in SVE process air VOC concentrations
- water levels of monitoring wells surrounding the AS well

Samples of extracted soil vapor (prior to offgas treatment) will be collected during the testing and submitted to a certified laboratory for analyses. A minimum of three air samples (2 bags per sample) will be collected during the test; one sample will be collected near the end of SVE only operation; one sample will be collected at approximately 30 minutes of air sparge operation; and one sample will be collected near the end of the AS/SVE test.

The AS test should be conducted with an oilless compressor/blower. If an oilless compressor is not available, then an oil coalescing filter should be used to ensure contaminant free injection air. The test should be started at a pressure just above the hydrostatic pressure (0.43 psi/ft of water column above sparge screen) + injection pressure (additional pressure required for air to enter the surrounding soil formation).

Airflow should be introduced slowly, starting at approximately one cfm, and gradually increasing.

Air should be injected at a minimum of two flow rates and injection pressures. The first pressure flow rate should be held steady for two hours (including the time necessary to slowly introduce air). After two hours the injection rate/pressure should be increased and maintained for the duration of the test. The flow rate should not exceed 10 cfm and the injection pressure should not exceed 0.7 psi/ft of overburden soil.

When the AS pilot test is complete, the following parameters should be monitored and recorded (in addition to the regular system checks):

- SVE concentrations after the sparge test is complete and the compressor is off;
- DO concentrations of the water sampled prior to the test;
- Water levels in monitoring wells

ATTACHMENT A
AIR SPARGE PILOT TEST ACFM - SCFM CALCULATIONS

$Q = 128.8K\sqrt{P}$ P/T+460

Where:

Q $\rightarrow$ Flow rate for air through a pipe (in SCFM)
K = 0.586 for a 2" diameter, 0.670 for 4" diameter
P $\rightarrow$ Static line pressure (PSIA)(Add 14.7 to gauge reading)
P $\rightarrow$ Differential pressure ("H_2O)(measure with manometer or Magnehelic from pitot tube)
T $\rightarrow$ Temperature above pitot tube (^{o}F)

ACFM = SCFM (14.7/(14.7 + PSIG))(460 + ^{o}F/520)

Where:

ACFM $\rightarrow$ Actual cubic feet/minute
SCFM $\rightarrow$ Standard cubic feet/minute
PSIG $\rightarrow$ Pressure reading of gauge above holding tank (PSI)
^{o}F $\rightarrow$ Temperature above pitot tube

Appendix B

Well Logs

B..ING REPORT

GANNETT FLEMING

SHEET 1 OF 2

E STARTED: 7/13/99	DATE FINISHED: 7/13/99	BORING NO.: SP-1	
L.NT: Chemical Waste Disposal		PROJECT NO.: 35249.001	
ROJECT NAME & LOCATION: CWD - Astoria		PREPARED BY: E. Lochner	
LING CONTRACTOR: LAWES	LOGGED BY: E. Lochner	DRILLER: Carl	

EQUIPMENT:	CASING:	SOIL SAMPLER: S/SPOON		CORE BARREL	AUGER	MON. WELL (MW) PIPE	CAP	DRILL RIG AND METHOD
TYPE:								Mobile Rig, Hollow Stem Auger
SIZE:								
AMMER				BIT:				
T/FALL								

SURFACE CONDITIONS: Concrete

RFACE ELEVATION:

ER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

DEPTH BELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	SAMPLE DEPTH (FROM-TO)	SAMPLE MOISTURE CONTENT	SAMPLE RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0' - 15					Dk. brown silt, some gravel, little sand, trace brick debris 0'-5'
5				wet				Little auger return from 5'-15'
10								
15			15' - 17'					Peat at 16'
20								Well drilled in piling excavation for future building
25								

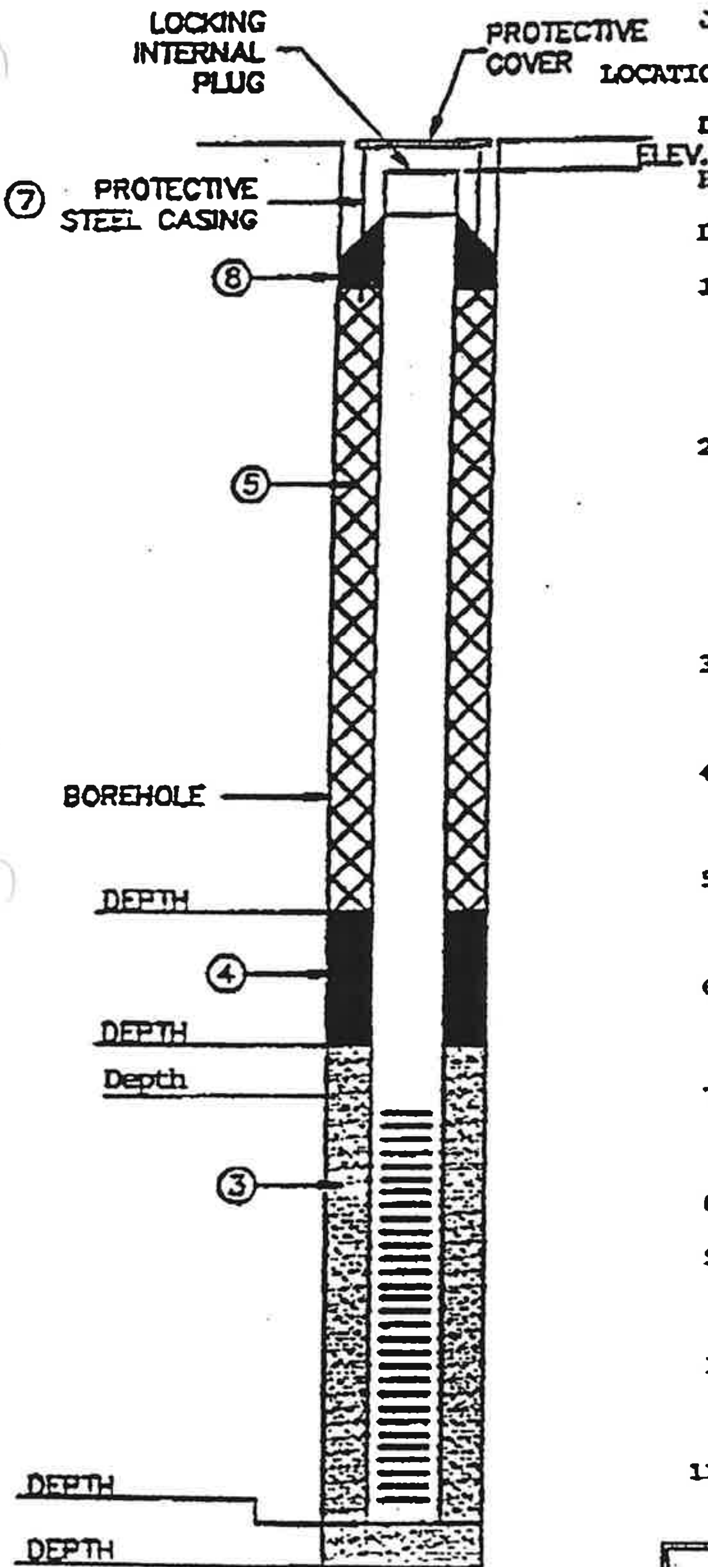
BORING REPORT	**GANNETT FLEMING**	**SHEET 1 OF 2**

DATE STARTED: 7/12/99	DATE FINISHED: 7/12/99	BORING NO.: MP-1	
CLIENT: Chemical Waste Disposal		PROJECT NO.: 35249.001	
PROJECT NAME & LOCATION: CWD - Astoria		PREPARED BY: E. Lochner	
DRILLING CONTRACTOR: LAWES	LOGGED BY: E. Lochner	DRILLER: Carl	

		SOIL SAMPLER:		CORE		MON. WELL (MW)		DRILL RIG AND METHOD
EQUIPMENT:	CASING:	S/SPOON		BARREL	AUGER	PIPE	CAP	Mobile Rig, Hollow Stem Auger
TYPE:								
SIZE:								
HAMMER WT/FALL				BIT:				

SURFACE ELEVATION:	SURFACE CONDITIONS: Concrete
WATER LEVEL AT FT. AFTER HRS.	FT. AFTER HRS.

DEPTH BELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	SAMPLE DEPTH (FROM-TO)	SAMPLE MOISTURE CONTENT	SAMPLE RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0.25' - 1'					Dk. brown silt, little fine sand, little gravel, trace brick debris
			1' - 3'					Brown fine-med sand, little gravel, little cobble
			3' - 5'					Dk. gray silt, some gravel, moist
	200		5' - 16'					Brown silt, some gravel, little sand, trace cobble, wet
10								
15								
			16' - 20'					Brown peat, dry
20								



MONITORING WELL CONSTRUCTION INFORMATION

JOB No. 35249.001 CLIENT CWO

LOCATION Astoria New York

DATE 7/12/99 WELL No. MP-1

HYDROGEOLOGIST E. Lochner

DRILLING CONTRACTOR Land Air, Water

1.) SCREEN TYPE PVC

SLOTTED LENGTH 1ft @ 19.5', 9.5', 4.5' bg. ft.

SLOT SIZE 0.01"

2.) SOLID PIPE TYPE PVC

SOLID PIPE LENGTH Varies ft.

PIPE & SCREEN DIA. 1 In.

JOINT TYPE-SLIP/GLUED ______ THREADED ✓

3.) TYPE OF BACKFILL AROUND SCREEN

#2 well gravel

4.) TYPE OF LOWER SEAL (IF INSTALLED)

bentonite

5.) TYPE OF BACKFILL ______

HOW INSTALLED ______

6.) TYPE OF SURFACE SEAL (IF INSTALLED)

bentonite

7.) PROTECTIVE CASING - YES ✓ NO ___

LOCKING CAP YES ✓ NO ___

8.) CONCRETE SEAL - YES ✓ NO ___

9.) DRILLING METHOD

Hollow stem auger

10.) ADDITIVES USED (IF ANY) ______

11.) TYPE OF BACKFILL ______

WATER LEVEL CHECKS*

DATE	TIME	DEPTH TO WATER	REMARKS

*FROM TOP OF WELL CASING

WELLCONS
092392

BORING REPORT	GANNETT FLEMING	SHEET 1 OF 2

DATE STARTED: 7/12/99	DATE FINISHED: 7/12/99	BORING NO.:	MF-2
CLIENT: Chemical Waste Disposal		PROJECT NO.:	35249.001
PROJECT NAME & LOCATION: CWD - Astoria		PREPARED BY:	E. Lochner
DRILLING CONTRACTOR: LAWES	LOGGED BY:	E. Lochner	DRILLER: Carl

EQUIPMENT:	CASING:	SOIL SAMPLER: S/SPOON		CORE BARREL	AUGER	MON. WELL (MW) PIPE	CAP	DRILL RIG AND METHOD
TYPE:								Mobile Rig, Hollow Stem Auger
SIZE:								
HAMMER WT/FALL				BIT:				

SURFACE ELEVATION: SURFACE CONDITIONS: Concrete

WATER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

DEPTH BELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	SAMPLE DEPTH (FROM-TO)	SAMPLE MOISTURE CONTENT	SAMPLE RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0.25' - 1'					Dk. brown silt, little fine sand, little gravel, trace brick debris
			1' - 2'					Brown fine sand, little silt, little gravel
			2' - 5'					Dk. gray fine sand and gravel
5	300		5' - 15'					Dk. gray silt, some gravel, little sand, wet, odor
10								
15								
			16'					Peat
20								
25								

MONITORING WELL CONSTRUCTION INFORMATION

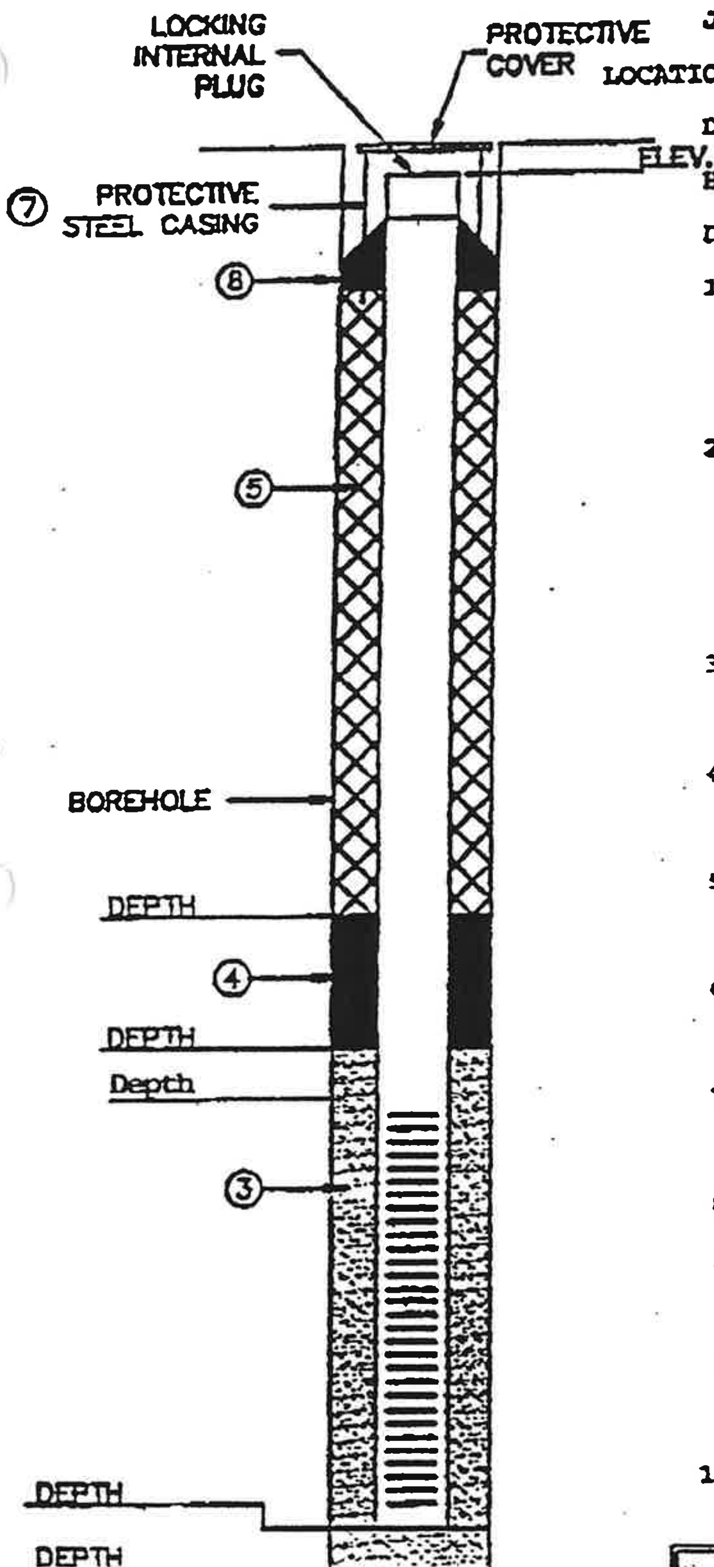
JOB No. 35249.001 CLIENT CWO

LOCATION Astoria, New York

DATE 7/12/88 WELL No. MP-2

HYDROGEOLOGIST E Lochner

DRILLING CONTRACTOR Land, Air, Water



1.) SCREEN TYPE PVC

SLOTTED LENGTH 1' e 15', 10', 5' bg. ft.

SLOT SIZE .001"

2.) SOLID PIPE TYPE PVC

SOLID PIPE LENGTH Varies ft.

PIPE & SCREEN DIA. 1 In.

JOINT TYPE-SLIP/GLUED ______ THREADED ✓

3.) TYPE OF BACKFILL AROUND SCREEN

#2 well gravel

4.) TYPE OF LOWER SEAL (IF INSTALLED)

bentonite

5.) TYPE OF BACKFILL ______

HOW INSTALLED ______

6.) TYPE OF SURFACE SEAL (IF INSTALLED)

bentonite

7.) PROTECTIVE CASING - YES ✓ NO ___

LOCKING CAP YES ✓ NO ___

8.) CONCRETE SEAL - YES ✓ NO ___

9.) DRILLING METHOD

Hollow stem auger

10.) ADDITIVES USED (IF ANY) ______

11.) TYPE OF BACKFILL ______

WATER LEVEL CHECKS*

DATE	TIME	DEPTH TO WATER	REMARKS

* FROM TOP OF WELL CASING

WELLCONS
092392

B[illegible]ING REPORT	GANNETT FLEMING	SHEET 1 OF 2

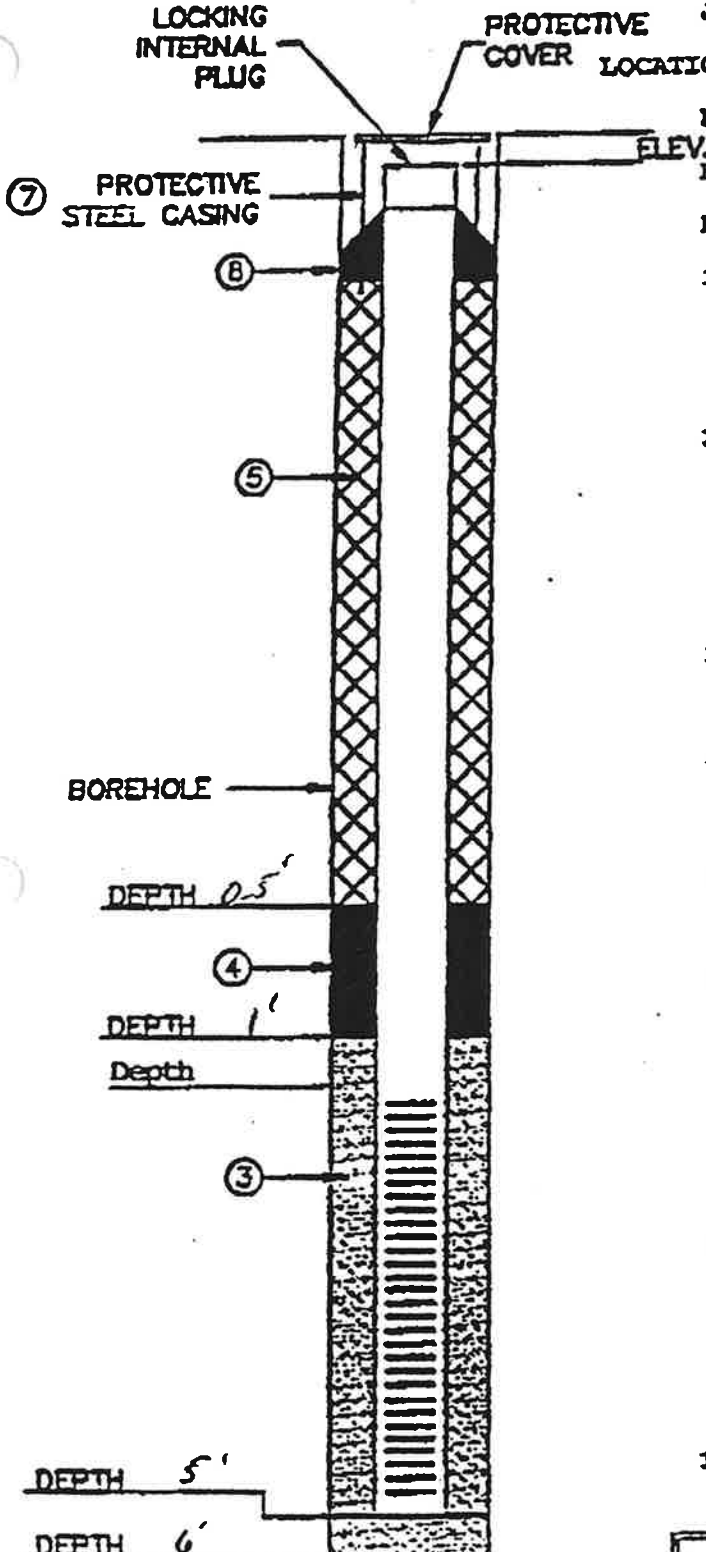
[D]ATE STARTED: 7/13/99	DATE FINISHED: 7/13/99	BORING NO.: MP-3	
[CLIE]NT: Chemical Waste Disposal		PROJECT NO.: 35249.001	
[PROJ]ECT NAME & LOCATION: CWD - Astoria		PREPARED BY: E. Lochner	
[D]RILLING CONTRACTOR: LAWES	LOGGED BY: E. Lochner	DRILLER: Carl	

	CASING:	SOIL SAMPLER: S/SPOON		CORE BARREL	AUGER	MON. WELL (MW) PIPE	MON. WELL (MW) CAP	DRILL RIG AND METHOD
[E]QUIPMENT:								Mobile Rig, Hollow Stem Auger
TYPE:								
SIZE:								
HAMMER [W]T/FALL				BIT:				

[SUR]FACE ELEVATION: SURFACE CONDITIONS: Concrete

[W]ATER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

[D]EPTH [B]ELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	SAMPLE DEPTH (FROM-TO)	SAMPLE MOISTURE CONTENT	SAMPLE RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0.25' - 5'					Dk brown silt, some gravel, little sand
5								
10								
15								
20								
25								



MONITORING WELL CONSTRUCTION INFORMATION

JOB No. 35249.001 CLIENT CWD

LOCATION Astoria New York

DATE 7/13/99 WELL No. MP-3

HYDROGEOLOGIST E. Lochner

DRILLING CONTRACTOR Land, Air, Water

1.) SCREEN TYPE PVC

SLOTTED LENGTH 5 ft.

SLOT SIZE 0.01"

2.) SOLID PIPE TYPE none

SOLID PIPE LENGTH — ft.

PIPE & SCREEN DIA. 1 In.

JOINT TYPE-SLIP/GLUED ______ THREADED ✓

3.) TYPE OF BACKFILL AROUND SCREEN

#2 well gravel

4.) TYPE OF LOWER SEAL (IF INSTALLED)

5.) TYPE OF BACKFILL

HOW INSTALLED

6.) TYPE OF SURFACE SEAL (IF INSTALLED)

bentonite

7.) PROTECTIVE CASING - YES ✓ NO ___

LOCKING CAP YES ✓ NO ___

8.) CONCRETE SEAL - YES ✓ NO ___

9.) DRILLING METHOD

Hollow Stem auger

10.) ADDITIVES USED (IF ANY)

11.) TYPE OF BACKFILL

WATER LEVEL CHECKS*

DATE	TIME	DEPTH TO WATER	REMARKS

*FROM TOP OF WELL CASING

WELLCONS
092392

BORING REPORT	GANNETT FLEMING	SHEET 1 OF 2

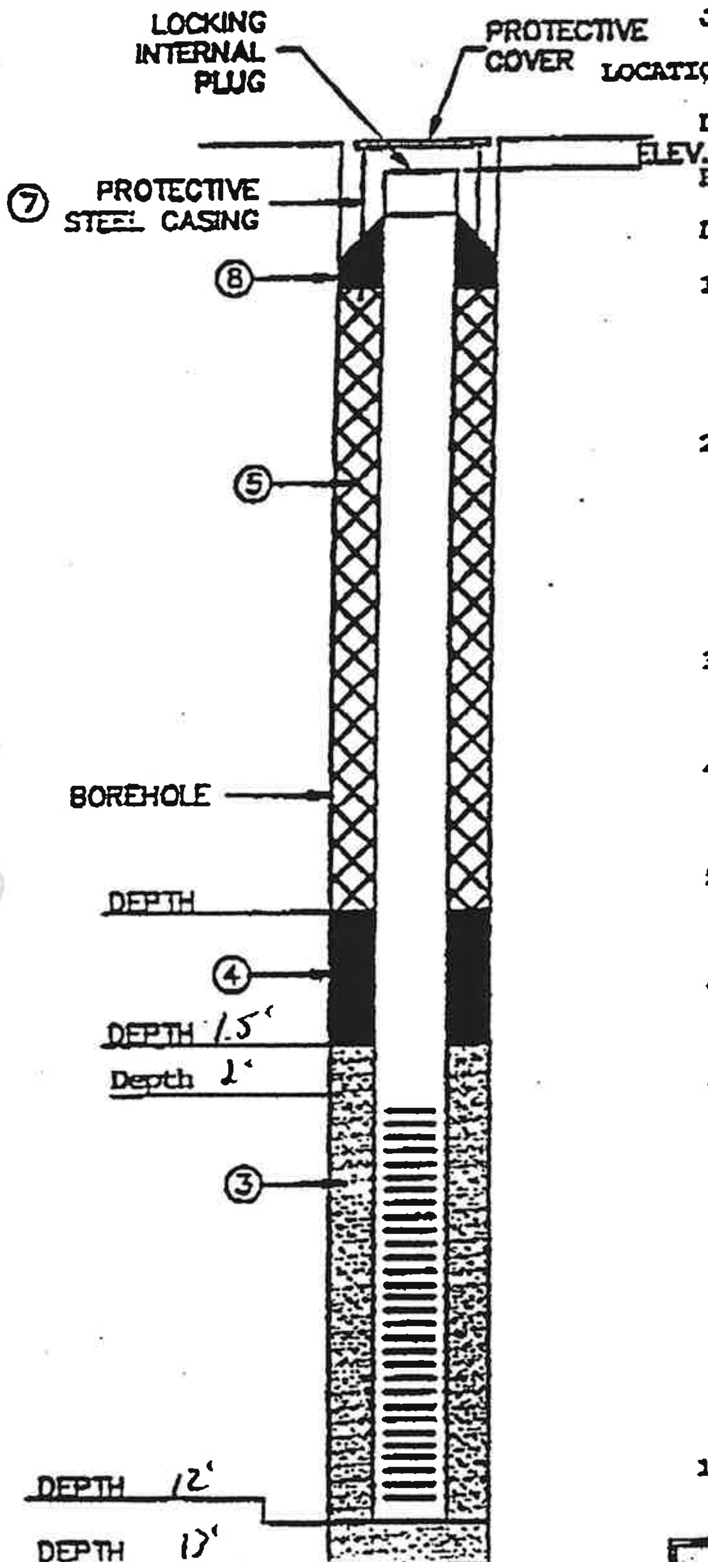
DATE STARTED: 7/13/99	DATE FINISHED: 7/13/99	BORING NO.: SVE-1	
CLIENT: Chemical Waste Disposal		PROJECT NO.: 55249.001	
PROJECT NAME & LOCATION: CWD - Astoria		PREPARED BY: E. Lochner	
DRILLING CONTRACTOR: LAWES	LOGGED BY: E. Lochner	DRILLER: Carl	

EQUIPMENT:	CASING:	SOIL SAMPLER: S/SPOON		CORE BARREL	AUGER	MON. WELL (MW) PIPE	CAP	DRILL RIG AND METHOD
TYPE:								Mobile Rig, Hollow Stem Auger
SIZE:								
HAMMER WT/FALL				BIT:				

SURFACE ELEVATION: SURFACE CONDITIONS: Concrete

WATER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

DEPTH BELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	SAMPLE DEPTH (FROM-TO)	SAMPLE MOISTURE CONTENT	SAMPLE RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0.25'-2'					Black silt and sand, little gravel
			2'-5'					Dk brown silt, little sand, little gravel, moist
5			5'-13'	wet				Gray silt, little gravel, trace sand, odor
10								
15								
20								
25								



MONITORING WELL CONSTRUCTION INFORMATION

JOB No. 35249.001 CLIENT CWD

LOCATION Astoria, New York

DATE 7/10/99 WELL No. SVE-1

HYDROGEOLOGIST E. Lechner

DRILLING CONTRACTOR Land, Air, Water

1.) SCREEN TYPE PVC

SLOTTED LENGTH 10 ft.

SLOT SIZE 0.01"

2.) SOLID PIPE TYPE PVC.

SOLID PIPE LENGTH 2 ft.

PIPE & SCREEN DIA. 4 In.

JOINT TYPE-SLIP/GLUED ____ THREADED ✓

3.) TYPE OF BACKFILL AROUND SCREEN

#2 well gravel

4.) TYPE OF LOWER SEAL (IF INSTALLED)

5.) TYPE OF BACKFILL

HOW INSTALLED

6.) TYPE OF SURFACE SEAL (IF INSTALLED)

bentonite

7.) PROTECTIVE CASING - YES ✓ NO ____

LOCKING CAP YES ✓ NO ____

8.) CONCRETE SEAL - YES ✓ NO ____

9.) DRILLING METHOD

Hollow Stem auger

10.) ADDITIVES USED (IF ANY)

11.) TYPE OF BACKFILL

WATER LEVEL CHECKS*

DATE	TIME	DEPTH TO WATER	REMARKS

* FROM TOP OF WELL CASING

WELLCONS
092392

Appendix C

Field Data Sheets

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
JECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-1 (shallow)
DISTANCE: SVE-1 = 20.9, AS-1 = 120

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	FID-540	4.4	4.46	
	10	0	360	12.4		
	40	0	140	19.8	DRY	—
	75	0				
	95	0	60	20.7		
SVE	130	0				
	180	0				
SVE/AS	185	0	20	20.9		
	210	0				
	225	0	100	20.7	DRY	—
	240	0				
	270	0				
	290	0				
	325	0				
	360	0				
	375	0				
	400	0				
system off	405	0				
	410	0				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
PROJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-1 (intermediate)
DISTANCE: 20.9 / 12.0 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	59		7.33	
	10	0	40	20.6		
	40	-.01	40	20.6	7.36	
SVE	75	0				
	95	0	40	20.7		
	130	0				
	150	-.01				
	185	0	20	20.9	7.31	2.14
SVE/AS	210	-.01				
	225	0	80	20.8		
	240	0			7.5	
	270	0				
	290	0				
	325	+.77				
	360	+.09				
	375	+.66				
	400	+.63				
System off	405	+.09				
	410	+.39				
	420	+.103				
	430	+.40				
	440	+.29				
	450	+.15				
	460	+.13				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/09
PROJECT NUMBER: 9007401
START TIME: 10:30

POINT ID: MP-1 (deep)
DISTANCE: 20.9/12.0

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	190		7.51	
	10	0	F>1000 G=40	20.8		
	40	-.01	20	20.7	7.57	
SVE	75	-.03				
	95	0	40	20.7		
	130	0				
	180	-.01				
	185	0	20	20.9	7.65	1.32
	210	-.02				
SVE/AS	225	0	20	20.9		
	240	0			7.49	
	270	0				
	290	0				3.30
	325	+1.99				3.35
	360	+3.39				
	375	+5.62				3.24
	400	+9.46				2.55
System off	405	+3.39				
	410	+8.69				
	420	+7.30				
	430	+6.23				
	440	+5.00				
	450	+.54				
	460	+.07				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
OJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-2 (Shallow)
DISTANCE: 22.4/20.3 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	5		DRY	
	10	-.13	0	20.7		
	40	-.15			DRY	
	75	-.14				
	95	-.14	60	20.7		
SVE	130	-.17				
	180	-.13				
SVE/AS	185	-.14	80	20.8	DRY	
	210	-.15				
	225	-.14	100	20.6		
	240	-.14	100	20.7		
	270	-.14				
	290	-.16				
	325	-.20				
	360	-.13				
	375	-.15				
	400	-.17				
system off	405	-.13				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
OJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-2 (intermediate
DISTANCE: ~~22.5~~ / 20.3 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	200		7.53	
	10	-.03	0	20.7		
	40	-.03	0	20.7	7.52	
	75	-.12				
	95	-.03	20	20.8		
SVE	130	0				
	180	0				
	185	0	20	20.9	7.50	1.29
	210	-.01				
SVE/AS	225	0	80	20.7		1.99
	240	-.01	20	20.9	7.84	
	270	-.01				
	290	0				2.05
	325	+.15				1.86
	360	+.17				
	375	+.57				
	400	+.97				2.55
System	405	+.17				
off	410	+.02				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
PROJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-2 (Deep)
DISTANCE: 229/203 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	F=100/60		7.54	
	10	-.02	0	20.7		
	40	-.002	0	20.7	7.51	
SVE	75	-.15				
	95	-.04	40	20.7		
	130	0				
	180	-.01				
	185	0	60	20.9	7.5	1.5
	210	0				
	225	0	80	20.7		1.85
SVE/AS	240	0	60	20.9	7.54	
	270	0				
	290	0				1.80
	325	+.49				2.90
	360	+.39				
	375	+.02				
	400	+.65				2.20
Sysem off	405	+.39				
	410	+.40				
	415	+.63				
	425	+.36				
	435	+.01				
	445	0				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
PROJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-3
DISTANCE: 5 / 4.5 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0				
	10	-.32				
	40	-.32				
SVE	75	-.37				
	95	-.33	60	20.7		
	130	-.34				
	180	-.30				
	185	-.28	120	20.6		
SVE/AS	210	-.29				
	225	-.31	140	20.4		
	240	-.30	120	20.7		
	270	-.31				
	290	-.31				
	325	-.35				
	360	-.32				
	375	-.34				
	400	-.36				
System off	405	-.32				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/94
PROJECT NUMBER: 940740
START TIME: 10:30

POINT ID: MW-
DISTANCE: SVE 2

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	~~b~~=540		12.43	
	10	-.06	440	12.0		
	40	-.04	300	13.4		
	75	-.07	140	20.4		
SVE	95	-.05	340	15.3		
	130	-.06				
	180	-.06	~~.07~~ ~~400~~	~~17.8~~		
	185	-.07	400	17.8		
SVE/AS	210	-.05				
	225	-.05	420	17.9		
	240	-.08	360	18.4		
	270	-.07				
	290	-.06				
	325	-.08				
	360	-.04				
	375	-.06				
	400	-.08				
system off	405	-.04				

MOBILE REMEDIATION UNIT
OPERATIONAL FIELD DATA SHEET

Bohemia, New York

Figure 4

Soil Vapor Extraction Graphical Radius of Influence Plot

FIGURE 4
Soil Vapor Extraction Graphical Radius of Influence Plot
Chemical Waste Disposal Corporation
42-14 19th Avenue
Astoria, New York
July 21, 1999

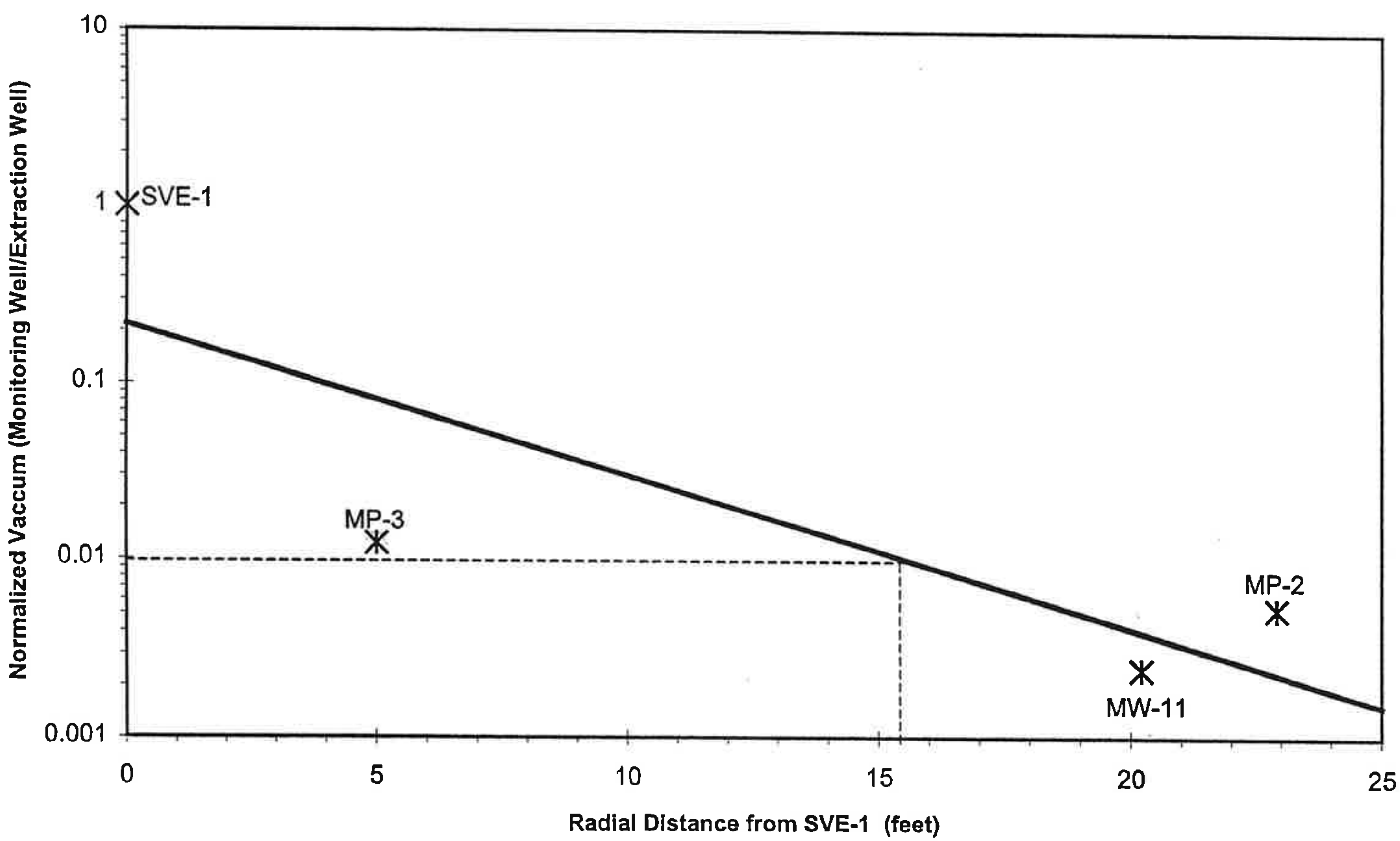


Figure 5

Steady State Pressure/Dissolved Oxygen Influence

APPENDICES

Appendix A

GSC Standard Operating Procedures (SOP)-
Soil Vapor Extraction (SVE)/ in situ Air Sparge (IAS)
Pilot Testing

Geologic Services Corporation Standard Operating Procedures
Soil Vapor Extraction (SVE) Pilot Testing

Design Considerations

- Review all available site background information, including the site plan, soil boring logs, field soil screening (PID/FID) data, groundwater level data, water level fluctuation data, groundwater analytical data, soil type and relative permeability, and previous pilot testing data (if available).

- Based upon this information, the pilot test will be conducted on the well(s) best suited to the test; typically, the well(s) with the highest level of hydrocarbons in soil based upon PID readings or lab analyses will be selected. Ideally, the test well(s) will be centrally located and have other nearby wells for monitoring radius of influence (ROI). The test will be completed on a maximum of two extraction wells. If sufficient information is obtained from testing the first well, a second test may not be necessary, particularly if the two test wells are relatively close, show similar boring log data, and influence is noted in the "other" extraction well when testing the first well.

- In the event that no soil analytical/screening data is available for the site, the well(s) with the greatest level of groundwater impact will be selected for testing. In no case should a previously clean well be used as a test well when there is an adjacent plume.

- Determine which wells will be used as monitoring points. If adequate monitoring points are not located near enough (within 10 feet) to the extraction well to monitor vacuum influence, temporary monitoring points will be installed. Three monitoring points located along a line within the anticipated ROI and 2-3 discrete points located in different directions from the extraction well is ideal.

- Provisions must also be made for proper treatment of extracted vapors. Extracted vapors will typically be treated with vapor phase granular activated carbon (GAC).

- 2 air samples will be collected and analyzed for BTEX, C_1-C_5 hydrocarbons, C_1-C_{10} hydrocarbons, and chlorinated hydrocarbons

Field Procedures/Data Collection

Prior to test start-up, groundwater levels in all site wells will be gauged and recorded. Distances between the extraction well and all monitoring points will also be measured and recorded accurately for inclusion in the scaled site plan. In addition, potential short-circuiting areas such as landscapes, pavement breaks, etc..., on the site's surface should be noted and sketched on the site plan.

To facilitate vacuum extraction, the extraction well will be retrofitted with an airtight well cap. Each of the surrounding monitoring wells will also be retrofitted with air tight caps. Each monitoring well cap will be equipped with a vacuum gauge or quick-connect fitting for use with a digital manometer (accurate to 0.1 inches of water) for monitoring observed vacuum. Applied vacuum at the extraction well will be measured with vacuum gauges on the SVE unit.

If site boring logs indicate relatively heterogeneous and impermeable soil and monitoring wells are not located within 10 feet of the extraction well(s), temporary monitoring points will be installed. The points should be installed with a rotary hammer type drill. These temporary monitoring points will also be equipped with an airtight fitting at the surface to allow for measurement of observed vacuum utilizing a vacuum gauge or manometer.

A photoionization detector (PID) will be used to monitor influent (pre-GAC) and effluent (post-GAC) vapor stream concentrations. The PID will be calibrated prior to use. An O_2/LEL meter will also be utilized to monitor oxygen content and percent LEL in the influent vapor stream; the O_2/LEL meter will be calibrated prior to use.

Air flow measurements will be made utilizing an averaging pitot tube installed on the SVE unit. Actual cubic feet per minute (ACFM) and standard cubic feet per minute (SCFM) air discharge rates will be determined in the field using the calculations on the attached sheet.

The SVE unit will be started with the air dilution valve fully open and the pitot tube valves closed. The dilution valve is then closed over a period typically not to exceed one minute and the pitot tube valves opened immediately after startup. Once the dilution valve is closed and the pitot tube valves open, the following data will be collected from the extraction well/SVE unit and the monitoring points:

- Elapsed time of each reading;
- Vacuum applied to the extraction well, both before (V_1) and after (V_2) the manual air dilution valve;
- Temperature of the influent vapor stream, both before (T_1) and after (T_2) the SVE unit;
- Pressure of the influent vapor stream (measured between the SVE unit and the vapor phase GAC drum);
- PID reading of the influent vapor stream (pre-GAC);
- % O_2 of the influent vapor stream;
- % LEL of the influent vapor stream;
- Differential pressure across the pitot tube, as measured with a gauge or manometer;
- PID reading of the effluent vapor stream (post-GAC);
- Observed vacuum at the temporary monitoring points, and;
- Observed vacuum at the monitoring wells.

These parameters will be measured on a regular basis throughout the pilot test, including startup (within 5 minutes of closing the air dilution valve and opening the pitot tube valves), at 15 minutes, at 30 minutes, at 45 minutes, at 60 minutes, and at 30-minute intervals thereafter until the pilot test is terminated. In addition to the above parameters, ACFM and SCFM will be calculated at each measurement interval using the influent pressure, pitot tube differential pressure, and the attached calculations (Attachment A).

The test should be conducted for a minimum of two hours. The test will not be terminated unless steady state conditions are observed in the surrounding monitoring points (as indicated by minimal fluctuation in vacuum levels for a least 30 minutes) or 3 to 4 hours have elapsed and no effect is observed at the nearest monitoring point. If this is the case, additional temporary monitoring point may be installed between the extraction well and nearest monitoring point.

In the event that no influence is noted in a monitoring point or temporary monitoring point after 3 or 4 hours, and another suitable extraction well is available with different soil lithologies, the test will be aborted and another test completed on the alternative well. If all the alternative wells are constructed in materials similar to the current extraction well (i.e., a similar minimal ROI expected regardless of the extraction well), then the test on the first well should be continued for up to 8 hours.

Samples of extracted soil vapor will be collected during the test and submitted to a certified laboratory for analysis. A minimum of three air samples (2 Tedlar bags per sample) will be collected during the test: one as soon as possible after start-up, one at an elapsed time of 30 minutes, and one at an elasped time of 60 minutes. An influent PID reading will be taken at the time of sample collection. The sample corresponding to the highest PID reading will be submitted for BTEX, C_1-C_5, C_1-C_{10}, and chlorinated hydrocarbon analyses.

Data Analysis

The SVE pilot test should be completed such that all data pertinent to the design of an SVE system is obtained. At a minimum, evaluation of this data should result in the following information:

- Soil vapor radius of influence (ROI) determined by observed vacuums in monitoring points and confirmed by at least one additional technique (graphical/mathematical);
- Maximum achievable air flow rate;
- Soil vapor hydrocarbon concentrations (and any fluctuations noted during the test) and VOC removal rates;
- An estimate of vapor-phase GAC consumption for an SVE system installed on the extraction well(s);

This information will initially be utilized to determine if vacuum extraction is a feasible remedial option for the site. If the data indicate a SVE system is feasible, the information will be further utilized to design a complete extraction system, including well design, well spacing and location, and selection of an appropriate off-gas treatment method.

ATTACHMENT A
SVE PILOT TEST ACFM - SCFM CALCULATIONS

$Q = 128.8K\sqrt{P}\ P/T+460$

Where:

$Q \rightarrow$ Flow rate for air through a pipe (in SCFM)
K = 0.586 for a 2" diameter, 0.670 for 4" diameter
$P \rightarrow$ Static line pressure (PSIA)(Add 14.7 to gauge reading)
$P \rightarrow$ Differential pressure ("H_2O)(measure with manometer or Magnehelic from pitot tube)
$T \rightarrow$ Temperature above pitot tube (°F)

ACFM = SCFM (14.7/(14.7 + PSIG))(460 + °F/520)

Where:

ACFM $\rightarrow$ Actual cubic feet/minute
SCFM $\rightarrow$ Standard cubic feet/minute
PSIG $\rightarrow$ Pressure reading of gauge above holding tank (PSI)
°F $\rightarrow$ Temperature above pitot tube

$[((P^2w - P^2atm)\ \ln(Rw/r))/(P^2(r) - P^2w)] + \ln(Rw)R_1 = e$

Where:

$R_1 \rightarrow$ Radius of influence (feet)
$Pw \rightarrow$ Pressure at extraction well (atm).
$P(r) \rightarrow$ Pressure at observation point (atm.)(As Above)
$Patm \rightarrow$ Atmospheric Pressure (1 atm.)
$Rw \rightarrow$ Radius of extraction well (feet)
$r \rightarrow$ Distance from extraction well to observation point

Geologic Services Corporation
Standard Operating Procedures
Air Sparge (AS) Pilot Testing

Design Considerations

- Review all available site background information, including site plan, soil boring logs, field soil screening (FID/PID) data, groundwater level data, water level fluctuation data, groundwater analytical data, soil type and relative permeability and any previous pilot test data.

- Assuming the background data review reveals conditions that are suitable for air sparging (i.e. soil permeability greater than 10^{-9} cm^2 and no confining layers of low permeability between the air injection point and air extraction point), the AS pilot test set up may continue. If the background data reveals soil permeabilities less than 10^{-9} cm^2 or confining layers between the air injection point and air extraction point, alternative remedial methods should be explored.

- Air sparging requires a specific type of well and it is likely that one will have to be installed in order to complete the AS pilot test. The well should be installed in an area of known hydrocarbon impact. This location may be based on background information or, if sufficient data is not available, a soil boring/sampling program.

- Once the location has been chosen, a one inch to two inch diameter well should be installed. The well should have a maximum of two feet of 0.010 inch slot screen, the top of which should be ten (10) feet below the lowest seasonal water table or a minimum of five (5) feet below the deepest known vertical extent of hydrocarbon impact. Driven wells may also be used if lithology allows advancement to proper depths with this drilling method.

- The annulus of the borehole should be filled with an approximately sized silica sand pack (#1 sand) to the top of the screen. The sand pack will be followed with a one to two foot thick bentonite clay seal and then completed to the surface with a pressure injected bentonite-cement grout seal. Refer to the attached diagram of a completed AS well.

- Determine which wells will be used as monitoring points. If adequate points are not located near the sparge well (within five to ten feet) to monitor pressure influence or water table elevation, additional monitoring points should be installed. A greater number of monitoring points would supply greater data, but a minimum of three monitoring point should be used (existing, newly installed or a combination of both) at different distances from the AS well. Discrete monitoring points in vadose zone (driven by KV type system or similar) may also be installed if present monitoring well array is not sufficient. Radial distances of five, ten and 15 to 20 feet can be used for many soil types. Closer well spacings may be required in soil where the permeability approached 10^{-9} cm^2.

- The AS pilot test will always be conducted in conjunction with a Soil Vapor Extraction (SVE) pilot test. This policy must be strictly followed in order to eliminate any unnecessary chances of uncontained vapors from migrating to potential environmental receptors such as building basements, utility pipelines and vaults, etc.

- A SVE well should be positioned in the immediate vicinity of the AS well. A nested AS/SVE well couplet may be installed but proper construction is crucial to ensure the pilot test and/or future system integrity.

- The monitoring wells used for the AS pressures and water table monitoring will also be used to monitor the SVE system. Additional groundwater monitoring wells may also be used to determine the SVE radius of influence, generally greater than that of an AS system.

<u>Field Procedures/Data Collection</u>

Prior to test startup, groundwater levels in all site wells will be gauged and recorded. Dissolved oxygen (DO) concentrations of the groundwater will also be collected and recorded in all wells (AS, SVE and monitoring). Distances between the AS well, SVE well and monitoring points will be measured and recorded. In addition, potential short-circuiting areas such as landscaping, pavement breaks, etc..., on the sites surface should be noted and sketched on the site plan.

All wells will be equipped with air tight well caps and vacuum/pressure gauges or quick connect fittings to be used with gauges or manometers.

A calibrated photoionization detector (PID) and a calibrated O_2/LEL meter will be used to screen offgas control influent and effluent air streams (sparge air contained by the SVE system). In addition, all well headspaces will be monitored for volatile organic compounds with a PID, and percent oxygen content with the O_2/LEL water.

Air flow measurements will be made using averaging pitot tubes installed on the AS and SVE systems. Actual cubic feet per minute (ACFM) and standard cubic feet per minute (SCFM) air injection (removal rates will be determined in the field using the calculations on the attached sheet.

The SVE unit will be started and operated alone for at least one hour or until operating conditions equilibrate, if a SVE pitot test was previously conducted on the site. If no SVE pilot testing was previously conducted, the SVE pilot test should be conducted for a minimum of four hours, in order to collect sufficient data to and in final system design. The SVE pilot portion of the AS pilot test will be conducted as outlined in GSC's Standard Operating Procedures for Soil Vapor Extraction Pilot Testing whether the SVE test is conducted for one hour or four hours. GSC's SVE SOP is attached.

SVE operating parameters will be measured on a regular basis throughout the pilot testing, including startup (within five minutes of system startup), at 15, 30, 45, 60 minutes and at 30 minute intervals thereafter until the pilot test is terminated. AS operating parameters will also be measured on a regular basis throughout the pilot testing. The AS portion of the pilot testing should last for a minimum of four hours.

The following data will be collected in addition to the data outlined in the SVE SOP:

- elapsed time of each reading
- air injection pressure
- air injection differential pressure (for flow calculation)
- changes in surrounding SVE vacuum influence caused by pressurized air
- changes in SVE process air VOC concentrations
- water levels of monitoring wells surrounding the AS well

Samples of extracted soil vapor (prior to offgas treatment) will be collected during the testing and submitted to a certified laboratory for analyses. A minimum of three air samples (2 bags per sample) will be collected during the test; one sample will be collected near the end of SVE only operation; one sample will be collected at approximately 30 minutes of air sparge operation; and one sample will be collected near the end of the AS/SVE test.

The AS test should be conducted with an oilless compressor/blower. If an oilless compressor is not available, then an oil coalescing filter should be used to ensure contaminant free injection air. The test should be started at a pressure just above the hydrostatic pressure (0.43 psi/ft of water column above sparge screen) + injection pressure (additional pressure required for air to enter the surrounding soil formation).

Airflow should be introduced slowly, starting at approximately one cfm, and gradually increasing.

Air should be injected at a minimum of two flow rates and injection pressures. The first pressure flow rate should be held steady for two hours (including the time necessary to slowly introduce air). After two hours the injection rate/pressure should be increased and maintained for the duration of the test. The flow rate should not exceed 10 cfm and the injection pressure should not exceed 0.7 psi/ft of overburden soil.

When the AS pilot test is complete, the following parameters should be monitored and recorded (in addition to the regular system checks):

- SVE concentrations after the sparge test is complete and the compressor is off;
- DO concentrations of the water sampled prior to the test;
- Water levels in monitoring wells

ATTACHMENT A
AIR SPARGE PILOT TEST ACFM - SCFM CALCULATIONS

Q = 128.8K√P P/T+460

Where:

Q → Flow rate for air through a pipe (in SCFM)
K = 0.586 for a 2" diameter, 0.670 for 4" diameter
P → Static line pressure (PSIA)(Add 14.7 to gauge reading)
P → Differential pressure ("H_2O)(measure with manometer or Magnehelic from pitot tube)
T → Temperature above pitot tube (°F)

ACFM = SCFM (14.7/(14.7 + PSIG))(460 + °F/520)

Where:

ACFM → Actual cubic feet/minute
SCFM → Standard cubic feet/minute
PSIG → Pressure reading of gauge above holding tank (PSI)
°F → Temperature above pitot tube

Appendix B

Well Logs

BORING REPORT	GANNETT FLEMING	SHEET 1 OF 2

E STARTED: 7/13/99	DATE FINISHED: 7/13/99	BORING NO.: SP-1	
ENT: Chemical Waste Disposal		PROJECT NO.: 35249.001	
OJECT NAME & LOCATION: CWD - Astoria		PREPARED BY: E. Lochner	
LING CONTRACTOR: LAWES	LOGGED BY: E. Lochner	DRILLER: Carl	

EQUIPMENT:	CASING:	SOIL SAMPLER: S/SPOON		CORE BARREL	AUGER	MON. WELL (MW) PIPE	MON. WELL (MW) CAP	DRILL RIG AND METHOD
TYPE:								Mobile Rig, Hollow Stem Auger
SIZE:								
HAMMER				BIT:				
WT/FALL								

RFACE ELEVATION: SURFACE CONDITIONS: Concrete

ER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

DEPTH BELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	SAMPLE DEPTH (FROM-TO)	SAMPLE MOISTURE CONTENT	SAMPLE RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0' - 15					Dk. brown silt, some gravel, little sand, trace brick debris 0'-5'
5				wet				Little auger return from 5'-15'
10								
15			15' - 17'					Peat at 16'
20								Well drilled in piling excavation for future building
25								

ORING REPORT	GANNETT FLEMING	SHEET 1 OF 2

TE STARTED: 7/12/99	DATE FINISHED: 7/12/99	BORING NO.:	MP-1
LIENT: Chemical Waste Disposal		PROJECT NO.:	35249.001
JECT NAME & LOCATION: CWD - Astoria		PREPARED BY:	E. Lochner
LLING CONTRACTOR: LAWES	LOGGED BY: E. Lochner	DRILLER:	Carl

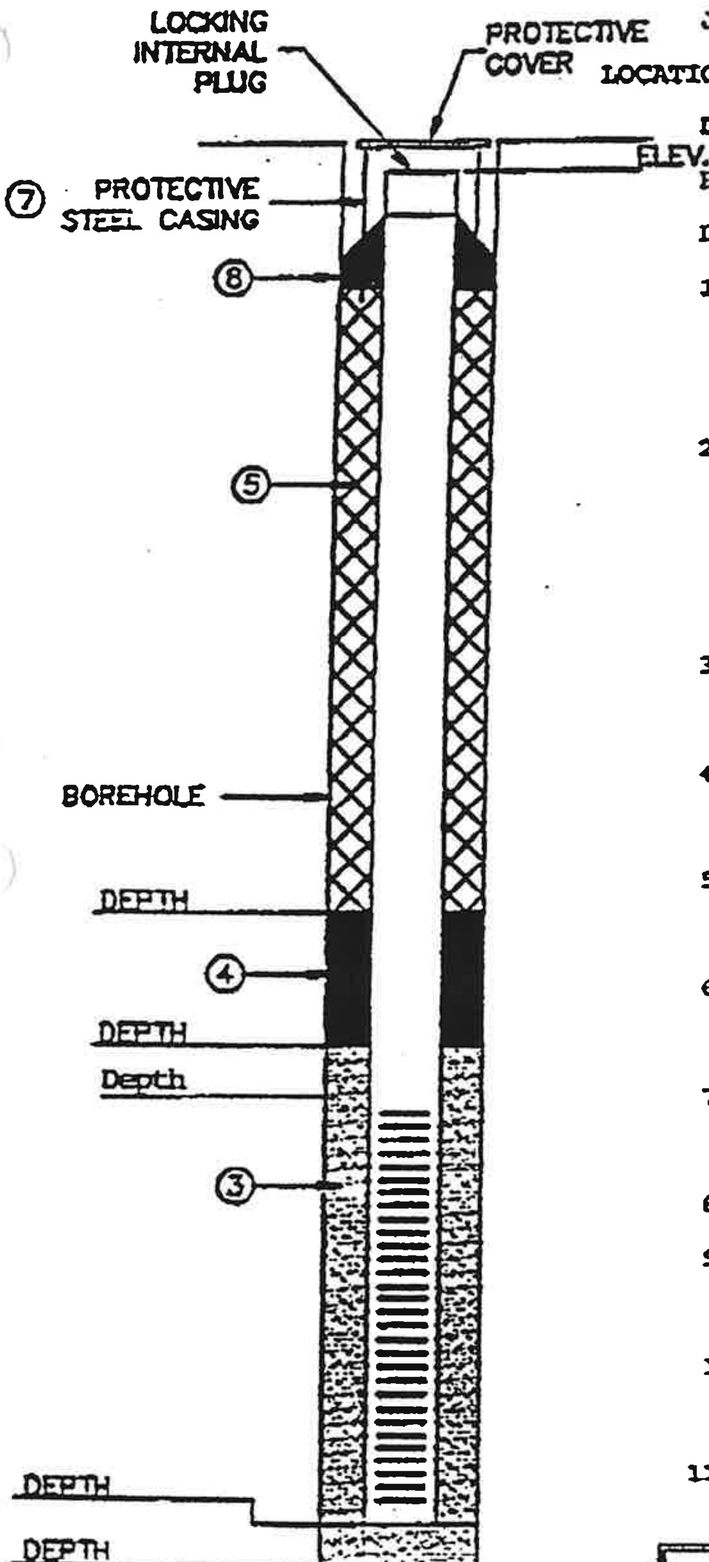
		SOIL SAMPLER:		CORE		MON. WELL (MW)		DRILL RIG
UIPMENT:	CASING:	S/SPOON		BARREL	AUGER	PIPE	CAP	AND METHOD
TYPE:								Mobile Rig, Hollow Stem Auger
SIZE:								
IAMMER WT/FALL				BIT:				

RFACE ELEVATION: SURFACE CONDITIONS: Concrete

TER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

DEPTH BELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	DEPTH (FROM-TO)	MOISTURE CONTENT	RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0.25' - 1'					Dk. brown silt, little fine sand, little gravel, trace brick debris
			1' - 3'					Brown fine-med sand, little gravel, little cobble
			3' - 5'					Dk. gray silt, some gravel, moist
	200		5' - 16'					Brown silt, some gravel, little sand, trace cobble, wet
10								
15								Brown peat, dry
			16' - 20'					
20								

MONITORING WELL CONSTRUCTION INFORMATION



JOB NO. 35249.001 CLIENT CWO

LOCATION Astoria New York

DATE 7/12/99 WELL NO. MP-1

HYDROGEOLOGIST E. Lochner

DRILLING CONTRACTOR Land, Air, Water

1.) SCREEN TYPE PVC

SLOTTED LENGTH 1ft @ 19.5', 9.5', 4.5' bg. ft.

SLOT SIZE 0.01"

2.) SOLID PIPE TYPE PVC

SOLID PIPE LENGTH Varies ft.

PIPE & SCREEN DIA. 1 In.

JOINT TYPE-SLIP/GLUED ______ THREADED ✓

3.) TYPE OF BACKFILL AROUND SCREEN

#2 well gravel

4.) TYPE OF LOWER SEAL (IF INSTALLED)

bentonite

5.) TYPE OF BACKFILL ______

HOW INSTALLED ______

6.) TYPE OF SURFACE SEAL (IF INSTALLED)

bentonite

7.) PROTECTIVE CASING - YES ✓ NO ___

LOCKING CAP YES ✓ NO ___

8.) CONCRETE SEAL - YES ✓ NO ___

9.) DRILLING METHOD

Hollow Stem auger

10.) ADDITIVES USED (IF ANY) ______

11.) TYPE OF BACKFILL ______

WATER LEVEL CHECKS*

DATE	TIME	DEPTH TO WATER	REMARKS

*FROM TOP OF WELL CASING

WELLCONS
092392

...RING REPORT	GANNETT FLEMING	SHEET 1 OF 2

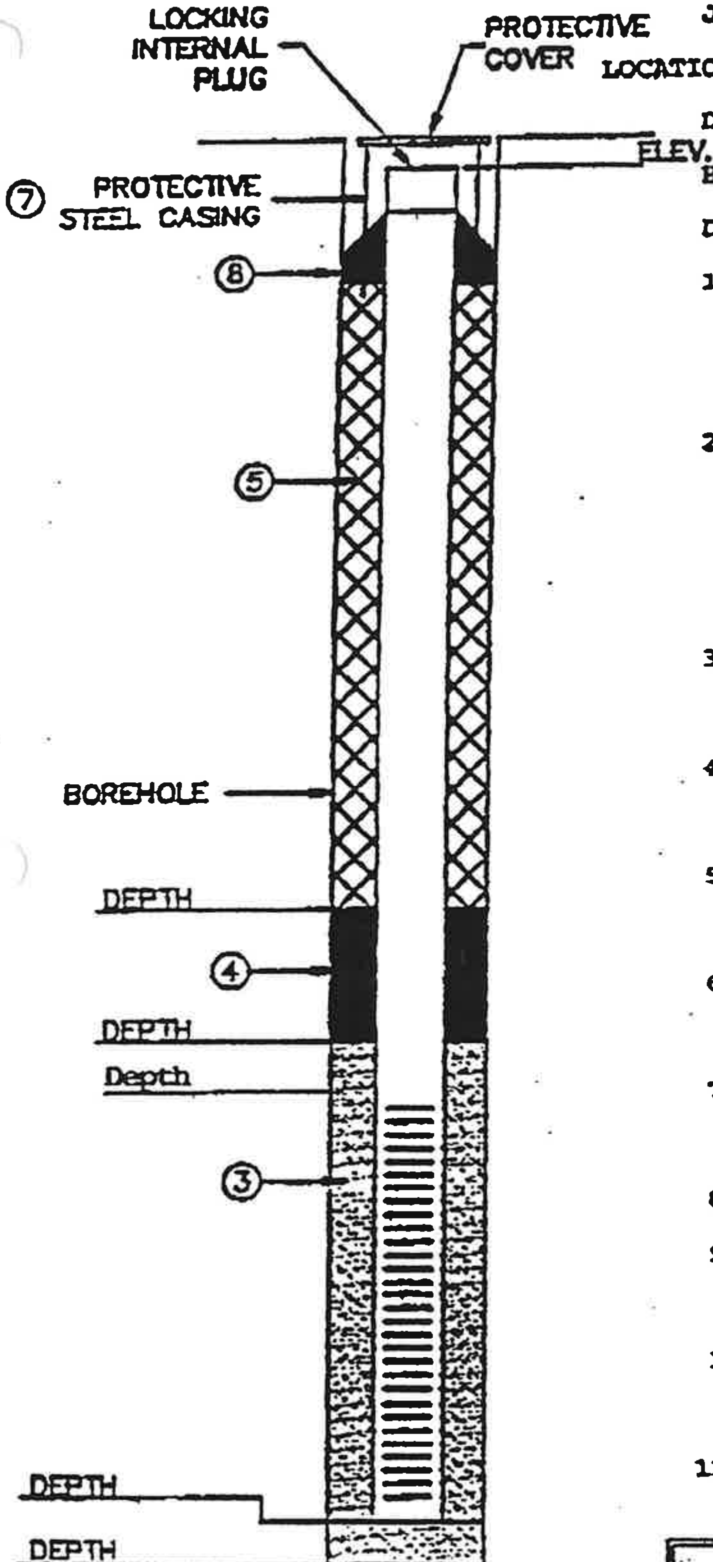
...ATE STARTED: 7/12/99	DATE FINISHED: 7/12/99	BORING NO.: MP-2	
...NT: Chemical Waste Disposal		PROJECT NO.: 35249.001	
...ECT NAME & LOCATION: CWD - Astoria		PREPARED BY: E. Lochner	
...RILLING CONTRACTOR: LAWES	LOGGED BY: E. Lochner	DRILLER: Carl	

...UIPMENT:	CASING:	SOIL SAMPLER: S/SPOON		CORE BARREL	AUGER	MON. WELL (MW) PIPE	CAP	DRILL RIG AND METHOD
TYPE:								Mobile Rig, Hollow Stem Auger
SIZE:								
HAMMER WT/FALL				BIT:				

...ACE ELEVATION: SURFACE CONDITIONS: Concrete

...ATER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

...EPTH BELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	DEPTH (FROM-TO)	MOISTURE CONTENT	RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0.25' - 1'					Dk. brown silt, little fine sand, little
								gravel, trace brick debris
			1' - 2'					Brown fine sand, little silt, little gravel
			2' - 5'					Dk. gray fine sand and gravel
5	300		5' - 15'					Dk. gray silt, some gravel, little sand,
								wet, odor
10								
15								
			16'					Peat
20								
25								



MONITORING WELL CONSTRUCTION INFORMATION

JOB No. 35249-001 CLIENT CWD

LOCATION Astoria, New York

DATE 7/12/88 WELL No. MP-2

HYDROGEOLOGIST E. Lochner

DRILLING CONTRACTOR Land, Air, Water

1.) SCREEN TYPE PVC

SLOTTED LENGTH 1' @ 15', 10', 5' bgs ft.

SLOT SIZE 0.01"

2.) SOLID PIPE TYPE PVC

SOLID PIPE LENGTH Varies ft.

PIPE & SCREEN DIA. 1 In.

JOINT TYPE-SLIP/GLUED ____ THREADED ✓

3.) TYPE OF BACKFILL AROUND SCREEN

#2 well gravel

4.) TYPE OF LOWER SEAL (IF INSTALLED)

bentonite

5.) TYPE OF BACKFILL

HOW INSTALLED

6.) TYPE OF SURFACE SEAL (IF INSTALLED)

bentonite

7.) PROTECTIVE CASING - YES ✓ NO ____

LOCKING CAP YES ✓ NO ____

8.) CONCRETE SEAL - YES ✓ NO ____

9.) DRILLING METHOD

Hollow stem auger

10.) ADDITIVES USED (IF ANY)

11.) TYPE OF BACKFILL

WATER LEVEL CHECKS*

DATE	TIME	DEPTH TO WATER	REMARKS

*FROM TOP OF WELL CASING

WELLCONS
092392

B[...]ING REPORT

GANNETT FLEMING

[D]ATE STARTED: 7/13/99	DATE FINISHED: 7/13/99	BORING NO.:	MP-3
		PROJECT NO.:	35249.001
[CLIE]NT: Chemical Waste Disposal		PREPARED BY:	E. Lochner
[PROJ]ECT NAME & LOCATION: CWD - Astoria			
[D]RILLING CONTRACTOR: LAWES	LOGGED BY: E. Lochner	DRILLER:	Carl

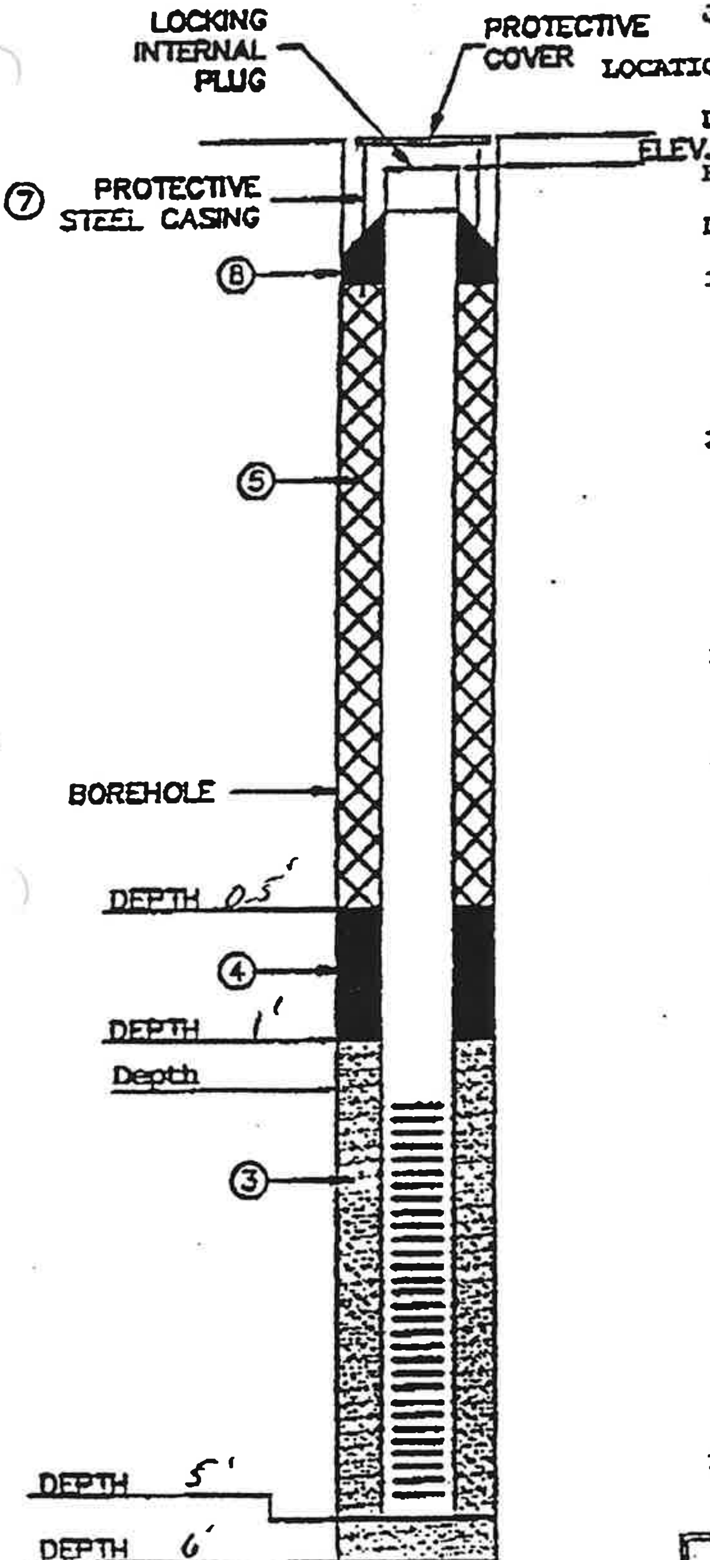
		SOIL SAMPLER:		CORE		MON. WELL (MW)		DRILL RIG AND METHOD
[E]QUIPMENT:	CASING:	S/SPOON		BARREL	AUGER	PIPE	CAP	Mobile Rig, Hollow Stem Auger
TYPE:								
SIZE:								
HAMMER [WT]/FALL				BIT:				

SURFACE CONDITIONS: Concrete

[SUR]FACE ELEVATION:

[W]ATER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

[D]EPTH [B]ELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	DEPTH (FROM-TO)	MOISTURE CONTENT	RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0.25' - 5'					Dk brown silt, some gravel, little sand
5								
10								
15								
20								
25								



MONITORING WELL CONSTRUCTION INFORMATION

JOB No. 35249.001 CLIENT CWD

LOCATION Astoria, New York

DATE 7/13/99 WELL No. MP-3

HYDROGEOLOGIST E. Lochner

DRILLING CONTRACTOR Land, Air, Water

1.) SCREEN TYPE PVC

SLOTTED LENGTH 5 ft.

SLOT SIZE 0.01"

2.) SOLID PIPE TYPE none

SOLID PIPE LENGTH — ft.

PIPE & SCREEN DIA. 1 In.

JOINT TYPE-SLIP/GLUED ______ THREADED ✓

3.) TYPE OF BACKFILL AROUND SCREEN

#2 well gravel

4.) TYPE OF LOWER SEAL (IF INSTALLED)

5.) TYPE OF BACKFILL

HOW INSTALLED

6.) TYPE OF SURFACE SEAL (IF INSTALLED)

bentonite

7.) PROTECTIVE CASING - YES ✓ NO ___

LOCKING CAP YES ✓ NO ___

8.) CONCRETE SEAL - YES ✓ NO ___

9.) DRILLING METHOD

Hollow Stem auger

10.) ADDITIVES USED (IF ANY)

—

11.) TYPE OF BACKFILL

WATER LEVEL CHECKS

DATE	TIME	DEPTH TO WATER	REMARKS

FROM TOP OF WELL CASING

WELLCONS
092392

BORING REPORT	GANNETT FLEMING	SHEET 1 OF 2

ATE STARTED: 7/13/99 DATE FINISHED: 7/13/99 BORING NO.: SVE-1

ENT: Chemical Waste Disposal PROJECT NO.: 55249.001

JECT NAME & LOCATION: CWD - Astoria PREPARED BY: E. Lochner

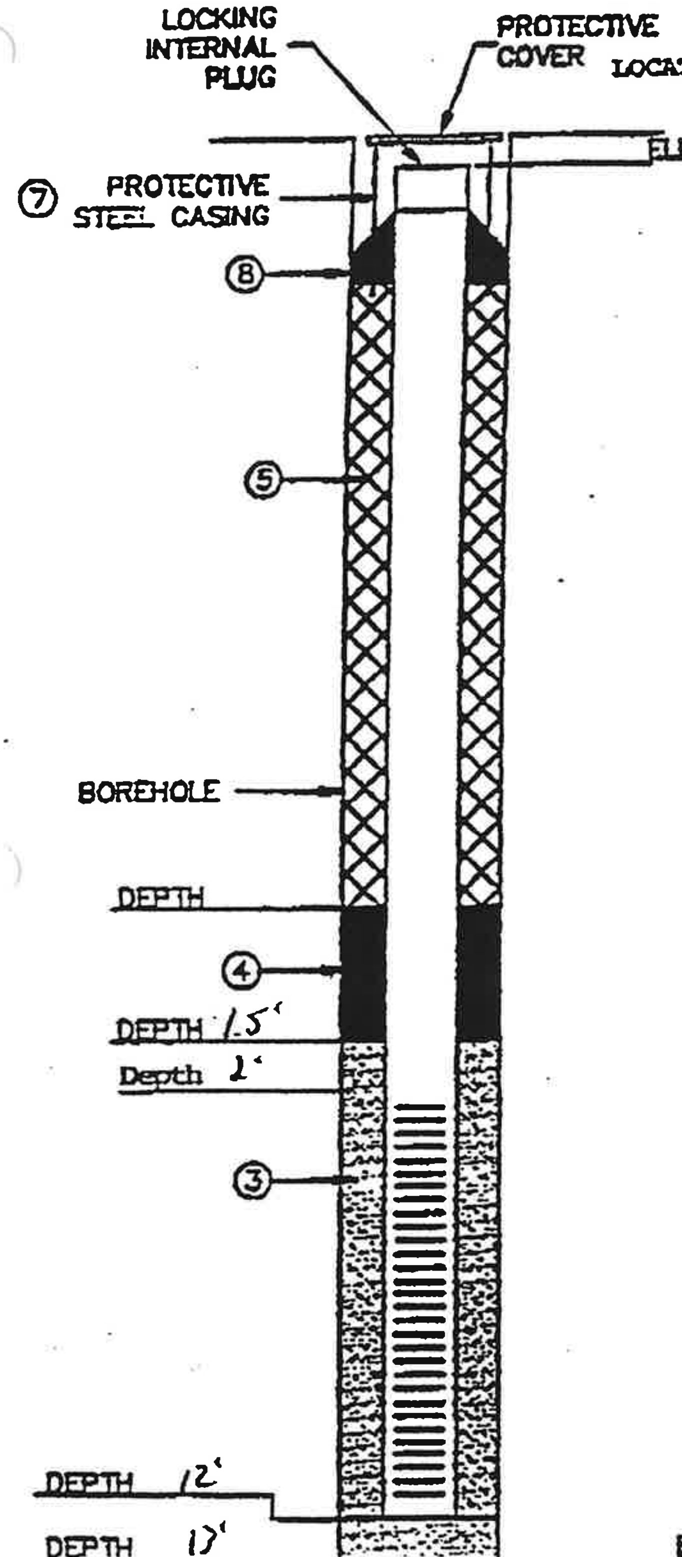
RILLING CONTRACTOR: LAWES LOGGED BY: E. Lochner DRILLER: Carl

		SOIL SAMPLER:		CORE		MON. WELL (MW)		DRILL RIG
UIPMENT:	CASING:	S/SPOON		BARREL	AUGER	PIPE	CAP	AND METHOD
TYPE:								Mobile Rig, Hollow Stem Auger
SIZE:								
HAMMER WT/FALL				BIT:				

FACE ELEVATION: SURFACE CONDITIONS: Concrete

ATER LEVEL AT FT. AFTER HRS. FT. AFTER HRS.

DEPTH BELOW GRADE	OVA READINGS (ppm)	SAMPLE TYPE AND NO.	DEPTH (FROM-TO)	MOISTURE CONTENT	RECOVERY	BLOWS/6" OR CORE TIME	STRATA DEPTH/ ELEV.	DESCRIPTION & REMARKS TRACE=0-10% LITTLE=10-20% SOME=20-30% AND=35-50%
0			0.25'-2'					Black silt and sand, little gravel
			2'-5'					Dk brown silt, little sand, little gravel, moist
5			5'-13'	wet				Gray silt, little gravel, trace sand, odor
10								
15								
20								
25								



MONITORING WELL CONSTRUCTION INFORMATION

JOB No. 35249.001 CLIENT CWD

LOCATION Astoria, New York

DATE 7/13/99 WELL No. SVE-1

HYDROGEOLOGIST E. Lechner

DRILLING CONTRACTOR Land, Air, Water

1.) SCREEN TYPE PVC

SLOTTED LENGTH 10 ft.

SLOT SIZE 0.01"

2.) SOLID PIPE TYPE PVC.

SOLID PIPE LENGTH 2 ft.

PIPE & SCREEN DIA. 4 In.

JOINT TYPE-SLIP/GLUED ____ THREADED ✓

3.) TYPE OF BACKFILL AROUND SCREEN

#2 well gravel

4.) TYPE OF LOWER SEAL (IF INSTALLED)

5.) TYPE OF BACKFILL

HOW INSTALLED

6.) TYPE OF SURFACE SEAL (IF INSTALLED)

bentonite

7.) PROTECTIVE CASING - YES ✓ NO ____

LOCKING CAP YES ✓ NO ____

8.) CONCRETE SEAL - YES ✓ NO ____

9.) DRILLING METHOD

Hollow Stem auger

10.) ADDITIVES USED (IF ANY)

11.) TYPE OF BACKFILL

WATER LEVEL CHECKS*

DATE	TIME	DEPTH TO WATER	REMARKS

* FROM TOP OF WELL CASING

WELLCONS
092392

Appendix C

Field Data Sheets

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
JECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-1 (shallow)
DISTANCE: SVE-1 = 20.9, AS-1 = 120

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	FID=540	4.4	4.46	
	10	0	360	12.4		
	40	0	140	19.8	DRY	—
	75	0				
	95	0	60	20.7		
SVE	130	0				
	180	0				
SVE/AS	185	0	20	20.9		
	210	0				
	225	0	100	20.7	DRY	—
	240	0				
	270	0				
	290	0				
	325	0				
	360	0				
	375	0				
	400	0				
system off	405	0				
	410	0				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99

OJECT NUMBER: 9907401

START TIME: 10:30

POINT ID: MP-1 (intermediate,

DISTANCE: 20.9 / 12.0 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	59		7.33	
	10	0	40	20.6		
	40	-.01	40	20.6	7.36	
SVE	75	0				
	95	0	40	20.7		
	130	0				
	150	-.01	~~2~~			
	185	0	20	20.9	7.31	2.14
SVE/AS	210	-.01				
	225	0	80	20.8		
	240	0			7.5	
	270	0				
	290	0				
	325	+.77				
	360	+.09				
	375	+.66				
	400	+.63				
System off	405	+.09				
	410	+.39				
	420	+.103				
	430	+.42				
	440	+.29				
	450	+.15				
	460	+.13				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/09
OJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-1 (deep)
DISTANCE: 20.9/ 12.0

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	190		7.51	
	10	0	F>1000 G=40	20.8		
	40	-.01	20	20.7	7.57	
SVE	75	-.03				
	95	0	40	20.7		
	130	0				
	180	-.01				
	185	0	20	20.9	7.65	1.32
	210	-.02				
SVE/AS	225	0	20	20.9		
	240	0			7.49	
	270	0				
	290	0				3.30
	325	+1.99				3.35
	360	+3.39				
	375	+5.62				3.24
	400	+9.46				2.55
System off	405	+3.39				
	410	+8.69				
	420	+7.30				
	430	+6.23				
	440	+5.00				
	450	+.54				
	460	+.07				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
PROJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-2 (shallow)
DISTANCE: 22.9/20.3 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	5		DRY	
	10	-.13	0	20.7		
	40	-.15			DRY	
	75	-.14				
	95	-.14	60	20.7		
SVE	130	-.17				
	180	-0.13				
SVE/AS	185	-.14	80	20.8	DRY	
	210	-.15				
	225	-.14	100	20.6		
	240	-.14	100	20.7		
	270	-.14				
	290	-.16				
	325	-.20				
	360	-.13				
	375	-.15				
	400	-.17				
System off	405	+.13				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
PROJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-2 (intermediate)
DISTANCE: 22.[illegible] / 20.3 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	200		7.53	
	10	-.03	0	20.7		
	40	-.03	0	20.7	7.52	
	75	-.12				
	95	-.03	20	20.8		
SVE	130	0				
	180	0				
	185	0	20	20.9	7.50	1.29
	210	-.01				
SVE/AS	225	0	80	20.7		1.49
	240	-.01	20	20.4	7.84	
	270	-.01				
	290	0				2.05
	325	+.15				1.86
	360	+.17				
	375	+.57				
	400	+.97				2.55
System	405	+.17				
off	410	+.02				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/09
PROJECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-2 (Deep)
DISTANCE: 229/203 feet

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
SVE	0	0	F=100/60		7.54	
	10	-.02	0	20.7		
	40	-.02	0	20.7	7.51	
	75	-.15				
	95	-.04	40	20.7		
	130	0				
	180	-.01				
SVE/AS	185	0	60	20.9	7.5	1.5
	210	0				
	225	0	80	20.7		1.85
	240	0	60	20.9	7.54	
	270	0				
	290	0				1.80
	325	+.49				2.90
	360	+.39				
	375	+.02				
	400	+.65				2.20
System off	405	+.39				
	410	+.40				
	415	+.63				
	425	+.36				
	435	+.01				
	445	0				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
JECT NUMBER: 9907401
START TIME: 10:30

POINT ID: MP-3
DISTANCE: 5 / 4.5 feet

TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
0	0				
10	-.32				
40	-.32				
75	-.32				
95	-.33	60	20.7		
130	-.34				
180	-.30				
185	-.28	120	20.6		
210	-.29				
225	-.31	140	20.4		
240	-.30	120	20.7		
270	-.31				
290	-.31				
325	-.35				
360	-.32				
375	-.34				
400	-.36				
405	-.32				

SVE

SVE/AS

System off

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/94
PROJECT NUMBER: 940740
START TIME: 10:30

POINT ID: MW-11
DISTANCE: SVE 20.2 / AS 27.5

	TIME (min)	PRESSURE VAC (in H20)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	b=540		12.43	
	10	-.06	440	12.0		
	40	-.04	300	13.4		
SVE	75	-.07	140	20.4		
	95	-.05	340	15.3		
	130	-.06				
	180	-.06	~~.07~~ ~~400~~	~~17.8~~		
	185	-.07	400	17.8		
SVE/AS	210	-.05				
	225	-.05	420	17.9		
	240	-.08	360	18.4		
	270	-.07				
	290	-.06				
	325	-.08				
	360	-.04				
	375	-.06				
	400	-.08				
system off	405	-.04				

PILOT TEST FIELD DATA SHEET

MONITORING POINT/OBSERVATION WELL DATA

DATE: 7/21/99
PROJECT NUMBER: 9007401
START TIME: 10:30

POINT ID: SVE-1
DISTANCE: 0 / 5.5 feet

	TIME (min)	PRESSURE VAC (in ~~H20~~ Hg)	VOC (ppm)	%O2	DTW (feet)	DO (ppm)
	0	0	1000	15.9	10.66	
	10	-1.8			11.20	
	40	-1.8			10.74	
SVE	75	-1.8				
	95	-1.8				
	130	-1.8				
	180	-1.8				
	185	-1.25				
SVE/AS	210	-1.8				
	225	-1.8				
	240	-1.8				
	270	-1.95				
	290					
	325					
	360	-1.8				
	375					
	400	-1.5				
System off	~~405~~	~~-.32~~				

G c Ser Corp n Bohemia, York

MOBILE REM ATION UNIT
OPERATIONAL FIELD DATA SHEET

PROJECT NO.: 9907401

SITE NAME: CWD/Astoria

GSC TECH: DL

DATE: 7/21/99

EXTRACTION WELL: SVE-1

TIME (MINUTES)	EFFLUENT CONCENTRATION (ppm)	PERCENT O_2	APPLIED VACUUM (INCHES OF Hg)	EXTRACTION FLOW RATE (SCFM)	APPLIED PRESSURE (PSI)	INJECTION FLOW RATE (CFM)
0	560 = G	8.2	3.6	100	-	-
30	340 = G	12.8	3.6	100	-	-
60	300 = G	14.2	3.2	100	-	-
90	300 = G	15.3	3.4	120	-	-
120	300 = G	15.6	3.4	120	-	-
150	300 = G	16.3	3.4	120	-	-
180		16.6	3.4	120	-	-
230	320 = G	16.9	3.4	120	6	2.6
270	300 = G	16.9	3.4	120	6	3.5
300	280 = G		3.4		7.5	4.4
330	X	X			7.5	5.5
360	X	X	3.4	120	10	6.5
390	X	X	3.4	120	11.5	5.5

G = Gastech organic vapor analyzer
X = Meter not functioning

ref-project general

Appendix D

Radial Influence Calculations

RADIAL INFLUENCE CALCULATIONS

$$Ri = e^{\left[\frac{\left(P^2atm - P^2w\right)\ln\left(r / Rw\right)}{P^2r - P^2w} + \ln Rw\right]}$$

Pw = Pressure at extraction well (atm)

Pr = Pressure at observation point (atm)

Patm = Atmospheric pressure (1 atm)

Rw = Radius of extraction well (feet)

r = Distance from extraction well to observation point (feet)

Ri = Radius of influence (feet)

Monitoring Point	MP-1 (S)	MP-2 (S)	MP-3	MW-11
Pw	0.93984	0.93984	0.93984	0.93984
Pr	1*	0.999680	0.999263	0.999850
Patm	1	1	1	1
Rw	0.125	0.125	0.125	0.125
R	20.9	22.9	5	20.2
Ri	20.90	23.57	5.24	20.47

* = No observed vacuum influence

Appendix E

Soil Vapor Analytical Results

Report of Analysis

Client Sample ID: SVE/AS-2
Lab Sample ID: E53143-1
Matrix: AIR - Air
Method: TO-14/TO-15
Project: CWD, Astoria, NY

Date Sampled: 07/21/99
Date Received: 07/24/99
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q6768.D	160	08/03/99	WG	n/a	n/a	VQ291
Run #2	Q6774.D	4000	08/04/99	WG	n/a	n/a	VQ291

CAS No.	MW	Compound	Result	RDL	Units	Q	Result	RDL	Units
71-43-2	78	Benzene	552	32	ppbv		1760	100	ug/m3
74-83-9	94	Bromomethane	ND	32	ppbv		ND	120	ug/m3
108-90-7	112	Chlorobenzene	ND	32	ppbv		ND	150	ug/m3
75-00-3	64	Chloroethane	238	32	ppbv		623	84	ug/m3
67-66-3	118	Chloroform	1880	32	ppbv		9070	150	ug/m3
74-87-3	50	Chloromethane	ND	32	ppbv		ND	65	ug/m3
56-23-5	152	Carbon tetrachloride	ND	32	ppbv		ND	200	ug/m3
75-34-3	98	1,1-Dichloroethane	6470	32	ppbv		25900	130	ug/m3
75-35-4	96	1,1-Dichloroethylene	883	32	ppbv		3470	120	ug/m3
106-93-4	186	1,2-Dibromoethane	ND	32	ppbv		ND	240	ug/m3
107-06-2	98	1,2-Dichloroethane	114	32	ppbv		457	130	ug/m3
78-87-5	112	1,2-Dichloropropane	ND	32	ppbv		ND	150	ug/m3
75-71-8	120	Dichlorodifluoromethane	ND	32	ppbv		ND	160	ug/m3
156-59-2	96	cis-1,2-Dichloroethylene	128000 [a]	800	ppbv		502000 [a]	3100	ug/m3
10061-01-5	110	cis-1,3-Dichloropropene	ND	32	ppbv		ND	140	ug/m3
541-73-1	146	m-Dichlorobenzene	ND	32	ppbv		ND	190	ug/m3
95-50-1	146	o-Dichlorobenzene	ND	32	ppbv		ND	190	ug/m3
106-46-7	146	p-Dichlorobenzene	ND	32	ppbv		ND	190	ug/m3
10061-02-6	110	trans-1,3-Dichloropropene	ND	32	ppbv		ND	140	ug/m3
100-41-4	106	Ethylbenzene	ND	32	ppbv		ND	140	ug/m3
622-96-8	120.2	4-Ethyltoluene	ND	32	ppbv		ND	160	ug/m3
76-13-1	186	Freon 113	608	32	ppbv		4620	240	ug/m3
76-14-2	170	Freon 114	ND	32	ppbv		ND	220	ug/m3
87-68-3	261	Hexachlorobutadiene	ND	32	ppbv		ND	340	ug/m3
75-09-2	84	Methylene chloride	437	32	ppbv		1500	110	ug/m3
1634-04-4	88	Methyl Tert Butyl Ether	252	32	ppbv		907	120	ug/m3
100-42-5	104	Styrene	ND	32	ppbv		ND	140	ug/m3
71-55-6	132	1,1,1-Trichloroethane	14800 [a]	800	ppbv		79900 [a]	4300	ug/m3
79-34-5	166	1,1,2,2-Tetrachloroethane	ND	32	ppbv		ND	220	ug/m3
79-00-5	132	1,1,2-Trichloroethane	69.3	32	ppbv		374	170	ug/m3
120-82-1	181	1,2,4-Trichlorobenzene	ND	32	ppbv		ND	240	ug/m3
95-63-6	120	1,2,4-Trimethylbenzene	65.2	32	ppbv		320	160	ug/m3
108-67-8	120	1,3,5-Trimethylbenzene	ND	32	ppbv		ND	160	ug/m3
127-18-4	164	Tetrachloroethylene	881000 [a]	800	ppbv	E	5910000 [a]	5400	ug/m3
108-88-3	92	Toluene	76.6	32	ppbv		288	120	ug/m3
79-01-6	130	Trichloroethylene	108000 [a]	800	ppbv		574000 [a]	4200	ug/m3

ND = Not detected
RDL = Reported Detection Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SVE/AS-2		
Lab Sample ID:	E53143-1	**Date Sampled:**	07/21/99
Matrix:	AIR - Air	**Date Received:**	07/24/99
Method:	TO-14/TO-15	**Percent Solids:**	n/a
Project:	CWD, Astoria, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q6768.D	160	08/03/99	WG	n/a	n/a	VQ291
Run #2	Q6774.D	4000	08/04/99	WG	n/a	n/a	VQ291

CAS No.	MW	Compound	Result	RDL	Units	Q	Result	RDL	Units
75-69-4	136	Trichlorofluoromethane	ND	32	ppbv		ND	180	ug/m3
75-01-4	62	Vinyl chloride	4920	32	ppbv		12500	81	ug/m3
	106	m,p-Xylene	43.6	32	ppbv		189	140	ug/m3
95-47-6	106	o-Xylene	ND	32	ppbv		ND	140	ug/m3
1330-20-7	106	Xylenes (total)	43.6	32	ppbv		189	140	ug/m3

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
460-00-4	4-Bromofluorobenzene	126%	90%	70-130%

(a) Result is from Run# 2

ND = Not detected
RDL = Reported Detection Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

APPENDIX 2 - FIELD LOGS

SVE Parameter Evaluation Test - 9/11/03
Triumvirate - Astoria, NY

Horizontal SVE Well Nomenclature: 4 inch manifold pipe designated HSVE-1 from left to right (NE to SW) facing wall of vault.
Vertical SVE Well Nomenclature: 2" manif. designated VSVE-1to 4 from left to right (NE to SW) and VSVE-5 to 8 from left to right in front of rear stubouts.
PID Screening: Using Thermoelectron 580B calibrated to 100 ppmv as isobutylene.

HSVE Test No.:	***1***
Duration:	56 min.
Start Time:	10:00
End Time:	10:58

Time:	10:01	10:08	10:26	10:54
Blower Vacuum (in H20):	7			
PID Discharge Reading (ppmv):	180	147	149	150

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.05	0.05	0.05	0.04	0.12	0.09	0.06	0.07

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		Test Well	0.17	0	0.12	0.07	0.08	0.02

Notes: No water uptake.

HSVE Test No.:	***2***
Duration:	40 min.
Start Time:	10:58
End Time:	11:38

Time:	10:59	11:22	11:38	
Blower Vacuum (in H20):	6.5		6.5	
PID Discharge Reading (ppmv):	180	188	188	

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.05	0.06	0.07	0.04	0.09	0.08	0.1	0.12

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		0.17	Test Well	0.04	0.17	0.11	0.1	0.02

Notes: No water uptake.

SVE Parameter Evaluation Test - 9/11/03
Triumvirate - Astoria, NY

Horizontal SVE Well Nomenclature: 4 inch manifold pipe designated HSVE-1 from left to right (NE to SW) facing wall of vault.
Vertical SVE Well Nomenclature: 2" manif. designated VSVE-1to 4 from left to right (NE to SW) and VSVE-5 to 8 from left to right in front of rear stubouts.
PID Screening: Using Thermoelectron 580B calibrated to 100 ppmv as isobutylene.

HSVE Test No.:	3
Duration:	<1 min.
Start Time:	11:44
End Time:	11:45

Time:	11:44			
Blower Vacuum (in H20):	NA			
PID Discharge Reading (ppmv):	NA			

Vertical SVE Well:		VSVE-1	VSVE-2	VSVE-3	VSVE-4	VSVE-5	VSVE-6	VSVE-7	VSVE-8
Measured Vacuum Influence:									

Horizontal SVE Well:		HVSVE-1	HSVE-2	HSVE-3	HSVE-4	HSVE-5	HSVE-6	HSVE-7
Measured Vacuum Influence:				Test Well				

Notes: Water uptake shut down blower after 5-10 seconds of operation. Drained blower/pipe.
Restarted w/ valve mostly closed. Pulled water immediately upon cracking valve.

HSVE Test No.:	4
Duration:	27 min.
Start Time:	12:00
End Time:	12:27

Time:	12:01	12:02	12:10	12:17	12:27
Blower Vacuum (in H20):	7			7.5	
PID Discharge Reading (ppmv):	542	415	324	300	280

Vertical SVE Well:		VSVE-1	VSVE-2	VSVE-3	VSVE-4	VSVE-5	VSVE-6	VSVE-7	VSVE-8
Measured Vacuum Influence:		0.09	0.19	0.14	0.06	0.21	0.18	0.13	0.1

Horizontal SVE Well:		HVSVE-1	HSVE-2	HSVE-3	HSVE-4	HSVE-5	HSVE-6	HSVE-7
Measured Vacuum Influence:		0.1	0.12	0.23	Test Well	0.17	0.18	0.03

Notes: No water uptake. Collected SVE Discharge Vapor Sample **HSVE-4** over 4 min (correspoding PID reading 251 ppmv).

SVE Para.neter Evaluation Test - 9/11/03
Triumvirate - Astoria, NY

Horizontal SVE Well Nomenclature: 4 inch manifold pipe designated HSVE-1 from left to right (NE to SW) facing wall of vault.
Vertical SVE Well Nomenclature: 2" manif. designated VSVE-1to 4 from left to right (NE to SW) and VSVE-5 to 8 from left to right in front of rear stubouts.
PID Screening: Using Thermoelectron 580B calibrated to 100 ppmv as isobutylene.

HSVE Test No.:	***5***
Duration:	32 min.
Start Time:	12:30
End Time:	1:02

Time:	12:31	12:59		
Blower Vacuum (in H20):	7	7		
PID Discharge Reading (ppmv):	187	235		

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.19	0.16	0.15	0.12	0.11	0.13	0.08	0.11

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		0.07	0.1	0.2	0.18	na	0.29	0.07

Notes: No water uptake. Collected SVE Discharge Vapor Sample **HSVE-5** over 6 min (cooresponding PID reading:214ppmv).

HSVE Test No.:	***6***
Duration:	35 min.
Start Time:	1:03
End Time:	1:38

Time:	12:01	12:02	1:37	1:38	
Blower Vacuum (in H20):	7		7		
PID Discharge Reading (ppmv):	400	330		290	

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.14	0.27	0.23	0.11	0.14	0.13	0.09	0.09

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		0.07	0.1	0.15	0.17	0.27	na	0.07

Notes: No water uptake.

SVE Parameter Evaluation Test - 9/11/03
Triumvirate - Astoria, NY

Horizontal SVE Well Nomenclature: 4 inch manifold pipe designated HSVE-1 from left to right (NE to SW) facing wall of vault.
Vertical SVE Well Nomenclature: 2" manif. designated VSVE-1to 4 from left to right (NE to SW) and VSVE-5 to 8 from left to right in front of rear stubouts.
PID Screening: Using Thermoelectron 580B calibrated to 100 ppmv as isobutylene.

HSVE Test No.:	7
Duration:	21 min.
Start Time:	1:39
End Time:	2:00

Time:	1:40	1:44	1:59	2:00
Blower Vacuum (in H20):	6.5		6.5	
PID Discharge Reading (ppmv):	65	70		88

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.13	0.1	0.09	0.13	0.09	0.09	0.03	0.04

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		0.03	0.03	0.05	0.06	0.09	0.09	Test Well

Notes: No water uptake. Collected SVE Discharge Vapor Sample **HSVE-7** over 3 min (cooresponding PID reading: 92 ppmv).

Appendix 3

REPORT OF ANALYTICAL RESULTS

Case Number N0916-16

Prepared for:

Attn: Rick Mandile
SAGE Environmental
172 Armistice Boulevard
Pawtucket, RI 02860

Report Date: September 26, 2003

Lab # RI010

NEW ENGLAND TESTING LABORATORY, INC.
1254 Douglas Avenue, North Providence, Rhode Island 02904-5392
PROVIDENCE (401) 353-3420 TOLL FREE: 1-888-863-8522

Total # of Pages: 18

ANALYTICAL REPORT CERTIFICATION FORM

Laboratory Name: New England Testing Laboratory, Inc.

Laboratory Project #: N0916-16

Project Name: Sage Environmental

Project Location: Astoria | MCP RTN #[3]

MCP SW-846 Methods	8260B ( )	8151A ( )	8330 ( )	6010B ( )	7470A/1A ( )
	8270C ( )	8081A ( )	VPH ( )	6020 ( )	9014M[1] ( )
	8082 ( )	8021B ( )	EPH ( )	7000 S[2] ( )	Other: X

[1]M – SW-846 Method 9014 Modified or MADEP Physiologically Available Cyanide Method
[2]S – SW-846 Methods 7000 Series. List individual method and analytes. [3]List RTN if known

Were all QA/QC procedures required for the specified analytical method(s) included in this report followed?	Yes (X) No ( ) (If No must address in narrative. Attach additional information if required)
Were all QA/QC performance standards for specified analytical method(s) included in this report met (including those not required to be reported)?	Yes (X) No ( ) (If No must address in narrative. Attach additional information if required)
Were all contaminants positively identified and quantified by the laboratory in the course of this analysis of field samples reported, even if not a requested analyte?	Yes (X) No ( ) (If No must address in narrative. Attach additional information if required) ( ) Additional Compounds reported in narrative
Were all samples received by the laboratory in a condition consistent with those described on their Chain-of-Custody documentation?	Yes (X) No ( ) (If No must address in narrative. Attach additional information if required)

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: John Boudreau John Boudreau   Position: Director, Organics and General Chemistry

Printed Name: John H. Boudreau   Date: 9/26/2003

STATEMENTS/CERTIFICATIONS REQUIRED BY THE NATIONAL ENVIRONMENTAL LABORATORY APPROVAL CONFERENCE (NELAC)

New England Testing Laboratory is certified under the National Environmental Laboratory Approval Program (NELAP). This certification requires the following statements and certifications be included in our report.

This report shall not be reproduced, except in full, without written approval of the laboratory.

New England Testing certifies that the test results contained within this report meet all NELAC requirements except as detailed in the Case Narrative section of this report.

SAMPLES SUBMITTED and REQUEST FOR ANALYSIS:

The sample information listed in Table I was submitted to New England Testing Laboratory on September 16, 2003. The group of samples appearing in this report was assigned an internal identification number (case number) for laboratory information management purposes. The client's designations for the individual samples, along with our case numbers, are used to identify the samples in this report. The case number for this sample submission is N0916-16.

Custody records are included in this report.

Project: Astoria

TABLE I, Samples Submitted

Sample ID	Date Sampled	Matrix	Analysis Requested
H SVE 4	9/11/03	Air	Table II
H SVE 5	9/11/03	Air	Table II
H SVE 7	9/11/03	Air	Table II

TABLE II, Analysis and Methods

ANALYSIS	DETERMINATIVE METHOD
VOCs	TO-14A

This method is documented in:

Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, (EPA/625/R-96/010b)

CASE NARRATIVE:

Sample Receipt:
The samples were received in the appropriate containers.
The chain of custody was adequately completed and corresponded to the samples submitted.

TO-14:
All samples were analyzed within method specified holding times and according to NETLAB's documented standard operating procedures. The results for the associated calibration, method blank and laboratory control sample (LCS) fell within method specified quality control criteria.

NETLAB

RESULTS: TO-14A

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NETLAB

Analytical Results
Method TO-14a

Case Number:	N0916-16	Date Analyzed:	9/25/03-9/26/03
Sample ID:	H SVE 4	Date Sampled:	9/11/03

Highest VOC test well

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
Dichlorodifluoromethane	ND	ND	92.5	457
Chloromethane	ND	ND	92.5	191
Freon-114	ND	ND	92.5	646
Vinyl Chloride	168	429	92.5	236
Bromomethane	ND	ND	92.5	359
Trichlorofluoromethane	ND	ND	92.5	519
Chloroethane	ND	ND	92.5	244
1,1-Dichloroethene	118	468	92.5	366
Methylene Chloride	ND	ND	925	3209
Freon-113	ND	ND	92.5	708
trans-1,2 Dichloroethene	226	895	92.5	366
1,1-Dichloroethane	1150	4650	92.5	374
cis-1,2-Dichloroethene	65500	259000	4690	18580
Chloroform	ND	ND	92.5	451
1,1,1-Trichloroethane	2640	14400	92.5	504
Carbon Tetrachloride	ND	ND	92.5	581
Benzene	ND	ND	92.5	295
1,2-Dichloroethane	ND	ND	92.5	374
Trichloroethene	75100	403000	4690	25163
1,2-Dichloropropane	ND	ND	92.5	427
cis-1,3-Dichloropropene	ND	ND	92.5	419
Toluene	98.5	371	92.5	348
trans-1,3-Dichloropropene	ND	ND	92.5	419
1,1,2-Trichloroethane	ND	ND	92.5	504
Ethylene Dibromide	ND	ND	92.5	710
Tetrachloroethene	570000	3860000	17500	118595
Chlorobenzene	ND	ND	92.5	425
Ethylbenzene	ND	ND	92.5	401
m & p-Xylene	ND	ND	92.5	401
o-Xylene	ND	ND	92.5	401
Styrene	ND	ND	92.5	394
1,1,2,2-Tetrachloroethane	ND	ND	92.5	634
1,3,5-Trimethylbenzene	ND	ND	92.5	454
1,2,4-Trimethylbenzene	ND	ND	92.5	454
Benzyl Chloride	ND	ND	92.5	479
1,3-Dichlorobenzene	ND	ND	92.5	556
1,4-Dichlorobenzene	ND	ND	92.5	556
1,2-Dichlorobenzene	ND	ND	92.5	556

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Analytical Results
Method TO-14a

Case Number:	N0916-16	Date Analyzed:	9/25/03-9/26/03
Sample ID:	H SVE 4	Date Sampled:	9/11/03

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
1,2,4-Trichlorobenzene	ND	ND	92.5	686
Hexachlorobutadiene	ND	ND	92.5	986
	715. PPmv	4543213 ug/m^3		
Surrogate Recovery (BFB)	106%			

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit
B = Compound detected in blank
* = Matrix Effect

NELTLAB

Analytical Results
Method TO-14a

Case Number:	N0916-16	Date Analyzed:	9/25/03-9/26/03
Sample ID:	H SVE 5	Date Sampled:	9/11/03

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
Dichlorodifluoromethane	ND	ND	4690	23174
Chloromethane	ND	ND	4690	9679
Freon-114	ND	ND	4690	32761
Vinyl Chloride	ND	ND	4690	11979
Bromomethane	ND	ND	4690	18197
Trichlorofluoromethane	ND	ND	4690	26331
Chloroethane	ND	ND	4690	12362
1,1-Dichloroethene	ND	ND	4690	18582
Methylene Chloride	ND	ND	4690	16272
Freon-113	ND	ND	4690	35914
trans-1,2 Dichloroethene	ND	ND	4690	18580
1,1-Dichloroethane	ND	ND	4690	18967
cis-1,2-Dichloroethene	54900	217000	4690	18580
Chloroform	ND	ND	4690	22881
1,1,1-Trichloroethane	ND	ND	4690	25570
Carbon Tetrachloride	ND	ND	4690	29482
Benzene	ND	ND	4690	14973
1,2-Dichloroethane	ND	ND	4690	18967
Trichloroethene	54700	293000	4690	25163
1,2-Dichloropropane	ND	ND	4690	21656
cis-1,3-Dichloropropene	ND	ND	4690	21269
Toluene	ND	ND	4690	17662
trans-1,3-Dichloropropene	ND	ND	4690	21269
1,1,2-Trichloroethane	ND	ND	4690	25570
Ethylene Dibromide	ND	ND	4690	36010
Tetrachloroethene	382000	2590000	17500	118595
Chlorobenzene	ND	ND	4690	21574
Ethylbenzene	ND	ND	4690	20349
m & p-Xylene	ND	ND	4690	20349
o-Xylene	ND	ND	4690	20349
Styrene	ND	ND	4690	19964
1,1,2,2-Tetrachloroethane	ND	ND	4690	32171
1,3,5-Trimethylbenzene	ND	ND	4690	23038
1,2,4-Trimethylbenzene	ND	ND	4690	23038
Benzyl Chloride	ND	ND	4690	24263
1,3-Dichlorobenzene	ND	ND	4690	28176
1,4-Dichlorobenzene	ND	ND	4690	28176
1,2-Dichlorobenzene	ND	ND	4690	28188

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Analytical Results
Method TO-14a

Case Number:	N0916-16	Date Analyzed:	9/25/03-9/26/03
Sample ID:	H SVE 5	Date Sampled:	9/11/03

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
1,2,4-Trichlorobenzene	ND	ND	4690	34777
Hexachlorobutadiene	ND	ND	4690	49986
	491,600 ppmv	3100000 ug/m^3		
Surrogate Recovery (BFB)	102%			

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit
B = Compound detected in blank
* = Matrix Effect

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Analytical Results
Method TO-14a

Case Number:	N0916-16	Date Analyzed:	9/25/03-9/26/03
Sample ID:	H SVE 7	Date Sampled:	9/11/03

Lowest VOC test well

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
Dichlorodifluoromethane	ND	ND	4690	23174
Chloromethane	ND	ND	4690	9679
Freon-114	ND	ND	4690	32761
Vinyl Chloride	ND	ND	4690	11979
Bromomethane	ND	ND	4690	18197
Trichlorofluoromethane	ND	ND	4690	26331
Chloroethane	ND	ND	4690	12362
1,1-Dichloroethene	ND	ND	4690	18582
Methylene Chloride	ND	ND	4690	16272
Freon-113	ND	ND	4690	35914
trans-1,2 Dichloroethene	ND	ND	4690	18580
1,1-Dichloroethane	ND	ND	4690	18967
cis-1,2-Dichloroethene	17000	67300	4690	18580
Chloroform	ND	ND	4690	22881
1,1,1-Trichloroethane	ND	ND	4690	25570
Carbon Tetrachloride	ND	ND	4690	29482
Benzene	ND	ND	4690	14973
1,2-Dichloroethane	ND	ND	4690	18967
Trichloroethene	25300	136000	4690	25163
1,2-Dichloropropane	ND	ND	4690	21656
cis-1,3-Dichloropropene	ND	ND	4690	21269
Toluene	ND	ND	4690	17662
trans-1,3-Dichloropropene	ND	ND	4690	21269
1,1,2-Trichloroethane	ND	ND	4690	25570
Ethylene Dibromide	ND	ND	4690	36010
Tetrachloroethene	144000	976000	4690	31784
Chlorobenzene	ND	ND	4690	21574
Ethylbenzene	ND	ND	4690	20349
m & p-Xylene	ND	ND	4690	20349
o-Xylene	ND	ND	4690	20349
Styrene	ND	ND	4690	19964
1,1,2,2-Tetrachloroethane	ND	ND	4690	32171
1,3,5-Trimethylbenzene	ND	ND	4690	23038
1,2,4-Trimethylbenzene	ND	ND	4690	23038
Benzyl Chloride	ND	ND	4690	24263
1,3-Dichlorobenzene	ND	ND	4690	28176
1,4-Dichlorobenzene	ND	ND	4690	28176
1,2-Dichlorobenzene	ND	ND	4690	28188

NETLAB

Analytical Results
Method TO-14a

Case Number:	N0916-16	Date Analyzed:	9/25/03-9/26/03
Sample ID:	H SVE 7	Date Sampled:	9/11/03

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
1,2,4-Trichlorobenzene	ND	ND	4690	34777
Hexachlorobutadiene	ND	ND	4690	49986
	186,300 ppmv	1179300 ug/m3		

Surrogate Recovery (BFB) 97%

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit
B = Compound detected in blank
* = Matrix Effect

NELTLAB

Analytical Results
Method TO-14a

Case Number:	N0916-16	Date Analyzed:	9/25/03
Sample ID:	BLK	Date Sampled:	N/A

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
Dichlorodifluoromethane	ND	ND	0.5	2.5
Chloromethane	ND	ND	0.5	1.0
Freon-114	ND	ND	0.5	3.5
Vinyl Chloride	ND	ND	0.5	1.3
Bromomethane	ND	ND	0.5	1.9
Trichlorofluoromethane	ND	ND	0.5	2.8
Chloroethane	ND	ND	0.5	1.3
1,1-Dichloroethene	ND	ND	0.5	2.0
Methylene Chloride	ND	ND	5.0	17
Freon-113	ND	ND	0.5	3.8
trans-1,2 Dichloroethene	ND	ND	0.5	2.0
1,1-Dichloroethane	ND	ND	0.5	2.0
cis-1,2-Dichloroethene	ND	ND	0.5	2.0
Chloroform	ND	ND	0.5	2.4
1,1,1-Trichloroethane	ND	ND	0.5	2.7
Carbon Tetrachloride	ND	ND	0.5	3.1
Benzene	ND	ND	0.5	1.6
1,2-Dichloroethane	ND	ND	0.5	2.0
Trichloroethene	ND	ND	0.5	2.7
1,2-Dichloropropane	ND	ND	0.5	2.3
cis-1,3-Dichloropropene	ND	ND	0.5	2.3
Toluene	ND	ND	0.5	1.9
trans-1,3-Dichloropropene	ND	ND	0.5	2.3
1,1,2-Trichloroethane	ND	ND	0.5	2.7
Ethylene Dibromide	ND	ND	0.5	3.8
Tetrachloroethene	ND	ND	0.5	3.4
Chlorobenzene	ND	ND	0.5	2.3
Ethylbenzene	ND	ND	0.5	2.2
m & p-Xylene	ND	ND	0.5	2.2
o-Xylene	ND	ND	0.5	2.2
Styrene	ND	ND	0.5	2.1
1,1,2,2-Tetrachloroethane	ND	ND	0.5	3.4
1,3,5-Trimethylbenzene	ND	ND	0.5	2.5
1,2,4-Trimethylbenzene	ND	ND	0.5	2.5
Benzyl Chloride	ND	ND	0.5	2.6
1,3-Dichlorobenzene	ND	ND	0.5	3.0
1,4-Dichlorobenzene	ND	ND	0.5	3.0
1,2-Dichlorobenzene	ND	ND	0.5	3.0

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Analytical Results
Method TO-14a

Case Number:	N0916-16	Date Analyzed:	9/25/03
Sample ID:	BLK	Date Sampled:	N/A

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
1,2,4-Trichlorobenzene	ND	ND	0.5	3.7
Hexachlorobutadiene	ND	ND	0.5	5.3

Surrogate Recovery (BFB) 101%

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit
B = Compound detected in blank
* = Matrix Effect

NELTLAB

TO-14a Lab Control Spike

Date Analyzed: 9/25/03

Analyte	Amt. Spiked, ppbv	Result, ppbv	% Recovery	LCL, %	UCL, %
Dichlorodifluoromethane	5.0	4.5	89	83	132
Chloromethane	5.0	5.0	99	77	155
Freon-114	5.0	4.7	93	89	132
Vinyl Chloride	5.0	5.3	106	78	163
Bromomethane	5.0	4.5	90	87	126
Trichlorofluoromethane	5.0	3.7	73	88	132
Chloroethane	5.0	4.8	96	75	133
1,1-Dichloroethene	5.0	4.6	91	80	147
Methylene Chloride	5.0	3.4	68	67	151
Freon-113	5.0	3.9	78	85	135
trans-1,2 Dichloroethene	5.0	5.1	102	85	149
1,1-Dichloroethane	5.0	5.0	99	80	154
cis-1,2-Dichloroethene	5.0	6.3	127	85	145
Chloroform	5.0	4.2	84	88	132
1,1,1-Trichloroethane	5.0	4.1	83	89	133
Carbon Tetrachloride	5.0	3.7	74	83	127
Benzene	5.0	5.7	115	84	145
1,2-Dichloroethane	5.0	4.4	88	86	138
Trichloroethene	5.0	5.7	114	88	125
1,2-Dichloropropane	5.0	5.5	111	84	149
cis-1,3-Dichloropropene	5.0	5.8	117	90	137
Toluene	5.0	5.8	116	88	134
Trans-1,3-Dichloropropene	5.0	5.6	112	90	135
1,1,2-Trichloroethane	5.0	4.8	96	86	132
Ethylene Dibromide	5.0	4.6	92	79	124
Tetrachloroethene	5.0	8.3	167	78	131
Chlorobenzene	5.0	4.7	94	81	133
Ethylbenzene	5.0	5.8	115	82	139
m & p-Xylene	5.0	5.2	104	81	132
o-Xylene	5.0	5.3	106	83	136
Styrene	5.0	5.7	115	83	137
1,1,2,2-Tetrachloroethane	5.0	5.0	100	81	132
1,3,5-Trimethylbenzene	5.0	3.9	77	83	129
1,2,4-Trimethylbenzene	5.0	3.9	78	81	132
1,3-Dichlorobenzene	5.0	3.0	61	73	124
1,4-Dichlorobenzene	5.0	3.1	63	70	126
1,2-Dichlorobenzene	5.0	3.3	66	65	138
1,2,4-Trichlorobenzene	5.0	5.2	104	70	142
Hexachlorobutadiene	5.0	6.4	128	84	130

Custody Records

NEW ENGLAND TESTING LABORATORY, INC.
1254 Douglas Avenue
North Providence, RI 02904

CHAIN OF CUSTODY RECORD

PROJ NO: 51760 | PROJECT NAME: Astoria
CLIENT: ~~Friend~~ Sage Environmental

N0916.16

SAMPLE I D	DATE	TIME	COMP	GRAB	STATION LOCATION	NO OF CON-TAINERS	TESTS: VOC, TO14	REMARKS
HSVE4	9/11/03	[illegible]		✓	Horizontal SVE well	1	✓	4592
HSVE5	↓	2:31		✓		1	✓	4618
HSVE7	↓	2:03		✓		1	✓	1879

Relinquished by (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by (Signature)
[signature]	9/16/03 4/11/03 14:16	[signature]			
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks: 5-day TAT	

APPENDIX 4

INTERIM REMEDIAL ACTION PLAN

Chemical Waste Disposal Corporation
42-14 19th Avenue
Astoria, New York

October 1999

Prepared By:

Geologic Services Corporation
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Bohemia, New York 11716
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Prepared For:

Chemical Waste Disposal Corporation
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GSC Project No. 9907401

QUALITY ASSURANCE/QUALITY CONTROL

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Appendix A Catalytic Oxidizer and Blower Specifications

1.0 INTRODUCTION

Geologic Services Corporation (GSC) was contracted by Chemical Waste Disposal Corporation (CWD) to prepare this interim remedial action plan (IRAP) for implementation at the CWD facility located at 42-14 19th Avenue, Astoria, New York (Figure 1 – Site Locus). The IRAP is designed to satisfy guidance set forth in the Resource Conservation and Recovery Act (RCRA) Clean-up Reforms (USEPA, 1999). The plan provides a means to expedite the construction and operation of an efficient remedial system ensuring control of potential human exposures and controlling the migration of contaminated groundwater. Through extensive site investigation, the nature and extent of soil and groundwater contamination has been fully delineated. The primary constituents of concern are volatile organic compounds (VOCs) adsorbed to soils and dissolved in groundwater. This IRAP provides the design specification to effectively remediate soil and groundwater beneath the site.

To address the soil and groundwater contamination at the site, a soil vapor extraction and air sparging (SVE/AS) system will be installed, operated, and maintained. The remedial system is intended to remove the majority of the mass of soil and groundwater contamination, which would then be followed by a demonstration through a human health risk assessment (RA) that the residual contamination does not pose a risk to human health.

2.0 SITE BACKGROUND AND SETTING

The subject location consists of approximately 0.5 acres of land containing a chemical waste storage and transport facility (Figure 2 – Site Plan). The facility is composed of a storage building, an office building, and a storage yard. The storage building houses numerous drums containing various chemical wastes. Within the yard, drums are stored on wooden pallets and within steel storage containers. Wells existing on-site that were used in remedial action treatability testing activities include one vapor extraction well, one air sparge well, three vapor monitoring points, and one groundwater monitoring well.

The site is located in the Atlantic Coastal Plain Physiographic Province. Regional geology consists of unconsolidated sand, silt, clay, and gravel layers overlying crystalline bedrock. These layers dip to the southeast and generally follow the contours of the bedrock surface. From oldest (deepest) to youngest (shallowest), these deposits have been identified and divided into a series of hydrogeologic units: the Lloyd aquifer; the Raritan clay confining unit; the Magothy aquifer and the Upper Glacial aquifer (water table aquifer).

The Upper Glacial aquifer can be divided into geologic units of Holocene and upper Pleistocene age. The Holocene deposits are the more recent deposits, consisting of sand, gravel, silt, clay, organic mud, peat, loam, and shells. These deposits, which include undifferentiated artificial fill, salt-marsh and swamp deposits, stream alluvium and shore deposits, typically range in thickness from five to 50 feet (Kilburn and Krulikas, 1987). The upper Pleistocene deposits are moraine (till), composed of unsorted clay, sand, gravel, and boulders. These deposits may contain outwash deposits of stratified brown sand and gravel with interbedded layers of silty sand and clay.

The deposits beneath the site that are impacted and intended for remediation consist of artificial fill to depths of approximately 14 to 16 feet below land surface (bls). Beneath the fill is a tidal flat deposit (peat layer) consisting of compacted organics (peat, marsh, etc.), silt and clay. The peat layer ranges in thickness from five to 15 feet and acts as a confining unit preventing the downward migration of contaminants. Beneath the peat are Upper Glacial sands and gravel. Depth to groundwater is between four and eight feet bls and groundwater flow is to the northeast.

3.0 NATURE AND EXTENT OF CONTAMINANTS

Several subsurface investigations have been conducted at the CWD facility. Dvirka & Bartilucci Consulting Engineers' (D&B) February 1996 report "Phase II RCRA Facility Investigation Report" fully characterizes the nature and extent of soil and groundwater contamination at the site.

3.1 Soil Contamination

A soil boring program conducted as part of D&B's investigation indicates that significant concentrations of contaminants are present in vadose and saturated zone soils.

3.1.1 Vadose Zone Contamination

VOCs were detected in vadose zone soils at concentrations exceeding New York State Department of Environmental Conservation (NYSDEC) recommended Soil Cleanup Objectives (NYSDEC, 1994) throughout the site. VOCs, primarily consisting of tetrachloroethylene and its daughter compounds, were detected at highest concentrations in vadose zone soils near the southwest portion of the outdoor storage yard. Total VOCs at this location ranged from 4,959 micrograms per kilogram (µg/kg) to 1,088,975 µg/kg. Concentrations in vadose zone soils near the northern and eastern portions of the storage yard were approximately two orders of magnitude lower then in the southern and western portions. In the northern and eastern portions of the yard, concentrations were highest immediately above the water table.

3.1.2 Saturated Soil Contamination

The majority of saturated soil samples contained levels of VOCs exceeding NYSDEC recommended soil cleanup objectives. The saturated fill material located beneath the site contains significant levels of VOCs. Soil samples collected from the fill material contained total VOC concentrations ranging from 14,642 to 18,524 µg/kg. VOC concentrations were detected in highest concentrations in the upper portion of the peat layer. Soil samples collected from the upper portion of the peat layer contained total VOCs ranging from 1,624,564 μg/kg to 6,118,900 μg/kg.

3.2 Groundwater Contamination

Groundwater collected from the on-site monitoring well contained levels of VOCs in excess of NYSDEC groundwater standards (NYSDEC, 1995). Groundwater samples collected from the on-site and immediately downgradient monitoring wells contained total VOCs ranging from 2,742 to 397,218 micrograms per liter (μg/l).

4.0 TREATABILITY TESTING

To determine the effectiveness of Soil Vapor Extraction (SVE) and Air Sparging (AS) as a remedial technology, SVE/AS pilot testing was conducted at the site on July 21, 1999.

4.1 Pilot Test System

Pilot test system layout was designed by Gannet Flemming Engineers. The system consisted of one soil vapor extraction well (SVE-1), one air sparge well (AS-1), and four monitoring points (MP-1, MP-2, MP-3 and MW-11). The monitoring points MP-1, and MP-2 each contained three 1-foot long screen intervals at varying depths to permit monitoring at multiple depths within the subsurface. The locations of the wells and monitoring points are included on Figure 3 – Pilot Test System Layout.

4.2 Pilot Testing Procedures

SVE/AS pilot testing procedures were performed on July 21, 1999. The SVE pilot test was performed by applying a vacuum to the SVE point (SVE-1) using a 7-horsepower rotary lobe blower. Applied vacuum, extracted airflow rate, and VOC concentrations were recorded at the SVE well. Vacuum influence and VOC concentrations were recorded in the four monitoring points. SVE testing was conducted for a total of 180 minutes, at which time a influent sample was collected and later submitted to Accutest Laboratories of Dayton, New Jersey for analysis of VOCs using analytical method TO-14.

Upon conclusion of the SVE pilot test, the combination SVE/AS test was initiated. Air was injected into the air sparge point (AS-1) using an oil-less 4 horsepower air compressor. Pressure, vacuum, and dissolved oxygen in groundwater were measured at the monitoring points. Dissolved oxygen measurements were not taken from MW-11 and MP-1 (intermediate screen zone) due to the presence of separate phase liquids above the water table, and the risk of damaging the dissolved oxygen meter with these liquids. The combined SVE/AS pilot test was operated for a total of 220 minutes.

4.3 Results of SVE Testing

Prior to shutdown of the SVE test, an applied vacuum of 24.5 inches of water column (in w.c.) was maintained, resulting in an air flow of approximately 120 standard cubic feet per minute (SCFM). Effective vacuum influence was observed at a maximum distance of 22.9 feet from the extraction well. The laboratory analysis of the air sample collected prior to shut down of the SVE test revealed a total VOC concentration of 1,148.4 ppm.

The vacuum data collected during the pilot test was analyzed using a semi-log plot of normalized vacuums (monitoring point vacuum divided by the extraction well vacuum) on the logarithmic scale (y - axis) and radial distance from the extraction well on the arithmetic scale (x - axis). A best-fit line was drawn through the data using an exponential method. The radial distance corresponding to the log value of 0.01 for each line yields the estimated "effective" radius of vacuum influence at which observed vacuums are 1% of the applied vacuum. The 1% value is an arbitrary yet conservative estimate of the projected vacuum needed to provide adequate site coverage. This method of data evaluation resulted in an "effective" radius of vacuum influence (ROI) of 15.3 feet.

4.4 Results of SVE/AS Testing

The combination SVE/AS pilot test was conducted immediately following the SVE test, and operated for 220 minutes. Air was injected into the air sparge point at varying rates, resulting in distinctive pressures. During the SVE/AS test, pressure and dissolved oxygen was detected at a maximum distance of 20.3 feet from the air sparge well (AS-1).

4.5 Pilot Test Conclusions

During the SVE pilot test conducted on SVE-1, a vacuum of 24.5 in w. c. was applied with a resulting flow rate of 120 SCFM. Based on data collected during a three hour test, the observed ROI was 22.9 feet, and the graphical "effective" ROI evaluation was determined to be approximately 15.3 feet. The graphical "effective" radius of influence of 15.3 feet will be used for design consideration.

Based on the radius of influence and the extracted vapor VOC concentrations from the SVE/AS pilot test, it appears this technology would be an effective tool for site remediation.

Steady state applied pressure at the air sparge well was 11.5 pounds per square inch (psi) with an airflow of 5.5 cubic feet per minute (CFM). Pressure and dissolved oxygen influence was observed at a maximum distance of 20.3 feet from the air sparge well. Based on the results of the SVE/AS pilot test, it appears that the inclusion of air sparging to an SVE system would increase the effectiveness of site remediation. In addition to removing high concentrations of VOCs in the soil and groundwater, air sparging may also enhance bioremediation by increasing dissolved oxygen in groundwater. Air sparge injection points will be installed above the peat layer to ensure pressure response in the vadose zone.

5.0 REMEDIAL DESIGN

This section details how CWD intends to address remediation of the contaminated soil and groundwater identified at the site. The proposed remediation is discussion below.

5.1 Remedial Objectives

The remedial objectives for the system developed as parts of this IRAP are:

- To degrade and remove VOCs, specifically tetrachloroethylene adsorbed to soils beneath the site; and,
- To remediate the contaminated groundwater to levels determined during the RA.

This remedial objective will be met through the use of a full-scale SVE/AS system. The remedial program is intended to eliminate any potential ongoing VOC sources and cause mass-reduction of VOCs in groundwater. Prior to the completion of these remediation efforts, a RA will be performed to determine the residual contamination concentrations that do not pose a threat to human health and to determine when natural attenuation would be effective in remediation of residual, dissolved VOCs in groundwater.

5.2 Proposed Remedy

The proposed remedy to remediate soil and groundwater includes the use of SVE and AS. The SVE and AS processes are discussed in detail below.

5.2.1 SVE Process

SVE would be utilized to remove the high concentrations of VOCs from the impacted soil within the vadose zone. This process will remove volatile organic vapors from the subsurface soil by drawing air through the contaminated soil. In addition, the movement of air through the subsurface will enhance the natural biodegradation occurring at the source area. This process is known as "bioventing." Concurrently, SVE will be used to capture VOCs generated through the remediation of the contaminated groundwater as described in the description of the AS process in the following section.

5.2.2 AS Process

AS will be utilized to enhance removal of VOCs from the impacted soil and groundwater. AS operates as a flow of pressurized atmospheric air injected in air sparge wells to direct a flow of air into the saturated zone. As the air is forced through the groundwater, VOCs volatilize into the air stream. The air stream then migrates upward into the unsaturated zone stripping VOCs from the soil and, in turn, is recovered by an SVE well network via an induced low pressure zone created by the SVE system.

5.3 SVE Well Layout (Vertical)

Eight soil vapor extraction wells will be installed to remediate impacted soil in the vadose zone. The layout of the wells is shown in Figure 4-Soil Vapor Extraction Well/Piping Diagram. The layout is designed to remediate soils in the vadose zone and to recover injected sparge air which may migrate into these soils. The eight extraction wells will be constructed using 4-inch PVC 0.010 slot well screen from 4 to 6 feet BLS as shown in Figure 5- Remedial System Piping Cross Section. A 2-inch PVC lateral will be attached to each well plumbed to an airtight fitting on the riser pipe. The eight extraction wells will be split into two groups of four wells. Each lateral from the two groups of wells will extend to an 18-inch by 18-inch junction/control vault located on the west side of the waste storage area. Control valves will be installed on each lateral to allow wells to be turned on and off to maximize system efficiency.

5.4 SVE Lateral Layout (Horizontal)

Four horizontal soil vapor extraction laterals will be installed to remediate impacted soil in the vadose zone. The layout for the laterals is shown in Figure 6 – Horizontal SVE Piping Diagram. The layout is designed to remediate soils in the vadose zone and to recover injected sparge air which may migrate into these soils and into the gravel area beneath the concrete slab and foundation of the facility. Each of the four laterals will be constructed using 20 foot sections of 4-inch PVC 0.010 slot well screen evenly spaced from west to east across the waste storage facility as shown in Figure 6 – Horizontal SVE Piping Diagram. The depth of the laterals will be approximately 2.5 feet below grade. The laterals will be connected to the remedial system enclosure by a 4-inch PVC pipe. An isolation valve will be placed on each lateral to allow for isolation of certain sections of the laterals to maximize recovery from different positions of the facility. A 12-inch vault will be installed over each isolation valve.

5.5 Air Sparge Injection Wells

Six AS injection wells will be installed to remediate impacted soil and groundwater above and below the water table. The layout for the wells is shown in Figure 7-Sparge Well Piping Layout. The layout is designed to maximize the distribution of injected air to facilitate volatilization of VOCs dissolved in groundwater and absorbed to the soils within the saturated and unsaturated soil zones. The six injection wells will be constructed using 1-inch PVC 0.010 slot well screen from 13 to 16 feet bls, as show in Figure 5-Remedial System Piping Cross Section. A 1-inch PVC lateral will be attached to each well plumbed to an airtight fitting on the riser pipe. Each injection well will be plumbed directly to the system enclosure utilizing 1-inch PVC pipes. Control valves will be installed on each pipe to allow wells to be turned on and off to maximize system efficiency.

Off-site migration of the injected air will be controlled by the simultaneous operation of the SVE wells and laterals. In addition, twelve 8 1/4-inch borings will be drilled along the edge of the waste storage facility. Each of these borings will be backfilled with gravel which will extend to the gravel base beneath the concrete floor of the facility. The gravel boring will act as conduits for injected air to be captured by the SVE system before migrating off-site.

5.6 Extraction Well Operation

Based on data collected from the pilot tests conducted at the facility, the anticipated operating parameters for each extraction well are as follows:

SVE Extraction Wells

Flow Rate:	25 SCFM
Vacuum:	20 in w.c.

AS Injection Wells

Flow Rate:	12 SCFM
Pressure:	10 psi

The effective radius of influence for each extraction well is predicted to approximate the radius as determined from pilot testing activities (SVE – 15 feet, AS – 20 feet).

5.7 Remedial Equipment

All remediation equipment will be housed inside a 10 foot by 20 foot enclosure located between the CWD office and the interior storage area (Figure 2 – Site Plan). A process and instrumental diagram of the remedial system is provided as Figure 8. The SVE equipment will consist of an explosion proof SVE rotary lobe blower capable of producing 100 SCFM at 80 inches w.c. The AS equipment will consist of an explosion proof AS compressor cable of 80 SCFM at 15 PSI. Vapors and residual fluids will be extracted from the extraction wells and laterals and will enter a moisture separator. The vapors are then pumped through the SVE blower and travel through a catalytic oxidizer (cat/ox) where they are treated and discharged to the atmosphere. Fresh air will be injected into the six AS wells via the AS compressor. Additional features of the total fluids/vapors system include:

- Process flow valves to allow maximum operational flexibility.
- Vacuum/Pressure gauges to monitor system efficiency.
- Automated system shutdown circuitry in the event of failure of the liquid/vapor phase treatment units.
- Inlet and discharge silencers to reduce noise levels of the system.

The vacuum blower, AS compressor, and associated equipment/controls will be located on a metal skid inside the remediation enclosure area (Figure 9-Building and Equipment Diagram).

5.7.1 Vapor Treatment System

CWD will submit a revised application to NYSDEC, Division of Air Resources, Region 2, to include the system vapor treatment on their facility air permit. VOC emissions from the high vacuum recovery system will be treated to prevent exceedance of NYSDEC air quality standards. Off-gas from the system will initially be treated with a catalytic oxidizer prior to being vented to the atmosphere. System monitoring and analytical data will be evaluated following a few weeks of system operation in order to determine if the catalytic oxidizer unit represents the most cost effective method for long-term vapor effluent treatment. An alternative method, if selected, will then be utilized. Initial mass balance calculations were performed to estimate effluent vapor discharge rates and carbon consumption rates based upon VOC concentration data and airflow rate data obtained from the pilot testing activities. These calculations assume a soil vapor influent concentration of 1,148.4-ppm and a total system flow rate of 300 SCFM. The first year carbon consumption for VOC removal is estimated to be 26,000 pounds, assuming a 50% reduction in influent VOC concentrations every 30 days. To cost-effectively treat the vapors and aggressively remediate the site, a phased approach will be employed as discussed in Section 6.0.

5.7.2 System Controls

All system controls and failsafes will be integrated into one control panel mounted in the remediation system enclosure. Remedial system failsafes will include a pressure failsafe on the AS lines, a temperature failsafe of the SVE blower and on the cat/ox unit, and a liquid failsafe on the moisture separator holding tank. The system will be wired such that the shut-down of any individual component due to a failsafe activation will result in shut-down of the entire remedial system. In addition, the control panel will be equipped with a telemetry system which allows for remote monitoring (via telephone) of the system's operational status. In the event of system shutdown, the telemetry unit will dial a series of pre-programmed telephone numbers (in succession) and will notify the receiver that the system has been shut down.

6.0 PHASED REMEDIAL APPROACH

A three phase remedial approach will be implemented to efficiently remove volatiles from the subsurface.

Phase I: Conditions observed during the SVE/AS pilot test indicated elevated levels of vapors (2,000 ppmv) are expected during initial vapor extraction start-up. To capture and effectively treat vapors during the initial start-up period (60 to 90 days) the SVE/AS system specified in Section 5.7 will be utilized to remediate isolated system zones. By valving-off sections of sparge products, SVE wells and SVE laterals two distinct system zones will be periodically run.

Zones 1 and 2 will comprise the northern and southern portions of the yard, respectively (Figures 10 and 11).

Phase II: Once vapors extracted from both zones 1 and 2 are less than 500 ppmv the permanent SVE portion of the system will be temporarily shut-down and SVE will resume utilizing a Mobile Remediation System.

The Mobile Remediation System is contained within a 22 foot long by 8 foot wide Ford E-350 box truck equipped with a built in 20 kW 3-phase diesel generator. The remedial equipment housed within the truck consists of a 12 hp rotary lobe blower unit capable of 300 scfm flow rate at 15 inches vacuum, two 500 pound activated carbon units, Sentry telemonitoring system and failsafe alarms, and interlocks to prevent unintended discharge.

The objective of Phase II will be to aggressively vent Zones 1 and 2 for a period of 30 days in an attempt to remove the majority of the contaminant mass.

Phase III: Following the 30 day period, Phase III will be initiated consisting of the continuous operation of the original system.

6.1 System Operation and Maintenance

During Phases I, II, and III, system performance will be monitored on a daily basis. This will include monitoring flow, pressure, and vapors via field screening with a photoionization detector (PID). In addition, air samples will be collected at the combined zone influent and post-treatment effluent ports via summa canisters during the start-up of each phase. Summa canister samples will be analyzed for VOCs utilizing the TO-14 Method. Based upon the performance data, the phased approach and zones may be modified.

7.0 REMEDIAL SYSTEM PERFORMANCE REPORTING

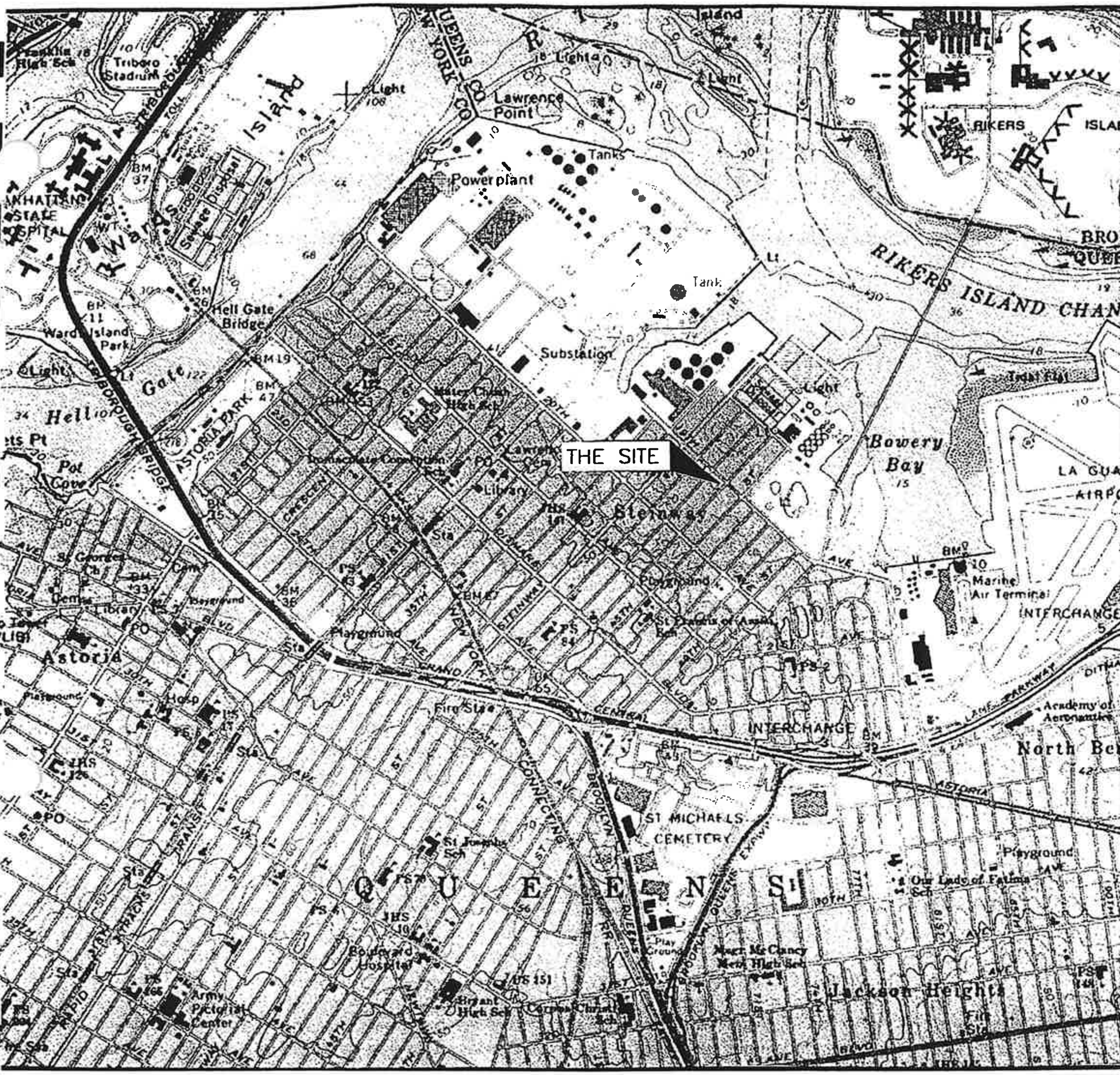
Detailed system operation and maintenance reports including groundwater monitoring data, will be prepared and submitted to NYSDEC quarterly for the first year of system operation. After the first year reports will be submitted semi-annually for a period of three years. If necessary, after three years, performance reports will be submitted annually.

8.0 HEALTH AND SAFETY PLAN

All site activities will be conducted in accordance with OSHA regulations, set forth in 20 CFR 1910. A detailed site-specific Health and Safety Plan is provided in the Interim Corrective Measure Design for Contaminated Soil, document dated September 1999.

Figure 1

Locus Plan



UTM COORDINATES:	45 14 344 N
	5 93 004 E
LATITUDE:	40° 46' 36" N
LONGITUDE:	73° 53' 52" W

0 — 4000

Scale in feet

FIGURE 1 – SITE LOCUS

CHEMICAL WASTE DISPOSAL CORPORATION
42–14 19TH AVENUE
ASTORIA, NEW YORK

GSC REF.: 9907401	DATE: 8-98
DRAFTED BY: dc	CHECKED BY: DC

SOURCE: USGS 7.5' TOPOGRAPHIC MAP
CENTRAA PARK, NY QUADRANGLE

LOCUS.DWG

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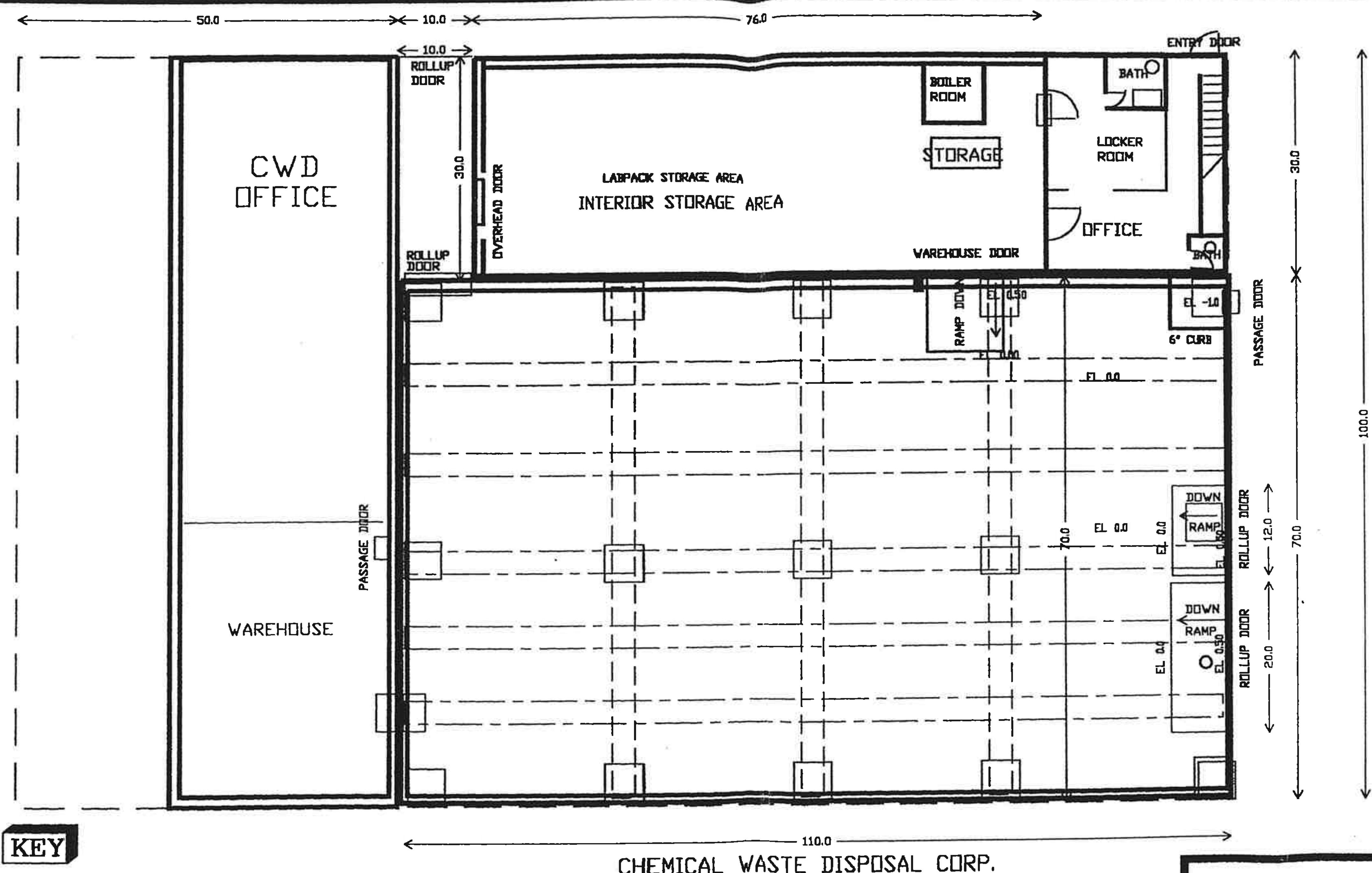
Hydrogeologists and Environmental Scientists
1401 Church Street Bohemia, NY 11716 (516) 218-6956

Figure 2

Site Plan



KEY

- Concrete Support Beams
- Drum Storage Area

0 15
Scale in feet

Figure 2 **Site Plan** **Chemical Waste Disposal Corp.** **42-14 19th Avenue** **Astoria, New York**	
GSC REF.: 9907401\02PLAN.DWG	
DRAFTED BY: cas	DATE: 8/99
REVISED BY:	CHECKED BY: DC
SOURCE: CWD Site Plan, GSC SVE System Design	

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Hydrogeologists and Environmental Scientists
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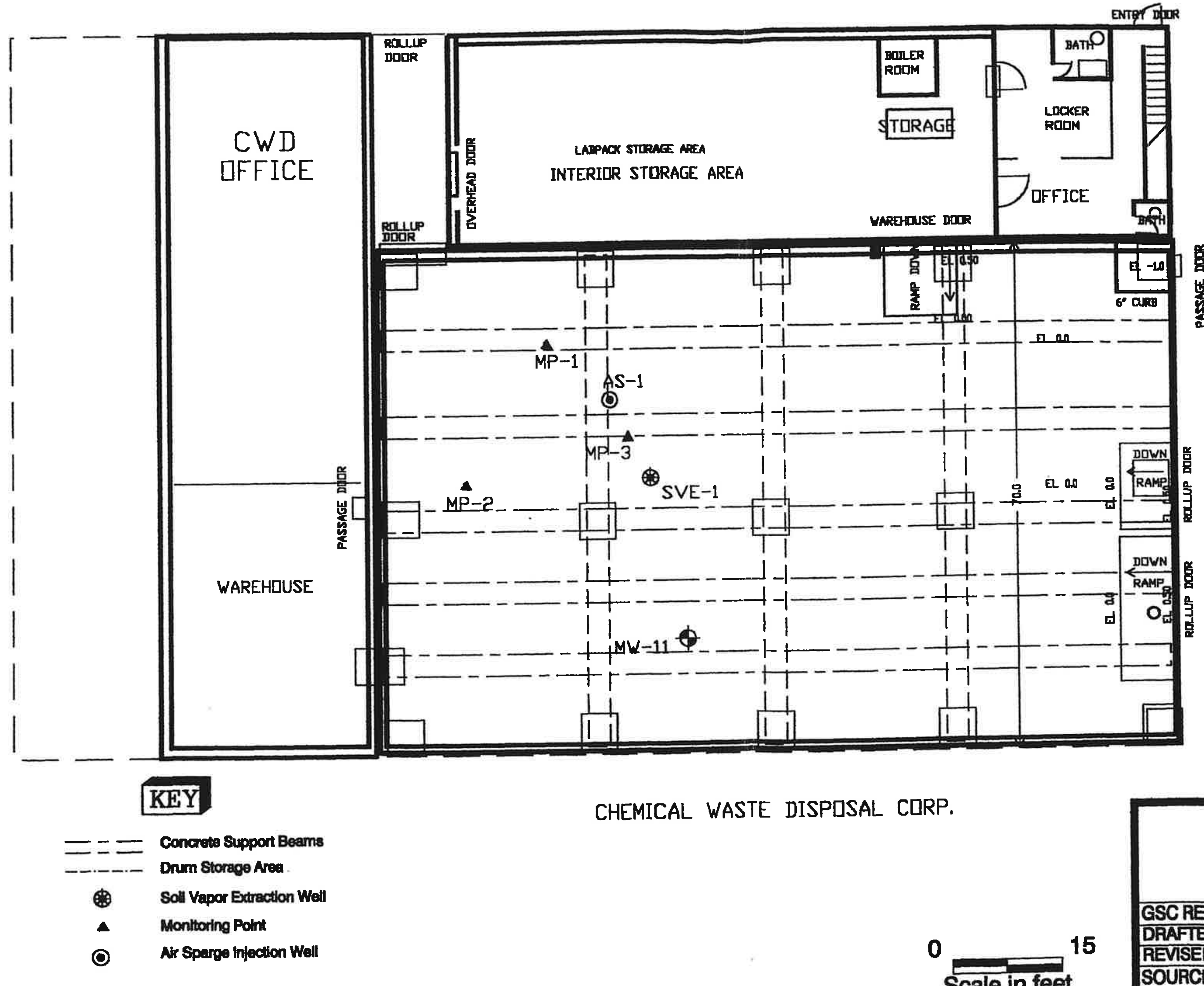
Figure 3

Pilot Test System Layout



KEY

- Concrete Support Beams
- Drum Storage Area
- Soil Vapor Extraction Well
- Monitoring Point
- Air Sparge Injection Well

Figure 3
Pilot Test System Layout
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\02PLAN.DWG	
DRAFTED BY: cas	DATE: 10/99
REVISED BY:	CHECKED BY:
SOURCE: CWD Site Plan, GSC Field Reconnaissance	

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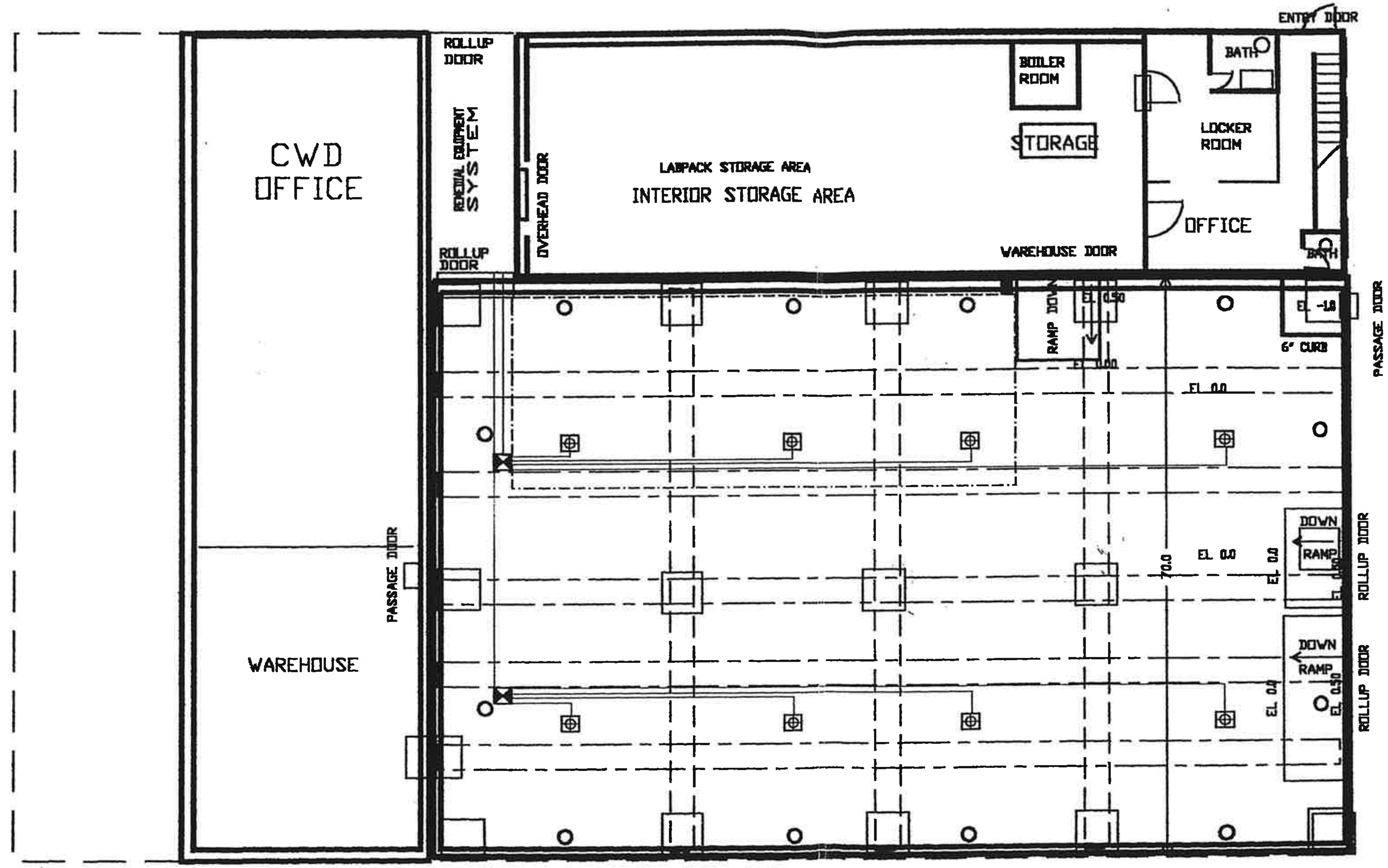
Figure 4

Soil Vapor Extraction Well/Piping Diagram



CHEMICAL WASTE DISPOSAL CORP.

KEY

○	8 1/4" Gravel Filled Borings	⊕	Soil Vapor Extraction Well
— — —	Concrete Support Beams	⊠	Soil Vapor Extraction Well Junction/Control Vault
— · — ·	Drum Storage Area	——	Remedial System Piping

0 15
Scale in feet

Figure 4
Soil Vapor Extraction Well Piping Diagram
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

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SOURCE: CWD Site Plan, GSC SVE System Design	

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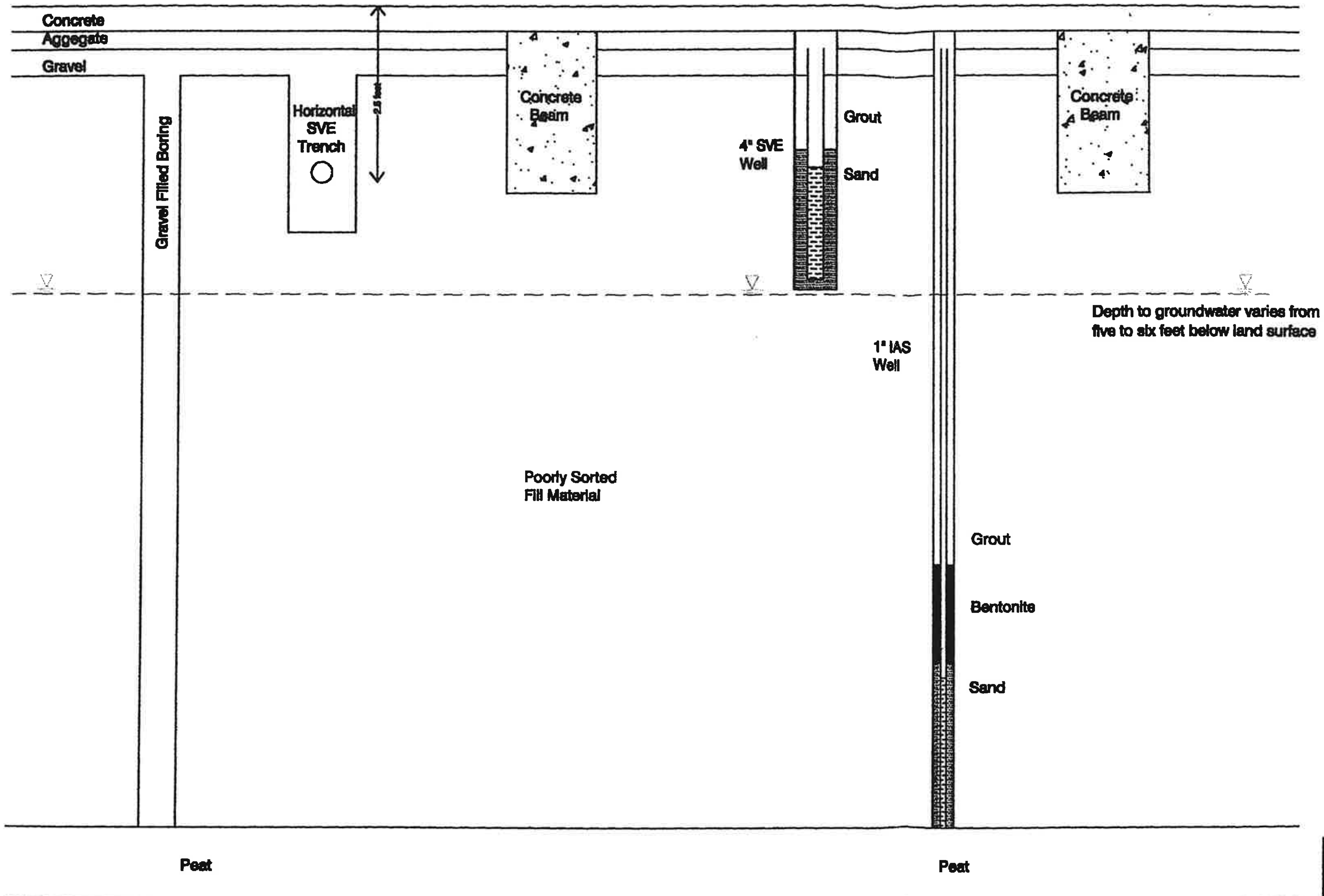
Figure 5

Remedial System Piping Cross Section



KEY

Water Table

4" Horizontal SVE Piping

0 — 5

Scale in feet

Figure 5
Remedial System Piping Cross Section
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\03SECTION.DWG	
DRAFTED BY: cas	DATE: 10/99
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SOURCE: GSC SVE/AS System Design	

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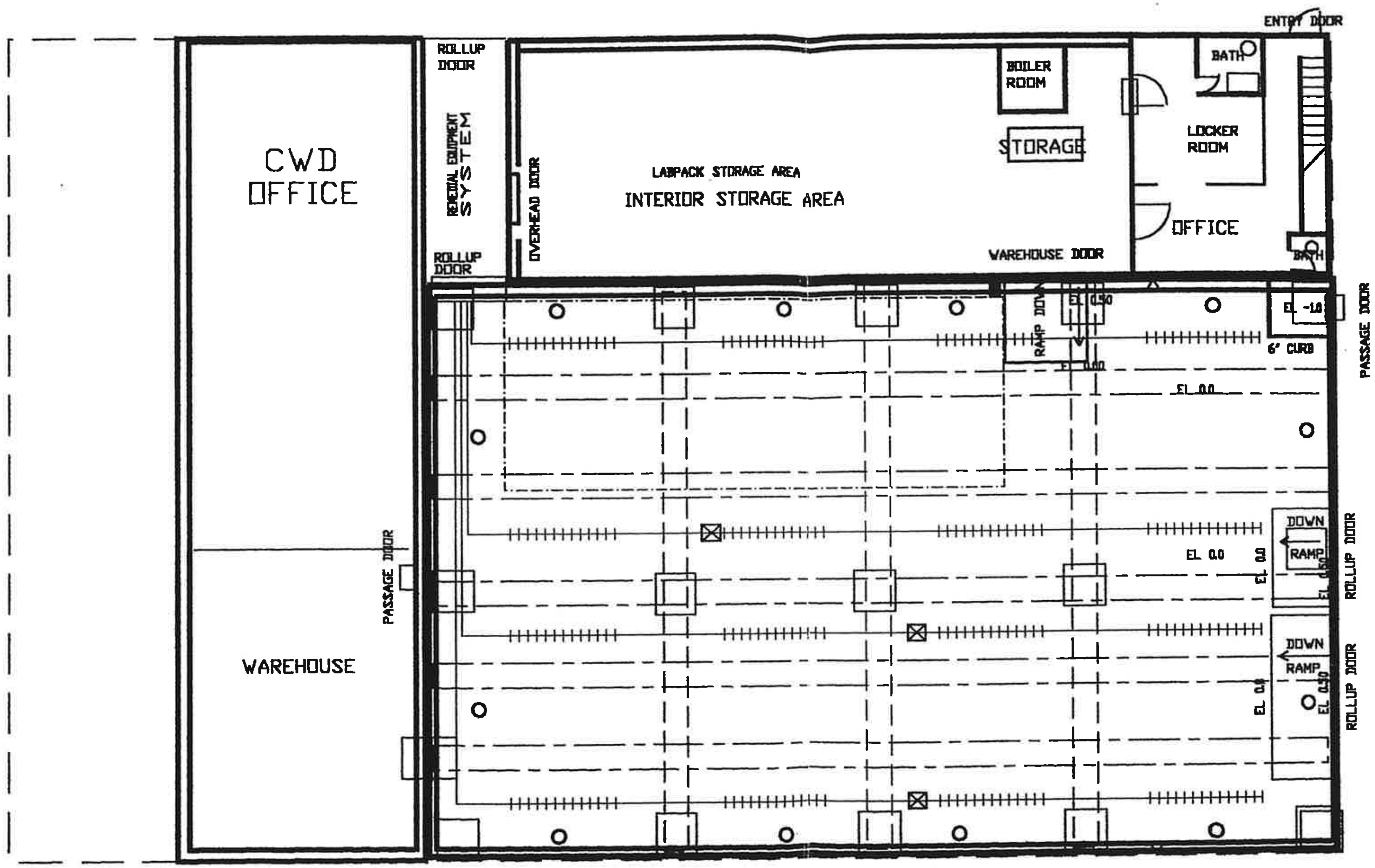
Figure 6

Horizontal SVE Piping Diagram



CHEMICAL WASTE DISPOSAL CORP.

KEY

- 8 1/4" Gravel Filled Borings
- Concrete Support Beams
- Drum Storage Area
- 4" Horizontal SVE Screen
- 4" Horizontal SVE Pipe
- Horizontal SVE Isolation Valve and Gate Box

0 15
Scale in feet

Figure 6
Horizontal SVE Piping Diagram
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\02PLAN.DWG	
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SOURCE: CWD Site Plan, GSC SVE System Design	

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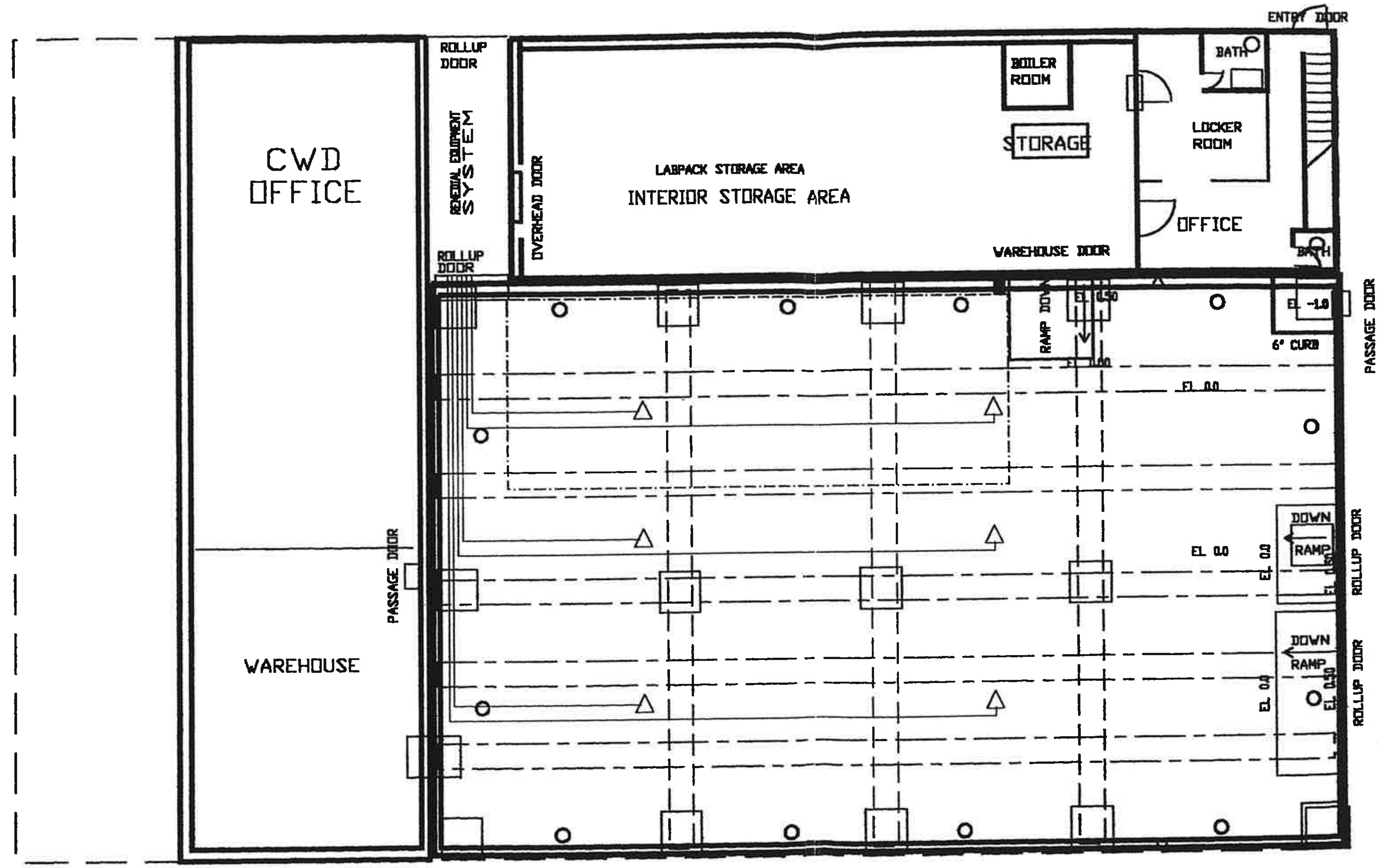
Figure 7

Sparge Well/Piping Layout



CHEMICAL WASTE DISPOSAL CORP.

KEY

- ○ 8 1/4" Gravel Filled Borings
- – – – Concrete Support Beams
- –·–·– Drum Storage Area
- △ Air Sparge Injection Well
- —— Injection Well Piping

0 15
Scale in feet

Figure 7 **Sparge Well Piping Layout** **Chemical Waste Disposal Corp.** **42-14 19th Avenue** **Astoria, New York**	
GSC REF.: 9907401\02PLAN.DWG	
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SOURCE: CWD Site Plan, GSC SVE System Design	

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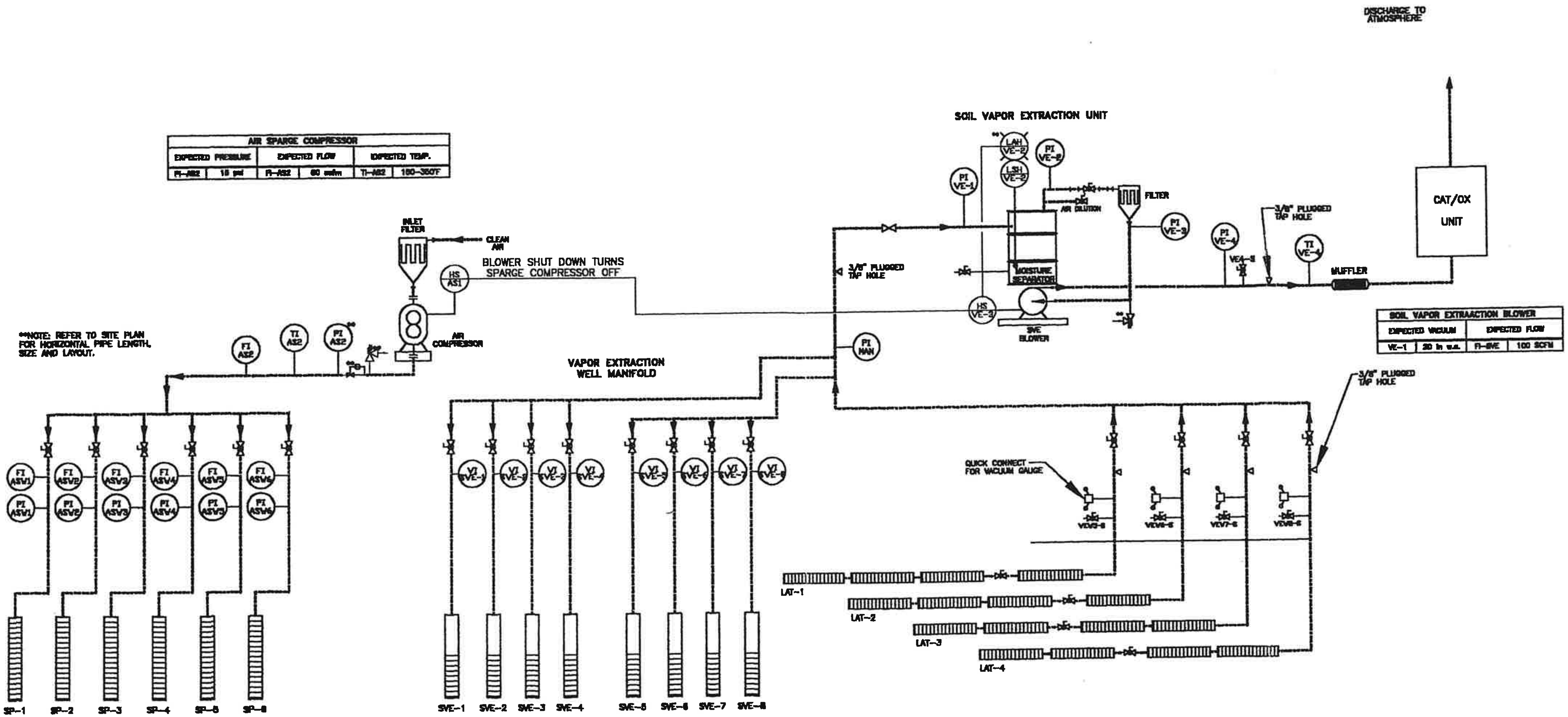
Figure 8

SVE/AS Process and Instrumentation Diagram



AIR SPARGE COMPRESSOR					
EXPECTED PRESSURE		EXPECTED FLOW		EXPECTED TEMP.	
PI-AS2	15 psi	FI-AS2	60 scfm	TI-AS2	150-350°F

SOIL VAPOR EXTRAACTION BLOWER			
EXPECTED VACUUM		EXPECTED FLOW	
VE-1	20 in w.c.	FI-SVE	100 SCFM

Figure 8 SVE/AS System Process & Instrumentation Diagram Chemical Waste Disposal Corp. 42-14 19th Avenue Astoria, New York	
GSC REF.: 9907401\03pid.DWG	DATE: 10/99
DRAFTED BY: CAS	CKD BY:
SOURCE: GSC SVE/AS SYSTEM DESIGN	

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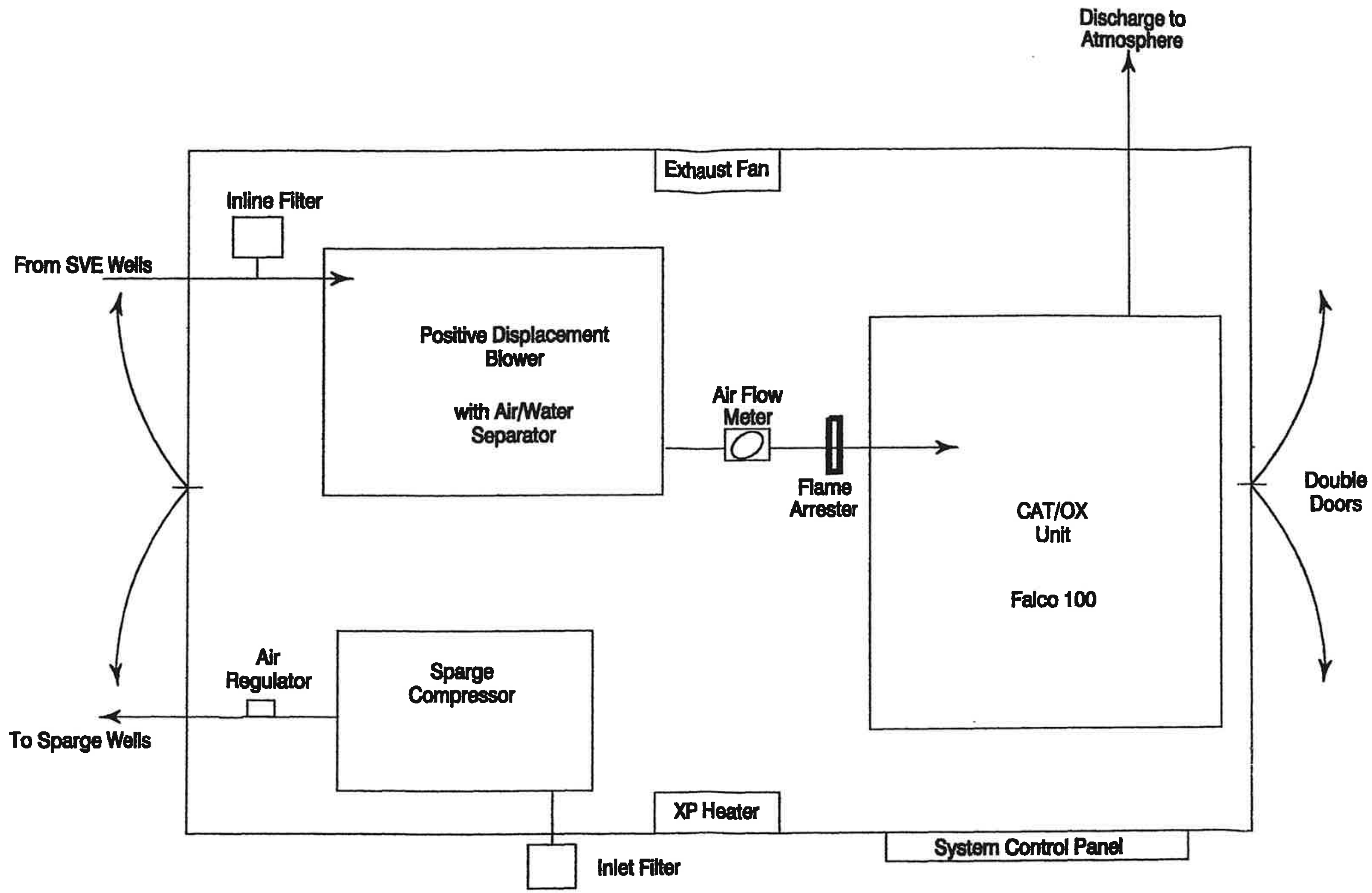
Figure 9

Building Equipment Diagram



0 2
Scale in feet

Figure 9
Building and Equipment Diagram
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

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SOURCE: GSC	

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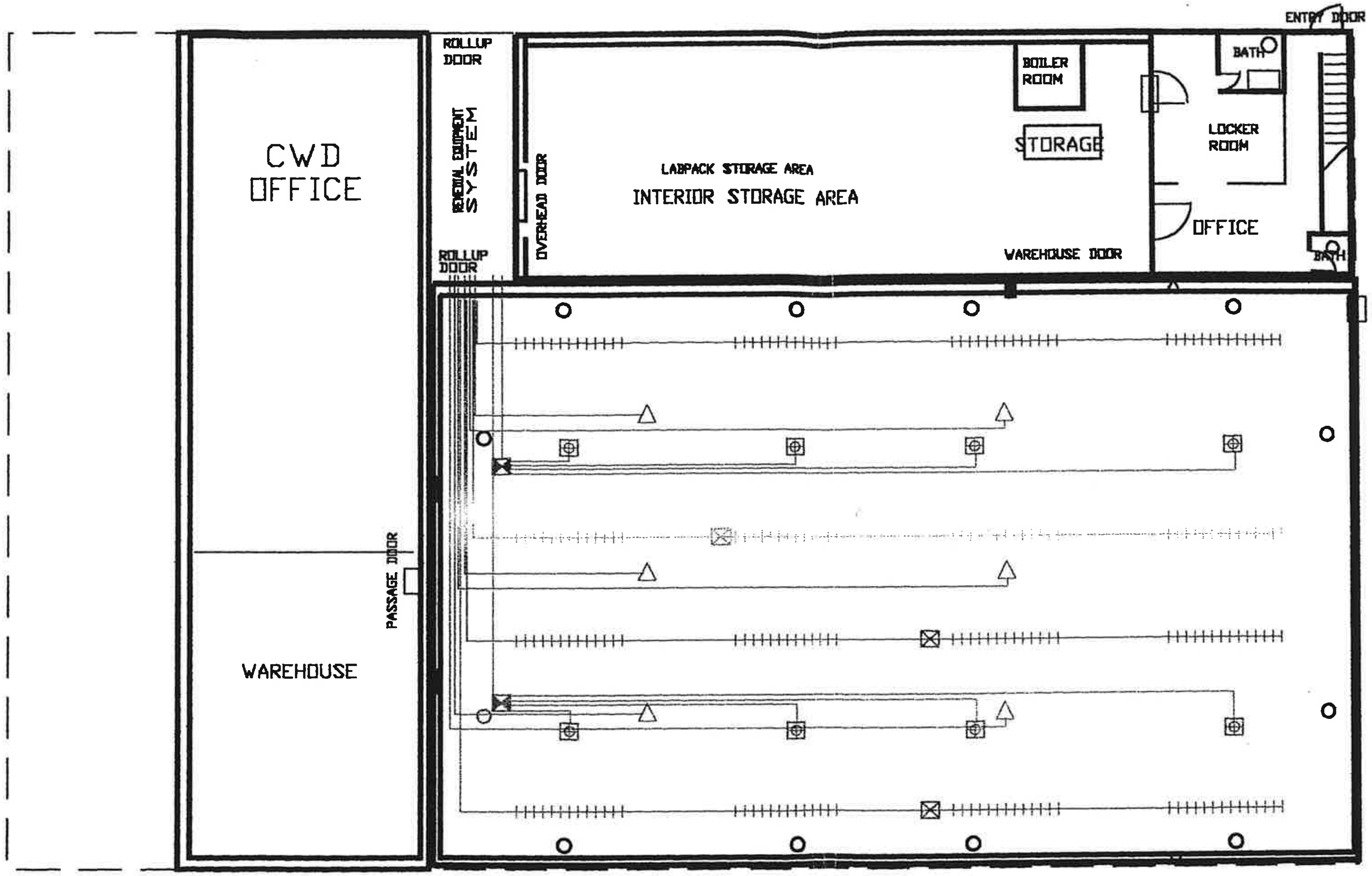
Figure 10

Remedial System Zone 1



CHEMICAL WASTE DISPOSAL CORP.

KEY

ACTIVE REMEDIAL EQUIPMENT

INACTIVE REMEDIAL EQUIPMENT

0 15
Scale in feet

Figure 10 Remedial System Zone 1 Chemical Waste Disposal Corp. 42-14 19th Avenue Astoria, New York	
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SOURCE: CWD Site Plan, GSC SVE System Design	

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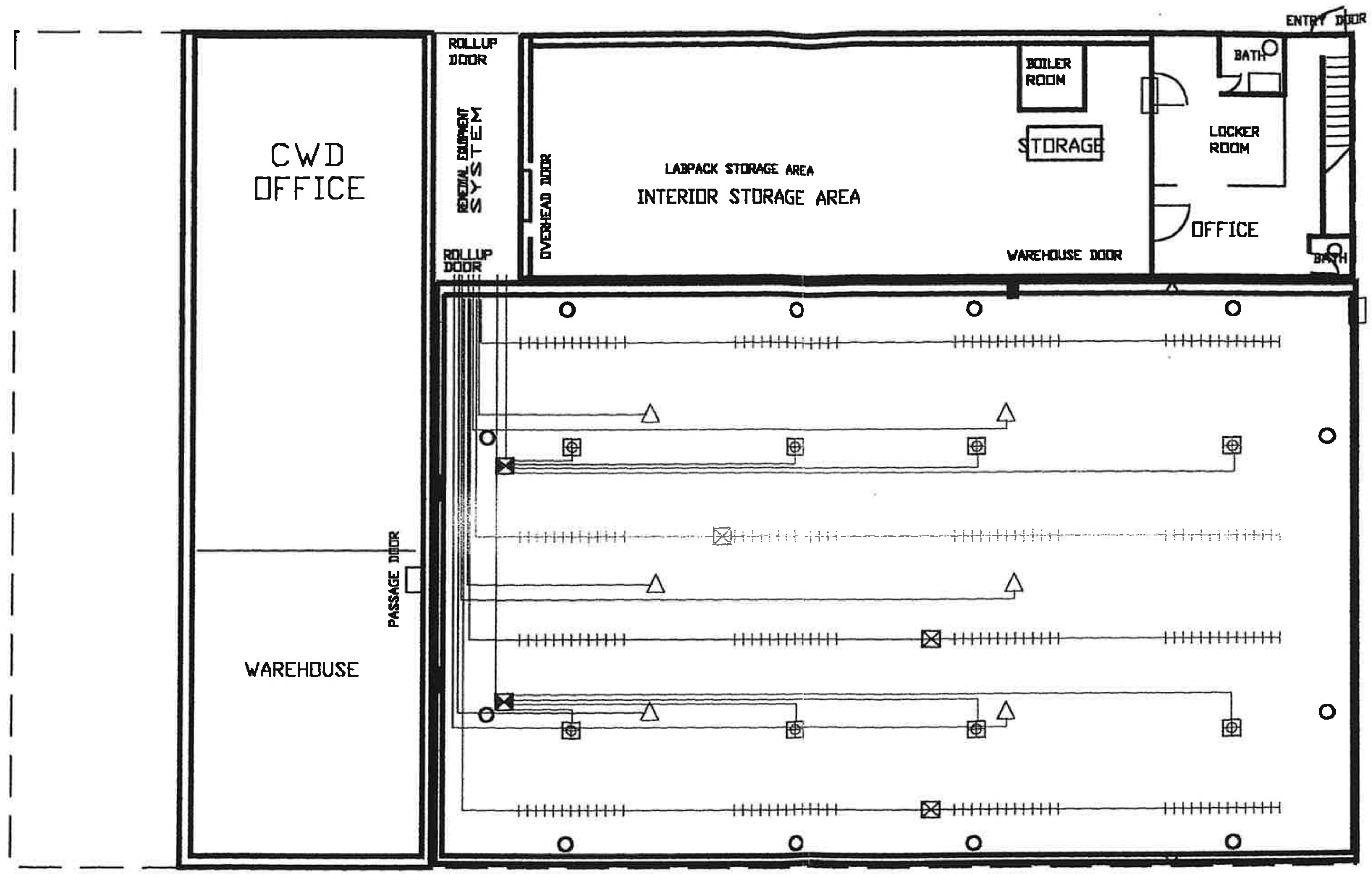
Figure 11

Remedial System Zone 2



CHEMICAL WASTE DISPOSAL CORP.

KEY

ACTIVE REMEDIAL EQUIPMENT

INACTIVE REMEDIAL EQUIPMENT

0 15
Scale in feet

Figure 11
Remedial System Zone 2
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

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SOURCE: CWD Site Plan, GSC SVE System Design	

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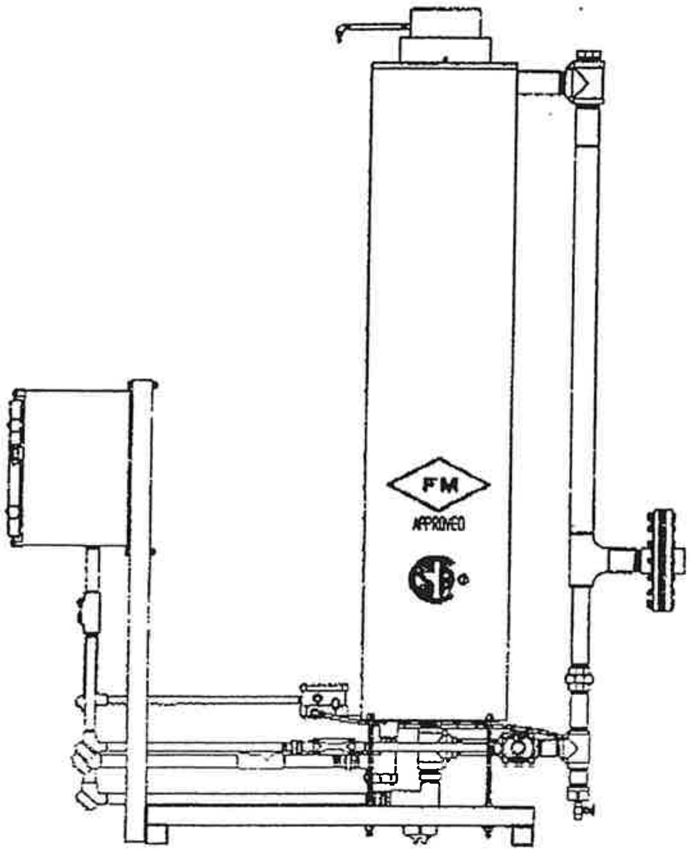
APPENDIX A - of Appendix 4

Catalytic Oxidizer and Blower Specifications

FALCO 100 SPECIFICATIONS

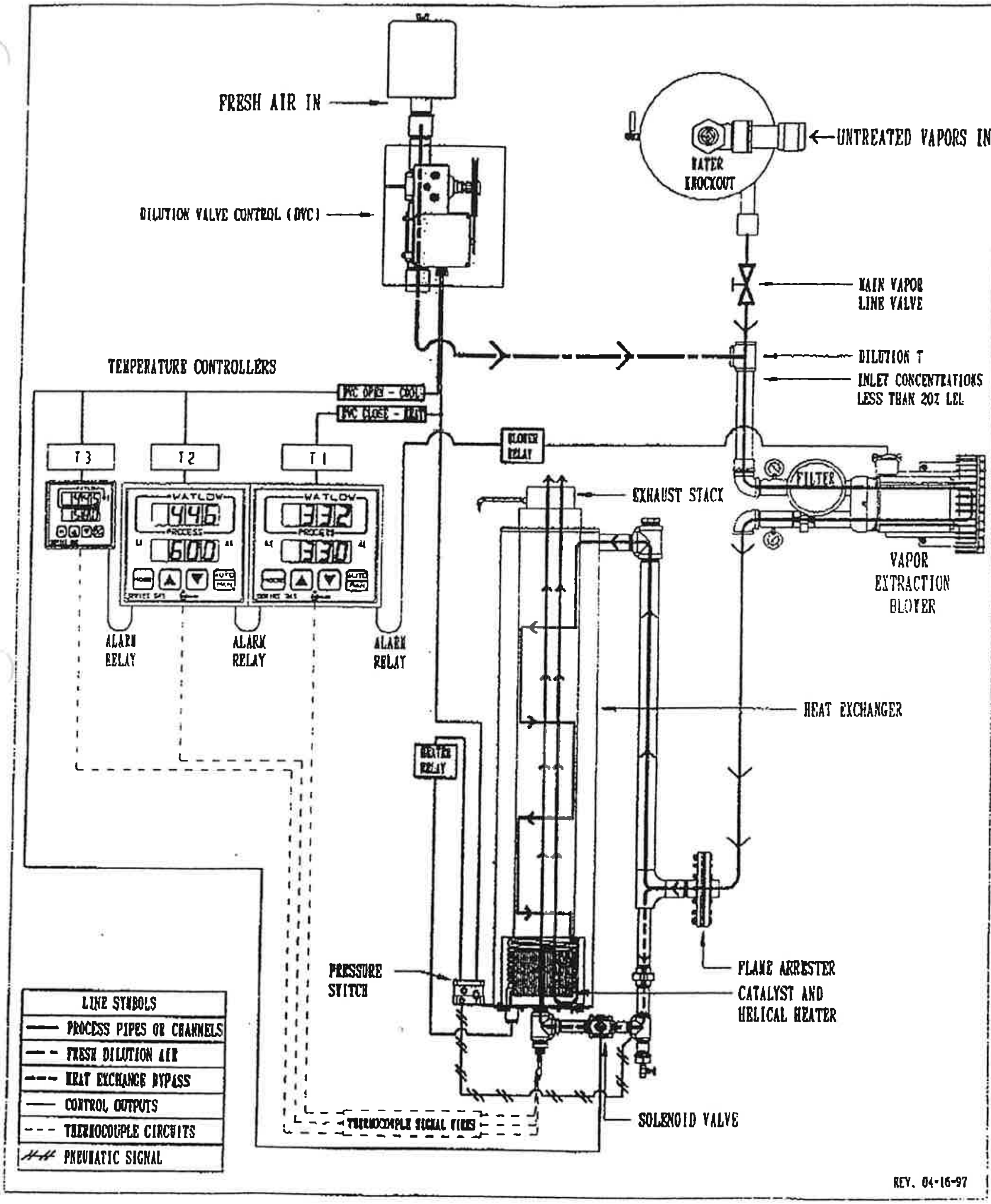


FALCO 100 catalytic oxidizer treats air streams contaminated with volatile organic compounds. The catalyst provides VOC destruction efficiencies of up to 99%. Temperature controllers accurately regulate process temperatures in response to input loading. This lightweight, portable unit has an integrated heat exchanger which provides efficient heat recovery for processing low concentration vapor. When processing high concentration vapor, the control system automatically adjusts dilution air flow to maintain safe maximum input vapor concentration. Automatic shutdown results if temperature limits are exceeded. The FALCO 100 is Factory Mutual approved and Canadian Standards Association certified for use in hazardous locations.

• **CAPACITY**	40-120 CFM
• **DESTRUCTION EFFICIENCY**	Up to 99%
• **CATALYST INLET TEMP**	310-430°C
• **OUTLET TEMP**	330-620°C
• **CATALYST**	Platinum/palladium
• **WEIGHT**	325 lb.
• **CONSTRUCTION**	304 stainless steel and aluminum
• **DIMENSIONS (apx)**	6'8" high X 50" long X 24" wide
• **POWER REQUIREMENTS**	7.4 kW, 240 Volt single phase

FALMOUTH PRODUCTS P.O. BOX 541 FALMOUTH, MA 02541 PHONE 508 548 6686 FAX 508 548 8144

FALCO 1-00 FLOW AND CONTROL



FALMOUTH PRODUCTS P.O. BOX 541 FALMOUTH, MA 02541 PHONE 508 548 6686 FAX 508 548 8144

FALMOUTH PRO

ELECTRICAL R at

SERVICE 100 , IP
Breakers r

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1 30 Amp. 24 vo

1 15 Amp. 12 /o

1 15 Amp. 12

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2 #14 Blov rn
1 #12 Blow

Wires from control ix
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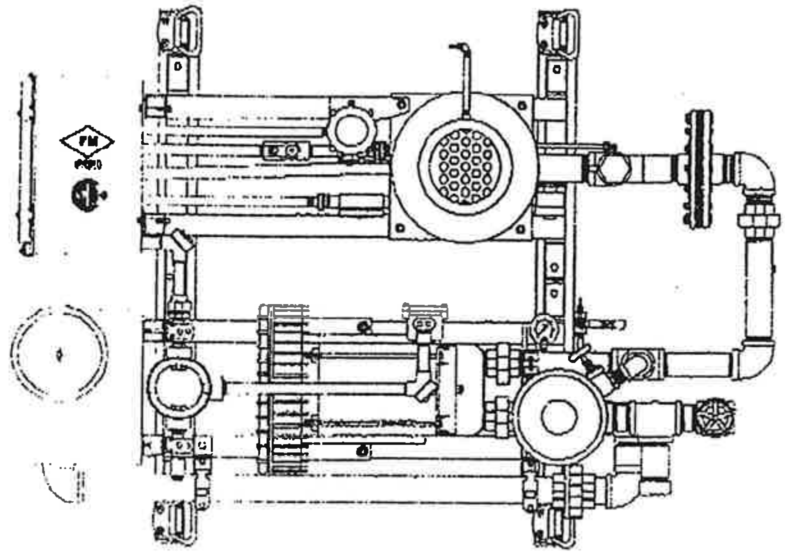
hazardous zone)

1 #12 whit
2 #12 Colo
1 #12 Gree

FALCO 100 WITH OPTIONAL BLOWER PACI



This factory assen
installation. The
installed on two al
frames joined by s
One frame suppor
dilution control sy
accessories. The s
supports the catal
This low profile e
treatment system
and measures 4' w
and 7' tall. This e
treatment system i
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Packaged system includes the following:

- FALCO 100 Catalytic Oxidizer
- Gast regenerative blowers: 2 hp R5125Q-50, 100 cfm @ 37" H_2O Vacuum
  OR 3 hp R6130Q-50, 110 cfm @ 60" H_2O Vacuum
- Automatic dilution control system (DVC) with filter
- 2" inline blower filter
- Vacuum and pressure gauges
- Vacuum relief valve (3 H. P. model)
- Recirculation valve for adjusting flow rate (3 hp model)
- Mounting frames, factory piping and wiring between FALCO, blower and DVC

FALMOUTH PRODUCTS P.O. BOX 541 FALMOUTH, MA. 02541 PHONE 508-548-6686 FAX 508-548-8144

ELECTRICAL REQUIREMENTS
FALCO 100 CATALYTIC OXIDIZER WITH
3 HP BLOWER PACKAGE

SERVICE 100 AMP 240 VOLT SINGLE PHASE

Breakers required

1	40 Amp.	240 volt double pole..............	7300 Watt Electric heater (30 amp draw)
1	30 Amp.	240 volt double pole..............	3 HP Blower motor (16.5 amp draw)
1	15 Amp.	120 volt	Controls (1.5 amp draw)
1	15 Amp.	120 volt..............................	Electric outlet G.F.I -Optional for heat tape/ power tools

IMPORTANT ! ***Protect temperature controllers from moisture and metal chips when working in oxidizers control box.***

Wires required--All wires must be stranded

Wires from breaker box to Oxidizer Control box through **3/4 rigid conduit with seal fittings**

2	#8	(40 amp)	Heater line	(240 volts)	(relay in control box)
2	#12	(30 amp)	Blower line	(240 volts)	(contactor in control box)
2	#12	(15 amp)	Controls	(120 volts)	(terminal block in control box)
1	#10		Ground		(grounding bar in control box)

Caution ! Low voltage will damage a 3 hp motor.

FALMOUTH PRODUCTS P.O. BOX 541 FALMOUTH, MA 02541 PHONE 508 548 6686 FAX 508 548 8144

FALMOUTH PRODUCTS CATALYTIC OXIDIZER OPERATIONS MANUAL FALCO 100

(Last revision 11/7/95)

Description: FALMOUTH PRODUCTS CATALYTIC OXIDIZER (FALCO) effects efficient conversion of hydrocarbon contaminates in an air stream to carbon dioxide and water vapor. Combustion occurs in the temperature range 300°C-620°C. Heat is transferred from the hot exhaust stream to the incoming contaminated air, heating it to the catalytic oxidation temperature. This manual covers models delivered since May, 1995.

FALCO is equipped with three programmable controllers. One controller (T1) monitors and responds to a thermocouple sensing the temperature at the upstream end of the catalyst. The second controller (T2) monitors and responds to a thermocouple sensing temperature downstream from the catalyst. The third controller (T3) senses the temperature at an intermediate position inside the catalyst. The T3 controller provides a rapid response to increasing vapor concentration by increasing dilution air and shutting the system down if necessary.

Auxiliary relays in the T1, T2, and T3 controllers shuts down the system if the thermocouple temperatures move above or below the set points by selected amounts. If the automatic dilution control does not respond rapidly enough to an increase in vapor line concentration, T2 and T3 will increase to their alarm settings and turn off the system.

FALCO is also equipped with a pressure switch which interrupts the heater circuit if flow is interrupted, for example, due to a thermal protection cut out of the blower or frozen vapor line. If a short power interruption should occur, 1 minute for example, the unit will resume normal operation. If the interruption persists long enough T1, or T2 will fall below the selected shutdown limit and the system will remain off until restarted by the operator.

The three controllers regulate the temperature of vapor entering the catalyst. The T1 controller regulates an electric heater, which adds heat to the incoming flow when required. The T2 and T3 controllers both operate a solenoid valve, which reduces the amount of heat recovered in the heat exchanger. The three controllers cooperate in the regulation of a dilution valve that controls the input vapor concentration when the vapor line concentration exceeds a selected input concentration to the catalytic unit. The controllers are programmed to automatically shut down the system if selected temperature limits are exceeded.

Appendix 5

DRAFT

DRAFT

REMEDIATION SYSTEM OPERATION AND MAINTENCE PLAN

Chemical Waste Disposal Corporation
42-14 19th Avenue
Astoria, New York

January 2000

Prepared By:

Geologic Services Corporation
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Chemical Waste Disposal Corporation
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QUALITY ASSURANCE/QUALITY CONTROL

The following personnel have reviewed this report for accuracy, content, and quality of presentation:

James A. Schaefer, Jr.
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Project Manager

Date

Daniel T. Canavan
Hydrogeologist

Date

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1.0 INTRODUCTION

Geologic Services Corporation (GSC) was contracted by Chemical Waste Disposal Corporation (CWD) to compile an Operation and Maintenance Plan for the soil vapor extraction (SVE) and air sparge (AS) remediation system at the CWD facility located at 42-14 19th Street in Astoria, New York (Figure 1). This plan provides a description of remedial equipment, system start-up and shut-down procedures, system operation, maintenance and sampling guidelines and schedules. A site plan of the subject site is presented as Figure 2.

2.0 REMEDIATION SYSTEM EQUIPMENT

The SVE/AS system consists of an AS compressor, six AS injection wells, a SVE blower, eight vertical vapor extraction wells, four horizontal vapor extraction laterals and a catalytic oxidizer. The SVE/AS system process and instrumentation diagram is presented as Figure 3.

2.1 Air Sparge System

The AS system consists of an explosion-proof AS compressor capable of a flow rate of 80 standard cubic feet per minute (SCFM) under a pressure of 10 pounds per square inch (psi). The compressor will inject atmospheric air into six AS injection wells.

The six injection wells are constructed of 1-inch diameter schedule 80 polyvinyl chloride (PVC) pipe with a 0.02-inch slot screen from 13 – 16 feet below grade (fbg). Each injection well is plumbed directly to a manifold extending from the compressor with 1-inch schedule 80 PVC pipe. The location of injection wells and associated system piping is indicated on Figure 4.

Each pipe extending from the manifold is equipped with a pressure gauge and air flow meter. Control valves were installed on each pipe to allow injection wells to be cycled on and off to maximize system efficiency. The manifold pipe extending to the compressor is equipped with a pressure and temperature gauge, flow meter, control valve, and pressure release valve.

2.2 Soil Vapor Extraction System

The SVE system consists of an explosion proof rotary lobe blower capable of an air flow rate of 100 SCFM under a vacuum of 80 inches water column (in w.c.). Soil vapors will be extracted from the vadose zone through a network of extraction wells. The extraction well network consists of eight vertical vapor extraction wells and four horizontal vapor extraction laterals. The location of extraction wells, horizontal extraction laterals, and associated system piping is indicated on Figure 5.

The eight vertical extraction wells are constructed of 4-inch diameter schedule 80 PVC pipe with 0.02-inch slot screen from 4 – 6 fbg. A 2-inch diameter schedule 80 PVC pipe is attached to each extraction well. These pipes are connected, in groups of four, to two separate 2-inch diameter schedule 80 PVC pipes which connect to a manifold extending from the SVE blower. The pipes extending from each extraction well are equipped with a sample port, vacuum gauge, flow meter, and control valve. The four horizontal vapor extraction laterals are constructed of four 20-foot sections of 4-inch diameter 0.002-inch schedule 80 PVC slot screen evenly spaced from west to east across the facility as shown in Figure 5.

The lateral extraction wells are located at approximately 2.5 fbg. Each lateral is connected to a manifold extending from the SVE blower with a 4-inch diameter schedule 80 PVC pipe. The pipes extending from each lateral extraction well are equipped with a sample port, pressure gauge, and flow meter. Each lateral contains a control valve for isolation of certain sections to maximize system efficiency.

The single manifold pipe connecting all SVE wells to the blower intake port is equipped with a moisture separator (knock-out pot), air filter, sample port, control valve, vacuum gauge, and flow meter. A 2-inch diameter steel pipe extends from the blower discharge port and is equipped with a blower recirculation valve and piping, pressure release valves, sample port, pressure gauge, temperature gauge, air flow meter, and a noise muffler.

2.3 Vapor Treatment

Soil vapors extracted by the SVE system will be treated using a Falco 100 catalytic oxidizer (cat/ox) to remove volatile organic compounds from the air stream. The cat/ox converts hydrocarbons in the air stream to carbon dioxide and water vapor which are discharged into the atmosphere through a emission stack. The emission stack is equipped with a sample port to monitor effluent.

2.4 System Enclosure

Remediation system equipment will be housed in a 10 foot by 20 foot shed (Figure 6) located between the CWD office and the interior storage area. A system control panel will be mounted on the exterior of the shed.

2.5 System Control Failsafes

The SVE/AS system is equipped with the following failsafes which are interlocked for safe system operation and the prevention of unattended discharge:

- High temperature/pressure failsafe for the SVE blower and manifold piping;
- High temperature/pressure failsafe for the AS compressor and manifold piping;
- High liquid level failsafe within the knock-out pot; and
- High/low temperature automatic adjustments and failsafe for the cat/ox unit.

The failsafes are interlocked such that the shutdown of any individual component of the system will result in the shutdown of the entire system.

All system controls/failsafes are integrated into a primary control panel mounted on the exterior of the system enclosure. A second panel will control the operation of a telemetry system. Signals from the primary panel are routed into the second panel to allow remote monitoring of the system by telephone. In the event of a shutdown of the system due to a failsafe, the telemetry system will dial a pre-programmed series of telephone numbers to alert the receivers of system status.

3.0 SYSTEM START-UP/SHUTDOWN PROCEDURES

Prior to start-up/shutdown, all manufacturer manuals should be thoroughly reviewed. The procedures contained within the manual should be followed to insure proper start-up of the SVE system. The SVE portion of the system should be started first with the AS system started upon satisfactory completion of SVE start-up. The SVE portion of system includes the extraction well network, blower, and cat/ox unit. The start-up of the cat/ox unit is the critical step in the start-up process. The Falco-100 manual should be reviewed prior to start-up.

Upon satisfactory start-up of the SVE portion of the system, the AS system should be initiated. The AS system consists of the injection wells and air compressor. The manual supplied by the manufacturer should be reviewed prior to start-up. The procedures contained within the manual should be followed to insure proper start-up of the AS system. The AS system is interlocked with the SVE system such that the AS system cannot be activated while the SVE system is shut down.

The shut down of the SVE/AS system should be completed as a staged approach. The AS system should be shut down first. After a period of approximately 15 minutes, the SVE system should be shut down. Shut down procedures for the systems should be followed as outlined in the manufacturer's manuals.

4.0 SYSTEM OPERATION, MAINTENANCE, AND SAMPLING

4.1 Operational Parameters

The SVE/AS system is designed to operated at the following parameters:

- SVE System: Flow Rate = 100 SCFM
  Vacuum = 80 in w.c.
- SVE Extraction Points: Flow Rate = 25 SCFM
  Vacuum = 20 in w.c.
- AS System: Flow Rate = 80 SCFM
  Pressure = 15 psi
- AS Injection Wells: Flow Rate = 12 SCFM
  Pressure = 10 psi

The control valves on the system piping should be adjusted to insure that flow rates, vacuum, and pressure levels are within efficient operating parameters. The system will operate using two separate zones. Zone 1 (Figure 7) consists of the northern section of the storage yard, and Zone 2 (Figure 8) consists of the southern section of the storage yard. Zones will be cycled periodically to maximize system efficiency.

4.2 System Operating and Maintenance

Remedial system operation and maintenance (O&M) will be conducted according to the schedule contained in Section 4.5. The following parameters will be monitored and recorded during each O&M visit:

- Overall system integrity;
- Total system operation time;
- Operating zone number;
- Total flow, temperature, and pressure through air sparge injection well manifold and well piping;
- Condition of air compressor air filter;
- Flow, vacuum, and VOC concentrations from each SVE lateral and extraction well;
- Total flow, VOC concentration, vacuum, and temperature from SVE blower manifold;
- Volume of water within knock-out pot;
- Position of blower recirculation valve;
- Condition of SVE blower air filter;
- Cat/ox operational parameters; and
- Effluent VOC concentrations.

Data will be recorded on field data sheets, which will be included in system monitoring reports (Section 5.0).

4.3 Preventative Maintenance Program for Critical System Equipment

Detailed maintenance procedures to be followed for remedial system equipment and for critical system devices are contained in this section. The list of critical system equipment includes the following:

- Devices that prevent unauthorized discharges, both vapor and liquid phase;
- Devices that prevent unauthorized access or modification to the remedial equipment;
- Devices that protect individuals from injury such as belt guards and guards covering other moving equipment;
- Devices that warn individuals about potential hot surfaces or electric shock;

- Devices that prevent immediate equipment damages such as pressure relief valves, liquid level probes, floats, temperature sensors, and interlocking sensors that control codependent equipment; and
- Devices that communicate failures such as warning lights and telemetry equipment including the telephone line.

In order to facilitate the identification of all critical system equipment, remedial equipment for this location has been grouped into the following system types:

4.3.1 General Items: Remediation Compound/Enclosure

4.3.2 Falco 100 Catalytic/Oxidizer Unit

4.3.3 Vacuum Extraction Blower

4.3.4 Air Sparge Compressor

4.3.5 Remote Monitoring System

Following are detailed descriptions of the remedial system components maintenance procedure for the system types listed above.

4.3.1 *General Items: Remediation Compound/Enclosure*

Permits

Inspection Criteria: Insure that applicable permits have been posted on-site. Verify the operating conditions listed in the permits and check the on-site records to insure that all operating conditions are being complied with.

Inspection frequency: Inspect once per quarter.

Corrective action: System should not be operated without permits or if permit conditions are not met. Notify the system engineer. Shut down the system until non-compliance is corrected.

Noise Protection

Inspection Criteria: Check to insure that all required noise protection such as machine covers and warning signs are in place. Verify the system does not cause noise levels above the allowable OSHA limits. Hearing protection is required inside the remediation enclosure. Observe the surrounding area to determine if there are any receptors that would be impacted by the normal noise of the system.

Inspection frequency: Inspect on each site visit, minimum once per quarter.

Corrective action: Noise levels above the allowable limits require the system to be shut down and the problem corrected before resuming operation.

Notification Signs

Inspection Criteria: A notification sign has been posted on the system enclosure that lists the 24-hour emergency notification number. In the event of an emergency, anyone can call this number and obtain assistance.

Inspection frequency: Inspect on each site visit, minimum once per quarter.

Corrective Action: Any missing notification sign should be replaced as soon as possible, typically on the next scheduled visit.

Warning Signs

Inspection Criteria: All required warning signs have been posted per local regulation. These include: No Smoking, Electrical Current or Voltage, High Noise Levels, and other warning signs as appropriate.

Inspection frequency: Inspect on each site visit, minimum once per quarter.

Corrective action: Any missing sign will be replaced as soon as possible. The system engineer will be notified if a missing warning sign requires system shutdown.

System Operational Manual

Inspection Criteria: This Operation & Maintenance Plan will be stored on-site with an explanation of system operation and detailed instructions of how to start and stop the system. All the applicable manufacturer manuals for the equipment will be stored on-site. All documents will be stored in a secure, weatherproof area inside the remedial enclosure and will be available for use by the system technicians.

Inspection frequency: Check to see manual is present and secured on each site visit, detailed manual inspection once per quarter.

Corrective action: Replace or update manual as needed. This can be done on the next scheduled site visit. Secure manual before leaving site.

System Inspection Records

Inspection Criteria: All records required to be stored on-site will be completely filled out and kept up to date. The records are stored inside the remedial enclosure, and are available for inspection at any time.

Inspection frequency: Inspect each quarter.

Corrective action: Note missing records. Inform system engineer. Do not replace on-site unless directed. Do not update or correct past inspection records.

Remediation Compound Security

Inspection Criteria: The compound has been secured to prevent unauthorized entry. All compound walls, gates, and doors are unobtrusive, and of sturdy construction. All portions of the compound will be kept in good repair. There should be no way the casual public could accidentally gain access to the compound. All places where a lock is required will be secured with a working lock, and a key will be provided to the system engineer.

Inspection frequency: Inspect on each site visit, minimum once per quarter.

Corrective action: Report non-secured compound to system engineer. Compound should be re-secured before leaving site.

Manhole Covers

Inspection Criteria: Verify that all manhole covers are in serviceable condition with no cracking or other damage. Insure that they are properly secured to protect against unauthorized entry.

Inspection frequency: Inspect on each site visit, before leaving the site.

Corrective action: Repair or replace damaged covers in traffic areas as soon as possible. In non-traffic areas, may be deferred to the next scheduled visit at the discretion of the system engineer.

Process Piping

Inspection Criteria: All process piping, fittings, and valves which are exposed to contaminant are made of material that is compatible with the compounds, temperatures, volumes, and pressures moving through it. All joints, valves, and pipes will be visually inspected to insure there are no leaks, seeps, or drips. The direction of fluid flow is marked on all process piping inside the remedial enclosure.

Inspection frequency: Visually inspect all above ground piping for leaks, and correct valve settings on each site visit.

Corrective action: If any piping leaks or discrepancies are noted, shut down system and repair before operating.

Gauges

Inspection Criteria: All gauges that are present to measure either liquid or air pressure or vacuum, will be compatible with the fluids measured, and are designed to measure the full range they will be exposed to. The range measured by the gauge will be close enough to the actual operating range of the system that normal fluctuations can be accurately measured. Gauges should be operational, should not have any leaks or seeps, and the system should be operating within the normal range.

Inspection frequency: Visually inspected for leaks and proper operation on each site visit, minimum once per quarter.

Corrective action: If condition result in potential discharge or other safety hazard, shut down system and correct as soon as possible. Otherwise, repair or replace as needed on the next site visit.

4.3.2 *Falco 100 Catalytic/Oxidizer Unit*

Inspection Procedures

Inspection Criteria: Visually inspect the exterior of the cat/ox unit for evidence of leaks, such as water staining, propane odor, etc. Insure that there are no loose connections or fittings. Check for the beginning of corrosion, such as blistering paint. Verify there is no odor in the compound that would indicate a release or venting problem.

Inspection frequency: Visually inspect on each site visit. Further inspection is only required when a problem is indicated.

Corrective action: Clean any release in accordance with regulations. Do not operate system until all deficiencies are corrected. Correct as soon as possible.

Combustion Unit

Inspection Criteria: Check the inlet and outlet temperature for the catalyst (T_1 and T_2) and insure they are in the normal range. The process blower should be operating normally and listened to during normal operation for unusual noises and evidence of wear. All connections should be tight and all protective covers should be in place.

Inspection frequency: Visually inspect on each site visit. Further inspection is only required when a problem is indicated.

Corrective action: Do not operate system until all deficiencies are corrected. Correct as soon as possible.

4.3.3 *Vacuum Extraction Blower*

SVE Rotary Lobe Blower

Inspection Criteria: The Rotary Lobe Blower should be operating in the normal vacuum and flow for which it was designed. It should not be vibrating, emitting excessive noise, or running at a high temperature. The blower should not be shutting down between normally scheduled visits. The blower has been firmly attached inside the remediation compound, and all electrical connections are in accordance with the general electrical specifications.

Inspection frequency: Visually inspect on each site visit. Further inspection is only required when a problem is indicated.

Corrective action: Do not operate system until all deficiencies are corrected. Correct as soon as possible.

Moisture Separator or Knock-Out Pot

Inspection Criteria: The vapors coming from the extraction wells must pass through the knock-out pot to insure water is not entering the blower. The knock-out pot has been sized to handle the air flows and pressures expected during system operation. Visually inspect for leaks or signs of corrosion, such as water staining, rust stains, drips, holes, etc. The knock-out pot also has a high water shut-off switch that will shut the system down in the event water is not draining properly from the knock-out pot. The device will be tested per the manufacturer's instructions.

Inspection frequency: Visually inspect on each site visit. Further inspection is only required when a problem is indicated. Test for high water shut-off at start-up and only when a problem is indicated thereafter.

Corrective action: Do not operate system until all deficiencies are corrected. Correct as soon as possible.

Inlet Gas Concentrations

Inspection Criteria: The inlet gas concentrations that are being extracted from the ground will be measured to ensure that they are in the expected range, and will not cause any permit violations or problems with the treatment system. The compounds in the exhaust stream will be analyzed, and their impact on the treatment system will be evaluated. The moisture content will also be evaluated to ensure it will not degrade performance.

Inspection frequency: Inspect with portable meter each visit and by taking lab samples as described in section 4.5.

Corrective action: Do not operate system until all deficiencies are corrected. Correct as soon as possible.

4.3.4 *Air Sparge Compressor*

AS Compressor

Inspection Criteria: The compressor should be operating in the normal pressure and flow for which it was designed. It should not be vibrating, emitting excessive noise, or running at a high temperature. The compressor should not be shutting down between normally scheduled visits. The compressor has been firmly attached inside the remediation compound, and all electrical connections are in accordance with the general electrical specifications.

Inspection frequency: Visually inspect on each site visit. Further inspection is only required when a problem is indicated.

Corrective action: Do not operate system until all deficiencies are corrected. Correct as soon as possible.

4.3.5 *Remote Monitoring System*

Telemetry System

Inspection Criteria: The integrity of the phone line will be checked by calling the telemetry unit and seeing if it responds. Once the phone line is checked, the unit will be checked to see if it is reporting all the parameters that it is supposed to. It will also be tested to insure that all the required alarm settings are as they are supposed to be.

Inspection frequency: Can be checked remotely, by calling the site once a week.

Corrective action: Do not operate system until all deficiencies are corrected. Correct as soon as possible.

Actual Unit Status Reflects What the Monitoring System is Reporting

Inspection Criteria: The unit should be reporting things as they are in the field. All parameters that the unit is monitoring will be checked on the actual remediation system.

Inspection frequency: Inspect on each site visit, minimum once per quarter.

Corrective action: Do not operate system until all deficiencies are corrected. Correct as soon as possible.

Remote Monitoring Panel Box (Primary Control Panel)

Inspection Criteria: Will be inspected to insure that it is tight, does not have any moisture in it, and all the electrical connections are tight.

Inspection frequency: Inspect on each site visit, minimum once per quarter.

Corrective action: Do not operate system until all deficiencies are corrected. Correct as soon as possible.

4.4 Vapor Sampling

To monitor system efficiency and ensure that treated emission concentrations are within applicable discharge limits, influent (pre-treatment) and effluent (post-treatment) vapor samples will be collected. Vapor samples will be collected via summa canister and submitted to a New York State Department of Health approved analytical laboratory for analysis of VOC concentrations utilizing Environmental Protection Agency (EPA) Method TO-14. Influent samples will be collected from the sample port located on the pipe extending from the blower discharge port to the cat/ox unit. Effluent samples will be collected from the emission stack extending from the cat/ox unit.

4.5 Schedule

During the initial start-up phase, the system will be monitored on a daily basis for the first week of operation, once every three days for the second weeks of operation and weekly thereafter.

During the system start-up phase, vapor samples (influent and effluent) will be collected each day for the first week of operation, once every three days for the second week of operation, and weekly for the third and fourth weeks of operation. Following the system start-up phase, influent an effluent vapor samples will be collected monthly for the duration of system operation.

5.0 REPORTING

System monitoring reports containing, at a minimum, the following information will be submitted:

- Site Plan;
- Process and instrumental diagram;
- Field data sheets including all system operational data recorded during monitoring;
- Tables summarizing all vapor sampling analytical results;
- Calculated discharge rates with comparison to applicable permissible discharge limits;
- Calculated VOC removal rates; and
- Total VOCs removed to date.

Reports will be submitted on a quarterly basis (every three months) for the first year of operation. Following the first year of operation, reports will be submitted semi-annually for a duration of three years. If necessary, after four years of system operation, reports will be submitted annually.

FIGURES

UTM COORDINATES: 45 14 344 N
5 93 004 E

LATITUDE: 40° 46' 36" N
LONGITUDE: 73° 53' 52" W

0 4000
Scale in feet

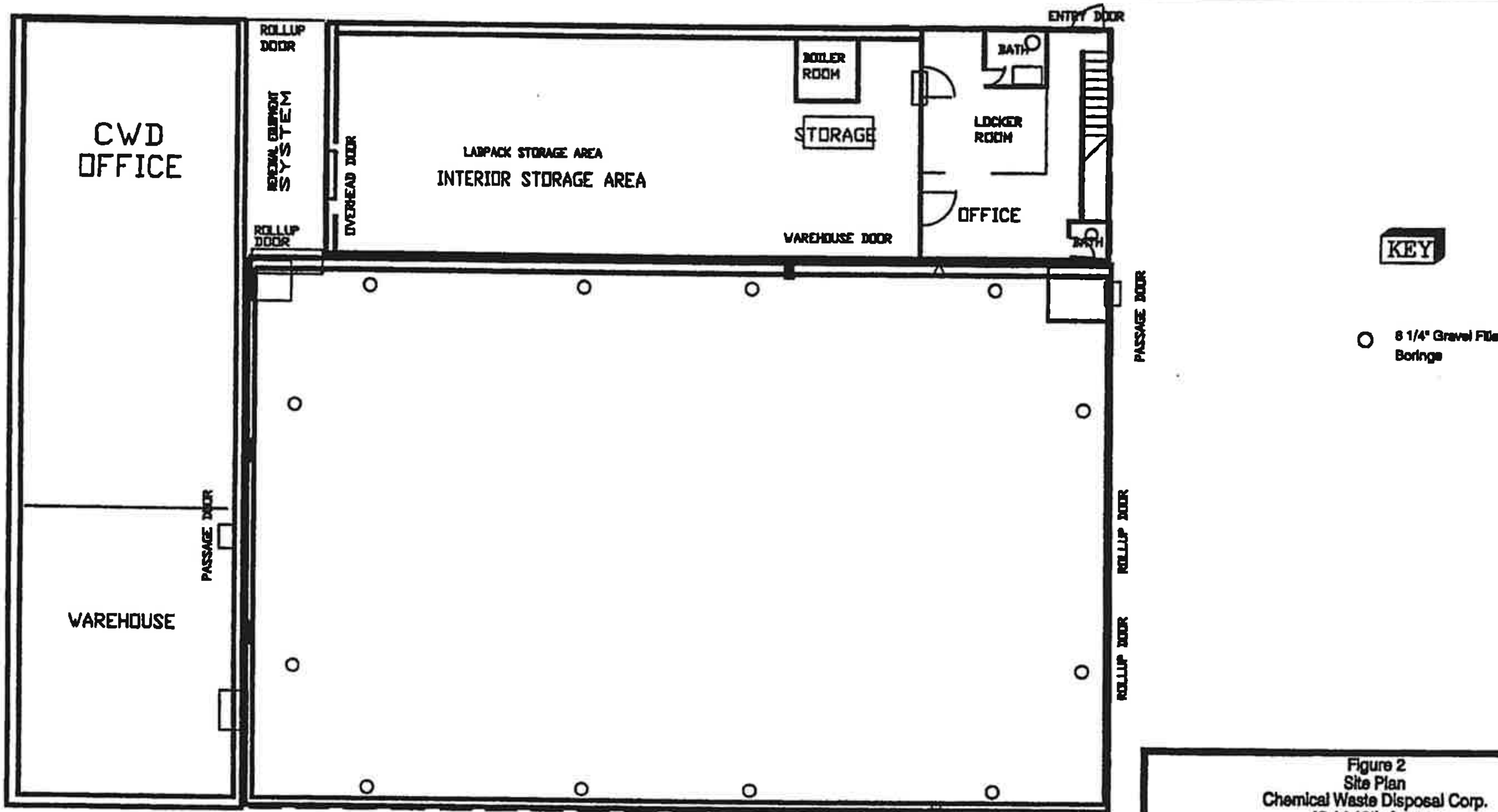
N

QUADRANGLE
LOCATION

FIGURE 1 – SITE LOCUS CHEMICAL WASTE DISPOSAL CORPORATION 42–14 19TH AVENUE ASTORIA, NEW YORK	
GSC REF.: 9907401	DATE: 8–98
DRAFTED BY: dc	CHECKED BY:
SOURCE: USGS 7.5' TOPOGRAPHIC MAP CENTRAA PARK, NY QUADRANGLE	

LOCUS.DWG

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Bohemia, NY 11716 (516) 218-6956



0 15
Scale in feet

Figure 2
Site Plan
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\02PLAN.DWG	
DRAFTED BY: cas	DATE: 1/00
REVISED BY:	CHECKED BY:
SOURCE: CWD Site Plan, GSC SVE System Design	

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Suite 8 • Bohemia, NY 11716 • (516) 218-6858

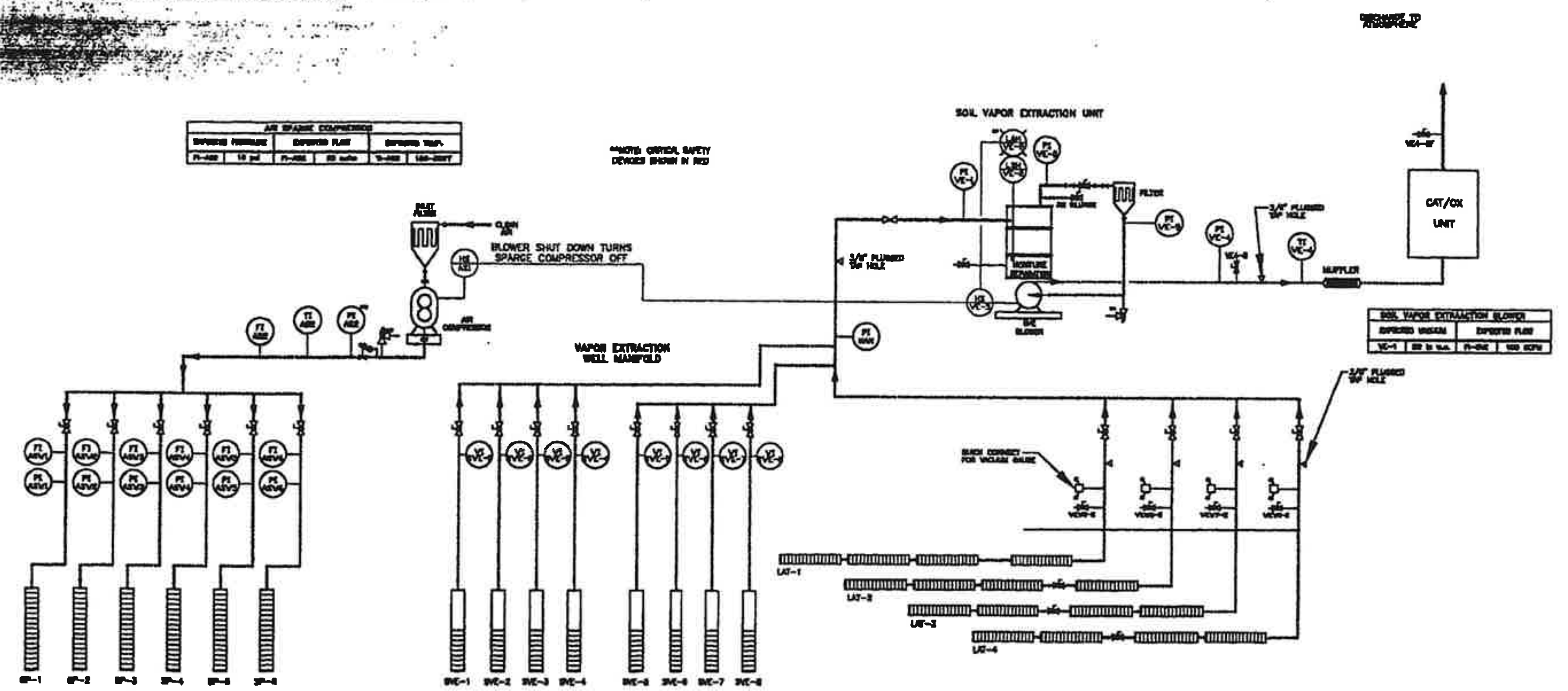
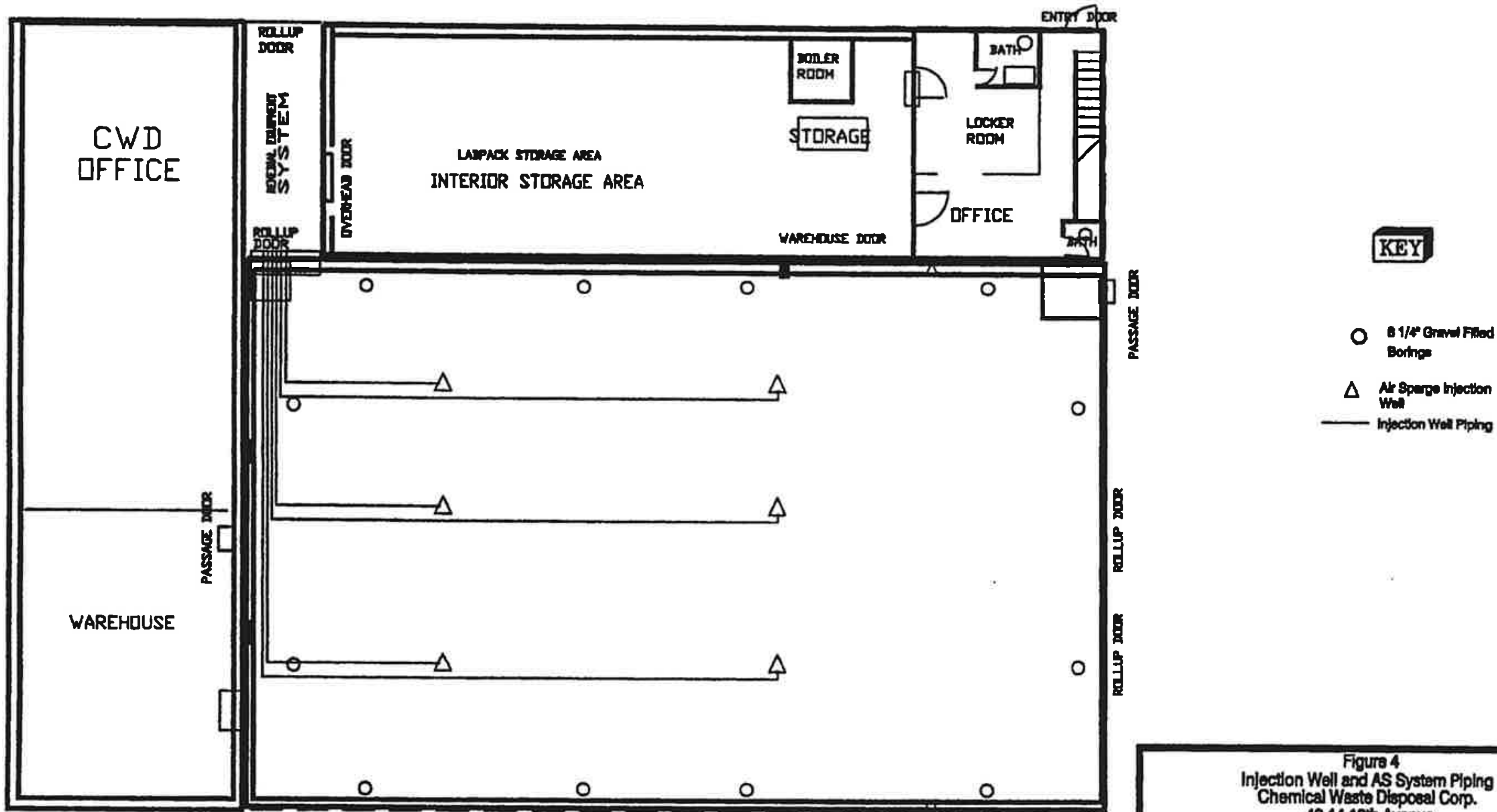


Figure 3
SVE/AS System Process & Instrumentation Diagram
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\03pid.DWG	DATE: 1/00
DRAFTED BY: CAS	CKD BY:
SOURCE: GSC SVE/AS SYSTEM DESIGN	

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Suite 6 Bohemia, NY 11716 (516) 218-8856



0 15
Scale in feet

Figure 4
Injection Well and AS System Piping
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\02PLAN.DWG	
DRAFTED BY: cas	DATE: 1/00
REVISED BY:	CHECKED BY:
SOURCE: CWD Site Plan, GSC SVE System Design	

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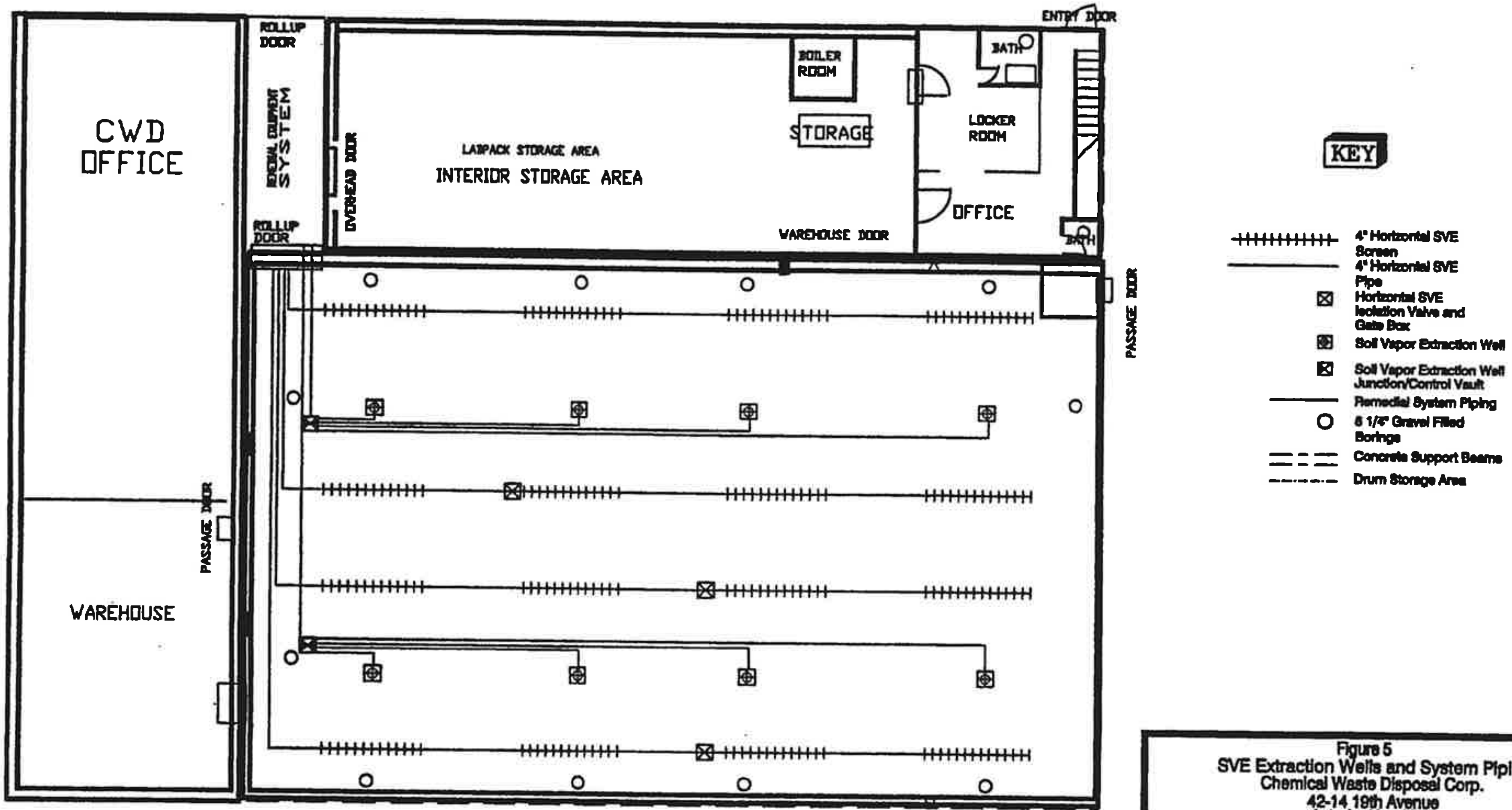

0 15
Scale in feet

Figure 5
SVE Extraction Wells and System Piping
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\02PLAN.DWG	
DRAFTED BY: cas	DATE: 1/00
REVISED BY:	CHECKED BY:
SOURCE: CWD Site Plan, GSC SVE System Design	

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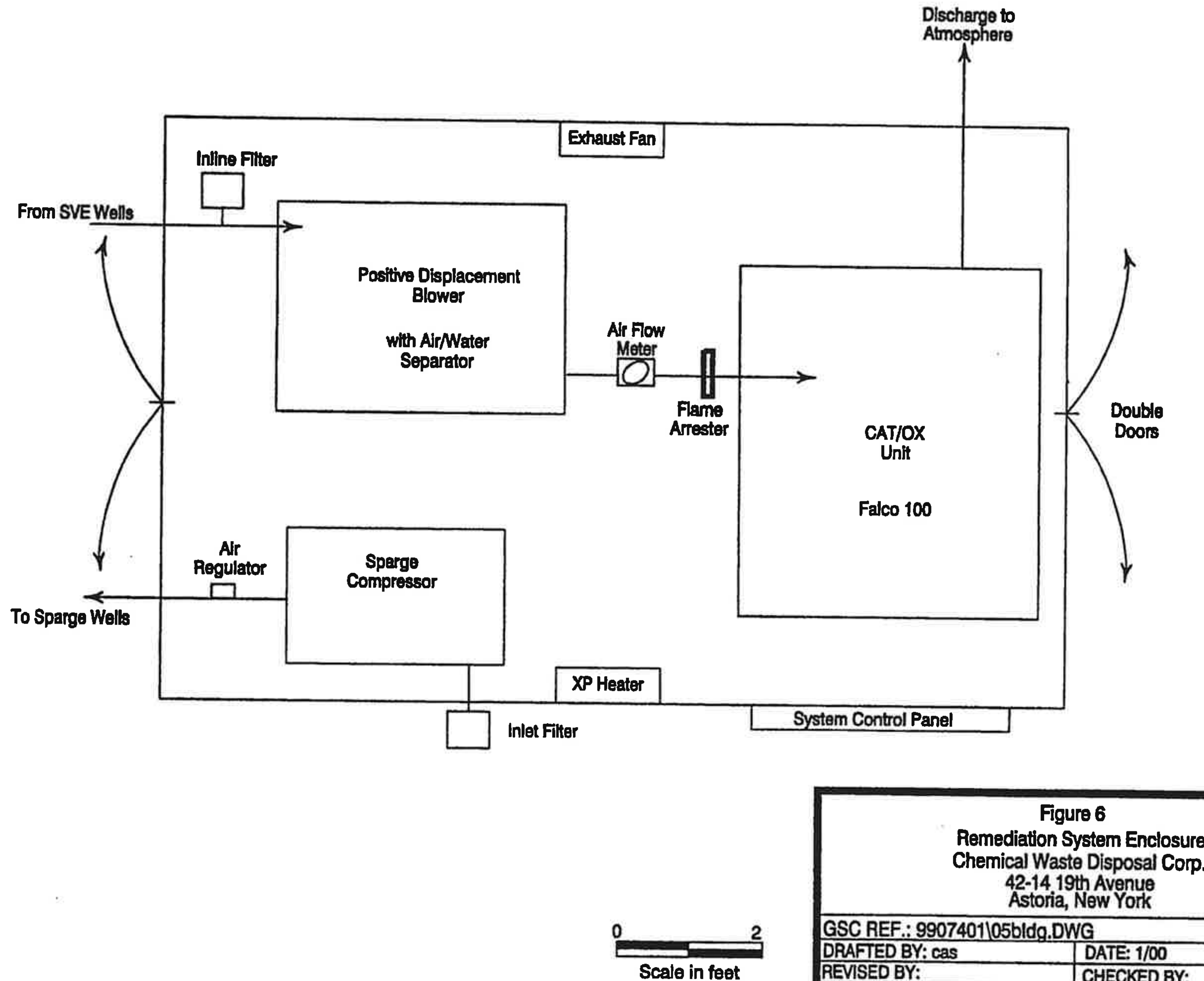


Figure 6
Remediation System Enclosure
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\05bldg.DWG	
DRAFTED BY: cas	DATE: 1/00
REVISED BY:	CHECKED BY:
SOURCE: GSC	

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Suite 6 Bohemia, NY (516) 218-6956

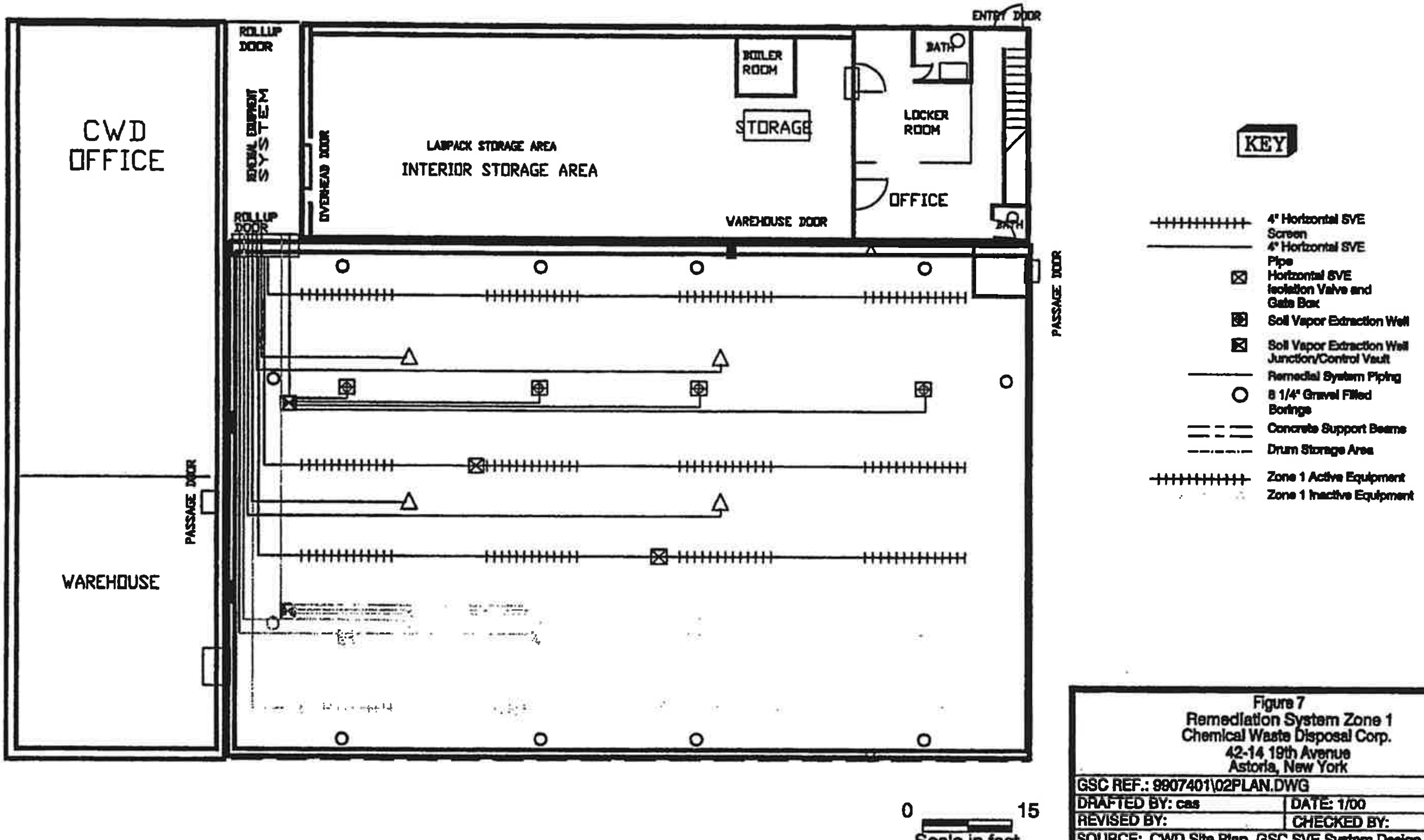


Figure 7
Remediation System Zone 1
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

GSC REF.: 9907401\02PLAN.DWG	
DRAFTED BY: cas	DATE: 1/00
REVISED BY:	CHECKED BY:
SOURCE: CWD Site Plan, GSC SVE System Design	

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Suite 6 • Bohemia, NY 11716 • (516) 218-6958

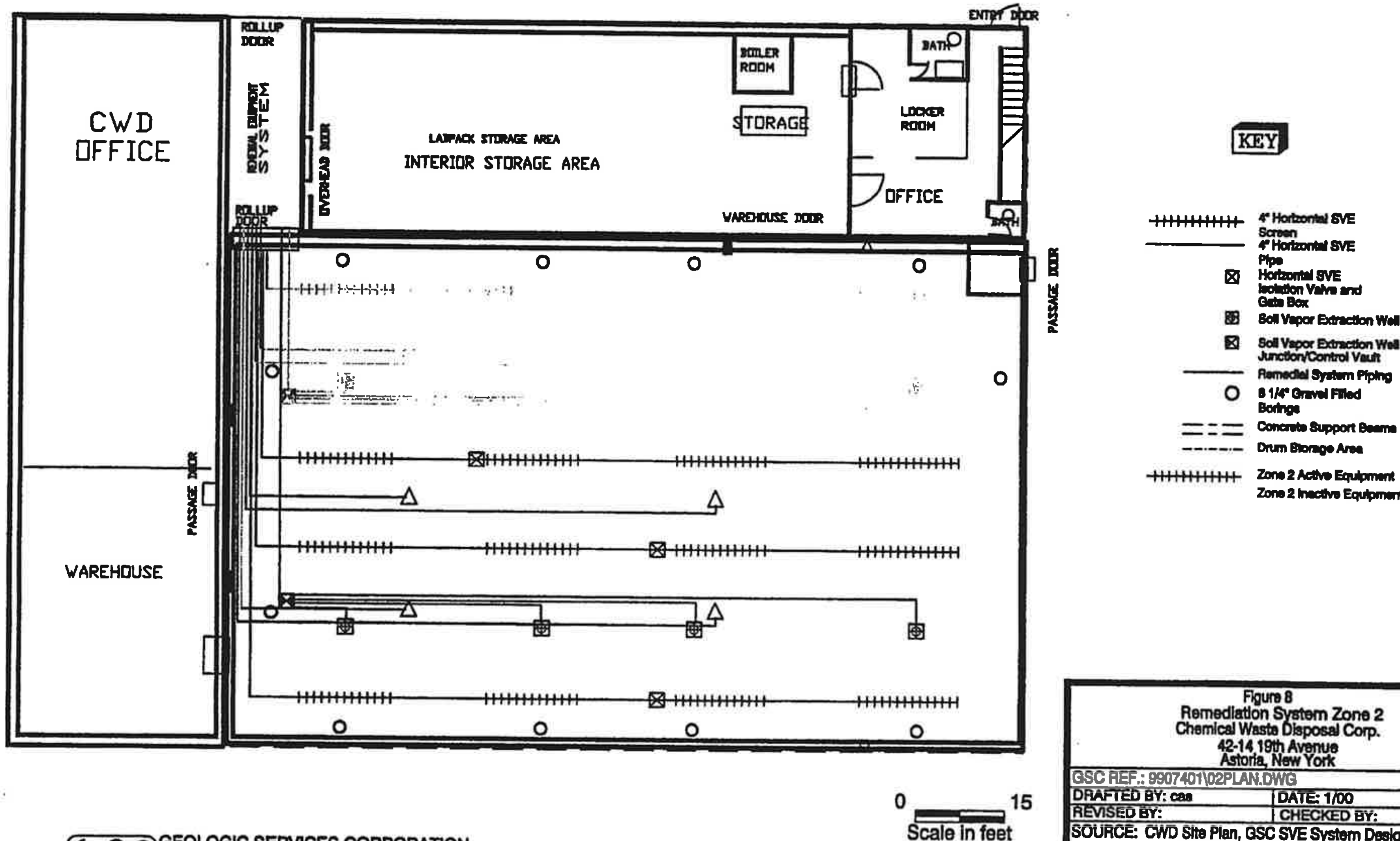


Figure 8
Remediation System Zone 2
Chemical Waste Disposal Corp.
42-14 19th Avenue
Astoria, New York

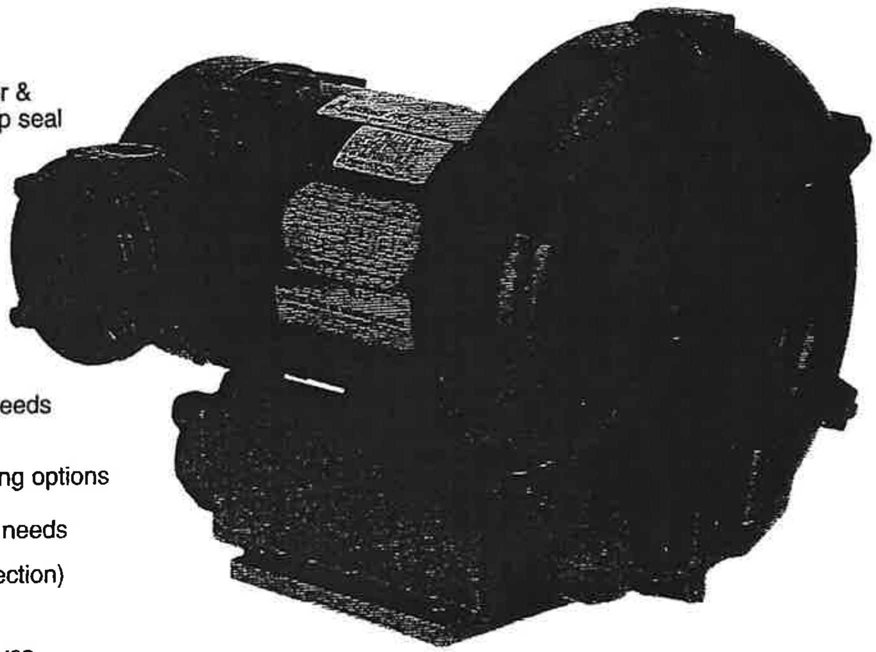
GSC REF.: 9907401\02PLAN.DWG	
DRAFTED BY: cas	DATE: 1/00
REVISED BY:	CHECKED BY:
SOURCE: CWD Site Plan, GSC SVE System Design	

GEOLOGIC SERVICES CORPORATION
Hydrogeologists and Environmental Scientists
1401 Church Street Suite 6 • Bohemia, NY 11716 • (516) 218-6956

Appendix 6

EN/CP 454
Explosion-Proof Regenerative Blower

FEATURES
- Manufactured in the USA
- Maximum flow: 127 SCFM
- Maximum pressure: 65 IWG
- Maximum vacuum: 59 IWG
- Standard motor: 1.5 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

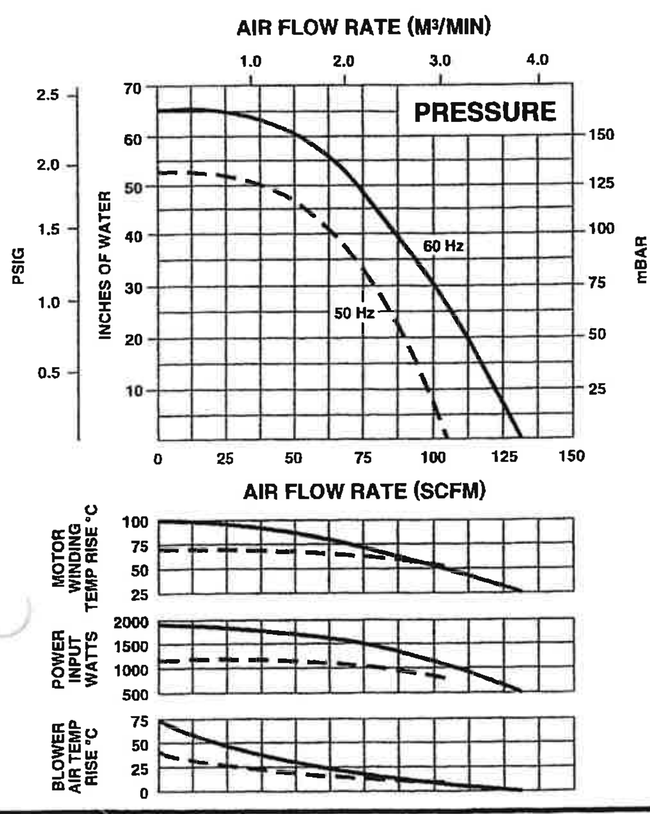


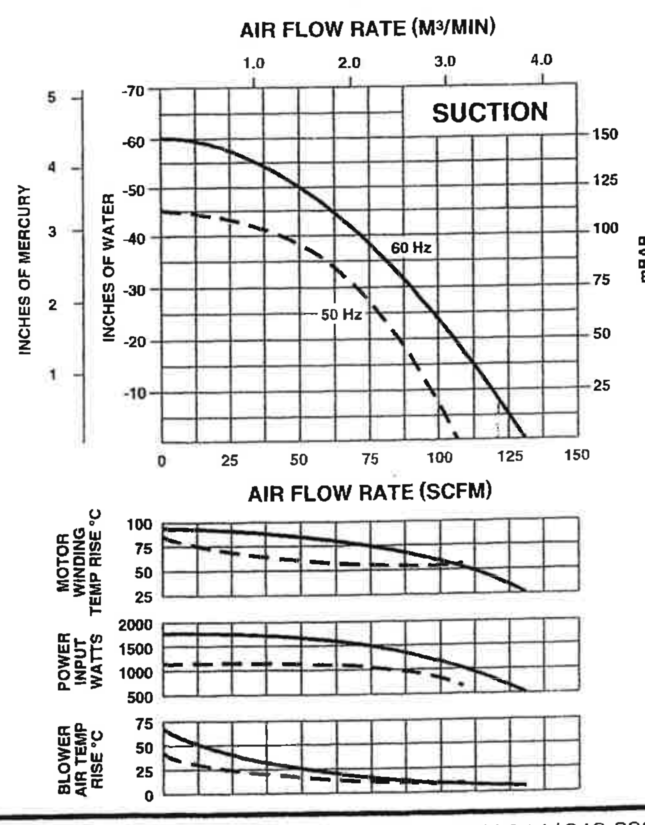
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)

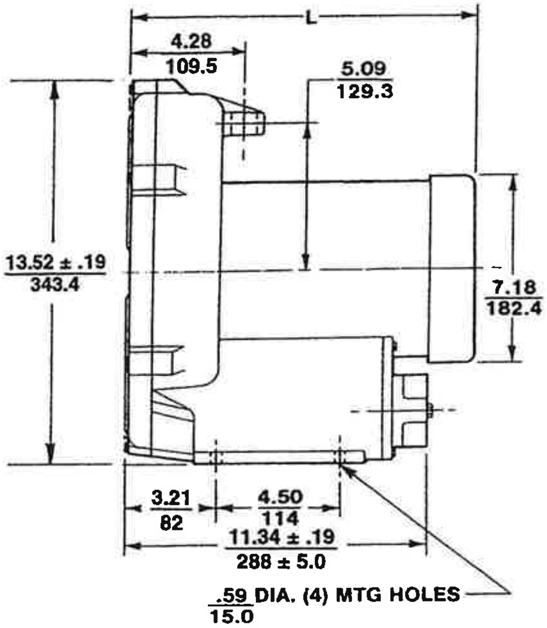
BLOWER PERFORMANCE AT STANDARD CONDITIONS

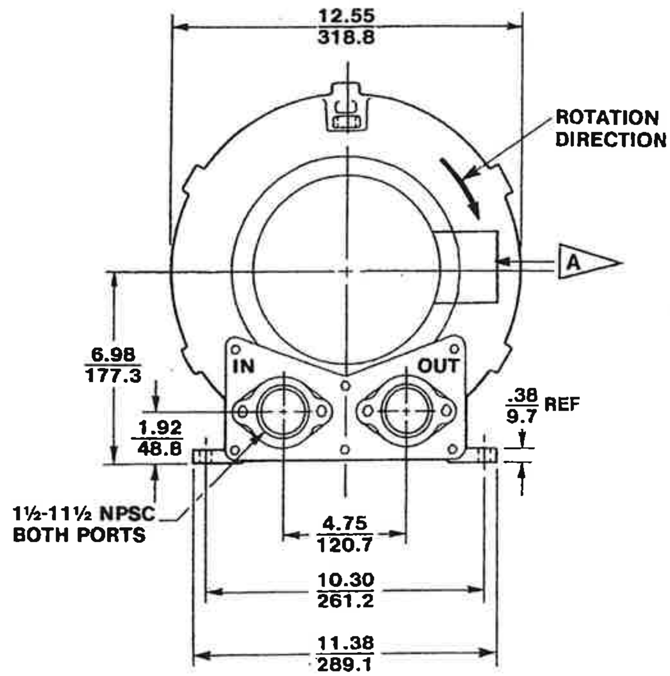




EG&G ROTRON, SAUGERTIES, N.Y. 12477 • 914/246-3401 • FAX 914/246-3802

EN/CP 454
Explosion-Proof Regenerative Blower





DIMENSIONS: IN / MM
TOLERANCES: .XX ± .06 / 1.5
(UNLESS OTHERWISE NOTED)

MODEL	L (IN) ± .30	L (MM) ± 8
EN/CP454W58L	16.48	419
EN/CP454W72L	15.6	396

A — 0.75" NPT CONDUIT CONNECTION AT 12 O'CLOCK POSITION

SPECIFICATIONS

MODEL	EN454W58L		EN454W72L		CP454FR58LR	CP454FR72LR
Part No.	038175		038176		–	038960
Motor Enclosure – Shaft Material	Explosion-proof – **CS**		Explosion-proof – **CS**		Chem XP – **SS**	Chem XP – **SS**
Horsepower	1.5		1.5		Same as EN454W58L – 038175 except add Chemical Processing (CP) features from catalog inside front cover	Same as EN454W72L – 038176 except add Chemical Processing (CP) features from catalog inside front cover
Phase – Frequency [1]	Single - 60 Hz		Three - 60 Hz			
Voltage [1]	115	208-230	230	460		
Motor Nameplate Amps	15	7.9-7.5	4.6	2.3		
Max. Blower Amps [3]	19.4	9.7-9.0	4.8	2.4		
Inrush Amps	96	48	32	16		
Starter Size	1	0	00	00		
Service Factor	1.0		1.0			
Thermal Protection [2]	Class B - Pilot Duty		Class B - Pilot Duty			
XP Motor Class – Group	I-D, II-F&G		I-D, II-F&G			
Shipping Weight	84 lb (38 kg)		78 lb (35 kg)			

1 Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **200-220/400-440 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz.** All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

2 Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

3 Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

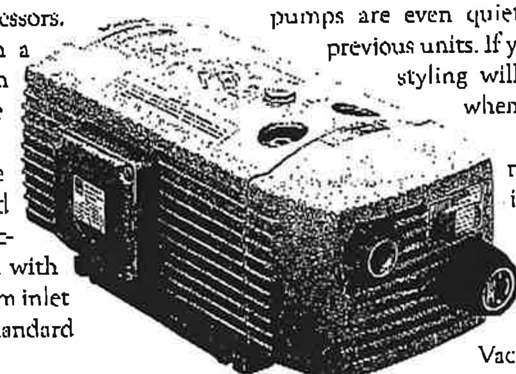
Specifications subject to change without notice. Please contact factory for specification updates.

BECKER

DT4.10 — 4.40 Series

ISO 9001 Certified
CE Compliant

100% OIL-LESS COMPRESSORS

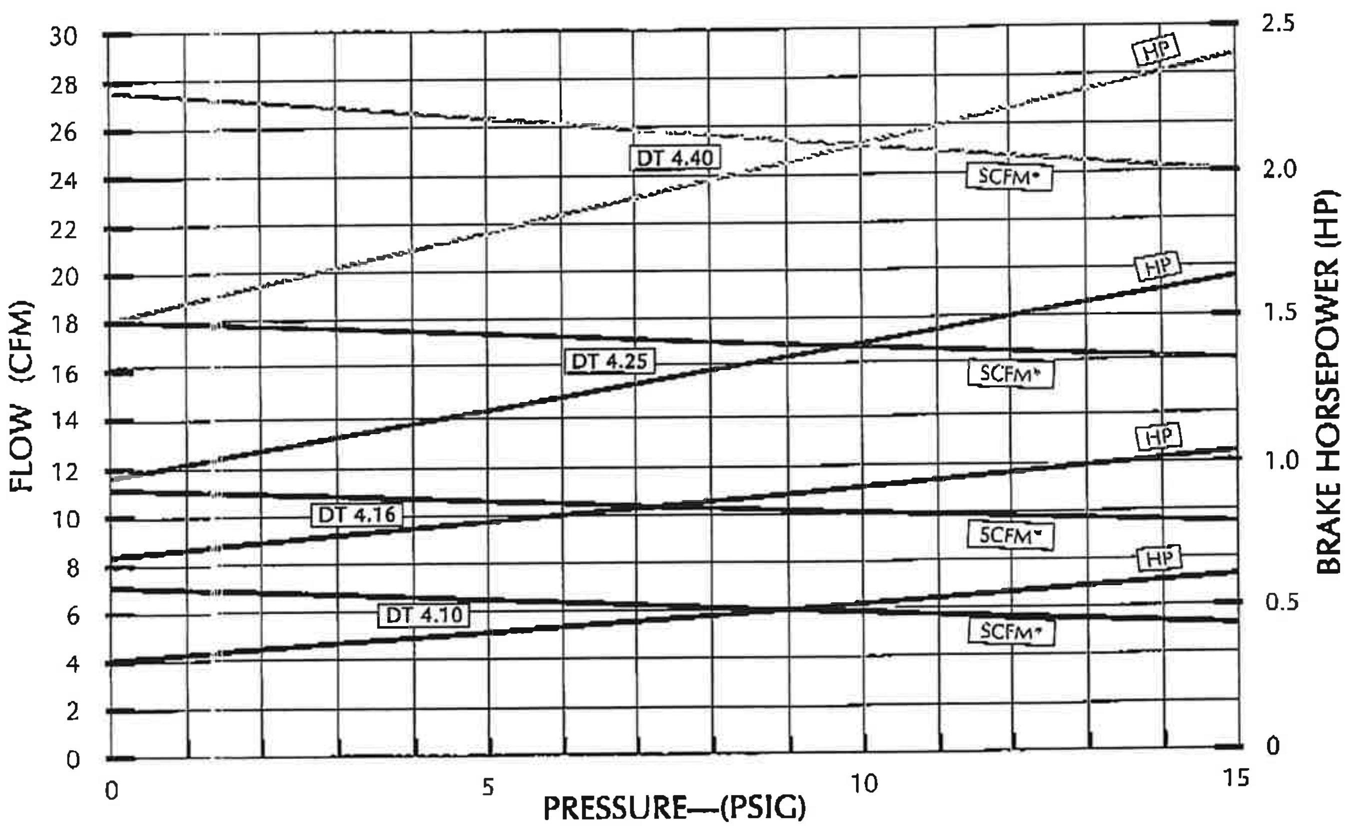


The Becker DT4.10 — 4.40 Series compressors are 100% oil-less rotary vane compressors. They are designed to operate on a continuous basis at any point from atmospheric pressure to a pressure of 15 PSIG.

The DT series compressors are direct drive units and are supplied with a TEFC flange mounted electric motor. Each pump is equipped with an integral pressure relief valve, a 10m inlet filter, and vibration isolators as standard equipment.

Becker DT series compressors have a reputation for being exceptionally quiet. These newly redesigned pumps are even quieter, and operate cooler than previous units. If you are an OEM, their attractive styling will never cause embarrassment when included with your product.

These 100% oil-less, or dry, non-polluting compressors are ideal for applications where oil or water is objectionable. All Becker DT series compressors use long-life, self-lubricating graphite composite vanes. Vacuum, and combination pressure/vacuum models are also available.

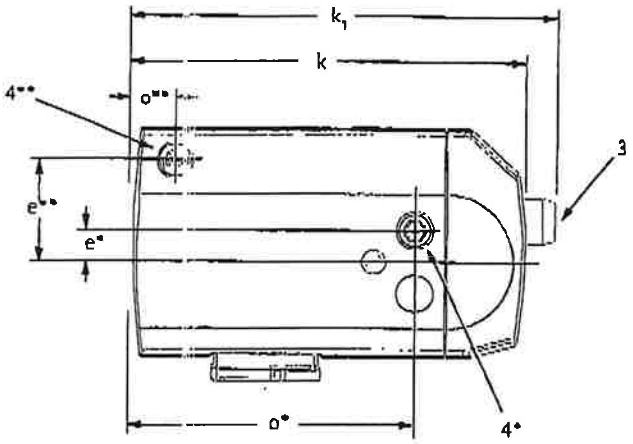


* @ 29.92" Hg Bar. Pr.; 68°F; 36% R.H.; 0.075#/ft³

Becker Pumps Corp. • 1069 Evans Avenue • Akron, Ohio 44305-1061
Ph. (330) 633-1083 · (888)633-1083 · FAX: (330) 633-1102 · e-mail: beckerpc@bright.net · www.beckerpumps.com

BECKER

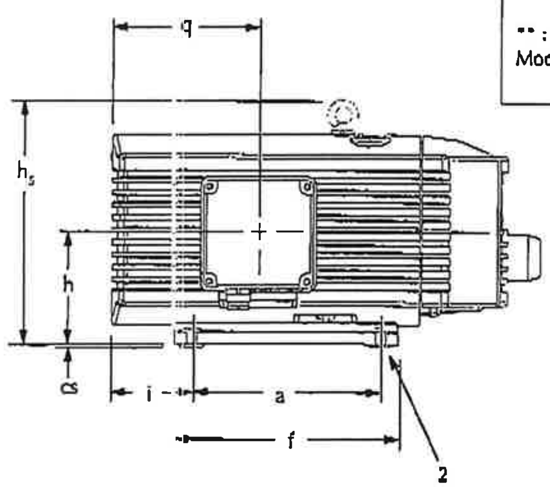
TECHNICAL DATA



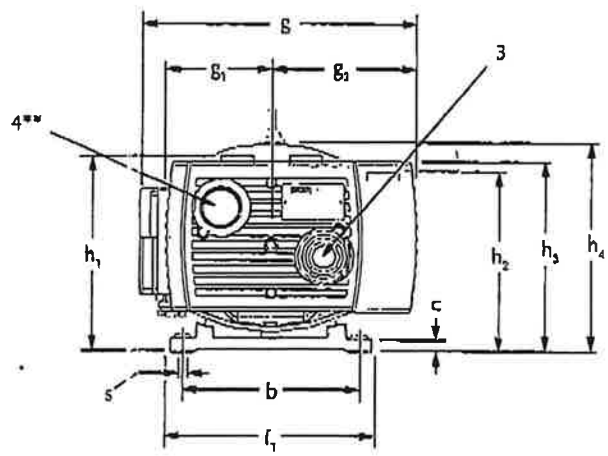
Top View

*: Models DT4.10 & DT4.16

**: Models DT4.25 & DT4.40



Side View



End View (Opposite Motor End)

All data based on 60 Hz operation

	DT 4.10	DT 4.16	DT 4.25	DT 4.40
Flow (SCFM @ 0 PSIG)	7.1	11	18	28
Horsepower	0.6	0.94	1.75	2.9
Speed (RPM)	1740	1740	1740	1740
Max. Oper. Pressure (PSIG)	15	15	15	15
Weight (lbs.)—w/ motor	35.2	51.7	80.3	101
Noise Level (Max. dBA)	62	64	68	70
Outlet size (BSP, inches)	1/2	1/2	3/4	3/4
Dimensional Data	(Inches)			
a	6.3	7.95	8.66	8.66
b	4.41	4.92	7.48	8.19
c	0.6	0.6	0.6	0.6
cs	0.12	0.12	0.12	0.12
e	1.38	1.38	5.12	5.12
f	7.88	9.53	10.24	10.24
f_1	5.6	6.1	9.37	9.37
g	8.11	9.1	12.92	12.92
g_1	3.54	4.03	4.92	4.92
g_2	3.54	4.03	6.81	6.81
h	4.21	4.45	5.51	5.51
h_1	6.66	7.4	—	—
h_2	—	—	8.43	8.43
h_3	6.93	7.32	8.9	8.9
h_4	7.44	8.07	9.84	9.84
h_5	7.68	8.3	11.42	11.42
i	4.17	2.88	4.45	7.0
k	15.25	16.38	19.89	23.04
k_1	16.9	17.8	21.46	24.61
o	10.12	11.48	2.16	2.16
q	4.84	5.97	6.81	7.56
s	0.27	0.27	0.27	0.27

Manufacturer reserves right to alter data without notice.

1 - Inlet
2 - Vibration Isolator
3 - Pressure Regulating Valve
4 - Discharge Port

31IT0026 - 10/97

Becker Pumps Corp. • 1069 Evans Avenue • Akron, Ohio 44305-1061

	SPECIFICATIONS
Meter Body, Bezel and Tube	Polycarbonate
Wetted Metal Parts	Stainless Steel(except for optional brass valves)
Floats	St. Steel, Blk. Glass, Alum., K Monel, Tung. Carbide
Float Stops	Polycarbonate
Pipe Connections	Model RMA, 1/8"; Model RMB, 1/4", Model RMC, 1/2" NPT
"O" Rings	Neoprene and Buna-N
Fittings	Stainless Steel brazed to Stainless Steel backbone plate
Rivets	Stainless Steel, set into slots
Scale	Brushed Aluminum-Clear Epoxy Coated
Knobs	ABS Plastic
Pressure Limits	RMA 100 psi (6.9bar), RMB 70 psi(4.8bar), RMC 35 psi (2.4bar) max
Temperature Limits	130°F maximum(54.4°C)
Accuracy	Model RMA, 4%; Model RMB 3% Model RMC, 2% of full scale
Weight	RMA: 4 oz. (113.4 g); RMB: 13 oz. (368.54 g); RMC: 39 oz. (1105.63 g)

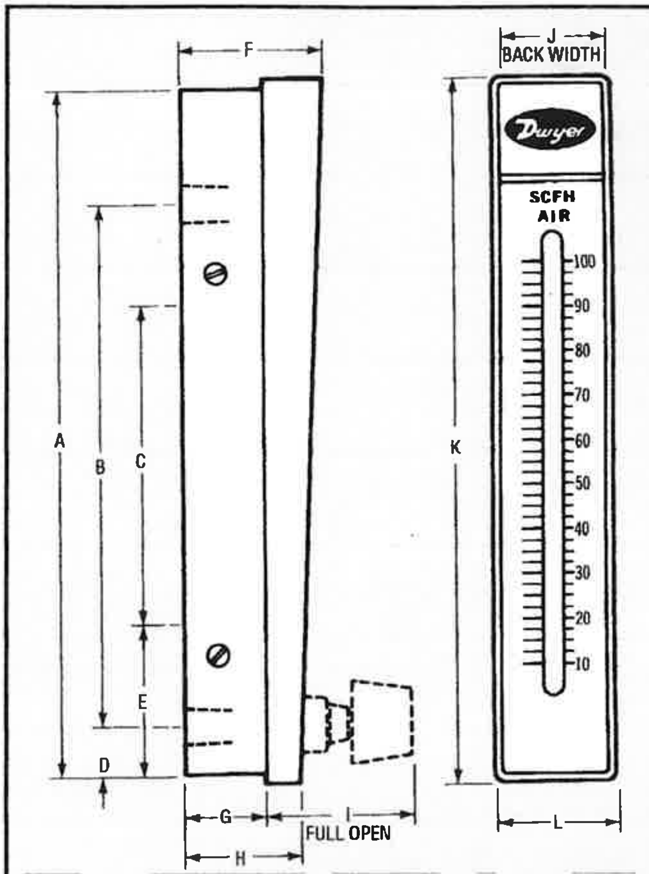
	OPTIONS AND ACCESSORIES	CODE
Metering Valve	Brass Stainless Steel	BV SSV
Top Mounted Valve	Stainless Steel — available only on RMA for air (vacuum applications)	TMV
Pointer Flag	Polycarbonate	PF

Series RM RATE-MASTER® Models and Ranges
STOCKED MODELS in bold

Model RMA-2" Scale		Model RMB-5" Scale		Model RMC -10" Scale	
Range SCFH Air	**Ordering No.**	**Range SCFH Air**	**Ordering No.**	**Range SCFH Air**	**Ordering No.**
.05-.5	**1**	.5-5	**49**	5-50	**101**
.1-1	**2**	1-10	**50**	10-100	**102**
.2-2	**3**	3-20	**51**	20-200	**103**
.5-5	**4**	4-50	**52**	40-400	**104**
1-10	**5**	10-100	**53**	60-600	**105**
2-20	**6**	20-200	**54**	100-1000	**106**
5-50	**7**	40-400	**55**	120-1200	107
10-100	**8**	50-500	**56**	200-1800	**108**
15-150	**9**	60-600	**57**	**SCFM Air**	
20-200	**10**	**Gal. Water per hour**		1-10	**121**
CC Air/min.				2-20	**122**
5-50	**151***	1-12	**82**	3-30	**123**
10-100	**150***	1-20	**83**		
30-240	**11**	4-40	**84**	**Gal. Water per hour**	
50-500	**12**	10-100	**85**		
100-1000	**13**			2-20	**134**
200-2500	**14**			8-90	135
LPM Air				**Gal.Water per minute**	
.5-5	**26**				
1-10	**21**			.1-1	**141**
2-25	**22**			.2-2.2	**142**
5-50	**23**			.4-4	**143**
5-70	**24**			.8-7	**144**
10-100	**25**			1.2-10	**145**
CC Water/min.					
5-50	**32**				
10-110	**33**				
20-300	**34**				
Gal.Water/hr					
1-11	**42**				
2-24	**43**				
4-34	44				
5-50	**45**				

CAUTION

Dwyer Rate-Master® flowmeters are designed to provide satisfactory long term service when used with air, water, or other compatible media. Refer to factory for information on questionable gases or liquids. Caustic solutions, anti-freeze (ethylene glycol) and aromatic solvents should definitely not be used.



DIMENSION IN INCHES			
	Model RMA	**Model RMB**	**Model RMC**
A	4 9/16	8 1/2	15 1/4
B	3 1/8 NPT Conn.	6 7/16 1/4 NPT Conn.	12 1/4 1/2 NPT Conn.
C	1 5/8 10-32 Thds.	3 15/16 1/4-20 Thds.	8 3/4 3/8-24 Thds.
D	3/8	5/8	1
E	1 1/16	1 7/8	2 3/4
F	1 3/16	1 3/4	2 1/4
G	3/4	1	1 7/8
H	1	1 7/16	1 31/32
I (OPEN)	1 3/8	1 9/16 (BV or SSV MODELS ONLY)	2 1/2
J	3/4	1 1/4	2
K	4 13/16	8 3/4	15 3/8
L	1	1 1/2	2 1/4

How To Order

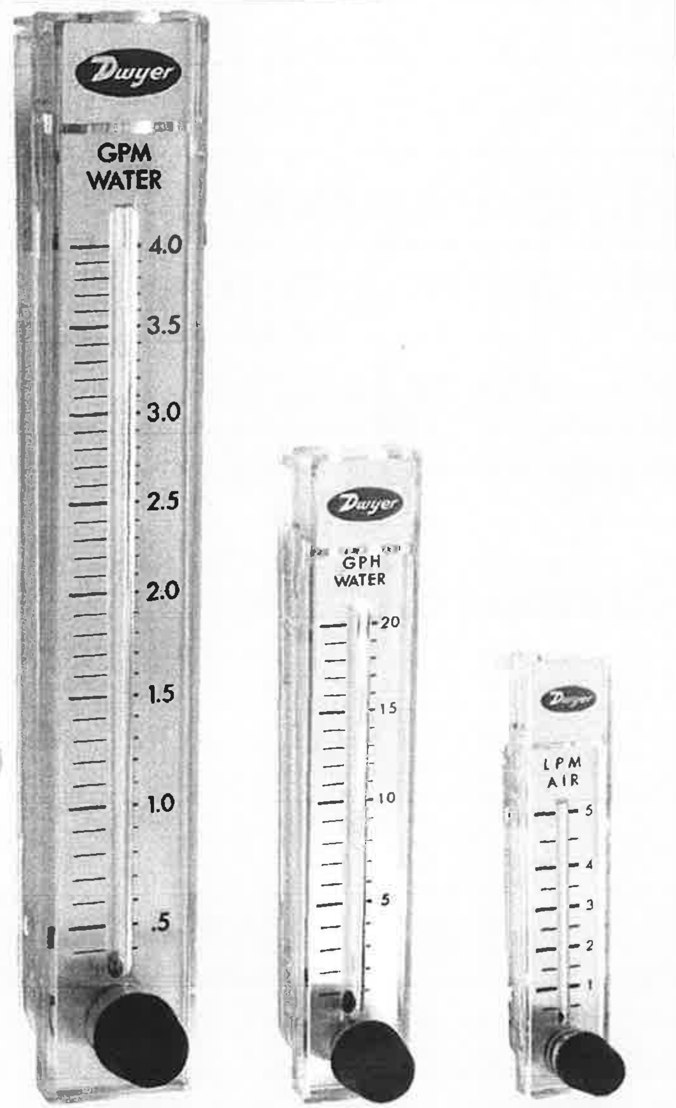
1. Select series by letter designation, RMA, RMB or RMC.
2. Add ordering number to specify range. Example: RMB-49.
3. Add suffix BV for brass valve, SSV for stainless steel valve or TMV for top mounted valve (RMA only). Example: RMB-49-SSV.
4. For adjustable pointer flag add -APF (RMA), -BPF (RMB) or -CPF (RMC). Example: RMB-49-SSV-BPF.

RMA ....
RMA-BV ....
RMA-SSV ....
RMA-TMV....................................
RMA-body only..........................
*Add to prices above for -150 and -151 ranges ....
-APF pointerflag.........................
RKA Regulator Kits ....
RMB................................ ....
RMB-BV.....................................
RMB-SSV....................................
RMB-body only ....
-BPF pointer flag ....
RMB Regulator Kits ....
RMC...
RMC-BV......................................
RMC-SSV.....................................
RMC-body only ....
-CPF pointer flag ....

Flow

Series RM Rate-Master® Flowmeters

Polycarbonate, Gas flow from .1-1800 SCFH, Water Flows to 10 GPM



Model RMC-SSV10" scale, 15⅜" high

Model RMB-SSV 5" scale, 8¾" high

Model RMA-SSV 2" scale, $4\frac{15}{16}$" high

The Dwyer Rate-Master® line of direct reading precision flowmeters incorporates many unique user features at moderate cost. These low cost flowmeters are ideal for general use.

Easy to read design – The direct reading scales eliminate troublesome conversions. The scales are brushed aluminum, coated with epoxy and the graduations are on both sides of the indicating tube. Special integral flow guides stabilize the float throughout the range to keep it from hunting or wandering in the bore. The float is highly visible against a white background.

Construction assures accuracy – All Rate-Master® flowmeter bodies are injection molded of tough, clear, shatter-proof polycarbonate plastic around a precision tapered pin. The result is accurate and repeatable readings. The single piece plastic body is mounted to a stainless steel back bone into which pipe thread inserts are welded to absorb piping torque. Precision metering valves of brass or stainless steel (specify BV or SSV on order) are available as an optional extra and permit precise flow adjustments. For vacuum applications, Model RMA units are available with top mounted valves (specify TMV). The small Series RMA models are accurate within ±4% of full scale reading; Series RMB within ±3%; large Series RMC within ±2%.

Installation is simple – The Rate-Master® can be neatly through – panel mounted to keep flow tube centers in the same plane as the panel surface or surface mounted on the panel by means of tapped holes in the backbone. When through-panel mounted, the bezel automatically positions the instrument at the correct depth in the panel cutout. Surface mounted units can also be held in place by the piping. All mounting hardware plus installation and operating instructions are included.

Cleaning is easy – To release the plastic flowmeter body from the stainless steel backbone, just remove four screws. Pipe thread flow connections remain undisturbed. Remove the slide cover and the plug ball stop, clean the flow tube with soap and water and reassemble. It's that simple.

Specials — Special ranges, scales, mounting arrangements, etc., are available on special order, or in OEM quantities.

Easy-to-Interchange bodies – Within a given Series, Rate-Master® flowmeter bodies can be instantly interchanged. Simply "unplug" the body from backbone and replace it with another. "O" rings provide a tight seal on inlet and outlet. Piping remains undisturbed. Interchangeability is useful where different scale ranges are sometimes required at the same location in the laboratory or plant.

Top Mounted Metering Valves – Same precision construction for vacuum applications.

Adjustable pointer flags – Red lined pointer flags provide quick visual reference to a required flow level. Of clear plastic, they snap into place inside bezel and slide to desired level.

Item Details

< Back

HVAC > Controls > General Purpose Solenoid Valve

Valve,Solenoid,120 V
General Purpose Solenoid Valve, Pipe Size 1 Inch, Maximum Fluid Temperature 180 Degrees Fahrenheit, Orifice Diameter 1 Inch, CV Flow Factor 13.00, Maximum Flow 145.3 GPH, Differential Operating Pressure Air Inert Gas 150 PSI, Differential Operating Pressure Water 125 PSI, Differential Operating Pressure Light Oil 125 PSI, Power Rating/Class of Coil Insulation 16.1 Watts/F, Body Material Brass, Construction Reference Number 19

Grainger Item: 5JC40
Price (ea) : $264.00
Manufacturer: RED-HAT BY ASCO
Mfg. Model#: 8210G54 120/60

Ship Qty : 1
Sell Qty (Will-Call) : 1
Usually Ships : Today
Catalog 395 Page: 3411

Qty.

Add to Personal List | Add to Order
Compare Alternates

Price shown may not reflect your price. *Log-in* above,or click here to register.

NOTES & RESTRICTIONS
See Catalog 395 Page for application and/or safety information.

ALTERNATE PRODUCTS
Valve,Solenoid,120 V
General Purpose Solenoid Valve, Pipe Size 1 Inch, Maximum Fluid Temperature 180 Degrees Fahrenheit, Orifice Diameter 1 Inch, CV Flow Factor 13.00, Maximum
Price (ea): $338.50 Usually Ships : Today
Grainger Item#: 5JC42

TECHNICAL SPECIFICATIONS

Type	General Purpose
Valve Type	Solenoid
Pipe Size (In.)	1
Orifice Dia. (In.)	1
Cv Flow Factor	13.00
PSI Differential Light Oil	125
PSI Differential Air Inert Gas	150
PSI Differential Water	125
Coil Insulation Class (W)	16.1/F
Body Material	Brass
Number of Ways	2

Item Details

< Back

Pumps & Plumbing > Valves > Ball Valves

Valve,Ball
Exhaust Brass Ball Valve, Inlet/Outlet 3/4 Inch, Temperature Rating -40 to 350 Degrees Fahrenheit, 200 PSI, Lockable

Grainger Item:	6GD09	Ship Qty:	1
Price (ea) :	$9.78	Sell Qty (Will-Call):	1
Manufacturer:	IMPORT	Usually Ships:	Today
Mfg. Model#:	6GD09	Catalog 395 Page:	1393

Qty.
Add to Personal List Add to Order

Price shown may not reflect your price. *Log-in* above,or click here to register.

NOTES & RESTRICTIONS
See Catalog 395 Page for application and/or safety information.

OPTIONAL ACCESSORIES
Sealant,Tape
Tape Sealant, Size 1/2 x 260 Inches, For Fuel Connection
Price (ea): $1.04 Usually Ships: Today
Grainger Item#: 4X227

Qty.
Add to Personal List Add to Order

TECHNICAL SPECIFICATIONS

Material	Brass
Inlet/Outlet (In.)	3/4
WOG (PSI)	200
Temp. Rating (Deg. F)	-40 to 350
Conforms To	OSHA Requirement 1910.147
Handle	Lockable
Seats	Teflon Ball

Item Details

< Back

Pumps & Plumbing > Valves > Ball Valves

Valve,Ball
Exhaust Brass Ball Valve, Inlet/Outlet 1 Inch, Temperature Rating -40 to 350 Degrees Fahrenheit, 200 PSI, Lockable

Grainger Item:	6GD10	Ship Qty:	1
Price (ea) :	$12.44	Sell Qty (Will-Call):	1
Manufacturer:	IMPORT	Usually Ships:	Today
Mfg. Model#:	6GD10	Catalog 395 Page:	1393

Qty.
Add to Personal List Add to Order

Price shown may not reflect your price. *Log-in* above, or click here to register.

NOTES & RESTRICTIONS
See Catalog 395 Page for application and/or safety information.

OPTIONAL ACCESSORIES
Sealant,Tape
Tape Sealant, Size 1/2 x 260 Inches, For Fuel Connection
Price (ea): $1.04 Usually Ships: Today
Grainger Item#: 4X227

Qty.
Add to Personal List Add to Order

TECHNICAL SPECIFICATIONS

Material	Brass
Inlet/Outlet (In.)	1
WOG (PSI)	200
Temp. Rating (Deg. F)	-40 to 350
Conforms To	OSHA Requirement 1910.147
Handle	Lockable
Seats	Teflon Ball

Item Details

< Back

Tools & Test Instruments > Gauges > Pressure and Vacuum Gauges

Gauge,Pressure,30 PSI
Standard Pressure Gauge, Pressure Range 30 PSI, Dial Size 2 Inches, Smallest Graduation 0.5 PSI

Grainger Item:	5WH41	Ship Qty ? :	1
Price (ea) :	$7.64	Sell Qty (Will-Call) ? :	1
Manufacturer:	ASHCROFT	Usually Ships ? :	Today
Mfg. Model#:	20W 1005PH 02B 30#	Catalog 395 Page:	1150

Qty.

Add to Personal List Add to Order

Compare Alternates

Price shown may not reflect your price. *Log-in* above,or click here to register.

NOTES & RESTRICTIONS

See Catalog 395 Page for application and/or safety information.

OPTIONAL ACCESSORIES

Sealant,Thread
TFE Pipe Thread Sealant, Container Size 8 Ounce Bottle, Brush Top Applicator, Paste

Price (ea): $5.99 Usually Ships ? : Today
Grainger Item#: 4X222

Qty.

Add to Personal List Add to Order

Sealant,Tape
Tape Sealant, Size 1/2 x 260 Inches, For Fuel Connection

TECHNICAL SPECIFICATIONS

Gauge Type	Standard Pressure
Range (PSI)	30
Dial Size (In.)	2
Smallest Graduation	0.5
Mount	Center Back Connected
Accuracy	+/- 3-2-3
Case	ABS
NPT (In.)	1/4
Face	Glass
Application	Centrifugal Pumps, Air Compressors and Water Systems
	General Use with Water, Oil, Air and Chemicals

Qty.

Add to Personal List | Add to Order

Compare Alternates

GPM Max.	145.3
Configuration	Normally Closed
GPM Min.	0.0
Application	To Control the On/Off Flow of Fluids, Air, Inert Gas, Water and Light Oil

---

Item Details

< Back

Pneumatics & Hydraulics > Valves > Vacuum and Pressure Relief Valves

Valve,Relief,3/4 In

Vacuum/Pressure Relief Valve, Inlet 3/4 Inch Male NPT, Flow 0-54 CFM, Hex Size 1 1/16 Inches, Length 2 3/4 Inches

Grainger Item:	5Z765	Ship Qty :	1
Price (ea) :	$31.25	Sell Qty (Will-Call) :	1
Manufacturer:	CONTROL DEVICES	Usually Ships :	Today
Mfg. Model#:	VR-75	Catalog 395 Page:	1389

Qty.

Add to Personal List   Add to Order

Price shown may not reflect your price. *Log-in* above,or click here to register.

NOTES & RESTRICTIONS

MSDS Sheets Available

See Catalog 395 Page for application and/or safety information.

OPTIONAL ACCESSORIES

Sealant,Tape

Tape Sealant, Size 1/2 x 260 Inches, For Fuel Connection

Price (ea): $1.04   Usually Ships : Today

Grainger Item#: 4X227

Qty.

Add to Personal List   Add to Order

TECHNICAL SPECIFICATIONS

Item	Vacuum/Pressure Relief Valve
(M)NPT Inlet (In.)	3/4
Flow Capacity (CFM)	0-54
Hex (In.)	1 1/16
Length (In.)	2 3/4
Max. Temp. (Deg. F)	250
Function	Easily Convert from Vacuum to Pressure Relief by Reversing Poppet and Spring, Relieves Vacuum from 0 to 30 Inches Hg or Pressure to 20 PSI Maximum

Home | Order Form | Compare Items | Register | Help

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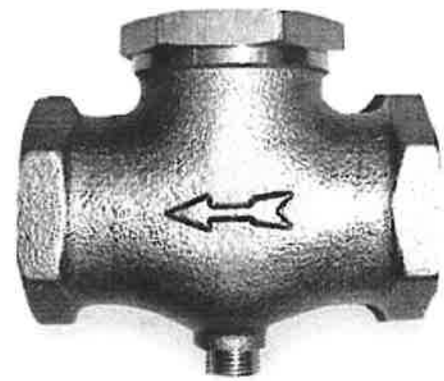
Item Details

< Back

Pneumatics & Hydraulics > System Components > Pneumatic Check Valves

Valve,Check,3/4 In

Air Check Valve, NPT Size (F) 3/4 Inch, Bronze, Maximum Hold 250 PSI



Grainger Item:	5X783	Ship Qty:	1
Price (ea) :	$19.04	Sell Qty (Will-Call):	1
Manufacturer:	CONTROL DEVICES	Usually Ships:	Today
Mfg. Model#:	CB75	Catalog 395 Page:	1391

Qty.

Add to Personal List | Add to Order

Compare Alternates

Price shown may not reflect your price. *Log-in* above,or click here to register.

TECHNICAL SPECIFICATIONS

Item	Check Valve
Type	Air
Material	Bronze
Hold Back Pressure (PSI)	250
(F)NPT Inlet (In.)	3/4
Mounting	Vertical or Horizontal
Tap Size	1/8 Inch for Pressure Switch Unloader Connection
Temp.	450
Disc	Positive Seating Flouropolymer, For Maximum Air Flow

NOTES & RESTRICTIONS

See Catalog 395 Page for application and/or safety information.

OPTIONAL ACCESSORIES

Sealant,Tape

Tape Sealant, Size 1/2 x 260 Inches, For Fuel Connection

Price (ea): $1.04 Usually Ships: Today

Grainger Item#: 4X227

Qty.

Add to Personal List | Add to Order

ALTERNATE PRODUCTS

Valve,Check,1 In

Air Check Valve, NPT Size (F) 1 Inch, Bronze, Maximum Hold 250 PSI

Price (ea): $49.55
Grainger Item#: 2A165

Usually Ships [?] : Today

Qty.

Add to Personal List | Add to Order

Compare Alternates

Item Details

Pneumatics & Hydraulics > System Components > Pneumatic Regulators

Regulator,1 In

Air Line Regulator, NPT 1 Inch, Maximum Flow 480 CFM, Maximum Pressure 300 PSI, Maximum Temperature 175 Degrees Fahrenheit, Adjustment Range 5-125 PSI, Bowl/Adjustment Knob Type Non Rising Knob, Height 7.09 Inches, Width 4.25 Inches, Prefilter/Gauge Stock Number 1X762

Grainger Item: 4ZM10
Price (ea) : $72.90
Manufacturer: SPEEDAIRE
Mfg. Model#: 4ZM10

Ship Qty ? : 1
Sell Qty (Will-Call) ? : 1
Usually Ships ? : Today
Catalog 395 Page: 1406

Qty.

Add to Personal List | Add to Order | Compare Alternates

Price shown may not reflect your price. *Log-in* above,or click here to register.

NOTES & RESTRICTIONS

Repair Parts Info available for this product.

See Catalog 395 Page for application and/or safety information.

OPTIONAL ACCESSORIES

Bracket And Nut

Regulator Mounting Bracket, With Panel Nut, For Use with 4ZM09, 4ZM10, 4ZM11

Price (ea): $7.62
Grainger Item#: 4ZK63

Usually Ships ? : Today

TECHNICAL SPECIFICATIONS

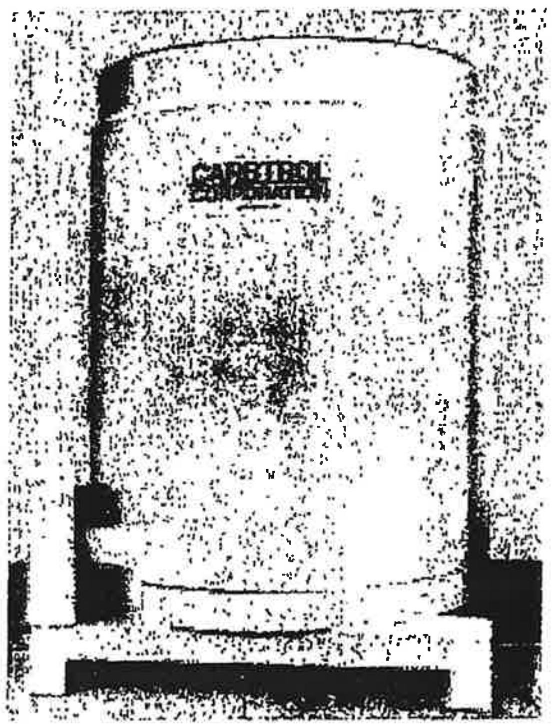
NPT	1
Max. Flow (CFM)	480
Max. Pressure (PSI)	300
Max. Temp. (F)	175
Height (In.)	7.09
Width (In.)	4.25
Adjustment Range (PSI)	5 - 125
Bowl/Adjustment Knob Type	Non-Rising Knob
Prefilter/Gauge Stock Number	1X762
Valve Design	Balanced, For Accurate Pressure Control

Large Unit

CARBTROL®

AIR PURIFICATION ADSORBERS

1,000 - 3,000 LB. ACTIVATED CARBON



FEATURES

- Low pressure drop.
- Epoxy lined mild steel construction.
- High activity carbon.
- Fork lift fittings for easy handling.
- 4"Ø slotted inlet distributor.
- Acceptable for transport of hazardous spent carbon.

OPTIONS

- Plastisol (PVC) lining.
- Interconnecting piping.

SPECIFICATIONS

MODEL G-4

CARBON:	1,000 lbs.
DIMENSIONS:	45-1/2" Ø x 64" H
SHIPPING WT:	1,700 lbs. Dry

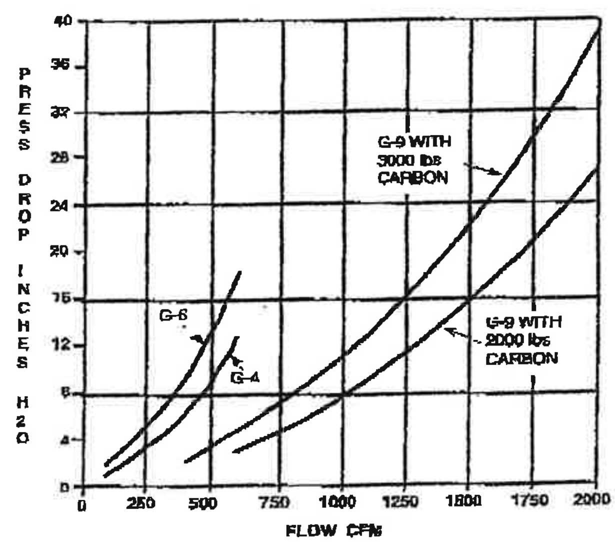
MODEL G-6

CARBON:	1,800 lbs. *
DIMENSIONS:	45-1/2" Ø x 88" H
SHIPPING WT:	2,675 lbs. Dry

MODEL G-9

CARBON:	3,000 lbs. *
DIMENSIONS:	60" Ø x 93" H
SHIPPING WT:	4,000 lbs. Dry

* 2,000 lbs. option available



AT-411/#1

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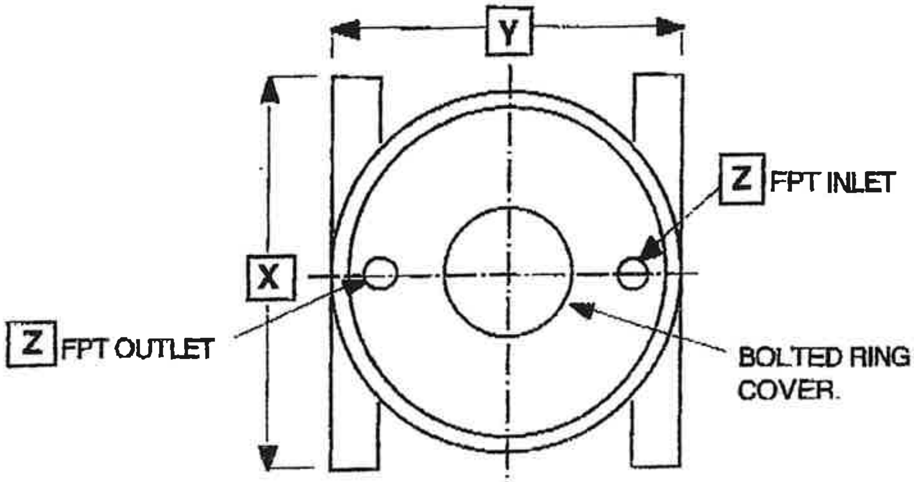
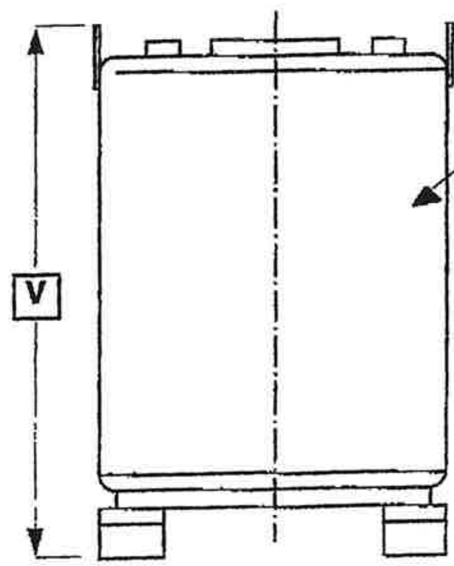
CARBTROL®

AIR PURIFICATION ADSORBERS

1,000 - 3,000 LB. ACTIVATED CARBON





UNIT	DIM. V	X	Y	Z
G-4	5'-2"	4'-0"	3'-8"	4"
G-6	7'-4"	4'-0"	3'-8"	4"
G-9	7'-7"	5'-0"	5'-0"	10"

SAFETY

Certain chemical compounds in the presence of activated carbon may oxidize, decompose or polymerize. This could result in temperature increases sufficient to cause ignition of the activated carbon or adsorbed material. If a compounds reaction with activated carbon is unknown, appropriate tests should be considered.

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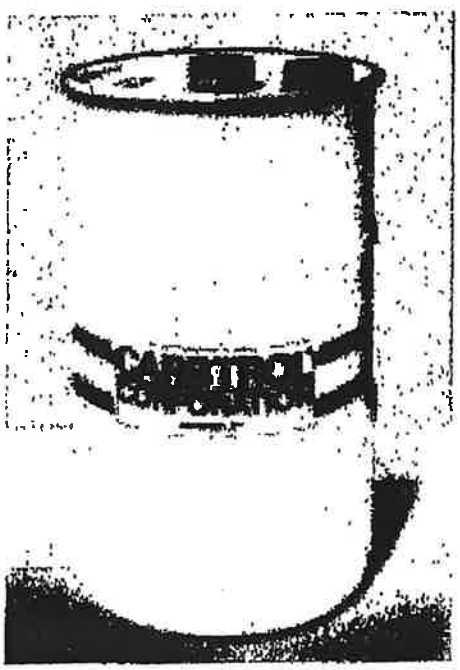
CARBTROL®

AIR PURIFICATION CANISTERS 140-200 LB. ACTIVATED CARBON

G-1
G-2
G-3



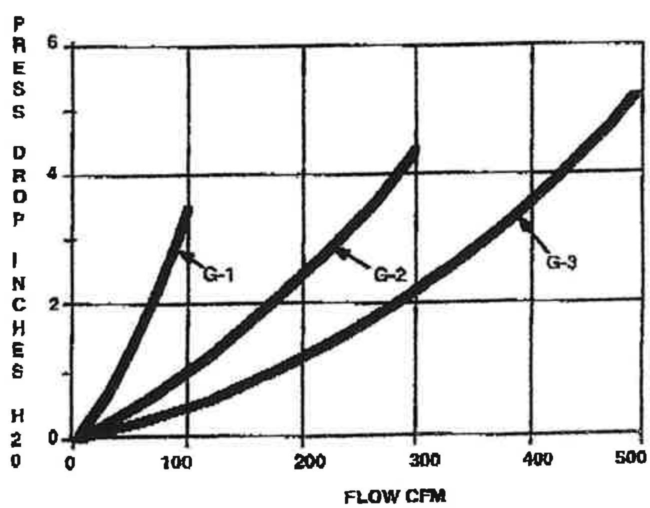
The CARBTROL "G" Canisters handles flows up to 500 CFM.

FEATURES

- High activity carbon.
- Epoxy lined steel or polyethylene construction.
- Acceptable for transport of hazardous spent carbon.
- Side drain for removal of accumulated condensate.
- Low pressure drop.
- PVC internal piping.
- High temperature (180°F) steel units available.

APPLICATIONS

- Soil vapor remediation
- Air stripper exhausts
- Tank vents
- Exhaust hoods
- Work area purification
- Sewage plant odor control



AT-116/#1

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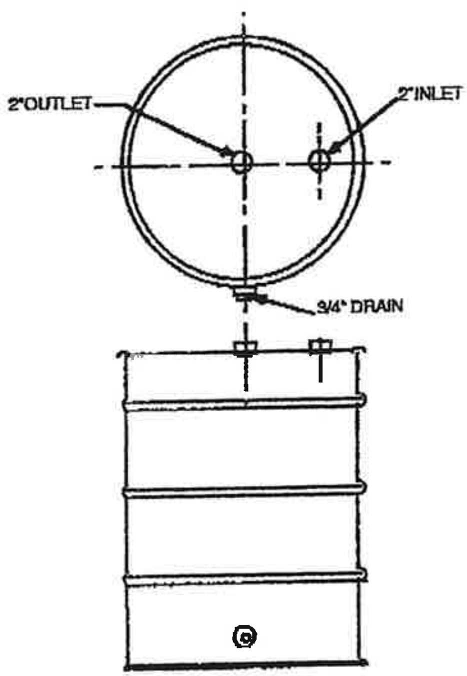
Small unit

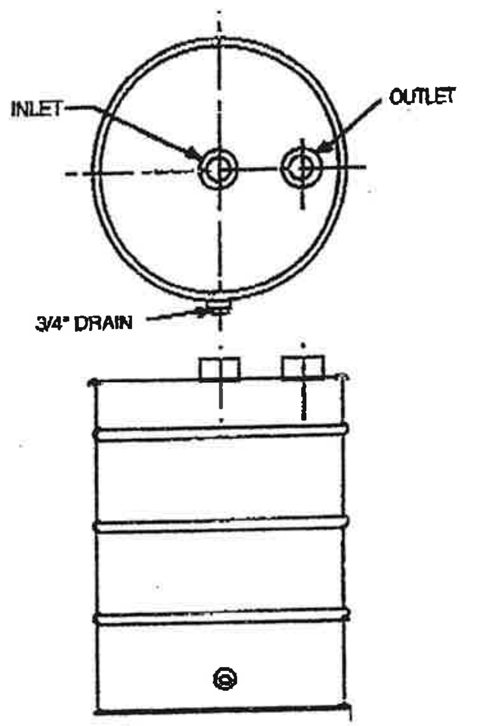
CARBTROL®

AIR PURIFICATION CANISTERS 140-200 L.B. ACTIVATED CARBON

G-1
G-2
G-3



MODEL G-1



MODEL G-2,G-3

SPECIFICATIONS

MODEL	DIAMETER/HEIGHT	CARBON WEIGHT	INLET/OUTLET	MAXIMUM RATED FLOW	APPROXIMATE SHIP WEIGHT
G-1*	24"/36"	200 lbs.	2"/2"	100 CFM	250 lbs.
G-2*	24"/36"	170 lbs.	4"/4"	300 CFM	220 lbs.
G-3P	24"/36"	140 lbs.	6"/6"	500 CFM	190 lbs.
G-3S	24"/34"	140 lbs.	4"/4"	500 CFM	180 lbs.

* Specify: Polyethylene (P) or Epoxy Lined Steel (S)

SAFETY

Certain chemical compounds in the presence of activated carbon may oxidize, decompose or polymerize. This could result in temperature increases sufficient to cause ignition of the activated carbon or adsorbed material. If a compounds reaction with activated carbon is unknown, appropriate tests should be considered.

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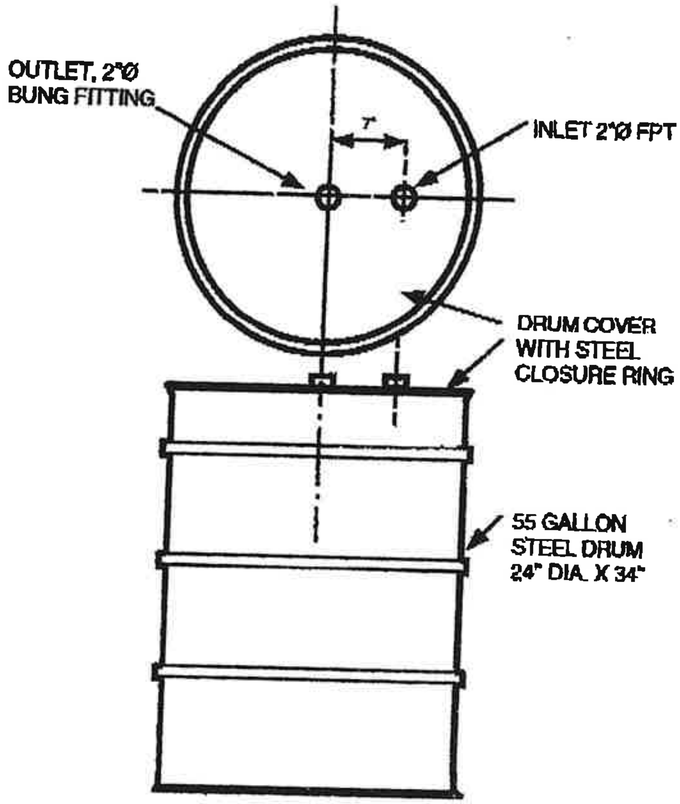

SPECIFICATION

Model:	GSE
Design Flow:	100 CFM
Design Features:	
Pressure Drop:	2.75 inch w.c. at 100 CFM
Max Operating Pressure:	10 psi
Carbon:	175 lbs. of vapor phase carbon, 4 x 8 mesh
Canister:	24" dia. x 34" steel drum, PVC internal piping. DOT rated. Acceptable for transport of hazardous waste.
Connections:	Inlet - 2" Ø FPT Outlet - 2" Ø Bung fitting Inlet and Outlet located in cover.
Shipping Weight (lbs.):	215
~~Availability:~~	~~From Stock~~

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CORPORATION

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GSE
AIR PHASE CANISTER

ARRANGEMENT	**S**	DWG **2621/3**

DTS400A / DZS400A PROGRAMMING GUIDE

MODE KEY ↓

Screen	Description	SETTING KEYS
SEt CLK	Set Clock	HOUR ➤ MIN ➤ DAY ➤ ENTER
SEt DATE	Set Date	MONTH ➤ DATE ➤ YEAR ➤ ENTER
dSt	Daylight Saving	ON OFF ➤ ENTER
St	Season 1 Begins	MONTH ➤ DATE ➤ ENTER
EN	Season 1 Ends	MONTH ➤ DATE ➤ ENTER
	Seasons 2, 3, 4	
H	Holiday Dates	MONTH ➤ DATE ➤ ENTER
	Holidays 2-24	
CH 1 SIG 1	Signal Durations	SIG/SEC ➤ ENTER
	Channel 1, Signal 2 through Channel 4, Signal 2	
SCH	Schedule Set	HOUR ➤ MIN ➤ SIG/SEC ON/OFF ➤ DAY ➤ SELCT ➤ ENTER
	All channels and Schedules	
LA LN (DZS400A only)	Astronomic Schedule	LAT ➤ ENTER ➤ DAY ➤ SELCT ➤ OFFSET
* DAY TIME	Run Mode	OVR CH1 ➤ OVR CH2 ➤ OVR CH3 ➤ OVR CH4

*After initial settings are made, unit will remain in run mode until mode key is pressed.

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4 CHANNEL DIGITAL TIME SWITCH

INSTALLATION & OPERATION

CAPABILITIES

365 Day Advance Single Holiday and Seasonal Scheduling.

ON and OFF (signal or pulse) set points.
Combined total for all channels - 99 per week
Minimum setting - 1 minute

Capable of different schedules each day of the week.

Astronomic Option **(DZS400A only)**. For Automatic ON at sunset, OFF at sunrise of outdoor lighting.

FEATURES

Holidays	1 to 24 individual dates.
Seasons	1 to 4 with different daily schedules which wrap around into the new year.
Signal Durations	1 to 99 seconds. (2 different durations per channel)
Daylight Saving	Automatic adjustment (can be omitted).
Leap Year	Automatic compensation.
Display	LCD
Manual Override	Until the next regularly scheduled ON or OFF. Automatic operation then resumes.
Clock Format	AM/PM only (although 24HR may flash, it is not available at present).
Power Outage	Permanent schedule retention for up to 40 years.
	Snap-in lithium battery maintains real time.

MLI 123(D)

ULE SHEETS LOCATED IN BACK OF THIS BOOKLET AND COMPLETE M PRIOR TO SETTING THE UNIT.

INSTRUCTIONS FOR SETTING THE UNIT

Connect unit to main power source prior to entering the settings.

First time power up - display shows 12HR

12 HR

Press **ENTER.**

Note: If screen shows 24HR, press hour key so that 12H appears instead. Then press **ENTER.** This unit will *not* accept 24 hour military format although it may appear on the screen.

After you press **ENTER** unit display shows

SEt
CLK

NOTE:

1. If 24HR format is entered in error, it can only be changed by clearing all memory. See note 4 on page 13.
2. Unit will not go to run mode unless it has clock and calendar information.
3. In any of the other setting modes, if no entry is made for 5 minutes, unit will go to run mode (time and day are displayed - colons are flashing).

1.0 TO SET THE CLOCK (Time of day and day of the week.)

Press **HOUR** to advance the time in hours to desired setting. Check AM/PM.

Press **MIN** to ad ce the time in minutes to desired setting.

Press **DAY** key to advance to today's day.

When present hour, minute and day are shown, press **ENTER.**

1.1 TO MODIFY THE CLOCK

(If the unit was already running the program, then unit will show the day of the week, hours, minutes).

Press **MODE** key. Display shows current time and day with colon *NOT* flashing and CLK symbol at the bottom.

Use **HOUR, MIN,** and **DAY** key to modify or alter the information. You must press **ENTER** to make the changes effective.

2.0 TO SET DATE

If you are setting for the first time, display will show

SEt
DATE

Press **MONTH** key. Display will show 010194

Advance month to desired setting.

Press **DATE** key to advance date.

Press **YEAR** key to advance to correct year.

When desired MONTH, DAY and YEAR are on the display, press **ENTER.**

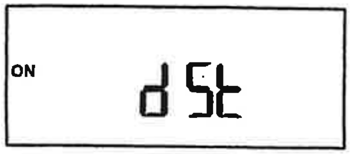
2.1 TO MODIFY OR CHANGE DATE

Press **MODE** key until display shows DATE. Use **MONTH, DATE** and **YEAR** key to modify MONTH, DATE, YEAR. Press **ENTER.**

DAYLIGHT SAVING TIME

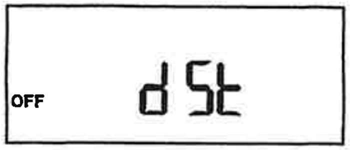
This unit is already set for automatic DAYLIGHT SAVING adjustment. If this is desired, you can proceed to section 4.0 by pressing mode key.

Display will show



To eliminate daylight saving adjustment, press **ON/OFF** key.

Display should show



Press **ENTER**. Daylight saving correction is deleted or turned off.

4.0 SEASON DURATION SET

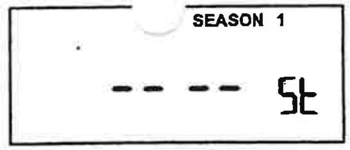
You can set up to four different seasons. If this is *NOT* needed, you can proceed to section 5.0 by pressing mode key.

Season durations are set by starting MONTH/DATE and ending MONTH/DATE:

NOTE:

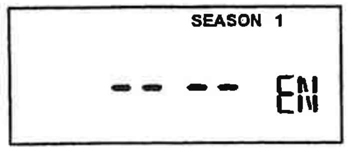
1. Each season can be set for up to 364 days.
2. Any season can cross the year boundary, i.e., season can start in the current year and end in the next year.
3. When any two or more seasons overlap, the higher numbered season has priority.

Press **MODE** key till display shows



Unit is ready to be programmed for starting MONTH and DATE for season 1.

Press **MONTH** and **DATE** keys to set MONTH and DATE for starting of season 1. Press **ENTER**. Display now shows



Use MONTH and DATE key to set ending MONTH and DATE for season 1. Press **ENTER**.

Set the start and end for other 3 seasons if desired.

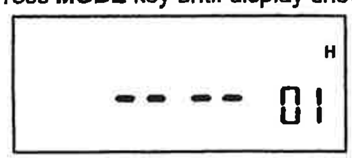
To delete an entry, press **DLETE** key.

NOTE 1: If for any reason you set starting MONTH and DATE and forget to set ending MONTH and DATE, that season becomes invalid. Unit will erase the starting date.

NOTE 2: After you define a season by its start and end dates, a specific schedule must be set for that period (see Section 7.3 Setting Days, Holidays, Seasons). If you do not assign a specific schedule to that season number (which must include day(s) of the week, on/off times, etc.) then <u>no</u> events will occur during that period. The normal everyday schedules will <u>not</u> execute.

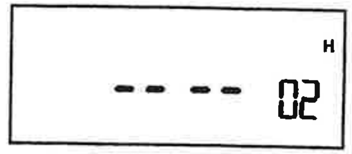
5.0 SET INDIVIDUAL HOLIDAY DATES

Press **MODE** key until display shows



NOTE:
A total of 24 individual holiday dates can be set. Each holiday is set by MONTH and DATE. The same schedule will repeat on every holiday date.

Press **MONTH** key to advance to desired month.
Press **DATE** key to advance to desired date.
Press **ENTER**. Now display shows



This means unit is ready to accept 2nd holiday date.

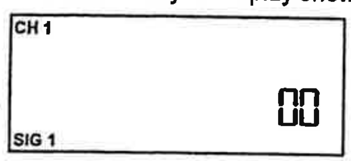
Use same procedure to set more holidays.

To delete a holiday date press the **DLETE** key. Press **ENTER.**

6.0 TO SET SIGNAL DURATIONS FOR EACH CHANNEL

If you do not require any signal settings proceed to section 7.0 by pressing mode key.

Press **MODE** key till display shows



This means unit is ready to accept signal duration (in SEC). for CH1, SIG1. (SIG1 or SIG2 can be set from 1 sec. to 99 sec.).

If you do not want CH1 as a signal timer, then select channel 2, 3, or 4 by pressing **SELCT** key. Or, you can set all channels for signal durations.

After selecting proper channel, press **SIG/SEC** key to set signal 1 duration to desired number of seconds. Press **ENTER**.

Now display automatically advances to SIG2. If you are not using SIG2, then leave 00 SEC. Press **ENTER.**

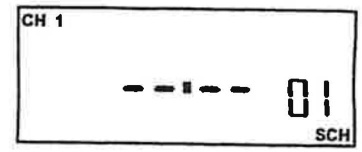
NOTE:
If you do not set SIG2 duration (leaving it 00 SEC), then make sure you never assign SIG2 in the scheduling as it will act as a constant "ON" event for that channel.

Use same procedure to set signal durations for the other channels if desired.

NOTE:
Each channel can have two independent durations.

7.0 SCHEDULE SET MODE

Press **MODE** key till display shows



In the SCHEDULE mode, the following information is set:

1. CHANNEL selection (CH1, CH2, CH3, CH4)
2. TIME: HOUR and MIN.
3. EVENT: ON or OFF (SIG1 or SIG2 *for signal* channel.)
4. DAY: DAY or DAYS combination.
5. HOLIDAY
6. SEASON: Use **SEASON** key to advance or **SELCT** to select SEASON in which this particular TIME, EVENT and DAYS combination is to occur.

NOTE: Duration for each season should have been already established.

Now you are ready to begin setting the schedules. There are a total of 99 ON/OFF events.

Press **SELCT** key to choose channel 1, 2, 3, or 4. When desir[illegible] hannel flashes, begin setting hours and minutes.

7.2 SETTING HOURS AND MINUTES

Press **HOUR** and **MIN** keys to desired setting.

a. If channel selected is being used for time ON or time OFF, press **ON/OFF** key to desired setting.

or

b. If channel selected is being used as a signal timer (you must have already set the signal durations) press **SIG/SEC** key to set for signal 1 or signal 2.

7.3 SETTING DAYS, HOLIDAY, SEASONS

MO (Monday) is flashing - If Monday is desired, press **SELCT** key. If Monday is *not* desired, press **DAY** key to pass Monday and advance to Tuesday.

a. Press **SELCT** key to select the flashing day, holiday, or season.

b. Press **DAY** key to pass the flashing day and advance to other days, holiday, and seasons.

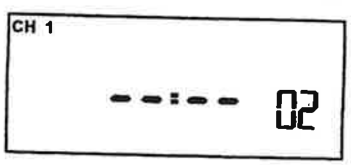
The same schedule will repeat on every holiday date.

Each season can have a different daily schedule.

NOTE: SELCT key can also be used to *delete* a day, holiday, or season *previously selected* when the aforementioned is flashing.

When you have desired time, event, steady days and season, press **ENTER**. This completes the first schedule entry.

Now display shows that SCH 02 appears on the display.



[illegible] means unit is ready to accept 2nd schedule entry.

Use same procedure [illegible] set more SCHEDULES for channel 1.

When you are finished setting schedules for channel 1, press **SELCT** key at the next blank schedule screen and CH2 will flash. You can now begin setting schedules for channel 2, followed by channels 3 and 4.

NOTE: If you have set a season(s) in section 4.0, you must assign a specific schedule to it. This schedule must include day(s) of the week, on/off times, etc.). The normal everyday schedules will <u>not</u> execute during the season period.

8.0 TO SET ASTRONOMIC SCHEDULE (Model DZS400A only).

IF YOU ARE SETTING MODEL DTS400A, SKIP TO SECTION 9.0.

Press **MODE** key until display shows

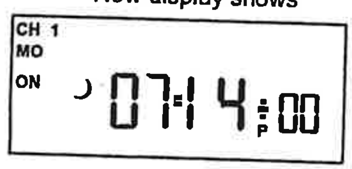
Press **SELCT** key to choose channel 1, channel 2, channel 3, or channel 4.

By default, latitude north 10° will appear on the display.

The latitude of your location can be set in this mode.

Press **LAT** key to advance to the desired # from 10° to 60° north or 10° to 60° south. Press **ENTER**. (Unit can not be used for latitudes greater than 60°).

Now display shows



(Model DZS400A only)

NOTE: Entering your latitude does not assign the astronomic function. You must enter DAYS/SEASONS while in the astro mode in order to enable this function.

Select the day(s) and/or season(s) in which you want the indicated channel to turn ON at sunset. This is done in the same way as section 7.3 "a." and 7.3 "b." using **DAY** key and **SELCT** key.
If you want the load to come on after or before sunset, you use the **OFFSET** key. A ÷ sign before the last 2 digits means the load comes ON that many minutes **after** sunset. A – sign means the load comes ON that many minutes **before** sunset.

Once desired DAYS/SEASON and OFFSET is set press **ENTER**.

Now display shows SUNRISE time along with all days and seasons displayed.

ALL DAYS TURN OFF AT SUNRISE whether or not those days were astro selected.

In this mode you can only set OFFSET for sunrise. If you want the load to turn OFF before or after sunrise, you use the **OFFSET** key. A ÷ sign before the last 2 digits means the load turns OFF that many minutes after sunrise. A – sign means the load turns OFF that many minutes before sunrise.

Unit displays CH and ASTRO along with LATITUDE.

If channel 2 is to be astronomic, press **SELCT** key to advance to CH2. Press **ENTER**. Repeat section 8.1. If the latitude was set in CH1, it will appear again and need *NOT* be changed. The same applies if you want channel 3 and/or 4 to be astronomic.

TIME ON, ASTRONOMIC OFF

(Model DZS400A only)

Set astronomic ON/OFF per section 8.0 and 8.1

To set a time OFF during the night and/or a time ON before sunrise, proceed as follows:

Press **MODE** key until schedule 01 appears

Press **ENTER** key repeatedly until the next blank schedule screen appears. Use **SELCT** key to select Channel 1, 2, 3, or 4 (whichever one is to be set for time ON or OFF during the night). Repeat for other channels if required.

Set the hours, minutes, and days per sections 7.2 "a." and 7.3. You can first set an OFF during the night and use the next blank schedule screen to set an ON before dawn.

9.0 REVIEW MODIFY AND DELETE

Use **MODE** key to advance to any of the following MODES:

1. CLOCK MODE: Use **HOUR**, **MIN**, and **DAY** keys to modify existing settings. Press **ENTER**.
2. DATE MODE: Use **MONTH**, **DATE**, and **YEAR** keys to modify existing settings. Press **ENTER**.
3. DST → Daylight Saving is automatic. You do not have to enter start and stop dates. Unit calculates 1st Sunday of April and last Sunday of October. You do not have to remember to change every year. To eliminate, press **ON/OFF** key to OFF. Press **ENTER**.

4. SEASON MODE: Seasons duration can be change · deleted. Press **MONTH** and **DATE** keys or ..ETE key. Press **ENTER** to confirm.
5. HOLIDAY MODE: Similar procedure as above can be used for the holidays. Press **ENTER.**
6. SIGNAL MODE: You can review previously entered information. Use **DLETE** key to delete or use SIG/SEC key to alter the duration. Press **ENTER** to confirm.

To eliminate a signal time or all signal times, you must eliminate those set points. By only setting SIG duration to 00, it will act as SIG2 ON and SIG1 OFF.

7. SCHEDULE MODE: Schedule review, modify, delete. You can modify the schedule entry using **HOUR, MIN, ON/OFF (SIG/SEC)** key and **SELCT** key. Press **ENTER** after each modification.

   To delete, simply press the **DLETE** key when unwanted information is on display. This will blank the entry. Press **ENTER** to confirm. Do not leave the MODE without pressing **ENTER.**
8. ASTRO MODE: (Model DZS400A). Press **LAT** key to change latitude. Press **ENTER.** Press **DAY** key and **SELCT** key to add or delete days in the sunset mode. Press **OFFSET** key to change offset time for sunset or sunrise. Press **ENTER** after each.
9. RUN MODE: Time and day is displayed. If today is a programmed holiday, the **H** will be displayed steady. If today falls within a programmed season, that season # will be displayed.

10.0 OVERRIDE

OVR1, **OVR2**, **OVR3**, and **OVR4** (override keys) are effective only in the **run mode.**

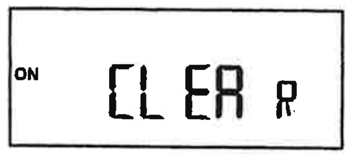
If a channel is scheduled for ON/OFF (non-signal timer), then that channel will change the present load

status until the next scheduled event. CH# will flash when the load is overrid' 'rom scheduled event.

If the channel is a signal timer, then load will turn on each time the override key is pressed for the length of SIG1 duration. CH# will flash while the load is on. While the signal is in progress, it can be terminated by using override key.

NOTES:
1. Unit will go to RUN MODE automatically if no key is pressed for five minutes.
2. Units do not have look back feature. If you have just finished setting the unit and an output is to be presently ON, press the **OVR** key to turn it On. Unit will automatically pick up the regular schedule thereafter.
3. Units do not have stagger start.
4. Clear all memory. All memory can be cleared using the following procedure: while in the RUN mode, press **Enter** key, display shows:

Use ON/OFF key to display:



Now press ENTER briefly and everything in the timer memory is wiped off including real time and date.

		End Date	Description
2			
3			
4			

Holiday (H)		
#	Date	Description
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		

Signal Durations (seconds)		
	Sig. 1	Sig. 2
Channel 1		
Channel 2		
Channel 3		
Channel 4		

				Schedule		Signal										Season			
Sch.#	Ch.#	Load Description	Time	ON	OFF	1	2	MO	TU	WE	TH	FR	SA	SU	H	1	2	3	4

Appendix 7

10/2/03 2:37 PM

VAPOR PHASE CARBON USAGE ESTIMATE

PROJECT: Lake Shore Env RI Astoria NY - Lowest Concentrations

FLOW IN CFM: 100.00
FLOW IN CFD: 144000.00

PERFORMANCE:

CONTAMINANT	CONC(ppmv)	#CONT /DAY	#CARBON /DAY	#CONT /100,000cf	#CARBON /100,000cf
cis-1,2-Dichloroethylene	17	0.61	7.29	0.42	5.06
Trichloroethylene	26.3	1.27	5.15	0.88	3.58
Tetrachloroethylene	144	8.77	16.53	6.09	11.48
TOTALS	187.3	10.65	28.97	7.39	20.12

Calculation based on CARBTROL CSV carbon having a Carbon Tetrachloride number of: 65.00

NOTE: Carbon Usage Estimate is based on vapor stream temperature of 77 deg F and Relative Humidity less than 50%. In particular, adsorption of chlorinated hydrocarbons is adversely affected by elevated humidity.

10/2/03 2:34 PM

VAPOR PHASE CARBON USAGE ESTIMATE

PROJECT: Lake Shore Env RI Astoria NY - Highest Concentrations

FLOW IN CFM: 100.00
FLOW IN CFD: 144000.00

PERFORMANCE:

CONTAMINANT	CONC(ppmv)	#CONT /DAY	#CARBON /DAY	#CONT /100,000cf	#CARBON /100,000cf
Vinyl Chloride	0.168	0.00	0.96	0.00	0.67
1,1-Dichloroethylene	0.118	0.00	0.20	0.00	0.14
t-1,2-Dichloroethylene	0.226	0.01	0.32	0.01	0.22
1,1-Dichloroethane	1.15	0.04	0.92	0.03	0.64
cis-1,2-Dichloroethylene	65.5	2.34	19.42	1.63	13.49
1,1,1-Trichloroethane	2.64	0.13	0.57	0.09	0.40
Trichloroethylene	75.1	3.63	12.26	2.52	8.52
Toluene	0.0985	0.00	0.02	0.00	0.02
Tetrachloroethylene	570	34.70	56.25	24.10	39.06
TOTALS	715.0005	40.87	90.92	28.38	63.14

Calculation based on CARBTROL CSV carbon having a Carbon Tetrachloride number of: 65.00

NOTE: Carbon Usage Estimate is based on vapor stream temperature of 77 deg F and Relative Humidity less than 50%. In particular, adsorption of chlorinated hydrocarbons is adversely affected by elevated humidity.

Appendix 8

Photograph 1: View of sealed area behind oxidizer shed in Inner Warehouse.

Photograph 2: View of sealed concrete around risers for soil vapor extraction system laterals in northeastern portion of Outer Warehouse.

Photograph 3: Close-up view of sealed concrete around risers for soil vapor extraction system laterals in northeastern portion of Outer Warehouse.

Photograph 4: View of sealed potential vapor migration pathway in office area.

Photograph 5: View of sealed potential vapor migration pathway in office area.

APPENDIX 9

OPERATIC ; MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 11/12/03 start up

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*
* = Site check frequency will increase after system charges/modifications.

General System Operation	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks. etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells / **Horizontal SVE Wells**

	PID Readings (ppmv)		Vacuum Readings (in-H2O)		PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1				HSVE-1			
SVE-2				HSVE-2			
SVE-3				HSVE-3			
SVE-4				HSVE-4			
SVE-5				HSVE-5			
SVE-6				HSVE-6			
SVE-7				HSVE-7			
SVE-8							

Insitu Air Sparging (Reserved)

Notes:

PID not operating properly

OPERATI... MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 11/13/03 (EJD)

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	N/A
Blower Pressure (in-H2O)	N/A
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

It appears. that water is not currently being pulled through the unit. The drum is empty.

OPERA... & MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 1/11/03 (JD)

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	Na
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OPERA… … MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 11/17/03

General System Operation	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	N/A
Blower Pressure (in-H2O)	N/A
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OPER... MAINTENANCE CHECKLIST
Soil V... ir Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 11/18/03

General System Operation

	Y/N/X
Blower operation	N
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	N/A
Blower Pressure (in-H2O)	N/A
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OPER[illegible] MAINTENANCE CHECKLIST
Soil V[illegible]r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 11/19/03

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	n/a
Blower Pressure (in-H2O)	n/a
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	200	
HSVE-6	6	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPER... MAINTENANCE CHECKLIST
Soil V... r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 11/20/03

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	n/a
Blower Pressure (in-H2O)	n/a
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	100	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPER[illegible] MAINTENANCE CHECKLIST
Soil [illegible]r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 11/21/03

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	100	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPER[illegible] MAINTENANCE CHECKLIST
Soil V[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 12/4/03

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	n/a
Blower Pressure (in-H2O)	n/a
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	5	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	100	
HSVE-6	5	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPER[illegible] MAINTENANCE CHECKLIST
Soil [illegible]ir Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 12/12

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	N/A
Blower Pressure (in-H2O)	N/A
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	3	
HSVE-5	100	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPER MAINTENANCE CHECKLIST
Soil V r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 12/19

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	N/A
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	40	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPER[illegible] MAINTENANCE CHECKLIST
Soil V[illegible]r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 12/22

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y:N:X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	N/A
Blower Pressure (in-H2O)	N/A
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1			
SVE-2			
SVE-3			
SVE-4			
SVE-5			
SVE-6			
SVE-7			
SVE-8			

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	40	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPER[illegible] MAINTENANCE CHECKLIST
Soil [illegible]r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 12/29/3

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPERATIC[illegible] MAINTENANCE CHECKLIST
Soil V[illegible]r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 1/5/04

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will Increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	N/A
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPERATIC . MAINTENANCE CHECKLIST
Soil V r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 1/14/04

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

OPE[illegible] MAINTENANCE CHECKLIST
Soil [illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 1/21/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

System Performance

Blower Vacuum (in-H2O)	1.89
Blower Pressure (in-H2O)	10.8
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

0-10" 0-1.0" 0-1.0" 0-10"

0 - .25"
0 - 1.0"
0 - 10" vac 6.0"

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	0	

Insitu Air Sparging (Reserved)

Notes:

SVE Monitoring Data
January, 30, 2004

	Well #	PID response	Vacuum (IW)	Comments	
Horizontals	1	0	0.13	± 0.03	Suction Side of Blower = 13 IW 113 cfm
	2	0	0.12	± 0.02	Pressure Side of Blower = 5 IW 127 cfm
	3	0	0.13	± 0.02	
	4	0	0.33	± 0.04	
	5	0	0.00		
	6	0	0.12	± 0.01	
	7	0	0.05	± 0.01	
Vertical (individually)	1	0	7		
	2	0	40+	Drawing water	
	3	0	30		
	4	0	22		
	5	0	39		
	6	0	32		
	7	0	29		
	8	0	0		
Vertical (1,3-7 open)	1	0	2.3		Suction Side of Blower = 14.5 IW
	2	-	-	closed	Pressure Side of Blower = 5.5 IW
	3	0	2.9		
	4	0	2.6		
	5	0	2.5		
	6	0	2.5		
	7	0	2.6		
	8	-	-	closed	

SVE Parameter Evaluation Test
Triumvirate - Astoria, NY 9/11

Horizontal SVE Well Nomenclature: 4 inch manifold pipe designated HSVE-1 from left to right (NE to SW) facing wall of vault.
Vertical SVE Well Nomenclature: 2" manif. designated VSVE-1to 4 from left to right (NE to SW) and VSVE-5 to 8 from left to right in front of rear stubouts.
PID Screening: Using Thermoelectron 580B calibrated to 100 ppmv as isobutylene.

0 – 10

HSVE Test No.:	1
Duration:	56 min.
Start Time:	10:00
End Time:	10:58

Time:	10:01	10:08	10:26	10:54
Blower Vacuum (in H20):	7			
PID Discharge Reading (ppmv):	180	147	149	150

Vertical SVE Well:		VSVE-1	VSVE-2	VSVE-3	VSVE-4	VSVE-5	VSVE-6	VSVE-7	VSVE-8
Measured Vacuum Influence:		0.05	0.05	0.05	0.04	0.12	0.09	0.06	0.07

Horizontal SVE Well:		HVSVE-1	HSVE-2	HSVE-3	HSVE-4	HSVE-5	HSVE-6	HSVE-7
Measured Vacuum Influence:		Test Well	0.17	0	0.12	0.07	0.08	0.02

Notes: No water uptake.

HSVE Test No.:	2
Duration:	40 min.
Start Time:	10:58
End Time:	11:38

Time:	10:59	11:22	11:38	
Blower Vacuum (in H20):	6.5		6.5	
PID Discharge Reading (ppmv):	180	188	188	

Vertical SVE Well:		VSVE-1	VSVE-2	VSVE-3	VSVE-4	VSVE-5	VSVE-6	VSVE-7	VSVE-8
Measured Vacuum Influence:		0.05	0.06	0.07	0.04	0.09	0.08	0.1	0.12

Horizontal SVE Well:		HVSVE-1	HSVE-2	HSVE-3	HSVE-4	HSVE-5	HSVE-6	HSVE-7
Measured Vacuum Influence:		0.17	Test Well	0.04	0.17	0.11	0.1	0.02

Notes: No water uptake.

SVE Parameter Evaluation Test
Triumvirate - Astoria, NY

Horizontal SVE Well Nomenclature: 4 inch manifold pipe designated HSVE-1 from left to right (NE to SW) facing wall of vault.
Vertical SVE Well Nomenclature: 2" manif. designated VSVE-1to 4 from left to right (NE to SW) and VSVE-5 to 8 from left to right in front of rear stubouts.
PID Screening: Using Thermoelectron 580B calibrated to 100 ppmv as isobutylene.

HSVE Test No.:	***3***
Duration:	<1 min.
Start Time:	11:44
End Time:	11:45

Time:	11:44			
Blower Vacuum (in H20):	NA			
PID Discharge Reading (ppmv):	NA			

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:									

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:				Test Well				

Notes: Water uptake shut down blower after 5-10 seconds of operation. Drained blower/pipe.
Restarted w/ valve mostly closed. Pulled water immediately upon cracking valve.

HSVE Test No.:	***4***
Duration:	27 min.
Start Time:	12:00
End Time:	12:27

Time:	12:01	12:02	12:10	12:17	12:27
Blower Vacuum (in H20):	7			7.5	
PID Discharge Reading (ppmv):	542	415	324	300	280

Sum A = 715 ppmv tot. VOCs
PID = 251 ppmv as isobutylene
2.84 X

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.09	0.19	0.14	0.06	0.21	0.18	0.13	0.1

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		0.1	0.12	0.23	Test Well	0.17	0.18	0.03

Notes: No water uptake. Collected SVE Discharge Vapor Sample **HSVE-4**.

SVE Parameter Evaluation Test
Triumvirate - Astoria, NY

Horizontal SVE Well Nomenclature: 4 inch manifold pipe designated HSVE-1 from left to right (NE to SW) facing wall of vault.
Vertical SVE Well Nomenclature: 2" manif. designated VSVE-1to 4 from left to right (NE to SW) and VSVE-5 to 8 from left to right in front of rear stubouts.
PID Screening: Using Thermoelectron 580B calibrated to 100 ppmv as isobutylene.

HSVE Test No.:	***5***
Duration:	32 min.
Start Time:	12:30
End Time:	1:02

Time:	12:31	12:59		
Blower Vacuum (in H20):	7	7		
PID Discharge Reading (ppmv):	187	235		

Suma = 491 ppmv tot. vocs
PID = 214 ppmv
2.3 X

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.19	0.16	0.15	0.12	0.11	0.13	0.08	0.11

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		0.07	0.1	0.2	0.18	na	0.29	0.07

Notes: No water uptake. Collected SVE Discharge Vapor Sample **HSVE-5** over 6 min (cooresponding PID reading:214ppmv).

HSVE Test No.:	***6***
Duration:	35 min.
Start Time:	1:03
End Time:	1:38

Time:	12:01	12:02	1:37	1:38	
Blower Vacuum (in H20):	7		7		
PID Discharge Reading (ppmv):	400	330		290	

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.14	0.27	0.23	0.11	0.14	0.13	0.09	0.09

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		0.07	0.1	0.15	0.17	0.27	na	0.07

Notes: No water uptake.

SVE Parameter Evaluation Test
Triumvirate - Astoria, NY

Horizontal SVE Well Nomenclature: 4 inch manifold pipe designated HSVE-1 from left to right (NE to SW) facing wall of vault.
Vertical SVE Well Nomenclature: 2" manif. designated VSVE-1to 4 from left to right (NE to SW) and VSVE-5 to 8 from left to right in front of rear stubouts.
PID Screening: Using Thermoelectron 580B calibrated to 100 ppmv as isobutylene.

HSVE Test No.:	7
Duration:	21 min.
Start Time:	1:39
End Time:	2:00

Time:	1:40	1:44	1:59	2:00
Blower Vacuum (in H20):	6.5		6.5	
PID Discharge Reading (ppmv):	65	70		88

Suma = 186 ppmv tot. voc
PID = 92 ppmv
2.02 x

Vertical SVE Well:		**VSVE-1**	**VSVE-2**	**VSVE-3**	**VSVE-4**	**VSVE-5**	**VSVE-6**	**VSVE-7**	**VSVE-8**
Measured Vacuum Influence:		0.13	0.1	0.09	0.13	0.09	0.09	0.03	0.04

Horizontal SVE Well:		**HVSVE-1**	**HSVE-2**	**HSVE-3**	**HSVE-4**	**HSVE-5**	**HSVE-6**	**HSVE-7**
Measured Vacuum Influence:		0.03	0.03	0.05	0.06	0.09	0.09	Test Well

Notes: No water uptake. Collected SVE Discharge Vapor Sample **HSVE-7** over 3 min (cooresponding PID reading: 92 ppmv).

OPER... MAINTENANCE CHECKLIST
Soil V... traction System - Triumvirate Environmental, Inc.
Astoria, N...

Date: 1/30/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	X

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	6
Blower Pressure (in-H2O)	7/0
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	X N/A	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OP[illegible]TIO[illegible] MAINTENANCE CHECKLIST
Soi[illegible]r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 2/2/04

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications

System Performance

Blower Vacuum (in-H2O)	6
Blower Pressure (in-H2O)	710
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	0	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OI[illegible] MAINTENANCE CHECKLIST
Soi[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 2/3/04

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	0		
SVE-2	0		
SVE-3	0		
SVE-4	0		
SVE-5	0		
SVE-6	0		
SVE-7	0		
SVE-8	0		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OP[illegible] MAINTENANCE CHECKLIST
So[illegible] r Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 2/4/08

General System Operation

General System Operation	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells / **Horizontal SVE Wells**

	PID Readings (ppmv)	Vacuum Readings (in-H2O)		PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0		HSVE-1		
SVE-2	0		HSVE-2		
SVE-3	0		HSVE-3		
SVE-4	0		HSVE-4		
SVE-5	0		HSVE-5		
SVE-6	0		HSVE-6		
SVE-7	0		HSVE-7		
SVE-8	0				

Insitu Air Sparging (Reserved)

Notes:

OPERA[illegible] MAINTENANCE CHECKLIST
Soil V[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 2/5/04

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	X

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	0		
SVE-2	X		
SVE-3	0		
SVE-4	0		
SVE-5	0		
SVE-6	0		
SVE-7	0		
SVE-8	X		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OPERATION & MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 2/6/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	X	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	X	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OPER/ [illegible] MAINTENANCE CHECKLIST
Soil V[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 2/13/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	Y

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	6
Blower Pressure (in-H2O)	>10
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	X	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	X	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

OP[illegible] MAINTENANCE CHECKLIST
Soi[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 2/17/04

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	Y

System Performance

Blower Vacuum (in-H2O)	6
Blower Pressure (in-H2O)	>10
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells / Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)		PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0		HSVE-1		
SVE-2	X		HSVE-2		
SVE-3	0		HSVE-3		
SVE-4	0		HSVE-4		
SVE-5	0		HSVE-5		
SVE-6	0		HSVE-6		
SVE-7	0		HSVE-7		
SVE-8	X				

Insitu Air Sparging (Reserved)

Notes:

MAINTENANCE CHECKLIST
Soil V... ...xtraction System - Triumvirate Environmental, Inc.
Astoria, N...

Date: 2/27/01

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	6
Blower Pressure (in-H2O)	10
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	0		
SVE-2	X		
SVE-3	0		
SVE-4	0		
SVE-5	0		
SVE-6	0		
SVE-7	0		
SVE-8	X		

Horizontal SVE Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
HSVE-1			
HSVE-2			
HSVE-3			
HSVE-4			
HSVE-5			
HSVE-6			
HSVE-7			

Insitu Air Sparging (Reserved)

Notes:

Soil V[illegible] [illegible]traction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 3/30/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	6
Blower Pressure (in-H2O)	>10
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	X	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	X	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

Soil V[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, N[illegible]

Date: 4/29/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	6
Blower Pressure (in-H2O)	210
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	0		
SVE-2	X		
SVE-3	0		
SVE-4	0		
SVE-5	0		
SVE-6	0		
SVE-7	0		
SVE-8	X		

Horizontal SVE Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
HSVE-1			
HSVE-2			
HSVE-3			
HSVE-4			
HSVE-5			
HSVE-6			
HSVE-7			

Insitu Air Sparging (Reserved)

Notes:

OPERATION & MAINTENANCE CHECKLIST
Soil Vapor E[illegible]tion System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 5/4/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	1

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

IAS Start up.

* Start w/ CH-1 @ 9:00 AM. Ran for 15 min before turning off to get hardware screws.
* start CH-2 @ 10 AM
* switch to CH-1 @ 11:00

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

General Compressor Operation: OK

IAS Pressure Readings:

		Pressure Gauge (psi)		Air Flow (cfm)		Indiv.
#1	IAS-1	11	5.5	4.5	9.5	8-9 max
#1	IAS-2	7.5	5.5	4.75	7.5	6-7
#1	IAS-3	5.75	5.5	5	5.75	14
#2	IAS-4	6.5		6	SCFM	
#2	IAS-5	7		6		
#2	IAS-6	7.5				

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-	
SGP-	
SGP-	

Notes:

1. Electricians had left SVE blower operating in reverse for previous 2 wks, so we corrected flow direction + left on over-night w/ all SVE wells open.

OPERATION & MAINTENANCE CHECKLIST
Soil V Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 5/13

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	0

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	33
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells / **Horizontal SVE Wells**

	PID Readings (ppmv)	Vacuum Readings (in-H2O)		PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	58		HSVE-1	11	
SVE-2	34		HSVE-2	10	
SVE-3	20		HSVE-3	19	
SVE-4	22		HSVE-4	27	
SVE-5	21		HSVE-5	2	
SVE-6	27		HSVE-6	16	
SVE-7	175		HSVE-7	6	
SVE-8	145				

Insitu Air Sparging (Reserved)

General Compressor Operation: ____________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	35
SGP-6:	20
SGP-2:	28
SGP-11	145
SGP-12	0
SGP-13	0

Notes:

OPERAT[illegible] & MAINTENANCE CHECKLIST
Soil Vap[illegible]xtraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 5/14

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	0

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	33
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	55	
SVE-2	35	
SVE-3	17	
SVE-4	20	
SVE-5	18	
SVE-6	35	
SVE-7	171	
SVE-8	142	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	11	
HSVE-2	10	
HSVE-3	18	
HSVE-4	27	
HSVE-5	2	
HSVE-6	14	
HSVE-7	6	

Insitu Air Sparging (Reserved)

General Compressor Operation: ____________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	33
SGP-6:	20
SGP-2:	23
SGP-11	141
SGP-12	8
SGP-13	0

Notes:

Drum is Empty

OPERA… & MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 5/19

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	O

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	31.5
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	55	
SVE-2	35	
SVE-3	17	
SVE-4	20	
SVE-5	18	
SVE-6	35	
SVE-7	171	
SVE-8	142	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	11	
HSVE-2	10	
HSVE-3	18	
HSVE-4	37	
HSVE-5	1	
HSVE-6	16	
HSVE-7	6	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	32
SGP-6:	22
SGP-2:	22
SGP-11	141
SGP-12	0
SGP-13	0

Notes:

Drum is empty

OPERA & MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 5/21

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	0

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	315
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	54	
SVE-2	34.9	
SVE-3	16.8	
SVE-4	20.4	
SVE-5	18.1	
SVE-6	34.4	
SVE-7	171	
SVE-8	143	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	11.3	
HSVE-2	10.1	
HSVE-3	18	
HSVE-4	26.8	
HSVE-5	1.5	
HSVE-6	15.5	
HSVE-7	6	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______
IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	32.4
SGP-6:	20.3
SGP-2:	28.4
SGP-11	141
SGP-12	0
SGP-13	0

Notes: SVE pipe 40ppm HSVE main pipe 17ppm Drum is empty

OPER N & MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 5/28

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	0

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	31
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells	PID Readings (ppmv)	Vacuum Readings (in-H2O)	Horizontal SVE Wells	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	53		HSVE-1	14	
SVE-2	25		HSVE-2	10	
SVE-3	17.5		HSVE-3	19.5	
SVE-4	11		HSVE-4	29	
SVE-5	18.5		HSVE-5	1	
SVE-6	32		HSVE-6	13.4	
SVE-7	180		HSVE-7	.4	
SVE-8	145				

Insitu Air Sparging (Reserved)

General Compressor Operation: ____

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	32.1
SGP-6:	20
SGP-2:	28.4
SGP-11	140
SGP-12	0
SGP-13	0

Notes: SVE main pipe 40ppm NSVE main pipe 16ppm

OPER. MAINTENANCE CHECKLIST
Soil Vapor ...action System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 6/4/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	26
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	45.8		
SVE-2	23.5		
SVE-3	20.2		
SVE-4	15.6		
SVE-5	20.8		
SVE-6	36		
SVE-7	167		
SVE-8	112		

Horizontal SVE Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
HSVE-1	10.4		
HSVE-2	12.2		
HSVE-3	22.1		
HSVE-4	27.5		
HSVE-5	6.1		
HSVE-6	14.3		
HSVE-7	.5		

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9 (Rollup (STL))	241
SGP-6 (Alley)	17.4
SGP-2 (sidewalk)	28.6
SGP-11	140
SGP-12	34.3
SGP-13	308

Notes:
SVE Main pipe - 42.1 HSVE main pipe - 17.1

OP[illegible]TIO[illegible] MAINTENANCE CHECKLIST
Soil Vapor [illegible]raction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 6/4/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	x
Air/Water Knockout	x
1,000 LB GAC Unit	x
200 LB GAC Unit	x
System Leaks, etc.	x
System Down Time Since Last Check	x

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	26
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	45.8		
SVE-2	23.5		
SVE-3	20.2		
SVE-4	15.6		
SVE-5	20.8		
SVE-6	36		
SVE-7	167		
SVE-8	112		

Horizontal SVE Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
HSVE-1	10.4		
HSVE-2	12.2		
HSVE-3	22.1		
HSVE-4	27.5		
HSVE-5	1.1		
HSVE-6	14.3		
HSVE-7	.5		

Insitu Air Sparging (Reserved)

General Compressor Operation: ________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9 (Billing (S.T.L.))	241
SGP-6 (Alley)	17.4
SGP-2 (sidewalk)	28.6
SGP-11	140
SGP-12	34.3
SGP-13	308

Notes:
SVE Main pipe - 42.1
HSVE main pipe - 17.1

OPERA[illegible] & MAINTENANCE CHECKLIST
Soil Vapo[illegible] raction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 6/11/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	Y

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	24
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells / **Horizontal SVE Wells**

	PID Readings (ppmv)		Vacuum Readings (in-H2O)		PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	52.1			HSVE-1	11.2		
SVE-2	15			HSVE-2	10.2		
SVE-3	23			HSVE-3	2.9		
SVE-4	14.5			HSVE-4	31		
SVE-5	.4			HSVE-5	1		
SVE-6	54.1			HSVE-6	17.5		
SVE-7	16.7			HSVE-7	.6		
SVE-8	102						

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings: / Soil Gas Readings:

	Pressure Gauge (psi)	Air Flow (cfm)		PID (ppmv)
IAS-1			SGP-9	
IAS-2			SGP-6	
IAS-3			SGP-2	
IAS-4			SGP-	
IAS-5			SGP-	
IAS-6			SGP-	

Notes: Main SVE - 35" Main HSVE - 19

OPERA... & MAINTENANCE CHECKLIST
Soil Vapo... traction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 6/14/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	Y

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	Ø	
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	Ø	
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	Ø
SGP-6:	Ø
SGP-2:	
SGP-12	Ø
SGP-11	13
SGP-13	Ø

Notes:

OPER... & MAINTENANCE CHECKLIST
Soil Vapo... traction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 6/21

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	7
Blower Pressure (in-H2O)	7
PID Reading -GAC Inlet (ppmv)	2
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	32		
SVE-2	5		
SVE-3	2		
SVE-4	4		
SVE-5	0		
SVE-6	34		
SVE-7	167		
SVE-8	102		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	11	
HSVE-2	10	
HSVE-3	23	
HSVE-4	31	
HSVE-5	1	
HSVE-6	17	
HSVE-7	.4	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings.

	PID (ppmv)
SGP-9:	38
SGP-6:	12
SGP-2:	24
SGP-11	170
SGP-12	34
SGP-13	50

Notes:

NY DEP ...

...ERATIO... & MAINTENANCE CHECKLIST
...il Vapo... ...traction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 7/23/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	Y

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	6
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	0	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	6	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	52	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	0
SGP-6:	0
SGP-2:	0
SGP-12	0
SGP-11	14
SGP-13	0

Notes:

O. ... & MAINTENANCE CHECKLIST
Soil Vap... ...traction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 7/30/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	6
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	0	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	35	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	0
SGP-6:	0
SGP-2:	0
SGP-12	0
SGP-11	13
SGP-13	0

Notes:

OPERA[illegible] & MAINTENANCE CHECKLIST
Soil Vapo[illegible]raction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 8/6/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	5
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	6	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	49	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______
IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	6
SGP-6:	0
SGP-2:	0
SGP-12	0
SGP-11	14
SGP-13	0

Notes:

OPERA & MAINTENANCE CHECKLIST
Soil Vapo traction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 8/12/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	5
PID Reading -GAC Intermediate (ppmv)	8
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	0	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	50	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______
IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	0
SGP-6:	0
SGP-2:	0
SGP-12	0
SGP-11	15
SGP-13	0

Notes:

OPERA & MAINTENANCE CHECKLIST
Soil Vapo. raction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 8/20/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	5
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	6	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	0	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	57	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	0
SGP-6:	0
SGP-2:	0
SGP-11	15
SGP-12	0
SGP-13	0

Notes:

OPERA & MAINTENANCE CHECKLIST
Soil Vapo raction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 9/27/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	Y

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	'
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	0
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	0	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	46	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______
IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	0
SGP-6:	0
SGP-2:	0
SGP-12	0
SGP-11	13
SGP-10	0

Notes:

OPERATIC[illegible] & MAINTENANCE CHECKLIST
Soil Var[illegible] traction System - Triumvirate Environmental, Inc.
Astoria, N[illegible]

Date: 9/3/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	0		
SVE-2	0		
SVE-3	0		
SVE-4	0		
SVE-5	0		
SVE-6	0		
SVE-7	0		
SVE-8	0		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	45	

Insitu Air Sparging (Reserved)

General Compressor Operation: ____________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	0
SGP-6:	0
SGP-2:	0
SGP-12	0
SGP-11	13
SGP-13	0

Notes:

OPERATI[illegible] & MAINTENANCE CHECKLIST
Soil Vap[illegible]traction System - Triumvirate Environmental, Inc.
Astoria, N[illegible]

Date: 9/10/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	Y
System Down Time Since Last Check	Y

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	0	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	6	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	2	
HSVE-7	45	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	0
SGP-6:	0
SGP-2:	0
SGP-12	0
SGP-11	13
SGP-13	0

Notes:

OPERATI[illegible] & MAINTENANCE CHECKLIST
Soil Vap[illegible] [illegible]traction System - Triumvirate Environmental, Inc.
Astoria, N[illegible]

Date: 9/17/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	X
200 LB GAC Unit	Y
System Leaks, etc.	X
System Down Time Since Last Check	X

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	0	
SVE-2	0	
SVE-3	0	
SVE-4	0	
SVE-5	0	
SVE-6	0	
SVE-7	0	
SVE-8	0	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	0	
HSVE-2	0	
HSVE-3	0	
HSVE-4	0	
HSVE-5	0	
HSVE-6	0	
HSVE-7	44	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______
IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	0
SGP-6:	0
SGP-2:	0
SGP-12	0
SGP-11	13
SGP-13	0

Notes:

OPERATIO[illegible] MAINTENANCE CHECKLIST
Soil Vapo[illegible]action System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 9/25/04

General System Operation

	Y/N/X
Blower operation	X
Air/Water Knockout	X
1,000 LB GAC Unit	X
200 LB GAC Unit	X
System Leaks, etc.	X
System Down Time Since Last Check	X

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance Sage TEI

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	.8
PID Reading -GAC Intermediate (ppmv)	1.3
PID Reading -GAC Outlet (ppmv)	0

256 ppm
320 ppm

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv) TEI	Sage	Vacuum Readings (in-H2O)
SVE-1	22.1	1.5	
SVE-2	450	8	
SVE-3	4	0	
SVE-4	8	0	
SVE-5	19	14.2	
SVE-6	7.6	3.4	
SVE-7	13.4	.4	
SVE-8	8	0	
Main	16	9.6	

Horizontal SVE Wells (TEI / Sage)

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	176 / 0	
HSVE-2	145 / .3	
HSVE-3	35.2 / .5	
HSVE-4	28 / .7	
HSVE-5	27 / .3	
HSVE-6	20.3 / 8	
HSVE-7	8.4 / .3	
Main	6.51 / 3	

Insitu Air Sparging (Reserved)

General Compressor Operation: ________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-	
SGP-	
SGP-	

Notes:

Astoria, NY

Date: ~~9/30/04~~, 10/4/04

General System Operation

	Y/N/X
Blower operation	
Air/Water Knockout	
1,000 LB GAC Unit	
200 LB GAC Unit	
System Leaks, etc.	
System Down Time Since Last Check	

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	480
PID Reading -GAC Intermediate (ppmv)	260
PID Reading -GAC Outlet (ppmv)	415 ppm

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	ppm 65	
SVE-2	ppm 85	
SVE-3	ppm 60	
SVE-4	ppm 85	
SVE-5	ppm 86	
SVE-6	〃 92	
SVE-7	ppm 106	
SVE-8	〃 130ppm	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	73	
HSVE-2	81	
HSVE-3	75	
HSVE-4	120	
HSVE-5	100	
HSVE-6	110	
HSVE-7	90	

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

SVE TOTAL → 70 HSVE TOTAL → 55

Astoria, NY ... Environmental, Inc.

Date: 10/5/04

General System Operation

	Y/N/X
Blower operation	
Air/Water Knockout	
1,000 LB GAC Unit	
200 LB GAC Unit	
System Leaks, etc.	
System Down Time Since Last Check	

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

General Compressor Operation: ____
IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:
No readings taken - System shut down for carbon change out & maintenance. Scheduled to be turned back on on 10/6/04.

Astoria, NY

Environmental, Inc.

Date: 10/8/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	# 3 days

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

System turned back on @ ~~#~~ 11:30 a.m. Blower activated while air compressor could not be turned. Sage Environmental called for Maintenance/Assistance. Compressor scheduled to be looked ...

Astoria, NY — Environmental, Inc.

Date: 10/12/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

System Performance		
Blower Vacuum (in-H2O)		
Blower Pressure (in-H2O)		
PID Reading -GAC Inlet (ppmv)	~~216~~	~~[illegible]~~ 520
PID Reading -GAC Intermediate (ppmv)	~~[illegible]~~	45
PID Reading -GAC Outlet (ppmv)		10

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	70	
SVE-2	118	
SVE-3	73	
SVE-4	90	
SVE-5	105	
SVE-6	83	
SVE-7	193	
SVE-8	235	

SVE (total) – 51

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	325	
HSVE-2	97	
HSVE-3	150	
HSVE-4	260	
HSVE-5	545	
HSVE-6	580	
HSVE-7	450	

HSVE (TOTAL) – 115

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Astoria, NY ... Environmental, Inc.

Date: 10/19/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	425
PID Reading -GAC Intermediate (ppmv)	8
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	59	
SVE-2	131	
SVE-3	122	
SVE-4	86	
SVE-5	163	
SVE-6	161	
SVE-7	126	
SVE-8	208	

SVE Common tube: 134

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	202	
HSVE-2	102	
HSVE-3	204	
HSVE-4	416	
HSVE-5	273	
HSVE-6	360	
HSVE-7	340 ppm	

HSVE Common Tube: 164

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	-
SGP-6:	-
SGP-2:	-
SGP-12	-
SGP-11	-
SGP-13	

Notes:

- PID Meter to undergo cleaning. May need routine cleaning & calibration through Pine Environmental. Will schedule for quick turn around cleaning after weekly sampling.

Astoria-NY ... Environmental, Inc.

Date: 10/25/04

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	54
PID Reading -GAC Intermediate (ppmv)	0
PID Reading -GAC Outlet (ppmv)	0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	17 ppm	
SVE-2	20 ppm	
SVE-3	25 ppm	
SVE-4	12 ppm	
SVE-5	35 ppm ~~3? ppm~~	
SVE-6	107 ppm	
SVE-7	64, ~~42 ppm~~	
SVE-8	67	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	2	
HSVE-2	0	
HSVE-3	4	
HSVE-4	16	
HSVE-5	0	
HSVE-6	8	
HSVE-7	5	

SVE total: 33 ppm

HSVE total: 8 ppm

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Date: 11/1/04 — readings before sending PID meter for service

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	28.6
PID Reading -GAC Intermediate (ppmv)	15.8
PID Reading -GAC Outlet (ppmv)	13.1

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	21.6	
SVE-2	18.3	
SVE-3	27.3	
SVE-4	12.1	
SVE-5	32.4	
SVE-6	68.7	
SVE-7	52.1	
SVE-8	66.1	

SVE Common Tube = 43.5 ppm

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	14.5	
HSVE-2	11.4	
HSVE-3	18.3	
HSVE-4	30.6	
HSVE-5	19.7	
HSVE-6	24.8	
HSVE-7	9.7	

HSVE Common Tube = 14.7 ppm

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Date: 11/1/04 Readings with rental PID meter

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)		
Blower Pressure (in-H2O)		
PID Reading -GAC Inlet (ppmv)	~~385~~	29
PID Reading -GAC Intermediate (ppmv)	~~163~~	12
PID Reading -GAC Outlet (ppmv)	4	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	32	
SVE-2	30	
SVE-3	52	
SVE-4	46	
SVE-5	86	
SVE-6	108	
SVE-7	93	
SVE-8	117	

SVE Common Tube - 83 ppm

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	29	
HSVE-2	33	
HSVE-3	146	
HSVE-4	87	
HSVE-5	81	
HSVE-6	53	
HSVE-7	62	

HSVE Common Tube - 69 ppm

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	-
SGP-6:	-
SGP-2:	-
SGP-12	-
SGP-11	-
SGP-13	-

Notes:

Date: 11/9/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	15.7
PID Reading -GAC Intermediate (ppmv)	2.3
PID Reading -GAC Outlet (ppmv)	1.4

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	13.5	
SVE-2	~~25.1~~ 13.6	
SVE-3	28	
SVE-4	11	
SVE-5	28.1	
SVE-6	86	
SVE-7	53	
SVE-8	85	

SVE Common Tube = 54

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	9.4	
HSVE-2	7.8	
HSVE-3	111	
HSVE-4	72	
HSVE-5	41	
HSVE-6	17	
HSVE-7	22	

HSVE Common Tube =

Insitu Air Sparging (Reserved)

General Compressor Operation: ____________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Astoria, NY   [illegible] Environmental, Inc.

Date: 11/16/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	9.2
PID Reading -GAC Intermediate (ppmv)	3.2
PID Reading -GAC Outlet (ppmv)	2.3

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	9.3	
SVE-2	10.8	
SVE-3	19.0	
SVE-4	6.1	
SVE-5	25.9	
SVE-6	65.2	
SVE-7	35.3	
SVE-8	62.2	

SVE Common Tube = 21.5

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	6.8	
HSVE-2	3.9	
HSVE-3	13.1	
HSVE-4	23.3	
HSVE-5	9.8	
HSVE-6	14.7	
HSVE-7	3.0	

HSVE Common Tube = 13.0

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Astoria, NY — Environmental, Inc.

Date: 11/23/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	11.4
PID Reading -GAC Intermediate (ppmv)	2.7
PID Reading -GAC Outlet (ppmv)	1.4

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	12.4	
SVE-2	9.6	
SVE-3	22.4	
SVE-4	11.3	
SVE-5	32.6	
SVE-6	60.1	
SVE-7	43.7	
SVE-8	59.9	

SVE Common Tube = 23.2

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	7.7	
HSVE-2	5.5	
HSVE-3	18.2	
HSVE-4	17.4	
HSVE-5	6.2	
HSVE-6	18.6	
HSVE-7	9.6	

HSVE Common Tube: 18.1

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Astoria, NY ... Environmental, Inc.

Date: 11/30/04

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	8.0
PID Reading -GAC Intermediate (ppmv)	2.2
PID Reading -GAC Outlet (ppmv)	1.4

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	8.8	
SVE-2	10.1	
SVE-3	15.7	
SVE-4	3.2	
SVE-5	25.5	
SVE-6	28.3	
SVE-7	~~30~~ 3	
SVE-8	37.3	

SVE Common Tube = 22.0

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	4.7	
HSVE-2	1.4	
HSVE-3	6.3	
HSVE-4	21.9	
HSVE-5	6.8	
HSVE-6	14.6	
HSVE-7	1.6	

HSVE Common Tube = 8.2

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Astoria ... Environmental, Inc.

Date: 12/8/04 → Sampling postponed by 1 day due to inclement weather. Rain can damage PID meter.

General System Operation

	Y/N/X
Blower operation	y
Air/Water Knockout	y
1,000 LB GAC Unit	y
200 LB GAC Unit	y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	8.4
PID Reading -GAC Intermediate (ppmv)	4.1
PID Reading -GAC Outlet (ppmv)	3.3

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	8.0	
SVE-2	7.3	
SVE-3	9.8	
SVE-4	3.2	
SVE-5	28.6	
SVE-6	12.9	
SVE-7	31.0	
SVE-8	59.2	

SVE Common Tube = 20.3

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	5.7	
HSVE-2	2.1	
HSVE-3	7.3	
HSVE-4	21.9	
HSVE-5	4.6	
HSVE-6	13.6	
HSVE-7	0.8	

HSVE Common Tube = 7.5

Insitu Air Sparging (Reserved)

General Compressor Operation: ____

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	-
SGP-6:	-
SGP-2:	-
SGP-12	-
SGP-11	-
SGP-13	-

Notes:

Soil V[illegible] [illegible]traction System - Triumvirate Environmental, Inc.
Asto[illegible] Y

Date: 12/14/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	6.9
PID Reading -GAC Intermediate (ppmv)	1.7
PID Reading -GAC Outlet (ppmv)	1.5

Individual SVE Well Performance

Vertical Wells / **Horizontal SVE Wells**

	PID Readings (ppmv)		Vacuum Readings (in-H2O)		PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	8.2			HSVE-1	4.6		
SVE-2	6.4			HSVE-2	1.9		
SVE-3	10.0			HSVE-3	6.2		
SVE-4	3.2			HSVE-4	17.9		
SVE-5	22.9			HSVE-5	3.5		
SVE-6	6.7			HSVE-6	11.2		
SVE-7	30.5			HSVE-7	0.5		
SVE-8	52.1						

SVE Common Tube - 19.5

HSVE Common Tube - 6.0

Insitu Air Sparging (Reserved)

General Compressor Operation: ____________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-8:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Vapo[illegible] [illegible]raction System - Triumvirate Environmental, Inc.
Astor[illegible] [illegible]Y

Date: 12/22/04

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	8.0
PID Reading -GAC Intermediate (ppmv)	4.2
PID Reading -GAC Outlet (ppmv)	4.0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	11.7	
SVE-2	8.2	
SVE-3	22.3	
SVE-4	4.2	
SVE-5	23.9	
SVE-6	61.9	
SVE-7	35.7	
SVE-8	56.2	

SVE Common Tube - 43.2

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	5.1	
HSVE-2	2.8	
HSVE-3	6.9	
HSVE-4	18.3	
HSVE-5	3.8	
HSVE-6	12.3	
HSVE-7	1.0	

HSVE Common Tube - 6.6

Insitu Air Sparging (Reserved)

General Compressor Operation: ____________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-8:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Va... ...traction System - Triumvirate Environmental, Inc.
Asto... ...r

Date: 12/29/04

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	6.8
PID Reading -GAC Intermediate (ppmv)	4.2
PID Reading -GAC Outlet (ppmv)	3.8

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	9.0	
SVE-2	10.8	
SVE-3	20.3	
SVE-4	3.9	
SVE-5	21.8	
SVE-6	34.0	
SVE-7	35.8	
SVE-8	51.9	

SVE Common Tube - 37.0

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	5.8	
HSVE-2	3.3	
HSVE-3	6.6	
HSVE-4	18.5	
HSVE-5	5.0	
HSVE-6	12.2	
HSVE-7	1.4	

HSVE Common Tube = 6.8

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Vapo[illegible]raction System - Triumvirate Environmental, Inc.
Asto[illegible]Y

Date: 1/5/05

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	9.5
PID Reading -GAC Intermediate (ppmv)	4.3
PID Reading -GAC Outlet (ppmv)	4.0

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	12.8	
SVE-2	13.2	
SVE-3	28.1	
SVE-4	8.6	
SVE-5	24.8	
SVE-6	39.1	
SVE-7	44.2	
SVE-8	6.9	

SVE Common Tube = 41.2

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	7.5	
HSVE-2	3.0	
HSVE-3	4.5	
HSVE-4	22.6	
HSVE-5	8.4	
HSVE-6	14.2	
HSVE-7	1.1	

HSVE Common Tube = 7.9

Insitu Air Sparging (Reserved)

General Compressor Operation: ____

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	-
SGP-6:	-
SGP-2:	-
SGP-12	-
SGP-11	-
SGP-13	-

Notes:

Soil Vapc traction System - Triumvirate Environmental, Inc.
Asto NY

Date: 1/12/05

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	7.6
PID Reading -GAC Intermediate (ppmv)	4.1
PID Reading -GAC Outlet (ppmv)	3.8

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	13.1	
SVE-2	10.8	
SVE-3	16.1	
SVE-4	4.1	
SVE-5	22.9	
SVE-6	52.5	
SVE-7	38.7	
SVE-8	38.7	

SVE Common Tube = 340.3

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	7.2	
HSVE-2	3.0	
HSVE-3	8.1	
HSVE-4	21.8	
HSVE-5	13.0	
HSVE-6	11.1	
HSVE-7	1.3	

HSVE Common Tube 7.1

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-8:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Vapo[r Ext]raction System - Triumvirate Environmental, Inc.
Astor[ia], NY

Date: 1/19/05

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	7.2
PID Reading -GAC Intermediate (ppmv)	4.7
PID Reading -GAC Outlet (ppmv)	3.6

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	11.3	
SVE-2	11.6	
SVE-3	18.8	
SVE-4	3.2	
SVE-5	21.1	
SVE-6	55.3	
SVE-7	39.1	
SVE-8	4.2	

SVE Common Tube - 42.1

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	5.8	
HSVE-2	2.7	
HSVE-3	8.6	
HSVE-4	22.0	
HSVE-5	16.0	
HSVE-6	10.7	
HSVE-7	1.6	

HSVE Common Tube - 6.8

Insitu Air Sparging (Reserved)

General Compressor Operation: ____________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Va... [illegible]traction System - Triumvirate Environmental, Inc.
Astor[illegible] Y

Date: ~~[illegible]~~ 1/28/05

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Not able to take readings. Below freezing temperatures causing frozen water in sampling tubes.

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	11.3	
SVE-2	10.4 ~~[illegible]~~	
SVE-3	17.2	
SVE-4	6.2	
SVE-5	19.1	
SVE-6	58.4	
SVE-7	38.2	
SVE-8	6.3	

SVE Common tube - 41.8

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	6.1	
HSVE-2	3.4	
HSVE-3	8.0	
HSVE-4	21.2	
HSVE-5	14.4	
HSVE-6	11.2	
HSVE-7	1.3	

HSVE Common Tube - 6.9

Insitu Air Sparging (Reserved)

General Compressor Operation: ________

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-8:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Vapo[illegible] traction System - Triumvirate Environmental, Inc.
Astor[illegible] Y

Date: 2/2/05

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation	Y/N/X
Blower operation	y
Air/Water Knockout	y
1,000 LB GAC Unit	y
200 LB GAC Unit	y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	12.3		
SVE-2	10.8		
SVE-3	22.7		
SVE-4	5.4		
SVE-5	21.8		
SVE-6	54.0		
SVE-7	40.2		
SVE-8	8.9		

SVE Common Tube - 41.8

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	5.9	
HSVE-2	3.3	
HSVE-3	8.1	
HSVE-4	21.8	
HSVE-5	13.1	
HSVE-6	12.0	
HSVE-7	1.1	

HSVE Common Tube - 6.7

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Vapo[illegible] [illegible]traction System - Triumvirate Environmental, Inc.
Aston[illegible]

Date: 2/8/05

General System Operation

General System Operation	Y/N/X
Blower operation	y
Air/Water Knockout	y
1,000 LB GAC Unit	y
200 LB GAC Unit	y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	7.6
PID Reading -GAC Intermediate (ppmv)	4.1
PID Reading -GAC Outlet (ppmv)	3.7

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	20.6	
SVE-2	29.7	
SVE-3	19.6	
SVE-4	23.3	
SVE-5	21.4	
SVE-6	54.7	
SVE-7	28.0	
SVE-8	18.3	

SVE Common Tube - 55.8

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	9.1	
HSVE-2	3.1	
HSVE-3	7.5	
HSVE-4	21.4	
HSVE-5	15.6	
HSVE-6	10.7	
HSVE-7	1.3	

HSVE Common tube - 8.5

Insitu Air Sparging (Reserved)

General Compressor Operation: ______

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Vapo[illegible] traction System - Triumvirate Environmental, Inc.
Astoria [illegible]

Date: 2/16/05

General System Operation

General System Operation	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	3.9
PID Reading -GAC Intermediate (ppmv)	3.2
PID Reading -GAC Outlet (ppmv)	1.9

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	7.3	
SVE-2	22.7 ~~4.8~~	
SVE-3	55.6	
SVE-4	7.8	
SVE-5	3.5	
SVE-6	68.7	
SVE-7	15.8	
SVE-8	46.2	
MAIN	67.1	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	9.2	
HSVE-2	3.5	
HSVE-3	8.8	
HSVE-4	23.4	
HSVE-5	17.5	
HSVE-6	13.6	
HSVE-7	1.8	
MAIN	9.4	

Insitu Air Sparging (Reserved)

General Compressor Operation: ____

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 2/23/05

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	5.6
PID Reading -GAC Intermediate (ppmv)	3.6
PID Reading -GAC Outlet (ppmv)	2.6

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	30.1	
SVE-2	22.3	
SVE-3	27.5	
SVE-4	22.3	
SVE-5	23.8	
SVE-6	54.3	
SVE-7	18.5	
SVE-8	28.5	
main	54.4	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	7.9	
HSVE-2	3.0	
HSVE-3	7.9	
HSVE-4	21.3	
HSVE-5	16.4	
HSVE-6	12.7	
HSVE-7	2.1	
main	8.5	

Insitu Air Sparging (Reserved)

General Compressor Operation: ____

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-6:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

Soil Vapor Extraction System - Triumvirate Environmental, Inc.
A... Y

Date: 3/2/05

Integrated SVE/IAS Site Check Schedule

Daily - 1st 7 days of operation
Every other day - Second week of operation
Once per week - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	y
Air/Water Knockout	y
1,000 LB GAC Unit	y
200 LB GAC Unit	N
System Leaks, etc.	y
System Down Time Since Last Check	N/A

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	6.3
PID Reading -GAC Intermediate (ppmv)	3.8
PID Reading -GAC Outlet (ppmv)	2.8

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	29.8	
SVE-2	29.2	
SVE-3	38.5	
SVE-4	18.5	
SVE-5	28.8	
SVE-6	54.4	
SVE-7	31.5	
SVE-8	18.7	
MAIN	53.9	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	15.5	
HSVE-2	3.2	
HSVE-3	10.5	
HSVE-4	24.5	
HSVE-5	23.7	
HSVE-6	20.6	
HSVE-7	8.3	
MAIN	8.9	

Insitu Air Sparging (Reserved)

General Compressor Operation: ____

IAS Pressure Readings:

	Pressure Gauge (psi)	Air Flow (cfm)
IAS-1		
IAS-2		
IAS-3		
IAS-4		
IAS-5		
IAS-6		

Soil Gas Readings:

	PID (ppmv)
SGP-9:	
SGP-8:	
SGP-2:	
SGP-12	
SGP-11	
SGP-13	

Notes:

OI ION & MAINTENANCE CHECKLIST
Soil \ or Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: ~~11/1/04~~ 3/9/05

General System Operation

	Y/N/X
Blower operation	Y
Air/Water Knockout	Y
1,000 LB GAC Unit	Y
200 LB GAC Unit	Y
System Leaks, etc.	N
System Down Time Since Last Check	N/A

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	
Blower Pressure (in-H2O)	
PID Reading -GAC Inlet (ppmv)	5.9
PID Reading -GAC Intermediate (ppmv)	1.8
PID Reading -GAC Outlet (ppmv)	1.6

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	38.6	
SVE-2	50.6	
SVE-3	54.9	
SVE-4	31.5	
SVE-5	37.4	
SVE-6	57.5	
SVE-7	45.9	
SVE-8	28.8	
MAIN	57.2	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	7.2	
HSVE-2	3.3	
HSVE-3	7.8	
HSVE-4	20.6	
HSVE-5	14.9	
HSVE-6	10.5	
HSVE-7	1.5	
MAIN	4.5	

Insitu Air Sparging (Reserved)

Notes:

C[illegible] MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 3/16/04

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	5.7
PID Reading -GAC Intermediate (ppmv)	2.2
PID Reading -GAC Outlet (ppmv)	1.8

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	41.1		
SVE-2	50.5		
SVE-3	42.8		
SVE-4	50.6		
SVE-5	42.8		
SVE-6	58.2		
SVE-7	48.7		
SVE-8	435.9		
MAIN	53.2		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	9.2	
HSVE-2	3.4	
HSVE-3	4.2	
HSVE-4	20.9	
HSVE-5	14.9	
HSVE-6	11.0	
HSVE-7	1.5	
MAIN	9.0	

Insitu Air Sparging (Reserved)

Notes:

O[illegible] TI[illegible] MAINTENANCE CHECKLIST
Soil [illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 3/17/04

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes: Tom Saccoccio from SAGE advised that the air compressor (sparging system) be shut down on the SVE system, while the passive air was left on. SAGE will be down on 3/22 to monitor/repair system.

OP[illegible] MAINTENANCE CHECKLIST
Soil V[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 3/18/05

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

SVE system completely shut down ~~while~~ from 8:00 a.m. to 11 a.m. for a full carbon changeout at the system. Air compressor still in shut down until 3/22/05.

OPE[illegible] MAINTENANCE CHECKLIST
Soil Vapo[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 3/22/05

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes:

SAGE arrived on-site for further testing of compressor + sidewalk well. While on-site, compressor was determined to have been internally damaged from faulty parts/some mechanical electrical error. SAGE currently in process of obtaining a new piece of machinery. Passive blower still functioning.

OPER... MAINTENANCE CHECKLIST
Soil Vapor Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 3/29/05

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

General System Operation	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	5.9
PID Reading -GAC Intermediate (ppmv)	0.7
PID Reading -GAC Outlet (ppmv)	0.5

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	15.4	
SVE-2	26.3	
SVE-3	4.8	
SVE-4	1.1	
SVE-5	15.9	
SVE-6	45.9	
SVE-7	2.3	
SVE-8	0.9	
main	45.2	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	5.3	
HSVE-2	2.8	
HSVE-3	5.7	
HSVE-4	15.9	
HSVE-5	8.5	
HSVE-6	13.2	
HSVE-7	1.4	
main	6.5	

Insitu Air Sparging (Reserved)

Notes: Compressor still down. Passive blower only.

OPERA... MAINTENANCE CHECKLIST
Soil Vapo... xtraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 4/4/05

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance	
Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	
PID Reading -GAC Intermediate (ppmv)	
PID Reading -GAC Outlet (ppmv)	

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes: Tom Saccoccio from SAGE supervised the testing of new compressor that was installed 4/1/05. Compressor was installed perfectly. Tom approved that it was o.k. to run, and compressor has been going since 4/5/05.

OPERA[illegible] MAINTENANCE CHECKLIST
Soil Vapo[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 4/6/05

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	5.2
PID Reading -GAC Intermediate (ppmv)	3.3
PID Reading -GAC Outlet (ppmv)	2.4

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

Individual SVE Well Performance

Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	4.9	
SVE-2	29.3	
SVE-3	26.8	
SVE-4	31.4	
SVE-5	8.4	
SVE-6	31.6	
SVE-7	26.0	
SVE-8	23.7	
MAIN	33.1	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	6.3	
HSVE-2	2.9	
HSVE-3	6.9	
HSVE-4	22.2	
HSVE-5	9.3	
HSVE-6	13.9	
HSVE-7	1.6	
MAIN	9.0	

Insitu Air Sparging (Reserved)

Notes:

OPER[illegible] MAINTENANCE CHECKLIST
Soil V[illegible]-xtraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 4/14/05

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	6.5
PID Reading -GAC Intermediate (ppmv)	4.0
PID Reading -GAC Outlet (ppmv)	3.1

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	8.2	
SVE-2	30.7	
SVE-3	18.6	
SVE-4	40.0	
SVE-5	12.2	
SVE-6	23.2	
SVE-7	24.7	
SVE-8	23.9	
Main	35.4	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	9.8	
HSVE-2	3.0	
HSVE-3	5.2	
HSVE-4	23.4	
HSVE-5	4.5	
HSVE-6	15.0	
HSVE-7	1.7	
Main	9.7	

Insitu Air Sparging (Reserved)

Notes:

OPERA[illegible] MAINTENANCE CHECKLIST
Soil Va[illegible]xtraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 4 / 20 / 05

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*
* = Site check frequency will increase after system changes/modifications.

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	8.0
PID Reading -GAC Intermediate (ppmv)	4.3
PID Reading -GAC Outlet (ppmv)	4.2

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	8.4	
SVE-2	~~33.5~~ 45.5	
SVE-3	48.9	
SVE-4	40.1	
SVE-5	33.5	
SVE-6	49.3	
SVE-7	41.2	
SVE-8	30.8	
MAIN	50.8	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	4.7	
HSVE-2	2.4	
HSVE-3	6.6	
HSVE-4	19.7	
HSVE-5	6.7	
HSVE-6	12.3	
HSVE-7	1.4	
MAIN	7.5	

Insitu Air Sparging (Reserved)

Notes:

OPERA[illegible] MAINTENANCE CHECKLIST
Soil Va[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 4/27/05

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	25.0
PID Reading -GAC Intermediate (ppmv)	12.5
PID Reading -GAC Outlet (ppmv)	18.3

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1	51.2	
SVE-2	52.1	
SVE-3	56.1	
SVE-4	48.9	
SVE-5	49.1	
SVE-6	53.4	
SVE-7	53.8	
SVE-8	48.9	
MAIN	53.2	

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1	6.5	
HSVE-2	3.0	
HSVE-3	6.4	
HSVE-4	22.4	
HSVE-5	9.7	
HSVE-6	10.4	
HSVE-7	2.6	
MAIN	7.2	

Insitu Air Sparging (Reserved)

Notes:
Sent out meter out for cleaning + calibration. Using a loaned meter

OPERA[illegible] MAINTENANCE CHECKLIST
Soil Va[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 5 / 4 / 05

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
	~~[illegible]~~
PID Reading -GAC Inlet (ppmv)	~~[illegible]~~ 19.8
PID Reading -GAC Intermediate (ppmv)	11.9
PID Reading -GAC Outlet (ppmv)	11.7

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
SVE-1	2.5		
SVE-2	53.9		
SVE-3	59.5		
SVE-4	59.3		
SVE-5	58.7		
SVE-6	66.0		
SVE-7	64.8		
SVE-8	46.5		
MAIN	55.3		

Horizontal SVE Wells

	PID Readings (ppmv)		Vacuum Readings (in-H2O)
HSVE-1	12.7		
HSVE-2	6.5		
HSVE-3	10.4		
HSVE-4	29.8		
HSVE-5	14.2		
HSVE-6	23.1		
HSVE-7	6.5		
MAIN	10.3		

Insitu Air Sparging (Reserved)

Notes:

OPERA[illegible] MAINTENANCE CHECKLIST
Soil Vap[illegible] Extraction System - Triumvirate Environmental, Inc.
Astoria, NY

Date: 5/9/05

General System Operation

	Y/N/X
Blower operation	✓
Air/Water Knockout	✓
1,000 LB GAC Unit	✓
200 LB GAC Unit	✓
System Leaks, etc.	✓
System Down Time Since Last Check	✓

Site Check Schedule

Daily - 1st 7 days of operation
Twice per week - next 3 weeks
Once per month - Thereafter*

* = Site check frequency will increase after system changes/modifications.

System Performance

Blower Vacuum (in-H2O)	NA
Blower Pressure (in-H2O)	NA
PID Reading -GAC Inlet (ppmv)	7.6
PID Reading -GAC Intermediate (ppmv)	1.7
PID Reading -GAC Outlet (ppmv)	3.4

Individual SVE Well Performance
Vertical Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
SVE-1		
SVE-2		
SVE-3		
SVE-4		
SVE-5		
SVE-6		
SVE-7		
SVE-8		

Horizontal SVE Wells

	PID Readings (ppmv)	Vacuum Readings (in-H2O)
HSVE-1		
HSVE-2		
HSVE-3		
HSVE-4		
HSVE-5		
HSVE-6		
HSVE-7		

Insitu Air Sparging (Reserved)

Notes: Quick scan of Outlet, Intermediate, Inlet.

APPENDIX 10

GeoLabs, Inc.

Environmental Laboratories

RECEIVED MAY 1 1 2004

LABORATORY REPORT

PREPARED FOR:

Sage Environmental
172 Armistice Blvd.
Pawtucket, RI 02860

Attn: Rick Lederer

PROJECT ID:	S1760 Astoria, NY
GEOLABS CERTIFICATION #:	M-MA015
SAMPLE NUMBER:	148621 - 148625
DATE PREPARED: **Re-Issued with QA/QC**	May 10, 2004
PREPARED BY:	Christine Johnson
APPROVED BY:	Jim Chen, Laboratory Director

GeoLabs, Inc.
Environmental Laboratories

MADEP MCP Response Action Analytical Report Certification Form

Laboratory Name:	GeoLabs, Inc.	Project #:	S1760
Project Location:	Astoria, NY	MADEP RTN:	

This form provides certifications for the following data set: 148621 - 148625

Sample matrices: Groundwater ( ) Soil / Sediment ( ) Drinking Water ( ) Other (x) AIR

MCP SW-846 Methods Used	8260B ( ) 8270C ( ) 8082 ( )	8151A ( ) 8081A ( ) 8021B ( )	8330 ( ) VPH ( ) EPH ( )	6010B ( ) 6020 ( ) 7000 S3 ( )	7470/1A ( ) 9014M2 ( )	Other: ( ) ?
As specified in MADEP Compendium of Analytical Methods (Check all that apply)	1- List Release Tracking Number (RTN), if known 2- M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Met 3- S - SW-846 Methods 7000 Series (List individual method and analyte)					

An affirmative response to questions A, B, and C is required for "*Presumptive Certainty*" status

A	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes (x)	No[1] ( )
B	Were all QA/QC procedures required for the specified analytical method(included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes (x)	No[1] ( )
C	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 of the MADEP documents CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes (x)	No[1] ( )

A response to questions D and E below is required for "*Presumptive Certainty*" status

D	Were all QC performance standards and recommendations for the specified methods achieved?	Yes (x)	No[1] ( )
E	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes (x)	No[1] ( )

[1]All NO answeres must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Jim Chen Position: Lab Director

Printed Name: Jim Chen Date: May 10, 2004

GeoLabs, Inc.

Environmental Laboratories

Case Narrative

Project ID: S1760
Client Name: Sage Environmental

Sample Number: 148621 - 148625
Received: 05/05/04

Physical Condition of Samples

This project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

This project was accompanied by satisfactory Chain of Custody documentation. The sample container label(s) agreed with the Chain of Custody.

Analysis of Sample(s)

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these sample(s).

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**SAGE ENVIRONMENTAL**	PROJECT ID:	S1760
SAMPLE TYPE:	AIR	REPORT DATE:	05/10/04
COLLECTION DATE:	05/04/04	ANALYZED BY:	JC
REC'D BY LAB:	05/05/04	ANALYSIS DATE:	05/06/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 148625
SAMPLE LOCATION: INF.

10x dilution on all except where * *** 240x dilution**	**RESULTS** (ppbv)	($\mu g/m^3$)	**DETECTION LIMIT** (ppbv)	($\mu g/m^3$)
Freon 12	ND	ND	4.10	20.3
Chloromethane	ND	ND	7.90	16.3
Freon 114	ND	ND	8.20	57.3
Vinyl chloride *	**2420**	**6190**	233	595
Bromomethane	ND	ND	6.60	25.6
Freon 11	ND	ND	5.60	31.5
Chloroethane	ND	ND	11.3	63.5
1,1-Dichloroethene	**28.0**	**113**	6.10	24.7
Freon 113	**159**	**1220**	6.10	46.7
cis-1,2-Dichloroethylene *	**64800**	**257000**	96.0	381
1,1-Dichloroethane	ND	ND	4.10	16.6
Chloroform	ND	ND	4.90	23.8
1,1,1-Trichloroethane	**600**	**3260**	4.00	21.8
1,2-Dichloroethane	ND	ND	4.50	18.2
Benzene	**53.0**	**169**	3.86	12.3
Carbon Tetrachloride	ND	ND	6.50	40.9
1,2-Dichloropropane	ND	ND	3.80	17.6
Trichloroethylene	**675**	**3620**	3.40	18.2
cis-1,3-Dichloropropene	ND	ND	2.90	13.2
trans-1,3-Dichloropropene	ND	ND	3.50	15.9

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**SAGE ENVIRONMENTAL**	PROJECT ID:	S1760
SAMPLE TYPE:	AIR	REPORT DATE:	05/10/04
COLLECTION DATE:	05/04/04	ANALYZED BY:	JC
REC'D BY LAB:	05/05/04	ANALYSIS DATE:	05/06/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 148625
SAMPLE LOCATION: INF.

10x dilution on all except where * * 240x dilution	RESULTS (ppbv)	RESULTS (µg/m³)	DETECTION LIMIT (ppbv)	DETECTION LIMIT (µg/m³)
1,1,2-Trichloroethane	ND	ND	4.00	21.8
Toluene	**24.1**	**90.8**	9.50	35.8
1,2-Dibromoethane (EDB)	ND	ND	3.70	28.4
Tetrachloroethylene *	**4270**	**29000**	101	684
Chlorobenzene	**6.80**	**31.4**	4.40	20.3
Ethylbenzene	**8.00**	**34.7**	5.40	23.4
m,p-Xylene	**14.5**	**62.9**	3.80	16.5
Styrene	ND	ND	4.80	20.4
1,1,2,2-Tetrachloroethane	ND	ND	5.10	35.0
o-Xylene	ND	ND	4.60	19.9
1,3,5-Trimethylbenzene	ND	ND	6.40	31.4
1,2,4-Trimethylbenzene	ND	ND	8.50	41.7
1,3-Dichlorobenzene	ND	ND	7.80	46.9
1,4-Dichlorobenzene	ND	ND	8.10	48.7
1,2-Dichlorobenzene	ND	ND	8.00	48.1
1,2,4-Trichlorobenzene	ND	ND	11.10	82.2
Hexachlorobutadiene	ND	ND	5.70	60.8

ND = NOT DETECTED

Method Reference:

EPA T014A

?

should be %D's

	AvgRF	CCRF	AREA%	DEV (MIN)
FLUOROBENZENE (IS)	1.000	1.000	88	0.00
Freon 12	1.003	0.983	89	0.00
Chloromethane	0.312	0.326	91	0.00
Freon 114	0.796	0.862	97	0.00
Vinyl chloride	0.209	0.234	101	0.00
Bromomethane	0.233	0.252	102	0.00
Freon 11	0.567	0.596	96	0.00
Chloroethane	0.088	0.098	99	0.00
1,1-Dichloroethene	0.245	0.261	97	0.00
Freon 113	0.378	0.407	98	0.00
Dichloromethane	0.207	0.253	111	0.00
cis-1,2-Dichloroethylene	0.218	0.215	100	0.00
1,1-Dichloroethane	0.309	0.383	116	0.00
Chloroform	0.373	0.370	103	0.00
1,1,1-Trichloroethane	0.283	0.260	83	0.00
1,2-Dichloroethane	0.403	0.367	83	0.00
Benzene	0.906	0.689	63	0.00
Carbon Tetrachloride	0.575	0.566	92	0.00
1,2-Dichloropropane	0.472	0.422	78	0.00
Trichloroethylene	0.413	0.398	87	0.00
cis-1,3-Dichloropropene	0.576	0.522	84	0.00
trans-1,3-Dichloropropene	0.316	0.291	96	0.00
1,1,2-Trichloroethane	0.463	0.400	80	0.00
Toluene	1.169	1.037	80	0.00
1,2-Dibromoethane (EDB)	0.626	0.561	83	0.00
Tetrachloroethylene	0.509	0.478	87	0.00
CHLOROBENZENE-D5	1.000	1.000	86	0.00
Chlorobenzene	0.978	0.939	83	0.00
Ethylbenzene	1.664	1.484	76	-0.01
m,p-Xylene	1.180	1.083	76	0.00
Styrene	0.512	0.454	74	0.00
1,1,2,2-Tetrachloroethane	0.996	0.918	78	0.00
o-Xylene	1.182	1.004	73	0.00
BFB	1.000	1.000	85	0.00
4-Ethyltoluene	1.363	1.202	74	0.00
1,3,5-Trimethylbenzene	1.363	1.202	74	0.00
1,2,4-Trimethylbenzene	1.293	1.187	75	0.00
1,3-Dichlorobenzene	0.943	1.026	90	0.00
1,4-Dichlorobenzene	0.896	0.988	93	0.00
1,2-Dichlorobenzene	0.780	0.851	91	0.00
1,2,4-Trichlorobenzene	0.094	0.120	113	0.00
Hexachlorobutadiene	0.175	0.177	90	0.00

Method Reference: EPA T014A

Freon 12	ND	ND	0.41	2.03
Chloromethane	ND	ND	0.79	1.63
Freon 114	ND	ND	0.82	5.73
Vinyl chloride	ND	ND	0.97	2.48
Bromomethane	ND	ND	0.66	2.56
Freon 11	ND	ND	0.56	3.15
Chloroethane	ND	ND	1.13	6.35
1,1-Dichloroethene	ND	ND	0.61	2.47
Freon 113	ND	ND	0.61	4.67
cis-1,2-Dichloroethylene	ND	ND	0.40	1.59
1,1-Dichloroethane	ND	ND	0.41	1.66
Chloroform	ND	ND	0.49	2.38
1,1,1-Trichloroethane	ND	ND	0.40	2.18
1,2-Dichloroethane	ND	ND	0.45	1.82
Benzene	ND	ND	0.386	1.23
Carbon Tetrachloride	ND	ND	0.65	4.09
1,2-Dichloropropane	ND	ND	0.38	1.76
Trichloroethylene	ND	ND	0.34	1.82
cis-1,3-Dichloropropene	ND	ND	0.29	1.32
trans-1,3-Dichloropropene	ND	ND	0.35	1.59
1,1,2-Trichloroethane	ND	ND	0.40	2.18
Toluene	ND	ND	0.95	3.58
1,2-Dibromoethane (EDB)	ND	ND	0.37	2.84
Tetrachloroethylene	ND	ND	0.42	2.85
Chlorobenzene	ND	ND	0.44	2.03
Ethylbenzene	ND	ND	0.54	2.34
m,p-Xylene	ND	ND	0.38	1.65
Styrene	ND	ND	0.48	2.04
1,1,2,2-Tetrachloroethane	ND	ND	0.51	3.50
o-Xylene	ND	ND	0.46	1.99
1,3,5-Trimethylbenzene	ND	ND	0.64	3.14
1,2,4-Trimethylbenzene	ND	ND	0.85	4.17
1,3-Dichlorobenzene	ND	ND	0.78	4.69
1,4-Dichlorobenzene	ND	ND	0.81	4.87
1,2-Dichlorobenzene	ND	ND	0.80	4.81
1,2,4-Trichlorobenzene	ND	ND	1.11	8.22
Hexachlorobutadiene	ND	ND	0.57	6.08

ND = NOT DETECTED

Method Reference:

EPA T014A

GEOLABS, INC.
45 JOHNSON LANE
BRAINTREE, MA 02184
M-MA015

LIMITATIONS & EXCLUSIONS

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This report was prepared for the sole use of our client. Portions of the report may not be used independent of the entire report.

All analyses were performed within required holding times, in accordance with EPA protocols and using accepted QA/QC procedures. All QA/QC meets acceptable limits unless otherwise noted. The information contained in this report is, to the best of my knowledge, accurate and complete.

Any and all subsequent pages of this report are chain(s) of custody.

GeoLabs, Inc.
Environmental Laboratories
45 Johnson Lane
Braintree, MA 02184
Phone: 781-848-7844
Fax: 781-848-7811

Turnaround Time
RUSH: 24hrs ☐ 48hrs ☐ 72hrs ☐
STANDARD: 5 Days____ Rush Approved By:____

Page 1 of 1

SPECIAL INSTRUCTIONS
NY pricing and QA/QC

Client: SAGE Environmental
Address: 172 Armistice Blvd Pawtucket, RI 02860
Phone: 401 723-9900
Fax: 401 723-9973
Contact: Rick Lederer
E-mail: rlederer@sageenvironmental.net

Project Number: S1760
Project Location: Astoria, NY
Purchase Order #: S1760
Collected By: SAGE

SAMPLE ID	COLLECTION DATE	COLLECTION TIME	SAMPLED BY	SAMPLE LOCATION	CONTAINER TYPE	CONTAINER QUANT	MATRIX	COMP	GRAB	PRES	GEOLABS SAMPLE NUMBER	TO-15	to be cleaned								TEMPERATURE	LAB pH
SGP-6	5/4/04	830	FM	19th Ave	S	1	A		X		148621	X										
SGP-11	|	740	FM	South Side Center	S	1	A		X		148622	X										
SGP-12	|	745	FM	" " East	S	1	A		X		148623	X										
SGP-13	|	805	FM	" " west	S	1	A		X		148624	X										
Inf.	↓	1400	FM	SVE Influent	S	1	A		X		148625	X										
				2595							148626		X									

CONTAINER CODES:
A = Amber
B = Bag
G = Glass
P = Plastic
S = Summa Canister
O = Other V = VOA

MATRIX CODES:
GW = Ground Water
WW = Wastewater
DW = Drinking Water
SL = Sludge
S = Soil A = Air
O = Oil OT = Other

PRESERVATIVE CODES:
1 = HCl 7 = ICE
2 = HNO_3
3 = H_2SO_4
4 = $Na_2S_2O_3$
5 = NaOH
6 = MeOH

Relinquished By:	Date/Time	Received By:	Date/Time:
[signature]	5/5/04 11:00	[signature]	5/5/04 11:00
Relinquished By: [signature]	5/5/04 2:35	Received By: [signature]	5/5/04 2:05
Relinquished By:		Received By GeoLabs: SBurke 5-5-04	1435

GEOLABS CHAIN OF CUSTODY

GeoLabs, Inc.

Environmental Laboratories

LABORATORY REPORT

PREPARED FOR:

Sage Environmental
172 Armistice Blvd.
Pawtucket, RI 02860

Attn: Tom S.

PROJECT ID: R036
Astoria, NY

GEOLABS CERTIFICATION #: M-MA015

SAMPLE NUMBER: 152016

DATE PREPARED: July 22, 2004

PREPARED BY: Jennifer McAlpine

APPROVED BY: Jim Chen

Jim Chen, Laboratory Director

Location: 45 Johnson Lane
Braintree, MA 02184

Phone: (781) 848-7844
Fax: (781) 848-7811

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**SAGE**	PROJECT ID:	R036
SAMPLE TYPE:	AIR	REPORT DATE:	07/22/04
COLLECTION DATE:	07/14/04	ANALYZED BY:	JC
REC'D BY LAB:	07/15/04	ANALYSIS DATE:	07/16/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 152016
SAMPLE LOCATION: GAC-INF

	RESULTS		DETECTION LIMIT	
	(ppbv)	($\mu g/m^3$)	(ppbv)	($\mu g/m^3$)
***120X DILUTION**				
Freon 12	ND	ND	0.41	2.03
Chloromethane	**1.62**	**3.35**	0.79	1.63
Freon 114	ND	ND	0.82	5.73
Vinyl chloride	**151**	**385**	0.97	2.48
Bromomethane	ND	ND	0.66	2.56
Freon 11	**3.22**	**18.1**	0.56	3.15
Chloroethane	ND	ND	1.13	2.98
1,1-Dichloroethene	**9.99**	**39.6**	0.61	2.42
Freon 113	**13.0**	**99.6**	0.61	4.67
cis-1,2-Dichloroethene*	**2180**	**8643**	0.40	1.59
1,1-Dichloroethane	**109**	**439**	0.41	1.64
Chloroform	**57.9**	**282**	0.49	2.38
1,1,1-Trichloroethane*	**1170**	**6370**	0.40	2.18
1,2-Dichloroethane	**7.31**	**29.3**	0.45	1.80
Benzene	**8.77**	**28.0**	0.386	1.23
~~**Carbon Tetrachloride**~~	~~**2.06**~~	~~**13.0**~~	~~0.65~~	~~4.09~~
1,2-Dichloropropane	**3.94**	**18.2**	0.38	1.76
Trichloroethylene	**1220**	**6570**	0.34	1.82
cis-1,3-Dichloropropene	ND	ND	0.29	1.32
trans-1,3-Dichloropropene	ND	ND	0.35	1.59

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**SAGE**	PROJECT ID:	R036
SAMPLE TYPE:	AIR	REPORT DATE:	07/22/04
COLLECTION DATE:	07/14/04	ANALYZED BY:	JC
REC'D BY LAB:	07/15/04	ANALYSIS DATE:	07/16/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 152016
SAMPLE LOCATION: GAC-INF

	RESULTS (ppbv)	RESULTS (μg/m³)	DETECTION LIMIT (ppbv)	DETECTION LIMIT (μg/m³)
1,1,2-Trichloroethane	**4.86**	**26.4**	0.40	2.18
Toluene	**4.49**	**16.9**	0.95	3.58
1,2-Dibromoethane (EDB)	ND	ND	0.37	2.84
Tetrachloroethylene*	**3460**	**23500**	0.42	2.85
Chlorobenzene	**25.0**	**115**	0.44	2.03
Ethylbenzene	**1.56**	**6.76**	0.54	2.34
m,p-Xylene	**1.69**	**7.33**	0.38	1.65
Styrene	ND	ND	0.48	2.04
1,1,2,2-Tetrachloroethane	ND	ND	0.51	3.50
o-Xylene	**1.02**	**4.42**	0.46	1.99
1,3,5-Trimethylbenzene	**1.49**	**7.31**	0.64	3.14
1,2,4-Trimethylbenzene	ND	ND	0.85	4.17
1,3-Dichlorobenzene	**2.84**	**17.1**	0.78	4.69
1,4-Dichlorobenzene	ND	ND	0.81	4.87
1,2-Dichlorobenzene	ND	ND	0.80	4.81
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~ND~~	~~1.11~~	~~8.22~~
Hexachlorobutadiene	ND	ND	0.57	6.08

ND = NOT DETECTED

Method Reference:

EPA T014A

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	SAGE	PROJECT ID:	R036
SAMPLE TYPE:	AIR	REPORT DATE:	07/22/04
COLLECTION DATE:	07/14/04	ANALYZED BY:	JC
REC'D BY LAB:	07/15/04	ANALYSIS DATE:	07/16/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 152016
SAMPLE LOCATION: GAC-INF

	RESULTS (ppbv)	DETECTION LIMIT (ppbv)
1,3-butadiene	ND	5.00
Propylene	**30.0**	5.00
ethanol	ND	5.00
acetone	**9.58**	5.00
2-propanol	**6.46**	5.00
carbon disulfide	ND	5.00
trans-1,2-dichloroethene	ND	5.00
MTBE	**27.6**	5.00
vinyl acetate	**18.6**	5.00
MEK (2-butanone)	**42.4**	5.00
ethyle acetate	ND	5.00
tetrahydrofuran	ND	5.00
cyclohexane	**1411**	5.00
bromodichloromethane	ND	5.00
1,4-dioxane	ND	5.00
heptane	**8.54**	5.00
(MBK) 2-hexanone	ND	5.00
1,1-Dibromoethane	ND	5.00
bromoform	ND	5.00

ND = NOT DETECTED

Method Reference:

EPA T015

GEOLABS, INC.
45 JOHNSON LANE
BRAINTREE, MA 02184
M-MA015

LIMITATIONS & EXCLUSIONS

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This report was prepared for the sole use of our client. Portions of the report may not be used independent of the entire report.

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Any and all subsequent pages of this report are chain(s) of custody.

GeoLabs, Inc.
Environmental Laboratories
45 Johnson Lane
Braintree, MA 02184
Phone: 781-848-7844
Fax: 781-848-7811

Turnaround Time
RUSH: 24hrs ☐ 48hrs ☐ 72hrs ☐
STANDARD: 5 Days ___ Rush ___ Approved By: ___

Page 1 of 1

SPECIAL INSTRUCTIONS

N.Y. QA/QC Package
Post-collection vacuum > 4" Hg
Please check + Record

Client: SAGE Environmental Inc
Address: 172 Armistice Blvd Pawtucket RI 02860
Phone: (401) 723-9900 x104
Fax: (401) 723-9973
Contact: Tom Sallowid
E-mail:

Project Number: R036
Project Location: Astoria N.Y.
Purchase Order #: R036
Collected By: TCS/AS

ANALYSES REQUESTED

SAMPLE ID	COLLECTION DATE	COLLECTION TIME	SAMPLED BY	SAMPLE LOCATION	CONTAINER TYPE	CONTAINER QUANT	MATRIX	COMP	GRAB	PRES	GEOLABS SAMPLE NUMBER	VOC TO15								TEMPERATURE	LAB pH
GAC-INF	7/1/04	1430	TCS/AS	GAC Influent	Summa		Air		X		~~IS2012~~ IS2016	X									

CONTAINER CODES:
A = Amber
B = Bag
G = Glass
P = Plastic
S = Summa Canister
O = Other V = VOA

MATRIX CODES:
GW = Ground Water
WW = Wastewater
DW = Drinking Water
SL = Sludge
S = Soil A = Air
O = Oil OT = Other

PRESERVATIVE CODES:
1 = HCl 7 = ICE
2 = HNO_3
3 = H_2SO_4
4 = $Na_2S_2O_3$
5 = NaOH
6 = MeOH

Relinquished By:	Date/Time	Received By:	Date/Time:
[signature]	7/14/04 1415	[signature]	7-15-04
Relinquished By: [signature]	7-15-04 3:30	Received By:	2PM
Relinquished By:		Received By GeoLabs: [signature]	1530 7-15-04

GEOLABS CHAIN OF CUSTODY

GeoLabs, Inc.

Environmental Laboratories

LABORATORY REPORT

PREPARED FOR:

Sage Environmental
172 Armistice Blvd.
Pawtucket, RI 02860

Attn: Tom Saccoceso

PROJECT ID:	R036 42-14 19th Ave Astoria, NY
GEOLABS CERTIFICATION #:	M-MA015
SAMPLE NUMBER:	156918
DATE PREPARED:	October 29, 2004
PREPARED BY:	Karen Mullally
APPROVED BY:	Jim Chen, Laboratory Director

Location: 45 Johnson Lane
Braintree, MA 02184

Phone: (781) 848-7844
Fax: (781) 848-7811

GeoLabs, Inc.
Environmental Laboratories

MADEP MCP Response Action Analytical Report Certification Form

Laboratory Name:	GeoLabs, Inc.	Project #:	R036
Project Location:	42-14 19th Ave	MADEP RTN:	

This form provides certifications for the following data set: 156918

Sample matrices: Groundwater ( ) Soil / Sediment ( ) Drinking Water ( ) Other (x) Air

MCP SW-846 Methods Used	8260B ( )	8151A ( )	8330 ( )	6010B ( )	7470/1A ( )	Other: (x)	TO-14
	8270C ( )	8081A ( )	VPH ( )	6020 ( )	9014M^2 ( )		
	8082 ( )	8021B ( )	EPH ( )	7000 S^3 ( )			
As specified in MADEP Compendium of Analytical Methods (Check all that apply)	1- List Release Tracking Number (RTN), if known 2- M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method 3- S - SW-846 Methods 7000 Series (List individual method and analyte)						

An affirmative response to questions A, B, and C is required for "*Presumptive Certainty*" status

A	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the date set?	Yes (x)	No[1] ( )
B	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes (x)	No[1] ( )
C	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 of the MADEP documents CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes (x)	No[1] ( )

A response to questions D and E below is required for "*Presumptive Certainty*" status

D	Were all QC performance standards and recommendations for the specified methods achieved?	Yes (x)	No[1] ( )
E	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes (x)	No[1] ( )

[1]All NO answers must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature:		Position:	Lab Director
Printed Name:	Jim Chen	Date:	October 29, 2004

GeoLabs, Inc.
Environmental Laboratories

Case Narrative

Project ID: R036
Client Name: Sage Environmental

Sample Number: 156918
Received: 10/22/04

Physical Condition of Samples

This project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

This project was accompanied by satisfactory Chain of Custody documentation. The sample container label(s) agreed with the Chain of Custody.

Analysis of Sample(s)

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these sample(s).

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**Sage Environmental**	PROJECT ID:	R036
SAMPLE TYPE:	AIR	REPORT DATE:	10/29/04
COLLECTION DATE:	10/21/04	ANALYZED BY:	JC
REC'D BY LAB:	10/22/04	ANALYSIS DATE:	10/28/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 156918
SAMPLE LOCATION: Gal-INF

10 X Dilution *	**RESULTS (ppbv)**	**RESULTS (µg/m³)**	**DETECTION LIMIT (ppbv)**	**DETECTION LIMIT (µg/m³)**
Freon 12	**0.990**	**4.90**	0.41	2.03
Chloromethane	ND	ND	0.79	1.63
Freon 114	ND	ND	0.82	5.73
Vinyl chloride	**12.1**	**31.0**	0.97	2.48
Bromomethane	ND	ND	0.66	2.56
Freon 11	ND	ND	0.56	3.15
Chloroethane	ND	ND	1.13	2.98
1,1-Dichloroethene	**2.79**	**11.0**	0.61	2.42
Freon 113	**4.33**	**33.1**	0.61	4.67
cis-1,2-Dichloroethene*	**1680**	**6660**	4.00	15.9
1,1-Dichloroethane	**18.6**	**74.5**	0.41	1.64
Chloroform	**13.0**	**63.3**	0.49	2.38
1,1,1-Trichloroethane*	**1020**	**5550**	4.00	21.8
1,2-Dichloroethane	**2.62**	**10.5**	0.45	1.80
Benzene	ND	ND	0.386	1.23
Carbon Tetrachloride	ND	ND	0.65	4.09
1,2-Dichloropropane	ND	ND	0.38	1.76
Trichloroethylene*	**1130**	**6050**	3.40	18.2
cis-1,3-Dichloropropene	ND	ND	0.29	1.32
trans-1,3-Dichloropropene	ND	ND	0.35	1.59

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**Sage Environmental**	PROJECT ID:	R036
SAMPLE TYPE:	AIR	REPORT DATE:	10/29/04
COLLECTION DATE:	10/21/04	ANALYZED BY:	JC
REC'D BY LAB:	10/22/04	ANALYSIS DATE:	10/28/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 156918
SAMPLE LOCATION: Gal-INF

	RESULTS (ppbv)	RESULTS ($\mu g/m^3$)	DETECTION LIMIT (ppbv)	DETECTION LIMIT ($\mu g/m^3$)
1,1,2-Trichloroethane	ND	ND	0.40	2.18
Toluene	**0.970**	**3.65**	0.95	3.58
1,2-Dibromoethane (EDB)	ND	ND	0.37	2.84
Tetrachloroethylene*	**3100**	**21000**	4.20	28.5
Chlorobenzene	**1.29**	**5.96**	0.44	2.03
Ethylbenzene	**0.800**	**3.47**	0.54	2.34
m,p-Xylene	**2.41**	**10.4**	0.38	1.65
Styrene	ND	ND	0.48	2.04
1,1,2,2-Tetrachloroethane	ND	ND	0.51	3.50
o-Xylene	**1.15**	**4.99**	0.46	1.99
1,3,5-Trimethylbenzene	ND	ND	0.64	3.14
1,2,4-Trimethylbenzene	ND	ND	0.85	4.17
1,3-Dichlorobenzene	ND	ND	0.78	4.69
1,4-Dichlorobenzene	ND	ND	0.81	4.87
1,2-Dichlorobenzene	ND	ND	0.80	4.81
1,2,4-Trichlorobenzene	ND	ND	1.11	8.22
Hexachlorobutadiene	ND	ND	0.57	6.08

TICS ND

ND = NOT DETECTED

Method Reference:

EPA T014A

GEOLABS, INC.
45 JOHNSON LANE
BRAINTREE, MA 02184
M-MA015

LIMITATIONS & EXCLUSIONS

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This report was prepared for the sole use of our client. Portions of the report may not be used independent of the entire report.

All analyses were performed within required holding times, in accordance with EPA protocols and using accepted QA/QC procedures. All QA/QC meets acceptable limits unless otherwise noted. The information contained in this report is, to the best of my knowledge, accurate and complete.

This lab report meets all requirements of NELAC unless otherwise noted.

Any and all subsequent pages of this report are chain(s) of custody.

GeoLabs, Inc.
Environmental Laboratories
10 Plain Street
Braintree, MA 02184
Office: 781-848-7844
Fax: 781-848-7811

Turnaround Time: RUSH 24hrs 48hrs 72hrs STANDARD ✓ 5 Days
Rush Approved By Lab:

SPECIAL INSTRUCTIONS

*Requires New York QA/QC Package

** - Include TICs

OT =

Client:	SAGE Environmental Inc
Address:	172 Armistice Blvd, Pawtucket RI 02860
Phone:	(401) 723-9900
Fax:	(401) 723-9973
Contact:	Tom Saccoccio
E-Mail:	tsaccoccio@sageenvironmental.net
Project Number:	R036
Project Location:	42-14 19th Avenue, Astoria NY
Purchase Order #:	R036
Collected By:	Tom Saccoccio

ANALYSES REQUESTED

SAMPLE ID	COLLECTION DATE	COLLECTION TIME	SAMPLE LOCATION	CONTAINER TYPE	CONTAINER QUANT	MATRIX	COMP	GRAB	PRES	GEOLABS SAMPLE NUMBER	TO-14A**								TEMP	pH
GAC-INF	10/[illegible]	1330	SVE Influent to GAC	S	1	A		X		156918	X								—	—

Relinquished By:	Date/Time	Received By:	Date/Time:
Thomas C. Saccoccio	10/27/04 [illegible]		
Relinquished By:		Received By GeoLabs:	
Relinquished By:		Received By GeoLabs: Danielle Rega	10/27/04 11:30a

CONTAINER CODES:
A = Amber
V = VOA Vial
G = Glass
P = Plastic
S = Summa Canister
TB = Tetlar Bag
OT = Other-Define

MATRIX CODES:
SW = Storm Water
GW = Ground Water
WW = Wastewater
DW = Drinking Water
SL = Sludge W = Wipe
S = Soil A = Air
O = Oil OT = Other-Define

PRESERVATIVE CODES:
1 = HCl
2 = HNO_3
3 = H_2SO_4
4 = $Na_2S_2O_3$
5 = NaOH
6 = MeOH
7 = ICE
8 = Other (Define)

GEOLABS CHAIN OF CUSTODY

REC'D DEC 3 0 2004

GeoLabs, Inc.

Environmental Laboratories

LABORATORY REPORT

PREPARED FOR:

Sage Environmental
172 Armistice Blvd.
Pawtucket, RI 02860

Attn: Tom Saccoccio

PROJECT ID: R036
Astoria, NY

GEOLABS CERTIFICATION #: M-MA015

SAMPLE NUMBER: 158858

DATE PREPARED: December 17, 2004

PREPARED BY: Karen Mullally

APPROVED BY:

Jim Chen, Laboratory Director

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**Sage Environmental Inc.**	PROJECT ID:	RO36
SAMPLE TYPE:	AIR	REPORT DATE:	12/17/04
COLLECTION DATE:	12/10/04	ANALYZED BY:	JC
REC'D BY LAB:	12/13/04	ANALYSIS DATE:	12/13/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 158858
SAMPLE LOCATION: SVE-IMP

10 X Dilution *	**RESULTS**		**DETECTION LIMIT**	
	(ppbv)	**(µg/m³)**	**(ppbv)**	**(µg/m³)**
Freon 12	**1.07**	**5.30**	0.41	2.03
Chloromethane	ND	ND	0.79	1.63
Freon 114	ND	ND	0.82	5.73
Vinyl chloride	**10.0**	**25.6**	0.97	2.48
Bromomethane	ND	ND	0.66	2.56
Freon 11	**11.9**	**66.9**	0.56	3.15
Chloroethane	**1.21**	**3.19**	1.13	2.98
1,1-Dichloroethene	**2.27**	**8.99**	0.61	2.42
Freon 113	**2.20**	**16.8**	0.61	4.67
cis-1,2-Dichloroethene*	**1510**	**5990**	4.00	15.9
1,1-Dichloroethane	**19.7**	**78.8**	0.41	1.64
Chloroform	**19.4**	**94.5**	0.49	2.38
1,1,1-Trichloroethane*	**841**	**4570**	4.00	21.8
1,2-Dichloroethane	**1.79**	**7.18**	0.45	1.80
Benzene	**1.43**	**4.57**	0.386	1.23
Carbon Tetrachloride	ND	ND	0.65	4.09
1,2-Dichloropropane	ND	ND	0.38	1.76
Trichloroethylene*	**888**	**4760**	3.40	18.2
cis-1,3-Dichloropropene	ND	ND	0.29	1.32
trans-1,3-Dichloropropene	ND	ND	0.35	1.59

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**Sage Environmental Inc.**	PROJECT ID:	RO36
SAMPLE TYPE:	AIR	REPORT DATE:	12/17/04
COLLECTION DATE:	12/10/04	ANALYZED BY:	JC
REC'D BY LAB:	12/13/04	ANALYSIS DATE:	12/13/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 158858
SAMPLE LOCATION: SVE-IMP

10 X Dilution *	**RESULTS (ppbv)**	**RESULTS (µg/m³)**	**DETECTION LIMIT (ppbv)**	**DETECTION LIMIT (µg/m³)**
1,1,2-Trichloroethane	**0.790**	**4.30**	0.40	2.18
Toluene	**1.56**	**5.88**	0.95	3.58
1,2-Dibromoethane (EDB)	ND	ND	0.37	2.84
Tetrachloroethylene*	**2510**	**17000**	4.20	28.5
Chlorobenzene	ND	ND	0.44	2.03
Ethylbenzene	**4.11**	**17.8**	0.54	2.34
m,p-Xylene	**16.4**	**70.9**	0.38	1.65
Styrene	ND	ND	0.48	2.04
1,1,2,2-Tetrachloroethane	ND	ND	0.51	3.50
o-Xylene	**4.37**	**18.9**	0.46	1.99
1,3,5-Trimethylbenzene	ND	ND	0.64	3.14
1,2,4-Trimethylbenzene	ND	ND	0.85	4.17
1,3-Dichlorobenzene	ND	ND	0.78	4.69
1,4-Dichlorobenzene	ND	ND	0.81	4.87
1,2-Dichlorobenzene	ND	ND	0.80	4.81
1,2,4-Trichlorobenzene	ND	ND	1.11	8.22
Hexachlorobutadiene	ND	ND	0.57	6.08

ND = NOT DETECTED

Method Reference:

EPA T014A

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**Sage Environmental Inc.**	PROJECT ID:	RO36
SAMPLE TYPE:	AIR	REPORT DATE:	12/17/04
COLLECTION DATE:	12/10/04	ANALYZED BY:	JC
REC'D BY LAB:	12/13/04	ANALYSIS DATE:	12/13/04
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

TENTATIVELY IDENTIFIED COMPOUNDS--VOLATILE ORGANICS

SAMPLE NUMBER:	158858	
SAMPLE LOCATION:	SVE-IMP	
	RESULTS	
	(ppbv)	**(µg/m³)**
TICS	ND	ND

ND = NOT DETECTED

Method Reference:

EPA T014A

GEOLABS, INC.
45 JOHNSON LANE
BRAINTREE, MA 02184
M-MA015

LIMITATIONS & EXCLUSIONS

All the professional opinions presented in this report are based solely on the scope of work conducted and sources referred to in our report. The data presented by GeoLabs in this report was collected and analyzed using generally accepted industry methods and practices at the time the report was generated. This report represents the conditions, locations and materials that were observed at the time the work was conducted. No inferences regarding other conditions, locations or materials, at a later or earlier time may be made based on the contents of the report. No other warranty, express or implied is made.

This report was prepared for the sole use of our client. Portions of the report may not be used independent of the entire report.

All analyses were performed within required holding times, in accordance with EPA protocols and using accepted QA/QC procedures. All QA/QC meets acceptable limits unless otherwise noted. The information contained in this report is, to the best of my knowledge, accurate and complete.

Any and all subsequent pages of this report are chain(s) of custody.

GeoLabs, Inc.
Environmental Laboratories
45 Johnson Lane
Braintree, MA 02184
Phone: 781-848-7844
Fax: 781-848-7811

Turnaround Time
RUSH: 24hrs ☐ 48hrs ☐ 72hrs ☐
STANDARD: ✓
5 Days ✓
Rush Approved By: ____

Page 1 of 1

SPECIAL INSTRUCTIONS

TO14A + Tics

N.Y. QA/QC Package

Client: SAGE Environmental Inc
Address: 172 Armistice Blvd
Pawtucket RI 02860
Phone: (401) 723-9900 x104
Fax: (401) 723-9973
Contact: Tom Saccoccio
E-mail: TSaccoccio@sageenvironmental.net

Project Number: R036
Project Location: Astoria, N.Y.
Purchase Order #: R036
Collected By: Tom Saccoccio

ANALYSES REQUESTED

SAMPLE ID	COLLECTION DATE	COLLECTION TIME	SAMPLED BY	SAMPLE LOCATION	CONTAINER TYPE	CONTAINER QUANT	MATRIX	COMP	GRAB	PRES	GEOLABS SAMPLE NUMBER	TO14A + Tics								TEMPERATURE	LAB pH
SVE-INF	12/10/04	1245	TB	SVE-INF	S	1	A		X	None	158858	X						1202			

CONTAINER CODES:
A = Amber
B = Bag
G = Glass
P = Plastic
S = Summa Canister
O = Other V = VOA

MATRIX CODES:
GW = Ground Water
WW = Wastewater
DW = Drinking Water
SL = Sludge
S = Soil A = Air
O = Oil OT = Other

PRESERVATIVE CODES:
1 = HCl 7 = ICE
2 = HNO_3
3 = H_2SO_4
4 = $Na_2S_2O_3$
5 = NaOH
6 = MeOH

Relinquished By:	Date/Time	Received By:	Date/Time:
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Relinquished By: [signature]	12/13/04 1010	Received By: [signature]	
Relinquished By:		Received By GeoLabs: [signature]	12/13/04 1000

GEOLABS CHAIN OF CUSTODY

GeoLabs, Inc.

Environmental Laboratories

LABORATORY REPORT

PREPARED FOR:

Sage Environmental
172 Armistice Blvd.
Pawtucket, RI 02860

Attn: Tom Saccoccio

PROJECT ID:	R036 Astoria, NY
GEOLABS CERTIFICATION #:	M-MA015
SAMPLE NUMBER:	162531
DATE PREPARED:	March 22, 2005
PREPARED BY:	Karen Mullally

APPROVED BY: Jim Chen

Jim Chen, Laboratory Director

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	**Sage Environmental**	PROJECT ID:	R036
SAMPLE TYPE:	AIR	REPORT DATE:	03/22/05
COLLECTION DATE:	03/14/05	ANALYZED BY:	JC
REC'D BY LAB:	03/15/05	ANALYSIS DATE:	03/18/05
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 162531
SAMPLE LOCATION: SVE Influent

10 X Dilution *	**RESULTS (ppbv)**	**RESULTS (µg/m³)**	**DETECTION LIMIT (ppbv)**	**DETECTION LIMIT (µg/m³)**
Freon 12	ND	ND	0.41	2.03
Chloromethane	ND	ND	0.79	1.63
Freon 114	ND	ND	0.82	5.73
Vinyl chloride	**1.46**	**3.73**	0.97	2.48
Bromomethane	ND	ND	0.66	2.56
Freon 11	**4.90**	**27.6**	0.56	3.15
Chloroethane	ND	ND	1.13	2.98
1,1-Dichloroethene	**1.96**	**7.76**	0.61	2.42
Freon 113	**3.07**	**23.5**	0.61	4.67
cis-1,2-Dichloroethene*	**801**	**3180**	4.00	15.9
1,1-Dichloroethane	ND	ND	0.41	1.64
Chloroform	ND	ND	0.49	2.38
1,1,1-Trichloroethane*	**436**	**2370**	4.00	21.8
1,2-Dichloroethane	**1.08**	**4.33**	0.45	1.80
Benzene	**1.06**	**3.39**	0.386	1.23
Carbon Tetrachloride	**1.44**	**9.07**	0.65	4.09
1,2-Dichloropropane	ND	ND	0.38	1.76
Trichloroethylene*	**462**	**2480**	3.40	18.2

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	Sage Environmental	PROJECT ID:	R036
SAMPLE TYPE:	AIR	REPORT DATE:	03/22/05
COLLECTION DATE:	03/14/05	ANALYZED BY:	JC
REC'D BY LAB:	03/15/05	ANALYSIS DATE:	03/18/05
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 162531
SAMPLE LOCATION: SVE Influent

10 X Dilution *	**RESULTS** (ppbv)	($\mu g/m^3$)	**DETECTION LIMIT** (ppbv)	($\mu g/m^3$)
cis-1,3-Dichloropropene	ND	ND	0.29	1.32
trans-1,3-Dichloropropene	ND	ND	0.35	1.59
1,1,2-Trichloroethane	**0.810**	**4.41**	0.40	2.18
Toluene	**1.31**	**4.93**	0.95	3.58
1,2-Dibromoethane (EDB)	ND	ND	0.37	2.84
Tetrachloroethylene*	**1620**	**10100**	4.20	28.5
Chlorobenzene	ND	ND	0.44	2.03
Ethylbenzene	ND	ND	0.54	2.34
m,p-Xylene	**2.57**	**11.1**	0.38	1.65
Styrene	ND	ND	0.48	2.04
1,1,2,2-Tetrachloroethane	ND	ND	0.51	3.50
o-Xylene	ND	ND	0.46	1.99
1,3,5-Trimethylbenzene	ND	ND	0.64	3.14
1,2,4-Trimethylbenzene	ND	ND	0.85	4.17
1,3-Dichlorobenzene	ND	ND	0.78	4.69
1,4-Dichlorobenzene	ND	ND	0.81	4.87
1,2-Dichlorobenzene	ND	ND	0.80	4.81
1,2,4-Trichlorobenzene	ND	ND	1.11	8.22
Hexachlorobutadiene	ND	ND	0.57	6.08
1,3-butadiene	ND	ND	5.00	11.5
Propylene	ND	ND	5.00	10.3

GeoLabs, Inc.
Environmental Laboratories

CLIENT NAME:	Sage Environmental	PROJECT ID:	R036
SAMPLE TYPE:	AIR	REPORT DATE:	03/22/05
COLLECTION DATE:	03/14/05	ANALYZED BY:	JC
REC'D BY LAB:	03/15/05	ANALYSIS DATE:	03/18/05
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS

SAMPLE NUMBER: 162531
SAMPLE LOCATION: SVE Influent

10 X Dilution *	**RESULTS (ppbv)**	**RESULTS (µg/m³)**	**DETECTION LIMIT (ppbv)**	**DETECTION LIMIT (µg/m³)**
Ethanol	ND	ND	5.00	9.41
Acetone	ND	ND	5.00	11.9
2-propanol	ND	ND	5.00	12.3
Carbon disulfide	ND	ND	5.00	15.6
trans-1,2-dichloroethene	ND	ND	5.00	19.8
MTBE	ND	ND	5.00	18.0
Vinyl acetate	ND	ND	5.00	17.6
MEK (2-butanone)	ND	ND	5.00	14.7
Ethyl acetate	ND	ND	5.00	18.0
Tetrahydrofuran	ND	ND	5.00	14.7
Cyclohexane	ND	ND	5.00	17.2
Bromodichloromethane	ND	ND	5.00	33.5
1,4-dioxane	ND	ND	5.00	18.0
Heptane	ND	ND	5.00	20.4
2-hexanone (MBK)	ND	ND	5.00	20.4
1,1-Dibromoethane	ND	ND	5.00	38.4
Bromoform	ND	ND	5.00	51.7

ND = NOT DETECTED

Method Reference:

EPA T014-15

GEOLABS, INC.
45 JOHNSON LANE
BRAINTREE, MA 02184
M-MA015

LIMITATIONS & EXCLUSIONS

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This report was prepared for the sole use of our client. Portions of the report may not be used independent of the entire report.

All analyses were performed within required holding times, in accordance with EPA protocols and using accepted QA/QC procedures. All QA/QC meets acceptable limits unless otherwise noted. The information contained in this report is, to the best of my knowledge, accurate and complete.

Any and all subsequent pages of this report are chain(s) of custody.

GeoLabs, Inc.
Environmental Laboratories
45 Johnson Lane
Braintree, MA 02184
Phone: 781-848-7844
Fax: 781-848-7811

Turnaround Time

RUSH: 24hrs ☐ 48hrs ☐ 72hrs ☐

STANDARD: 5 Days X
Rush
Approved By: ____

Page 1 of 1

SPECIAL INSTRUCTIONS

NY QA/QC

Client: Sage Environmental
Address: 172 Armistice Blvd. Pawtucket, RI 02860
Phone: 401-723-9900
Fax: -9973
Contact: Tom Saccoccio
E-mail: tsaccoccio@sageenvironmental.net

Project Number: R036
Project Location: Astoria, NY
Purchase Order #:
Collected By: FM/EG

ANALYSES REQUESTED

SAMPLE ID	COLLECTION DATE	COLLECTION TIME	SAMPLED BY	SAMPLE LOCATION	CONTAINER TYPE	CONTAINER QUANT	MATRIX	COMP	GRAB	PRES	GEOLABS SAMPLE NUMBER	TO-15								TEMPERATURE	LAB pH
GAC-INF	3/14/05	9:00	FM/EG	SVE Influent	S	1	A		X		EG 6472	X			162531					64	72

CONTAINER CODES:
A = Amber
B = Bag
G = Glass
P = Plastic
S = Summa Canister
O = Other V = VOA

MATRIX CODES:
GW = Ground Water
WW = Wastewater
DW = Drinking Water
SL = Sludge
S = Soil A = Air
O = Oil OT = Other

PRESERVATIVE CODES:
1 = HCl 7 = ICE
2 = HNO_3
3 = H_2SO_4
4 = $Na_2S_2O_3$
5 = NaOH
6 = MeOH

Relinquished By:	Date/Time	Received By:	Date/Time:
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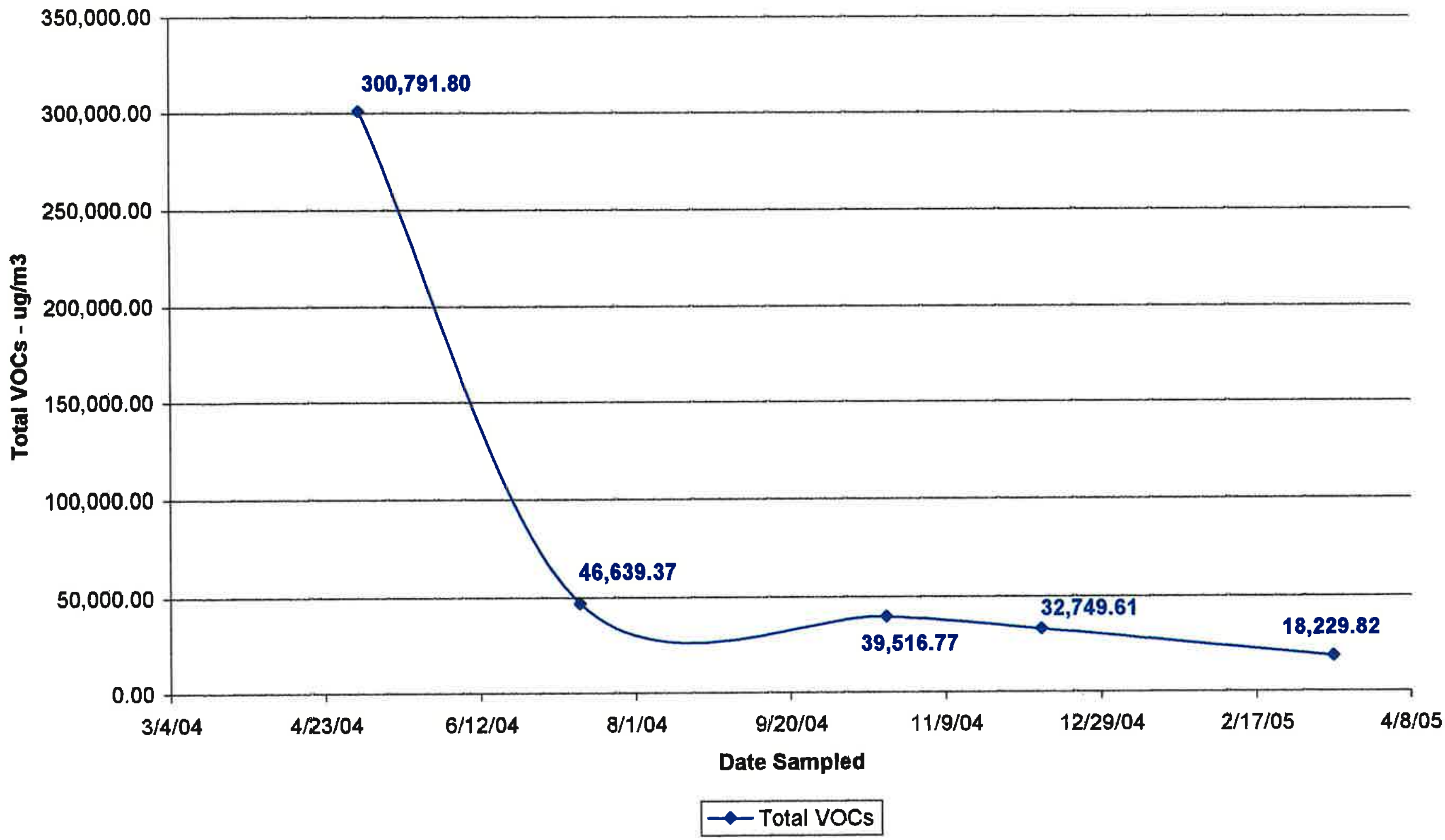
Relinquished By:		Received By:	
Relinquished By: [signature]	3-15-05 11:30	Received By GeoLabs: [signature]	3/15/05 11:30a

GEOLABS CHAIN OF CUSTODY

APPENDIX 11

Analytical Results - SVE Influent to Carbon
42-14 19th Avenue
Astoria, New York



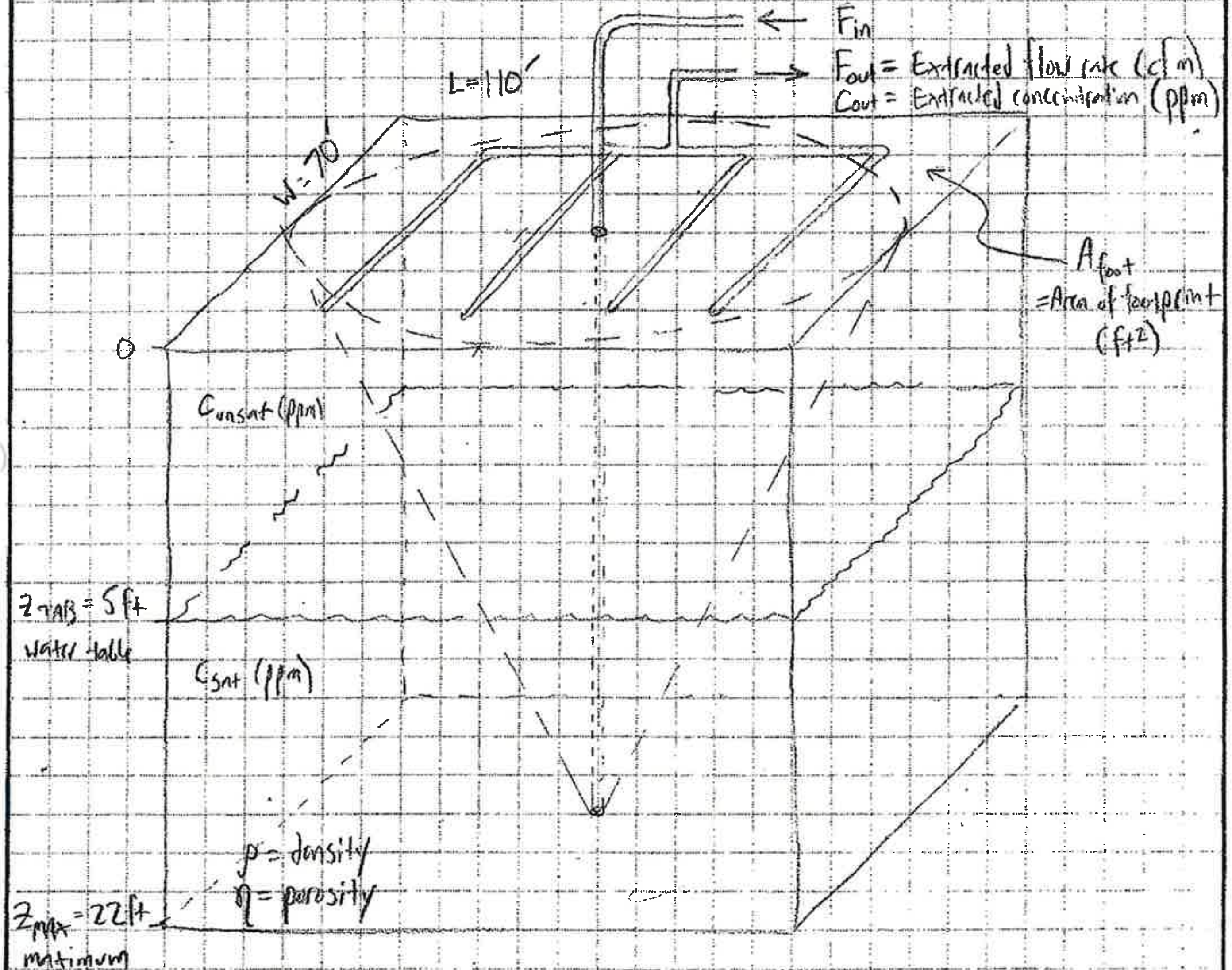
S:\Users\Science\tSaccoccio\Public\R jobs\R036\Analytical Data\Air - SVE\SVE influent results.xls

SAGE Environmental, Inc.
172 Armistice Blvd.
PAWTUCKET, RHODE ISLAND 02860
(401) 723-9900 • Fax (401) 723-9973

JOB R036 - Astoria
SHEET NO. 1 OF 3
CALCULATED BY EG DATE 3/10/05
CHECKED BY DATE
SCALE

ESTIMATION OF TOTAL TIME FOR COMPLETE CLEAN-UP

- Assume contaminated volume is a cube.
- Assume that over total time, SVE/AS influence will affect entire cube.



Contaminated Volume: $V_{cont} = L \times W \times Z_{max} = 110 \cdot 70 \cdot 22\ \cancel{ft^3}\left(\frac{0.0283\ m^3}{\cancel{ft^3}}\right) \approx 4{,}800\ m^3$

Soil Density: $\rho_{soil} = \frac{1.5\ \cancel{tons}}{\cancel{yd^3}}\left(\frac{2{,}000\ \cancel{lbs}}{\cancel{ton}}\right)\left(\frac{1.3079\ \cancel{yd^3}}{m^3}\right)\left(\frac{1\ kg}{2.21\ \cancel{lbs}}\right) = 1775\ \frac{kg}{m^3}$

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JOB R038 - Aston

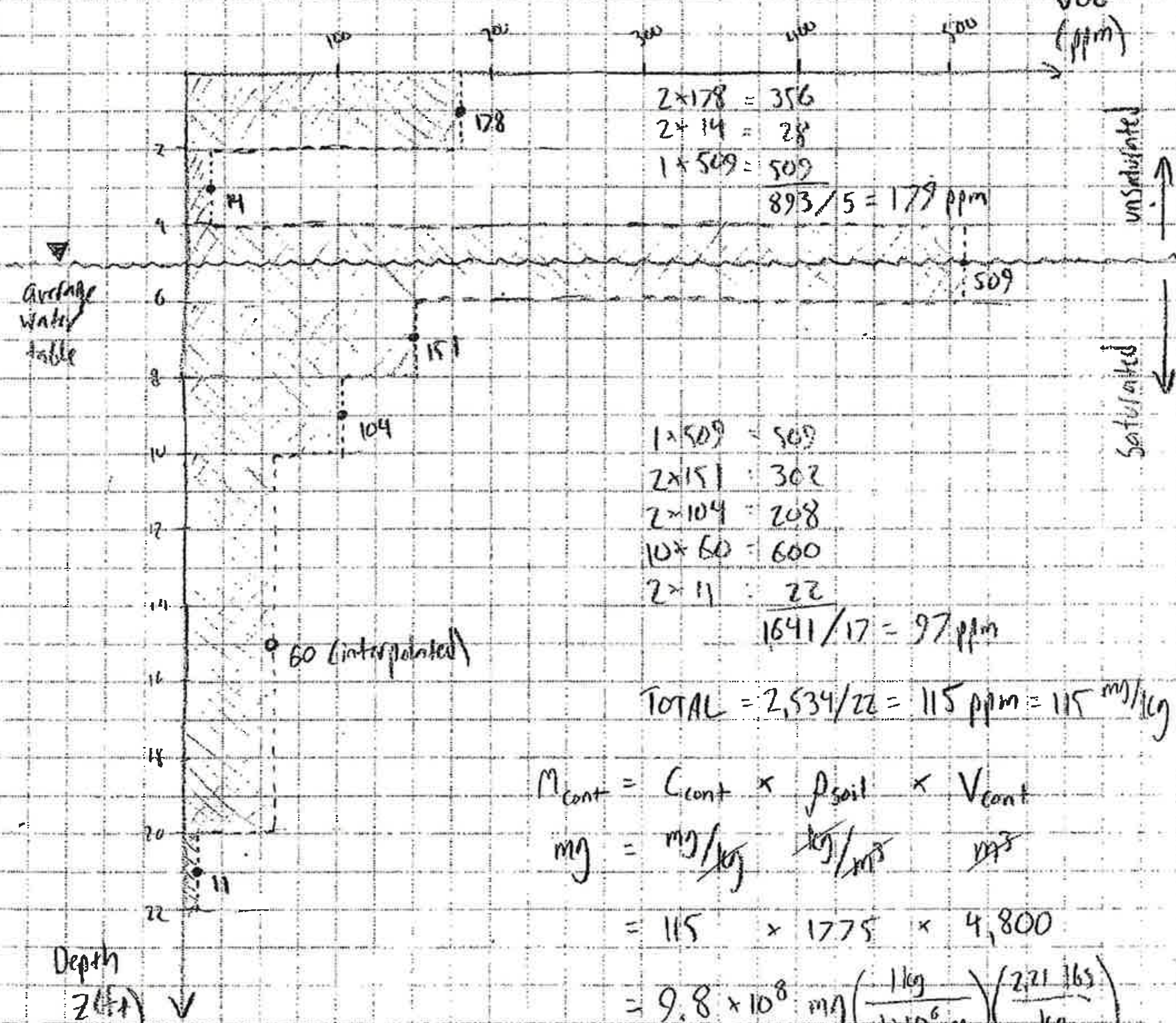
SHEET NO. 2 OF 3

CALCULATED BY EG DATE 3/10/05

CHECKED BY ______ DATE ______

SCALE ______

- Use soil data to estimate contaminant mass:



$2 \times 178 = 356$
$2 \times 14 = 28$
$1 \times 509 = 509$
$893/5 = 179$ ppm

$1 \times 509 = 509$
$2 \times 151 = 302$
$2 \times 104 = 208$
$10 \times 60 = 600$
$2 \times 11 = 22$
$1641/17 = 97$ ppm

TOTAL $= 2{,}534/22 = 115$ ppm $= 115$ mg/kg

$$M_{cont} = C_{cont} \times \rho_{soil} \times V_{cont}$$

$$mg = mg/\cancel{kg} \quad \cancel{kg}/\cancel{m^3} \quad \cancel{m^3}$$

$$= 115 \times 1775 \times 4{,}800$$

$$= 9.8 \times 10^8 \, mg \left(\frac{1\,kg}{1 \times 10^6\,mg}\right)\left(\frac{2.21\,lbs}{kg}\right)$$

$\approx 2{,}200$ lbs. (0.9) - Assume 10% of total contamination was removed via excavation

$\approx 2{,}000$ lbs.

$$\text{Total Time for Complete Clean-up (days)} = \frac{\text{Total Contam. Mass (lbs)}}{\text{Removal Rate (lbs/day)}} \Longrightarrow$$

Need to estimate contaminant mass removed by SVE/AS

SAGE Environmental, Inc.
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(401) 723-9900 • Fax (401) 723-9973

JOB R036 - Astoria
SHEET NO. 3 OF 3
CALCULATED BY EG DATE
CHECKED BY DATE
SCALE

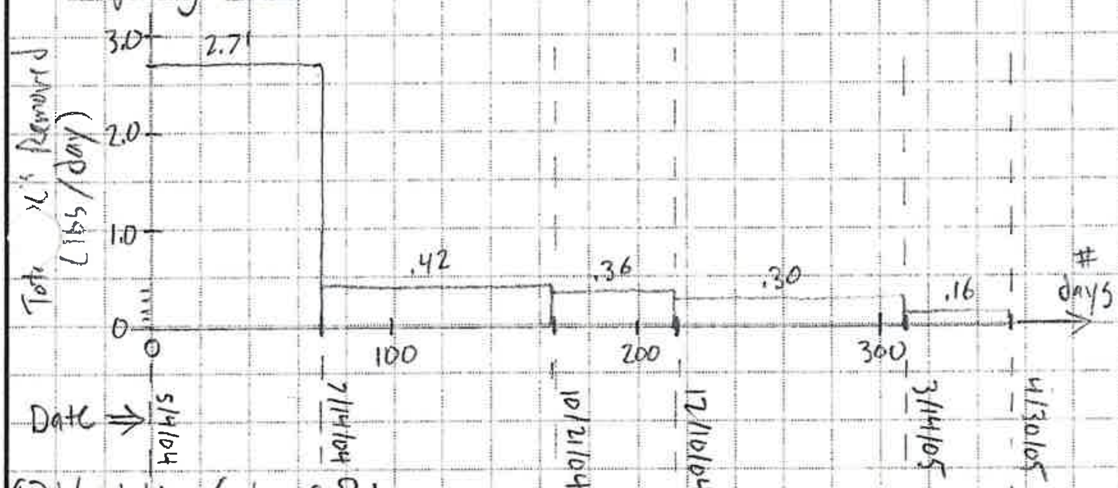
- Use SVE/AS influent air sample data to estimate average removal rate:

Sample Date	5/4/04	7/14/04	10/21/04	12/10/04	3/14/05
Total VOC's Removed (lbs./day)	2.71	0.42	0.36	0.30	0.16

① Straight Average: 2.71 + .42 + .36 + .30 + .16 = 3.95/5 = 0.79 lbs/day

② Straight Average (w/o 1st point): .42 + .36 + .30 + .16 = 1.24/4 = 0.31 lbs/day

③ Weighting Scheme A:

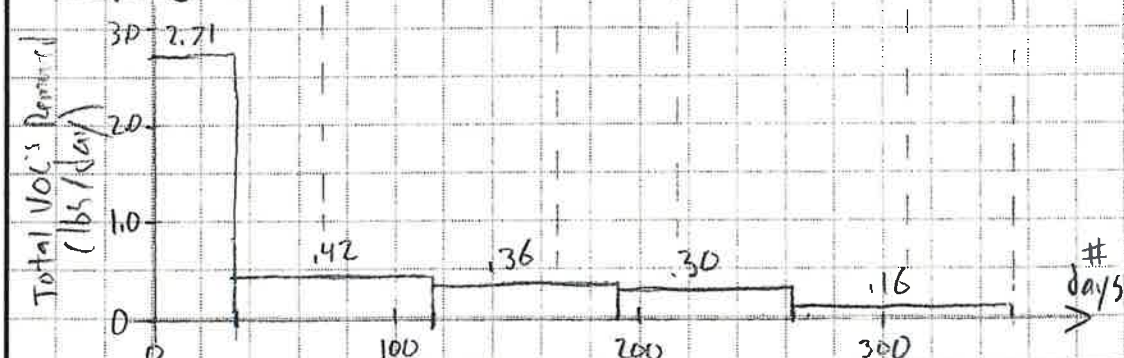


# of days

2.71 × 70 = 190
0.42 × 96 = 40
0.36 × 50 = 18
0.30 × 94 = 28
0.16 × 45 = 7
355 283

283/355 = 0.79 lbs/day

④ Weighting Scheme B:



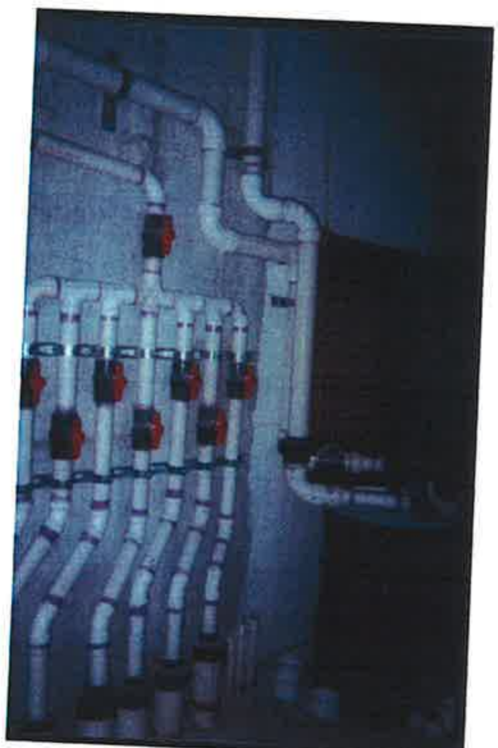
2.71 × 35 = 95
0.42 × 83 = 35
0.36 × 73 = 26
0.30 × 72 = 22
0.16 × 92 = 15
355 193

193/355 = 0.54 lbs/day

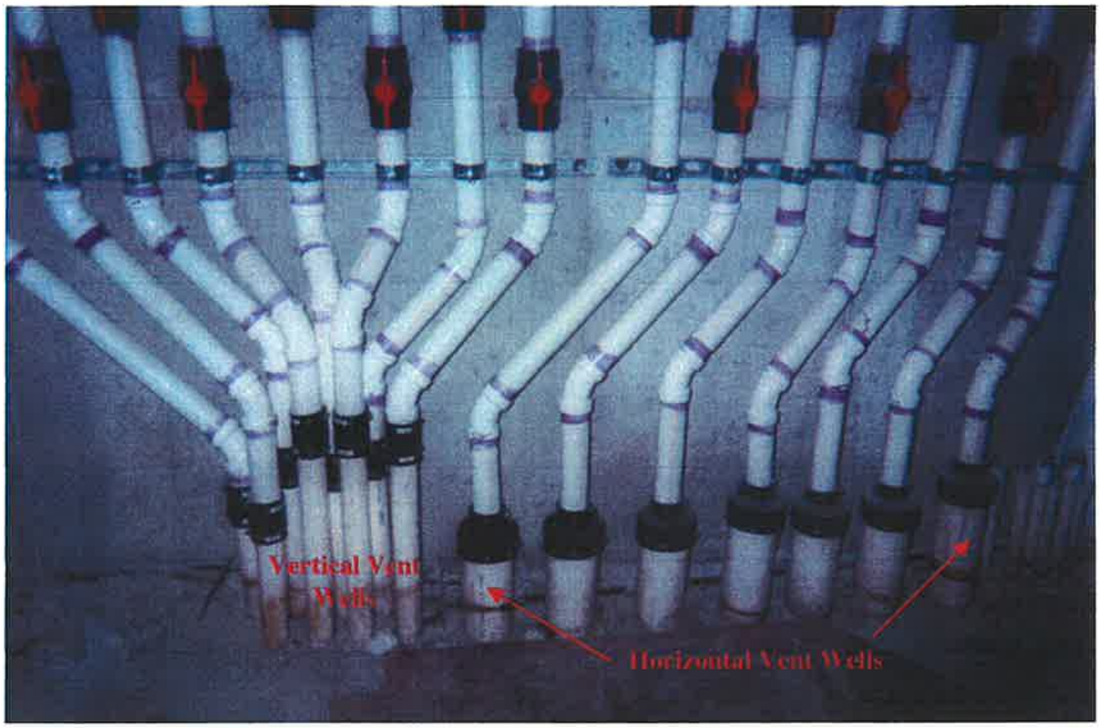
Averaging/Weighting Scheme	① Straight	② Straight w/o 1st	③ Scheme A	④ Scheme B
VOC mass removal rate (lbs/day)	0.79	0.31	0.79	0.54
Time to Complete Clean-up (days) = 2000 lbs / Removal Rate	2,532	6,452	2,532	3,703
Time to Complete Clean-up (years)	6.9	17.7	6.9	10.1

PHOTOGRAPHS

Photograph 1: SVE piping and knockout drum.

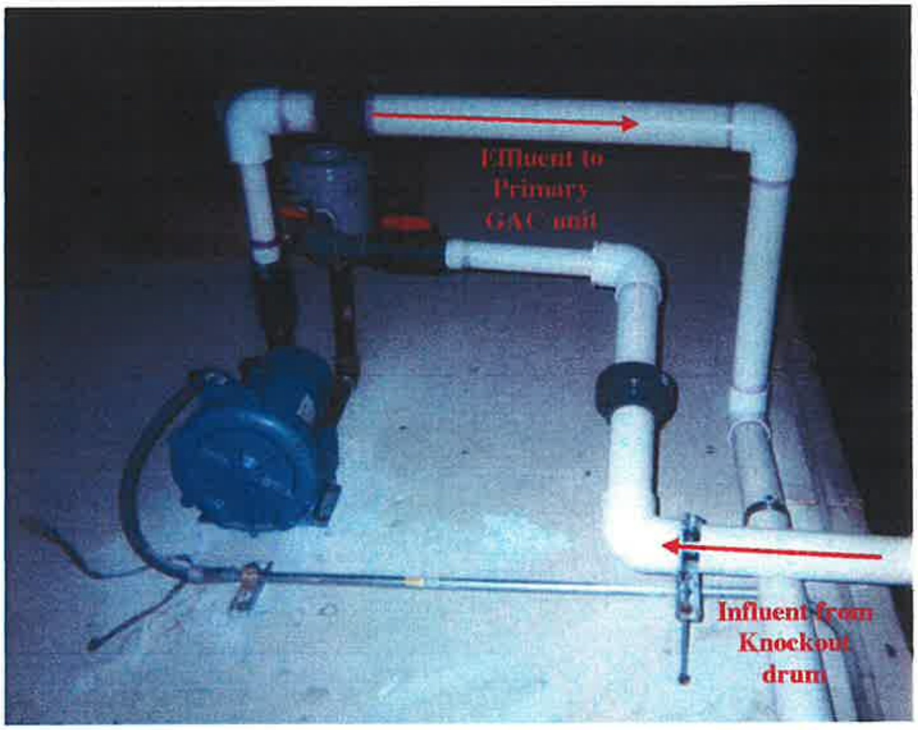


Photograph 2: SVE valve bank and water knockout drum.

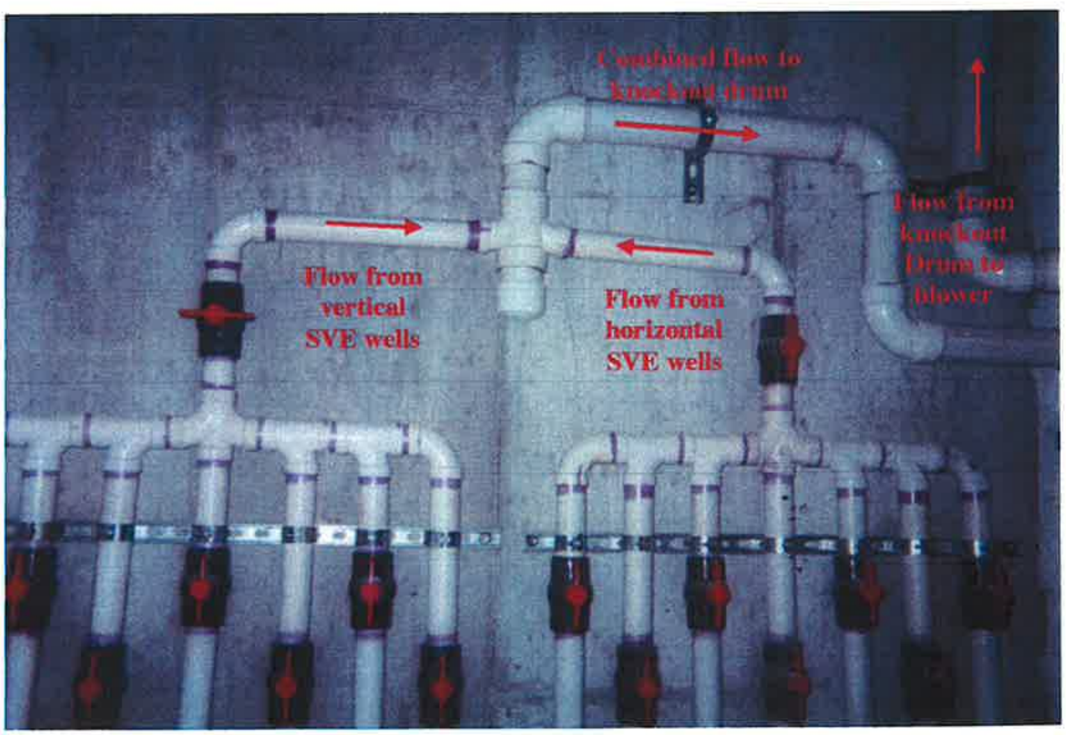


Photograph 3: SVE Risers.

Photograph 4: Blower and piping to vent wells on roof of reactives vault.

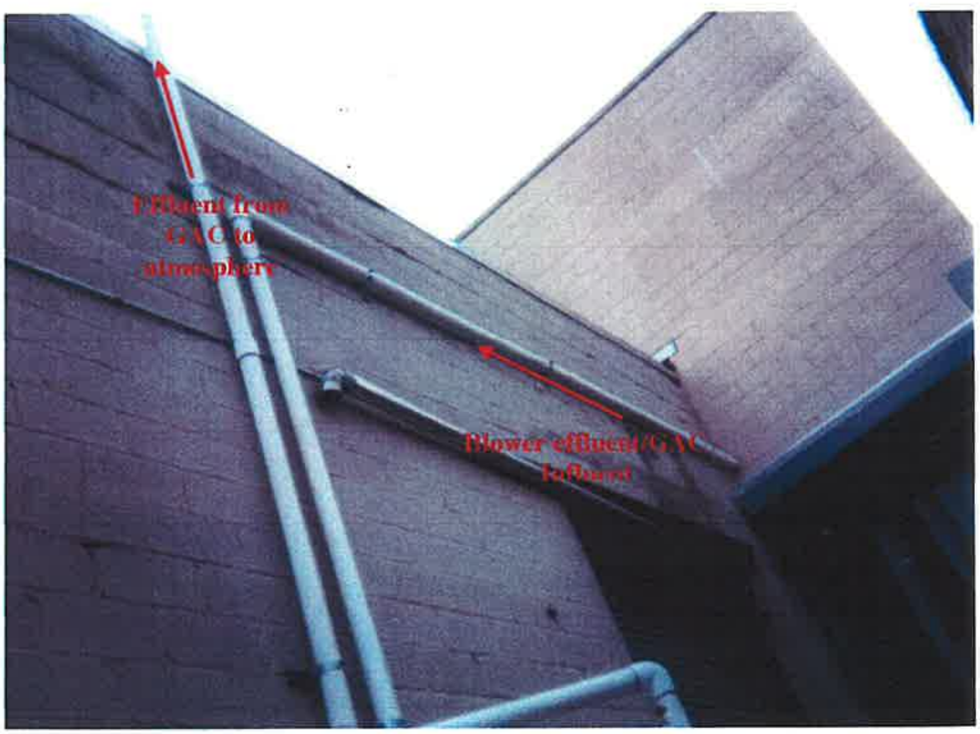


Photograph 5: SVE blower on reactives vault roof



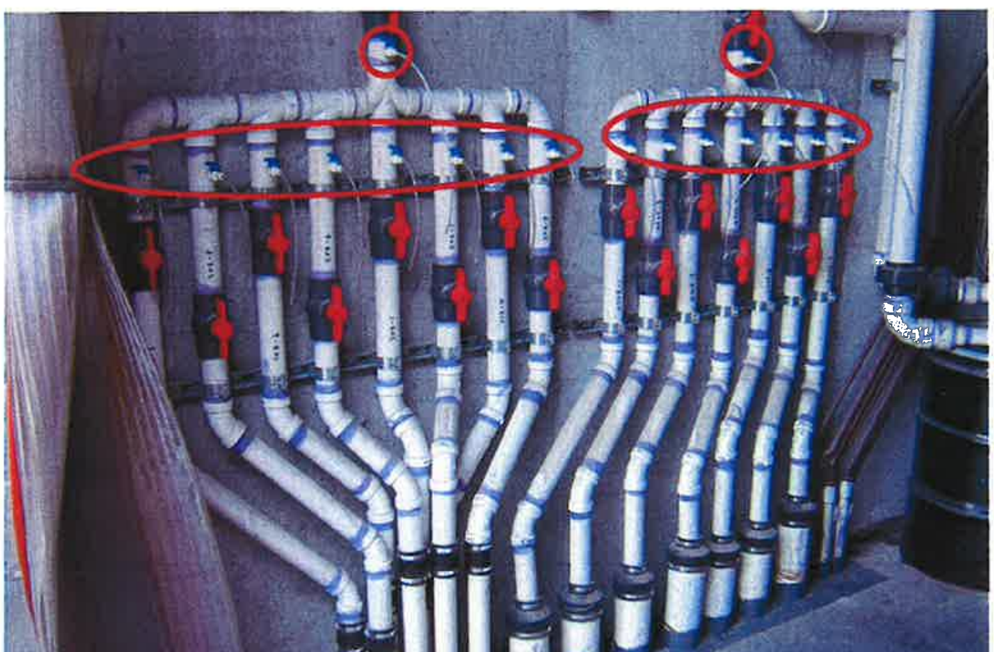
Photograph 6: SVE manifold bank.

Photograph 7: View of effluent discharge for treated air from SVE system.



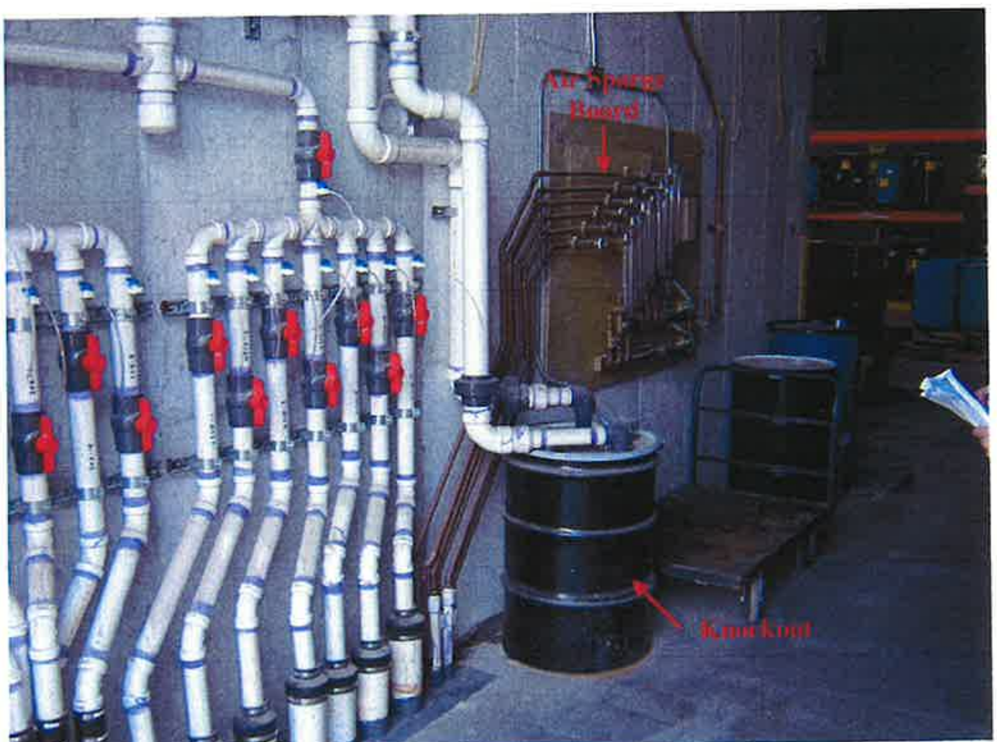
Photograph 8: View of GAC influent and effluent piping in breezeway.

Photograph 9: View of G-4 GAC unit (primary).

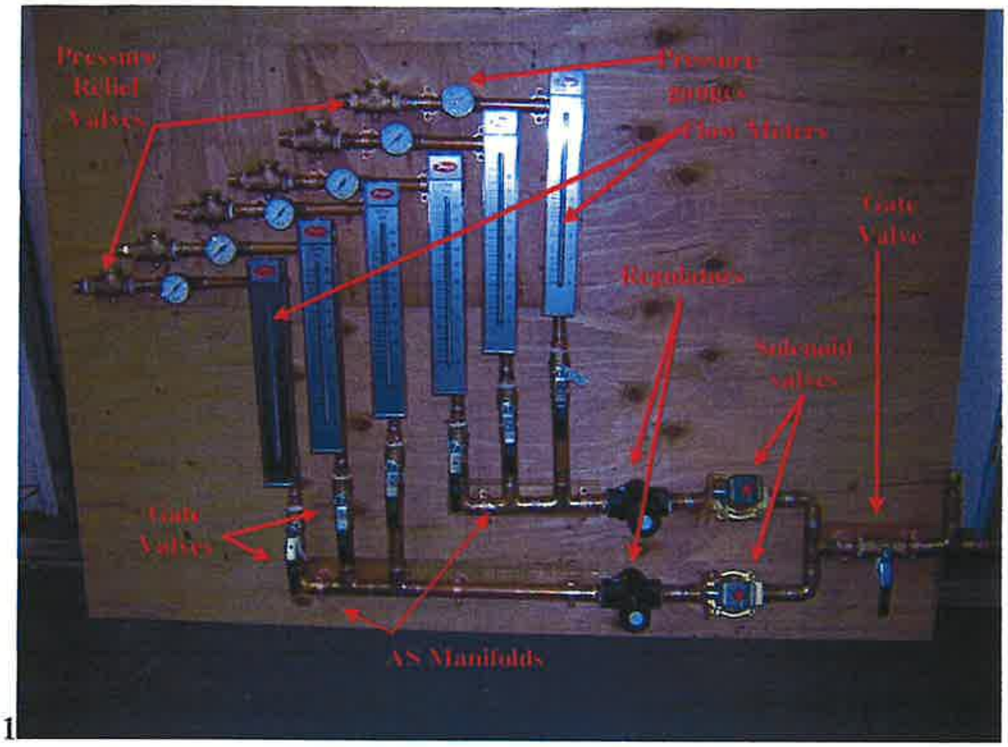


Photograph 10: View of sample ports installed on effluent lines from the horizontal and vertical vapor extraction wells and manifolds.

Photograph 11: View of GAC units in breezeway.



Photograph 12: View of SVE and AS piping.



Photograph 13: View of AS board.