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Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

Operation, Maintenance, and Monitoring Manual General Instrument Corporation Sherburne, New York

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OPERATION, MAINTENANCE, AND MONITORING MANUAL

GENERAL INSTRUMENT CORPORATION

SHERBURNE, NEW YORK

VOLUME I - GENERAL MANUAL

Prepared for

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CHAPTER 1

INTRODUCTION/PURPOSE OF O&M MANUAL

This Operation, Maintenance, and Monitoring Manual (O&M) will be used to facilitate the effective and efficient operation of the remediation program at the General Instrument Corporation (GIC) site in Sherburne, NY. This includes monitoring the remedial alternatives for performance and effectiveness; ensuring that all parties are aware of the specific O&M requirements at the site; providing a smooth transition from the remedial investigation phase through design and construction and to the O&M phase; and assuring that all units are operated, maintained, and monitored.

Completion of this manual is stipulated in a consent order (#A701578810) signed by New York State Department of Environmental Conservation (NYSDEC) and GIC officials. The general outline of this manual is based on a NYSDEC memorandum (April 1992).

1.1 PROJECT

This project consists of the remediation of free-phase petroleum product and volatile organic compound (VOC) contamination in the soil and groundwater at the former GIC site in Sherburne, NY. The areas of concern at the site include contaminated soils associated with an oil spill and plating room activities and groundwater associated with the areas of contaminated soil. A groundwater recovery system will be used to remediate the petroleum free product and any dissolved phase organic compounds recovered by the system. A soil vapor extraction (SVE) system will be installed to remediate VOCs in the vadose zone. In-situ groundwater treatment is planned for the groundwater off-site.

1.2 SITE DESCRIPTION

The GIC site is located on Kenyon Press Drive (formerly TACO Street), just west of Route 12 in the Village of Sherburne, Chenango County, NY (NYSDEC, 1994). This 5.5-acre site consists of several buildings, concrete slabs and foundations of former buildings, and open grassy areas. The majority of the property is surrounded by a chain link fence. It is bounded on the north, east, and south by residential and commercial properties, and on the west by a field used for agricultural purposes.

Potash Creek flows southward along the eastern edge of the property. This small drainageway follows the alignment of the abandoned and filled Chenango Canal. The section along the site has been enclosed in an underground culvert since the General Instrument facility closure in the mid-1980s. A railroad track follows the western property line. The Chenango River flows from north to south approximately 2,000 feet west of the site. A map showing buildings and monitoring well locations is presented as Figure 1-1.

1.3 SITE HISTORY

A. **Site History.** Manufacturing at this site began in 1947 and continued until 1983. Three separate concerns operated the site during this time: 1) Technical Appliance Corporation of America (1947-1962); 2) Jerrold Electronic Corporation (1962-1968); and (3) GIC (1968-1983). Antennas were manufactured at the plant from 1947 to 1983. After GIC's purchase of the plant in 1968, antennas and other electronic components were designed and manufactured at the site. Chemical processes associated with these plant operations included painting, degreasing, plating, and etching. GIC sold the property to Kenyon Press in 1989. Under the sale agreement, GIC assumed all responsibility for the inactive hazardous waste site characterization and remediation.

B. **Remedial History.** Pursuant to the Resource Conservation and Recovery Act (RCRA), GIC was required to implement a closure plan in 1983. Subsequent to the plan's implementation, soil and groundwater analytical and physical data were collected in 1985. In 1987, the property was listed as a Class 2 site in the New York State Registry of Inactive Hazardous Waste Sites due to the presence of hazardous waste in soils and in groundwater.

GIC and NYSDEC officials signed a consent order in 1989 that required GIC to conduct a Remedial Investigation/Feasibility Study (RI/FS) and implement remedial design and remedial action (RD/RA) for an appropriate site remedy. Currently, the RI/FS has been completed and a Record of Decision (ROD) selecting the chosen remedial actions for the site has been approved.

1.4 SUMMARY OF THE SITE HYDROGEOLOGY AND CONTAMINANTS

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

A. **Site Hydrogeology.** Stratigraphically, the site consists of three shallow units: fill (1 to 5 feet thick); 1 to 4 feet of sandy silt; and coarse gravel up to 10 feet thick. The gravel overlies a clay-silt unit which is estimated to be 150 feet thick.

The water table is found from 3 to 6 feet below grade, and groundwater flows from east to west in the gravel unit. Permeability of the gravel is high and the hydraulic gradient within the unit is low. Because of its thickness and low hydraulic conductivity, the underlying clay-silt unit acts as a confining layer for the deeper aquifer, located below the clay-silt unit. The thickness of the clay-silt unit prevents impacts to the deeper aquifer by site-related contamination.

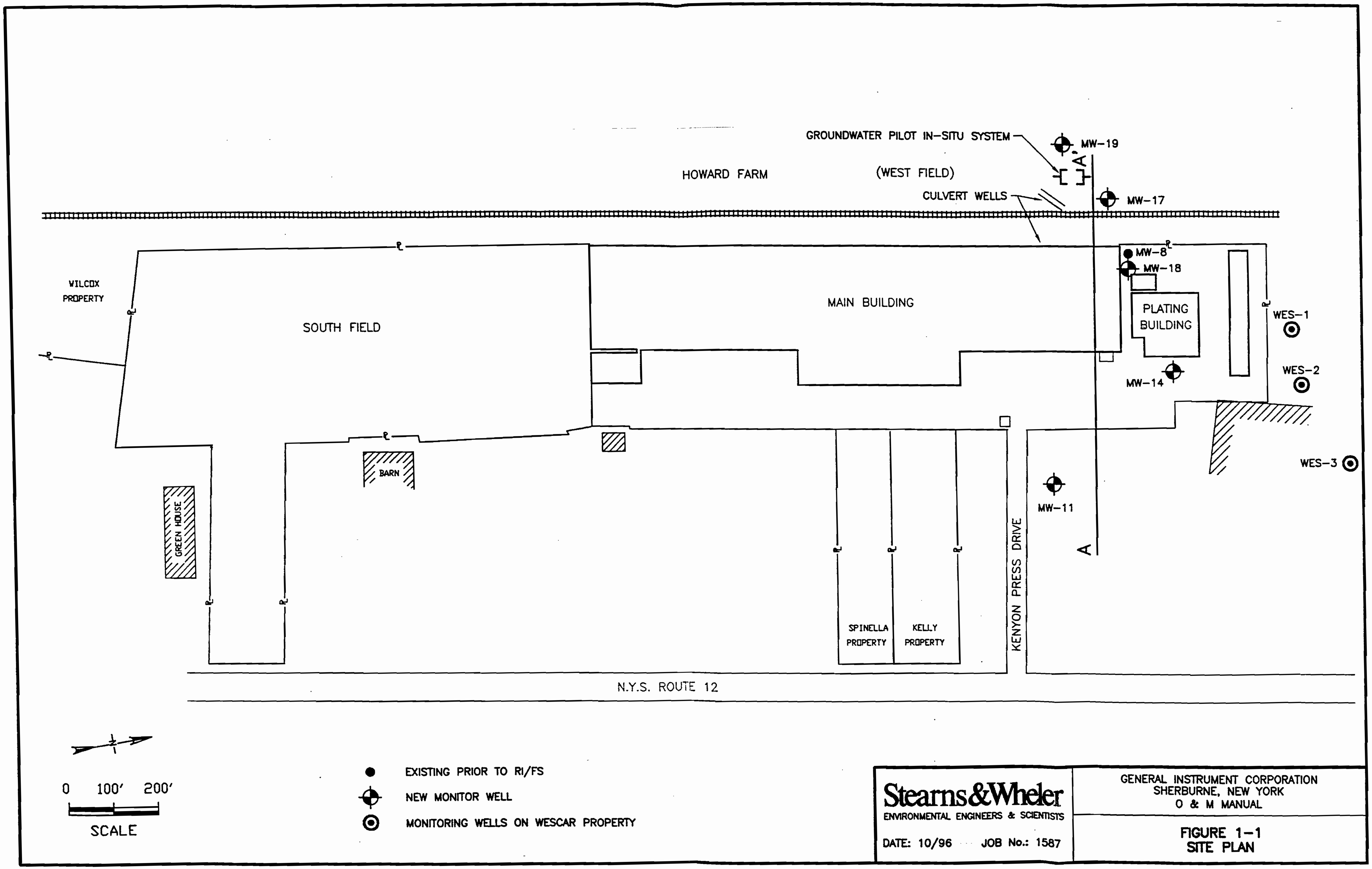
B. **Soil Contamination.** Soil contamination at the site is found at the north end of the facility, beneath and adjacent to the plating building. A number of VOCs were detected in surface soil at the site, including trichloroethane (5 ppb); dichloroethene (125 ppb); trichloroethene (297 ppb); and xylene (6,650 ppb). Concentrations of VOCs generally increase with depth, with the highest concentrations from 5 to 7 feet. The highest subsurface soil concentration was 75,117 ppb total VOCs, detected west of the plating building.

Semi-volatile compounds associated with fossil fuels were also detected on the site. Total semi-volatile concentrations on site range from 8 to 27,000 ppb. Metals concentrations in soils on site are similar to that of background soils.

C. **Groundwater Contamination.** Volatile organic compound contamination extends from the northern portion of the site into the field west of the railroad tracks. Total VOC concentrations on the site range from non-detect to 8,000 ppb at Monitoring Well MW-8. Off-site total VOC concentrations range from 50 to 820 ppb.

Free-phase petroleum product was detected in the area of MW-8 and MW-18. This product is thought to be the result of a release of petroleum product at the main loading dock. Semi-volatile compounds associated with this free product were detected at Monitoring Wells MW-8 and MW-18. No semi-volatile compounds were detected in any other well at the site.

In mid-January 1995, additional test pits were excavated along the west side of the facility between the main building and the railroad tracks and in the West Field. During this excavation, free-phase petroleum product was encountered in four of the test pits. Large diameter culvert wells were installed in these test pits to facilitate removal of the product.


GROUNDWATER PILOT IN-SITU SYSTEM
MW-19
A'
HOWARD FARM
(WEST FIELD)
CULVERT WELLS
MW-17
MW-8
MW-18
PLATING BUILDING
WES-1
WES-2
MW-14
WES-3
MAIN BUILDING
WILCOX PROPERTY
SOUTH FIELD
BARN
GREEN HOUSE
MW-11
A
SPINELLA PROPERTY
KELLY PROPERTY
KENYON PRESS DRIVE
N.Y.S. ROUTE 12
0 100' 200'
SCALE
EXISTING PRIOR TO RI/FS
NEW MONITOR WELL
MONITORING WELLS ON WESCAR PROPERTY
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O & M MANUAL
FIGURE 1-1
SITE PLAN

CHAPTER 2

SITE REMEDIAL ACTION

2.1 GENERAL

Remediation goals for this site, as stated in the Record of Decision (ROD), are:

1. Reduce, control, or eliminate the contamination present within the soils on the site.

2. Eliminate the potential for direct human or animal contact with the contaminated soils on site.

3. Mitigate the impacts of contaminated groundwater to the environment.

4. Prevent, to the extent possible, migration of contaminants in the soil to groundwater.

5. Provide for attainment of all standards, criteria, and guidelines for groundwater quality at the limits of the area of concern (AOC).

With these goals in mind, 16 remedial alternatives were evaluated under the process stated in 6 NYCRR 375-1.10. Of these, combined soil vapor extraction/bioventing for remediation of the soil, in-situ treatment for remediation of off-site groundwater, and on-site groundwater and free product recovery (ROD Alternative 4) were selected for the site's remedial action.

Soils in the on-site waste area will be remediated by in-situ treatment by an SVE system. After initial high-rate extraction aimed at removal of VOCs in the soils, low-rate operation of the SVE system will be used to promote bioremediation of SVOCs associated with fuel oil contaminants. Off-site petroleum-impacted soils will be remediated by land farming.

Groundwater contamination on and off site will be remediated using an on-site product recovery system for the free-phase petroleum and an off-site permeable reaction wall/funnel and gate system for dissolved VOCs. The on-site free product recovery system will consist of two recovery wells with dual pumping systems. Free product will be pumped directly to 55-gallon drums. Drums will be staged next to the plating building. Recovered groundwater will be treated above ground and discharged to the storm sewer on site. This system is supplemented by a series of culvert wells installed adjacent to the western property line, which will be monitored for free product until on-site treatment is complete. If product is detected, it will be recovered. Off site, a permeable reaction wall/funnel and gate system will be used for in-situ treatment of chlorinated VOCs in groundwater.

Finally, a free product recovery system using booms for LNAPL recovery is installed in the west field.

2.2 DESCRIPTION OF ON-SITE REMEDIAL ACTION

Recovery of the free-phase petroleum product at this site will be accomplished using a free product recovery system. Product recovered will be disposed of off site. A schematic representation of the system is presented in Figure 2-1. A dual pump system has been installed in recovery well MW-18 and in a newly installed recovery well (RW-1).

Groundwater removed from these wells will be pumped to a low profile air stripper and then into two-stage liquid phase carbon adsorbers (Figure 2-1). The air stripper is designed to volatilize organic compounds from the water. The liquid phase carbon adsorbers then remove the heavier dissolved phase petroleum contaminants. Effluent will be discharged to the storm sewer and eventually to Potash Creek. The air discharged from the air stripper will pass through two gas-phase carbon adsorbers where the volatilized organic compounds will be adsorbed. Sampling ports are located in the individual influent lines, the main line, after the air stripper, between the carbon drums and in the effluent pipe. Air sampling ports are also located between the air stripper and the exhaust stack.

The SVE system is designed to remove VOCs from the vadose zone. Because of the shallow depth to water, horizontal extraction wells rather than vertical wells were installed. The horizontal wells will be operated as independent zones. This will allow increased flexibility for the system by enabling operators of the system to extract more VOCs from highly contaminated zones and reducing the extraction rate of VOCs in less or uncontaminated areas.

Once the soil vapor is drawn through the piping manifold, entrained moisture is removed in a knockout pot. The vapor is then filtered, passed through a vacuum blower, through two-phase carbon treatment, and then exhausted to the outside through the stack. The blower is equipped with sheaves to allow for operation at four separate extraction rates.

The system will be monitored five days a week. A telephone dialer system will be used to allow remote monitoring of major system alarm conditions as listed in Table 2-1. Should system malfunctions occur, Stearns & Wheler, and/or the system supplier/manufacturer, will provide operational assistance as required to keep the systems operating.

2.3 GOALS FOR ON-SITE REMEDIAL ACTION

Goals for cleanup at the GIC site are based on NYSDEC standards and guidance documents. Technical and Guidance Memorandum (TAGM) No. 4046 (January 1994) (see Table 2-3) established soil cleanup objectives for volatile and semi-volatile organic contaminants found at hazardous waste sites.

Groundwater cleanup goals for the organic chemicals of concern are based on the TOGS 1.1.1, New York State ambient water quality standards and guidance values. For analytes which exceed promulgated standards in background monitoring wells, groundwater cleanup standards will be background concentrations (NYSDEC, 1994). Treated groundwater from the on-site air stripping system will also be required to meet effluent discharge limitations established by the NYSDEC (see Table 2-3).

The cleanup goals for the air discharge from the SVE and groundwater treatment systems are based on NYS Draft Air Guide I. Compounds being discharged from these systems should meet annual guideline concentrations (AGCs) and short-term guideline concentrations (SGCs) at the property line and at any on-site exposure points. The compound specific AGCs and SGCs are listed in Appendix C of the Draft Air Guide I and in Table 2-4.

In addition, removal of on-site free-phase petroleum product has been established as a goal. Operation of the groundwater pump and treat system will discontinue once free-phase petroleum product has been removed.

2.4 DECOMMISSIONING PROCEDURES

At the termination of remedial operations, all wells and equipment associated with the SVE and groundwater treatment systems will be fully decommissioned. The groundwater system product wells, RW-1 and MW-18, along with the on-site monitoring wells and piezometer, will be removed with any void space remaining being grouted in place. The SVE wells will be grouted in place. All groundwater and SVE system equipment will be fully dismantled and removed from the site. The timing of all decommissioning activities will be determined following receipt of NYSDEC approval for termination of operations.

TABLE 2-1

ON-SITE REMEDIATION SYSTEM ALARM CONDITIONS

GROUNDWATER TREATMENT SYSTEM ALARM/STATUS MONITORING
High/High level in equalization tank.
High/High level in air stripper.
High level in product storage drum.
Blower failure/air stripper failure.
High pressure before liquid carbon vessels.
High pressure before vapor carbon vessels.
High pressure before Bag Filter 1.
High pressure before Bag Filter 2.
Air stripper "on."
SVE SYSTEM ALARMS/STATUS MONITORING
SVE system high discharge pressure alarm.
Moisture separator high level alarm.
High/High equalization tank high level lockout.
SVE blower motor overload.
Condensate pump motor overload.
SVE blower "on."

TABLE 2-2

GROUNDWATER TREATMENT SYSTEM DISCHARGE LIMITATIONS

PARAMETER	EFFLUENT LIMIT	ANALYTICAL METHOD
Temperature	N/A	Monitor Only
pH	6.5 to 8.5	N/A
Solids, Total Suspended	50 mg/L	N/A
Solids, Total Dissolved	500 mg/L	N/A
Vinyl Chloride	2 μg/L	USEPA Method 502.2
1,1-Dichloroethane	5 μg/L	USEPA Method 502.2
cis-1,2-Dichloroethene	5 μg/L	USEPA Method 502.2
trans-1,2-Dichloroethene	5 μg/L	USEPA Method 502.2
1,1,1-Trichloroethane	5 μg/L	USEPA Method 502.2
Trichloroethene	5 μg/L	USEPA Method 502.2
Tetrachloroethene	5 μg/L	USEPA Method 502.2
Benzene	0.7 μg/L	USEPA Method 502.2
Toluene	5 μg/L	USEPA Method 502.2
Xylenes, Total	5 μg/L	USEPA Method 502.2
Naphthalene	10 μg/L	USEPA Method 8270*
Phenanthrene	50 μg/L	USEPA Method 8270*
Fluorene	50 μg/L	USEPA Method 8270*
Anthracene	50 μg/L	USEPA Method 8270*
Fluoranthene	50 μg/L	USEPA Method 8270*
Pyrene	50 μg/L	USEPA Method 8270*
Chrysene	50 μg/L	USEPA Method 8270*
Aluminum, Total	10,000 μg/L	USEPA Method 200 Series
Iron, Total	300 μg/L	USEPA Method 200 Series
Lead, Total	25 μg/L	USEPA Method 200 Series

* *USEPA Method 8270, Base/Neutral Fractions only*

TABLE 2-3

SVE SYSTEM SOIL CLEANUP GOALS

PARAMETER*	CLEANUP GOAL (PPM)
Chlorobenzene	1.7
Chloroethane	1.9
1,1-Dichloroethane	0.2
1,2-Dichloroethane	0.1
1,2-Dichloroethene	0.3
Methylene Chloride	0.1
1,1,2,2-Tetrachloroethane	0.6
1,1,1-Trichloroethane	0.8
Trichlorethene	0.7
Vinyl Chloride	0.2
Benzene	0.06
Toluene	1.5
Xylene (Total)	1.2
Naphthalene	13.0
2-Methylnaphthalene	36.4
Acenaphthylene	41.0
Flourene	50.0
Phenanthrene	50.0
Anthracene	50.0
Fluoranthene	50.0
Pyrene	50.0
Chrysene	0.4
Dibenzo[a,h]anthracene	0.014 or MDL
Benzo[a]anthracene	0.224 or MDL
Benzo[a]pyrene	0.061 or MDL
Benzo[g,h,i]perylene	50.0
Benzo[b]fluoranthene	1.1
Benzo[k]fluoranthene	1.1

* *Cleanup goals apply only to VOCs and SVOCs detected in on-site soils during RI/FS at concentrations exceeding TAGM HWR-94-4046 concentrations with the exception of trichloroethene, vinyl chloride, and representative fuel oil contaminants.*

TABLE 2-4

SHORT-TERM AND ANNUAL AIR GUIDELINE CONCENTRATIONS

COMPOUND ($\mu g/m^3$)	SCG	ACG
Vinyl Chloride	1,300	2×10^{-2}
1,1-Dichloroethane	None	None
cis-1,2-Dichloroethene	190,000	1,900
trans-1,2-Dichloroethene	None	360
1,1,1-Trichloroethane	None	None
Trichloroethene	33,000	4.5×10^{-1}
Tetrachloroethene	81,000	7.5×10^{-2}
Benzene	30	1.2×10^{-1}
Toluene	None	None
Xylenes, Total	100,000	300
Naphthalene	12,000	120
Phenanthrene	None	None
Fluorene	None	None
Anthracene	None	None
Fluoranthene	None	None
Pyrene	None	None
Chrysene	None	None

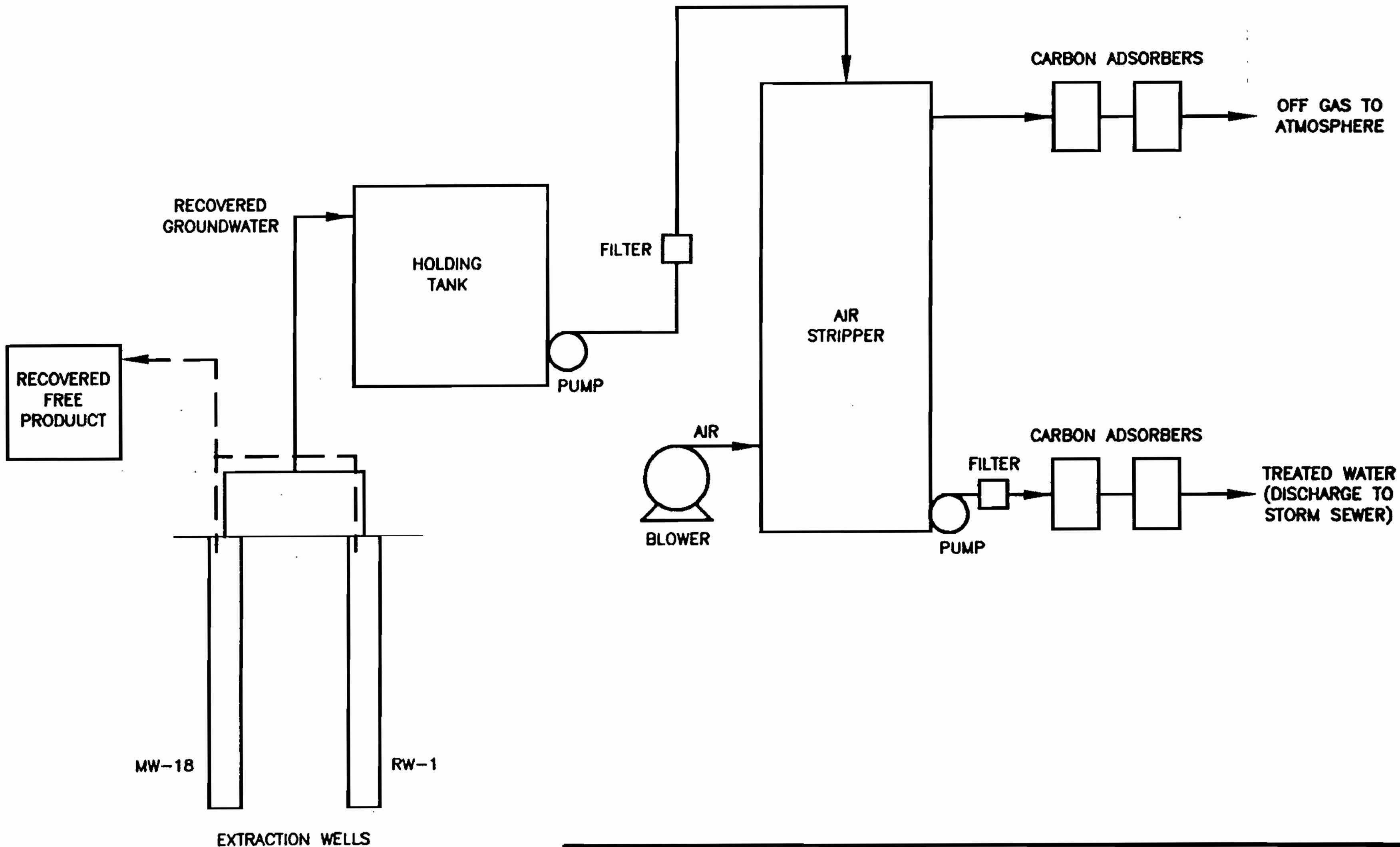

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FIGURE 2-1
SCHEMATIC:
AIR STRIPPING SYSTEM

CHAPTER 3

MONITORING, TESTING, AND RECORDS

3.1 OBJECTIVES

The objectives of the environmental monitoring plan are:

1. To determine the effectiveness of the chosen remedial actions.

2. To provide quantitative data for monitoring remedial system discharges to air and surface waters.

3. To provide quantitative data to determine whether cleanup criteria have been met for each impacted medium.

3.2 MONITORING PLAN

The monitoring plan consists of three elements: the Site Monitoring Plan, the SVE Performance Monitoring Plan, and the Groundwater Treatment System Performance Monitoring Plan. Supplementing these plans are the Field Sampling Plan (FSP), the Quality Assurance/Quality Control (QA/QC) Plan, and the Health and Safety Plan (HSP). The use of these elements ensures that the remedial actions at the site are continually and safely monitored for their effectiveness.

The design of these elements is based on the types of remedial systems employed (pump and treat and SVE), the types of contaminants (petroleum product and VOCs), and the medium that is being remediated (soil and groundwater).

3.3 SITE ENVIRONMENTAL MONITORING

A. **General.** Groundwater samples will be collected and analyzed during the remedial phase (of both on-site and off-site actions) to verify site cleanup is progressing. The following is a brief overview of the sampling locations, the standard analytical methods, and sampling protocols that will be used in the field sampling program.

B. **Sampling Program.** Once remedial systems are installed and operational, long-term groundwater monitoring will be undertaken to verify the remedial systems are performing as planned. Figure 3-1 shows the location of monitoring wells and Table 3-1 presents the site monitoring plan as described below. Groundwater samples will be collected on a quarterly basis from Monitoring Wells MW-17 and MW-19. When the groundwater in-situ treatment system is installed and operational, quarterly sampling will also begin at MW-20 and MW-21. All four wells will be monitored for dissolved chlorinated VOCs and iron. Iron concentrations in samples from MW-17 will be used as a basis for influent concentrations to the in-situ treatment system. MW-17 and MW-19 will also be monitored for PAHs. At the same time, on-site groundwater quality will be monitored by collecting samples of the groundwater from the influent to the air stripper. The air stripper influent will be analyzed for both VOCs and PAHs. Once free product removal is complete and the groundwater pump and treat system is shut down, groundwater samples will be collected from MW-8 and MW-18 on a semi-annual basis, with samples being analyzed for VOCs and PAHs.

Once the SVE system operation has reached closure, sampling frequency for MW-8 and MW-18 will be reduced to annual sampling for five years. After that period, the only ongoing sampling will include Monitoring Wells MW-17, MW-19, MW-20, and MW-21 as part of the off site, in-situ treatment process monitoring.

C. **Groundwater Sampling Procedures.** Detailed methods for sampling monitoring wells are listed in Section 3.7.

D. **Soil Sampling.** Once operational monitoring indicates the SVE system is reaching cleanup goals, confirmatory soil samples will be collected from the areas indicated in Figure 3-2 and the aboveground SVE pile. Two sampling locations will be agreed upon from each of the three areas, with grab samples collected at depths of 2 to 4 feet and 5 to 7 feet (provided the groundwater elevation is greater than 5 feet below grade) for a total of 12 maximum confirmatory soil samples. Three grab samples will also be collected from the SVE pile. Each soil sample will be collected at locations approved by the NYSDEC. Soil samples will be analyzed for total VOCs and PAHs using USEPA Method 8021/8270. Results will then be compared to cleanup goals as listed in the

NYSDEC TAGM HWR-94-4046, dated January 24, 1994 (refer to Table 2-3). Refer to soil sampling procedures detailed in Section 3.7.

3.4 SVE SYSTEM PERFORMANCE MONITORING

A. **General.** The SVE system monitoring will be undertaken with the following goals:

1. Monitor VOCs and SVOCs removed from the soil during system operation.
2. Monitor vapor treatment efficiency and operation.
3. Monitor SVE and bioventing performance.

Figure 3-3 presents a schematic representation of the SVE system showing sampling locations.

B. **SVE System Monitoring Plan.** The overall SVE system monitoring plan is presented in Table 3-2. Influent vapor concentrations will be sampled at points where each separate vapor extraction well enters the SVE system manifold using a hand-held Mini RAE Plus PID. Prior to use, the PID will be calibrated according to the manufacturer's instructions. This analysis will be undertaken daily during the first week following equipment startup; however, after startup, the frequency will diminish to monthly. The purpose of this individual well sampling is to assess the need for operation of each extraction well. As total VOCs approach non-detectable concentrations in individual extraction wells, they can be closed off, allowing continued high-rate extraction to continue only where necessary. Air samples will be analyzed by a gas chromatograph (GC) for confirmation. The NYSDEC will be notified when monitoring data indicates a well may be taken off-line. Wells will not be taken off-line without the Department's concurrence.

Total influent VOCs to the carbon canisters (sampling port SVE-A-7) will also be monitored daily during startup with a hand-held PID. Once during startup, the total influent vapor concentrations will be monitored with a GC to provide a baseline of initial VOC concentrations. The frequency of monitoring total VOCs with a PID in the influent will continue to be undertaken on a weekly basis. A GC will be used quarterly (every three months) to verify extraction performance related to individual VOCs. The purpose of this monitoring is two-fold. First, it will provide an indication of influent loadings to the carbon system. Second, it will provide an indication of instantaneous mass removals accomplished by the SVE system.

C. **Effluent Sampling.** Effluent samples will be collected at sampling ports SVE-A-8 and SVE-A-9 (see Figure 3-3) to verify performance of the vapor treatment system.

After startup, off-gas contaminant concentrations exiting the stack will be monitored weekly at sampling ports, SVE-A-8 and SVE-A-9, using a PID to verify compliance with air quality requirements and performance of the vapor treatment system. Similar to the influent sampling, this sampling will be undertaken daily during startup with total VOCs being measured with a hand-held Mini RAE Plus PID. Start-up is estimated to last four weeks. The PID will be calibrated daily according to the manufacturer's instructions. Once during startup, a GC will be used to monitor individual VOCs in samples before and after the vapor treatment system.

The primary carbon unit will be changed out when the efficiency of this unit decreases to 90 percent, or when PID readings at SVE-A-9 are greater than zero. Primary carbon removal efficiency will be based on PID readings at SVE-A-7 and SVE-A-8. The spent carbon will be removed with a vacuum truck and sent to an approved regeneration facility. Once removed, the carbon will be replaced with regenerated carbon.

D. **Flow Measurement.** Each sampling event for SVE-A-1 through SVE-A-7 shall be accompanied by a flow measurement from the respective flow meter SVE-AF-1 through SVE-AF-7. Additionally, a temperature measurement will be performed at each flow meter using the installed thermometers. The information from this flow/temperature measurement will be used to calculate both soil vapor volumetric and mass flow rates.

E. **Soil Vacuum Level Monitoring.** Ten soil vacuum monitoring probes (VM-1 through VM-10) are installed to allow measurement of areal influence of each SVE system well. During startup, vacuum levels will be monitored with manometers to verify vacuum levels and areas of influence. Soil vacuum levels will be monitored quarterly or when a well is taken off line to verify system performance has remained consistent.

F. **High Water Table Elevations.** While the horizontal wells of the SVE treatment system were installed in the vadose zone, seasonal and storm-related increases in the water table elevation make water intake by the system likely. Water intake can damage the blower and other equipment within the SVE system. To reduce water intake, the vacuum within the wells can be decreased. This is achieved by scaling-down the operating level of the blower or by opening the system intake bleed valve to the atmosphere.

G. **Change to Bioventing Operation.** When cumulative GC sampling records of total VOC concentrations in a given sampling well indicate an asymptotic level, the DEC will be notified of plans to change SVE operation on that well. If the department concurs, the individual well will be turned off for a period of one month. The off-line well will be restarted during subsequent sampling visits. VOC concentrations will be measured upon restart of a well and then once every 10 minutes for a period of one hour to determine whether there is a startup spike. If no VOCs are detected upon restarting vapor extraction through the closed well, then it shall be assumed the SVE system has been successful in removing VOCs. If VOC startup spikes do occur when a well is put back on line, the well will remain under operation until startup spikes no longer occur (i.e., "pulsed operation"). Once samples from all wells contain concentrations of VOCs at an asymptotic level, with no startup spikes occurring on startup, confirmatory sampling will be undertaken to verify whether cleanup goals have been reached (see Table 2-3). If cleanup goals have not been reached for petroleum hydrocarbon contaminants, the entire system will be operated as a bioventing system. Bioventing, like the SVE process, involves direct air injection or vacuum induced air extraction in unsaturated soils. With both processes, removal of hydrocarbon contaminants occurs by volatilization and biodegradation. Biodegradation occurs when the indigenous soil microorganisms use the hydrocarbons as a fuel source, thereby resulting in degradation of the petroleum contaminants. Bioventing differs from SVE in that it incorporates significantly lower air flow rates. As a consequence, the primary contaminant removal mechanism is biodegredation, rather than volatilization.

3.5 GROUNDWATER TREATMENT SYSTEM PERFORMANCE MONITORING

A. **General.** The groundwater treatment system monitoring will be undertaken with the following goals:

1. Monitor total VOCs and PAHs removed from the groundwater during operation of the system.

2. Monitor treatment system efficiency at removing VOC and PAH contaminants of concern.

3. Monitor treatment system air and water discharges.

Figure 3-4 presents a schematic of the groundwater treatment system, including sampling locations. Table 3-3 presents a summary of the overall groundwater treatment system monitoring program.

B. **Influent Sampling.** During system startup (minimum period of one week), the level of VOCs and SVOCs in the influent groundwater to the treatment system will be monitored daily using immunoassay techniques (IAT). Samples will be collected at each of the influent sampling ports (GW-W-1 and GW-W-2) and the sampling port located after the first bag filter (GW-W-3). This will allow cost-effective rapid analysis of total BTEX and PAHs without the time lags presented by laboratory analysis. Grab samples of influent after the first bag filter will also be collected during startup from GW-W-3 for laboratory analysis of VOCs, SVOCs, and metals using USEPA Methods 502.2, 8270 (PAH only), and 200 Series. After startup, formal influent sampling will continue only on a quarterly basis with laboratory quantification of VOCs, SVOCs, and metals. All laboratory analyses will be conducted by a NYSDOH certified lab.

C. **Effluent Sampling.** Similar to influent sampling during system startup, samples will be collected daily during startup from the water effluent of the air stripper (GW-W-4) and the effluent of both the primary and secondary carbon adsorbers (GW-W-5 and GW-W-6). IAT will be utilized to analyze for total BTEX and PAH concentrations in these samples. Grab samples will also be collected from each of these sampling ports during startup and sent for laboratory quantification of individual VOCs and PAHs. Again, all analytical testing, other than field testing, will be done by a NYSDOH certified laboratory.

During the first month of operation, system performance will be monitored weekly by collecting and sending samples from ports GW-W-4, GW-W-5, and GW-W-6 for laboratory quantification. Laboratory quantification will include a compound-specific analysis for VOCs and PAHs for all three sampling ports, and a metals-specific analysis for GW-W-6. At the end of the first month of operation, the frequency of laboratory sampling for GW-W-4 and GW-W-5 will decrease to a biweekly basis. At the end of three months, in which no exceedances of discharge limits have occurred, a request will be sent to the NYSDEC to reduce laboratory monitoring of the effluent (GW-W-6) to a biweekly basis. At the end of six months, another request will be sent to the NYSDEC to reduce monitoring of the effluent to a monthly basis. Appendix D contains the NYSDEC effluent limitations and monitoring requirements as well as a format of the effluent sampling reports that will be sent to the NYSDEC.

The removal efficiency of the primary carbon adsorber will be established using laboratory results from sampling ports GW-W-4 and GW-W-5. Once removal efficiency falls to 90 percent, the primary carbon unit will be taken off-line and replaced by the secondary carbon unit. Carbon in the primary unit will be replaced, and this unit will be placed in service, becoming the new secondary carbon adsorber. Once the time necessary for the removal efficiency of the primary adsorber to fall to 90 percent is established, the frequency of laboratory sampling for GW-W-4 and GW-W-5 will decrease to a quarterly basis.

D. **Air Discharge Monitoring.** Air samples will be collected from the influent to the carbon system and the effluent of the primary and secondary carbon adsorbers and analyzed with a hand-held PID or OVA for total VOCs. During startup, samples will be collected daily. The sampling frequency will then decrease to weekly during the three months after startup, biweekly during months four to six, and monthly after month six. The primary carbon system will be removed if VOCs are detected at GW-A-3, or if the removal efficiency of the primary carbon decreases to 90 percent. At that time, the secondary carbon system will become the primary carbon and a new secondary carbon system will be added.

E. **Closure.** Once free product thickness in MW-18 and RW-1 has diminished to a sheen, the operation of the groundwater treatment system will be suspended. Prior to terminating operation of the treatment system, the NYSDEC will be contacted and consulted about termination of system operation. The system will be monitored for the presence of recoverable free product quarterly for one year. If recoverable free product is detected, the system will be restarted. If not detected after one year, the system will be decommissioned.

3.6 LANDFARM CELL AND CULVERT WELL MAINTENANCE AND MONITORING

During the growing season, maintenance of the landfarm cells will be conducted in four week cycles. At the end of the first two weeks of the cycle, the top 8 to 10 inches of soil in each cell will be turned with a disk harrow. At the end of the fourth week in the cycle, a chisel plow will be used to turn each cell to its full depth of 18 inches. This may be followed by an additional turning with the disk harrow. During each turning operation, the soil moisture content will be re-evaluated. If the soil is excessively dry or dense, water, manure, or straw will be added accordingly. The polyethylene landfarm cell covers will be removed prior to and replaced after each turning operation.

Both the landfarm cells and culvert wells will be examined during the scheduled operation and monitoring visits to the on-site systems. Examination of the landfarm cells will include an inspection of the cell covers for tears or punctures and an assessment of the landfarm maintenance. The culvert wells will be visually monitored for free product. If free product is observed, the thickness will be measured and appropriate measures will be taken to remove the product from the wells.

3.7 ANALYTICAL PROGRAM

A. **General.** The goals of the analytical program include appropriate QA and QC to ensure defensible analytical data result.

B. **Sample Designation.** All sampling locations of a particular matrix type (groundwater, soil, air) will be given a unique sample designation. The sample designation consists of matrix type, location, site name, date and time of sampling. Sample matrices are identified by a short alphanumeric prefix to the sample location number. A list of prefixes for various matrices is shown below:

GW-W	-	Groundwater Treatment System, Water Sample Port
GW-A	-	Groundwater Treatment System, Air Sample Port
SVE-A	-	Soil Vapor Extraction System, Air Sample Port
MW	-	Groundwater
SP	-	Sampling port
SW	-	Surface water
SS	-	Soil
A	-	Air
D	-	Drums

All sample bottles will be labeled individually. Each label will identify the site name, depth (where applicable), matrix and sample location (i.e., MW-1, SS-1) and date and time of sample collection. Chain-of-custody forms and field log book entries should refer to each sample in the same manner. No two samples will carry the same sample designation.

C. **Laboratory Methods.** The following methods will be used for laboratory analysis of samples:

PARAMETER	METHOD
Volatiles in Groundwater	EPA 502.2
PAHs	EPA 8270 Base neutrals only
Metals	EPA 200 Series
Volatiles in Soil	EPA 8021

3.8 SAMPLING EQUIPMENT AND PROCEDURES

A. **Decontamination.** The following materials and procedures should be used to decontaminate all equipment that will come in contact with sample media. Wherever possible, dedicated or disposable sampling equipment is used to eliminate the need for decontamination and further reduce the possibility of cross contamination between samples.

1. **Materials.**

Five-gallon jug with pour spout, potable water source
Five-gallon bucket - wash tub
Tall, kitchen-style garbage can lined with clean garbage bag - clean equipment holder/dryer
Small Rubbermaid storage box - small parts wash tub
Lab grade detergent
Bottle brushes - 24" or more
Bristle scrub brush
Pesticide-grade methanol or hexane
Deionized water
Latex gloves
Nitrile gloves

Tyvek suit
Pipe wrench
Paper towels
Aluminum foil
Goggles

2. **Procedure.**

a. Wash in detergent and water; use bottle brush on inside of bailers; use bottle brush or scrub brush as necessary; wipe with paper towel.

b. Rinse with tap water; be sure to rinse hands (collect rinse solution in wash bucket).

c. Rinse with methanol or hexane and allow to air dry; rinse hands.

d. Rinse with deionized water; air dry.

e. Dispose of rinse water properly.

B. **Groundwater Sampling at Sampling Ports (Influent and Effluent).** Table 3-4 is a list of equipment needed for sampling groundwater at the recovery system sampling ports. The protocol is designed to provide representative samples while minimizing the chances for cross contamination between sampling ports.

1. **Preparation.**

a. Review sampling plan and project QAPP.

b. Order sample bottles from laboratory.

c. Notify interested parties (regulators, client, and property owners) of sampling event.

d. Receive bottles. Check for proper bottles and chain-of-custody information.

e. Attend presampling meeting.

f. Assemble and check necessary equipment (personal protection equipment, field instruments, notebook).

2. **Sampling.**

a. Identify the sampling port and record its location in the field book.

b. Put on a new pair of disposable latex gloves.

c. Put on a pair of nitrile gloves.

d. Clean all meters, tools, equipment, etc. before use.

e. Record physical appearance of water, sampling time, and data in the field book.

f. Screen with PID.

g. Fill sample bottles directly. Place samples immediately in a cooler on ice. If required, seal each container with a chain-of-custody seal.

h. Using a clean beaker, record field parameters (pH, Eh, conductivity, temperature, and turbidity). Record this information in field book.

i. Remove and dispose of gloves before sampling the next location.

C. **Groundwater Sampling From Monitoring Wells.** Table 3-5 is a list of equipment needed for sampling monitoring wells using bailers. All the listed equipment may not be needed if the sampling effort is limited in scope, but the general procedures should be followed in all situations. The protocol is designed to provide representative samples while minimizing the chances for cross contamination between sampling locations. Toward this end, disposable or dedicated bailers should be used. In addition, sampling shall proceed from the least likely to the most likely contaminated locations. Sampling by bailer in Wells MW-8 , MW-18, and RW-1 will be conducted only after free product is removed from wells. A peristaltic pump will be used to purge and sample the recovery wells (MW-18 and RW-1) if the presence of system equipment (hoses, pitless adaptors, pumps) in the wells prevents the use of bailers.

1. **Preparation.**

a. Review sampling plan and project QAPP.

b. Order sample bottles from laboratory.

c. Notify interested parties (regulators, client, and property owners) of sampling event.

d. Receive bottles. Check for proper bottles and chain-of-custody information.

e. Attend presampling meeting.

f. Assemble and check necessary equipment (personal protection equipment, rope, bailers, field instruments, notebook).

2. **Sampling.**

a. Identify the well and record the location in the field book.

b. Put on a new pair of disposable latex gloves.

c. Put on a pair of nitrile gloves.

d. Cut a slit in the center of the plastic sheet and slip it over the well, creating a clean surface onto which the sampling equipment can be positioned.

e. Do not kick, transfer, drop or in any way let soils or other materials fall onto this plastic sheet unless it comes from inside the well.

f. Clean all meters, tools, equipment, etc. before use.

g. Clean the well cap with a clean towel, remove the well cap, and plug, placing both on the plastic sheet. Do not use petroleum products or aerosol lubricants to free.

h. Using an electric water level indicator, measure the depth to the water table to the nearest 0.01 foot. If free-phase product is present, use an oil-water interface probe or a clear bottom-valve bailer to determine the thickness of the free product. Record this information in the field book. If the free product thickness is greater than 0.05 feet, the well should not be sampled.

i. Clean the well depth probe and rinse it with deionized water after use.

j. Compute the volume of water in the well and record this volume in the field book.

k. Attach enough polypropylene rope to a bailer to reach the bottom of the well and lower the bailer slowly into the well, making certain to submerge it only far enough to fill it one-half full. The purpose of this is to recover any oil film if one is present on the water table.

l. Pull the bailer out of the well, keeping the polypropylene rope on the plastic sheet. Empty the groundwater from the bailer into a clean glass quart container and observe its appearance. Note: This sample will not undergo laboratory analysis and is collected to observe the physical appearance of the groundwater only.

m. Record the physical appearance of the groundwater in the field book.

n. Initiate bailing the well from the top of the water column, making certain to keep the polypropylene rope on the plastic sheet. All groundwater should be dumped from the bailer into a graduated pail to measure the quantity of water removed from the well. The purged water should be screened with the photoionization detector (PID) before disposing. Purged water will be disposed of through the groundwater treatment system.

o. Continue bailing the well until three well volumes of groundwater have been removed or until the well is bailed dry. If the well is bailed dry, allow sufficient time for the well to recover before proceeding with Step P. Record this information on the groundwater field sampling record.

p. Remove the sampling bottles from their transport containers and prepare the bottles for receiving samples. Inspect all labels to insure proper sample identification. Be sure labeling is complete before filling containers. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for convenient filling. Always fill the containers for volatile organic compounds first.

q. Record time sampling begins, and note the interval between bailing (purging) and sampling. To ensure comparable samples, maintain same interval between well evacuation and sampling.

r. To minimize agitation of the water and obtain a sample fresh from the surrounding formation, initiate sampling by lowering the bailer slowly into the well, making certain to submerge it only far enough to fill it completely. Fill sample bottles and return each to its proper transport container. Keep samples on ice. If required, seal each container with chain-of-custody seals.

s. If the sample bottles cannot be filled quickly, keep them cool with the caps on until they are filled. The vials (three) labeled purgeable priority pollutant analysis should be filled from one bailer, then securely capped.

t. After the last sample has been collected, record the date and time and empty one bailer of water from the surface of the water in the well into a beaker and measure the record the pH, Eh, conductivity and temperature of the groundwater following the procedures outlined in the equipment operation manuals. Record this information in the field book. The beaker must then be rinsed with distilled water prior to reuse.

u. Begin the chain-of-custody record. A separate entry is required for each well with the required analysis listed individually.

v. Replace the well cap and lock the well protection assembly before leaving the well location.

w. Place the polypropylene rope and disposable bailer, gloves, rags and plastic sheeting into a plastic bag for disposal.

D. **Immunoassay.** The environmental immunoassay techniques rely on a specific antibody that is developed to have a high degree of affinity for a target analyte. This high specificity and high affinity to the antibody is combined with a colorimetric reaction that provides an accurate field result. The immunoassay test is a product of simple chemistry accomplished with a small number of solutions that are applied to the processed sample, diluted sample, or extracted sample in the case of soils. The following steps are general instructions supplied with procedure for conducting a field test for a particular contaminant; however, each manufacturer's kit should be consulted prior to use.

1. For a groundwater sample, measure a specified amount of the sample and transfer into a designated container. For a soil sample, measure a specified amount of the sample and transfer into a soil extraction bottle and mix thoroughly.

2. Samples are passed through a filter and into a vial containing a measured number of antibodies. Gently mix. In a separate vial, the reagent being used as a reference is also placed in a vial containing the antibodies. Gently mix.

3. Allow time for the analytes to bind to their respective antibodies.

4. Pour contents of both vials into their respective cups and allow for the liquid to pass through the filter. Add several reagents to each solution and wait for the color of the sample

solution being tested to develop so that its color is equal to the reference color on the specified color card.

5. At the time the color of the sample is the same as the color on the reference chart, the color development should be stopped.

6. Add an additional reagent and allow to drain completely through the filter. Compare the color to the analytes conversion chart on the color reference card or use a designated computerized meter, depending on the brand of test kit used.

E. **GC Procedures.**

1. Determine air sampling locations; record sampling locations in field book.
2. Label tedlar bags for air sample collection.
3. Collect air samples as described in Section 3.7.F.

F. **Air Sampling.**

1. **Sample Ports.** Sample ports are located on both the vacuum side and pressure side of the SVE system blower and the air stripper discharge. Sampling ports for either case are identical and consist of a barbed, low pressure port tapped into the piping system. A positive shutoff petcock is provided on each sample port. Note that the individual sample port location for each of the SVE wells is physically located between the well and well shutoff valve.

2. **Vacuum Side of Blower.** Samples are obtained with a 500 cc syringe. The syringe should be purged a total of three times prior to taking the final sample.

3. **Pressure Side of SVE Blower or Air Stripper Discharge.** On the pressure side of the blower, the sample bag is simply connected to a sample port and the petcock opened slowly until the sample bag is filled. The sample port petcock is then closed.

G. **Soil Sampling Procedures.** Table 3-6 contains a list of equipment needed for soil sampling. All the listed equipment may not be needed if the sampling effort is limited in scope, but the general procedures should be followed in all situations. The following are the procedures for collecting samples.

1. Determine sampling locations; record on site map and in field book.

2. Properly label sample containers.

3. Put on latex and nitrile gloves.

4. Collect samples using hand auger or sampling spoons (if possible).

5. Screen with PID. Place samples in cooler on ice.

6. Record physical appearance of sample (moisture, mottling, organic composition, etc.), sampling time, and date in field book.

7. Remove and dispose of gloves before sampling next location.

3.9 SAMPLE HANDLING AND ANALYSIS

The following sections describe what to do with samples once they have been collected. Examples of paperwork are attached for reference.

A. **Packaging.** Samples processed for CLP analyses must be packaged for shipment in accordance with current U.S. Department of Transportation (DOT) regulations. All required government and commercial carrier shipping papers must be filled out. Information can be obtained from the carrier (i.e., Federal Express) before field sampling begins.

The following checklist should be followed regardless of transport method:

1. Samples will be transported in metal ice chests or sturdy plastic coolers (cardboard or styrofoam containers are unacceptable).

2. Remove previously used labels, tape and postage from cooler.

3. Ship filled sample bottles in same cooler in which empty bottles were received. Coolers should have a permanent identification number affixed to the outside walls or lid.

4. Affix return address label to cooler.

5. Check to see that all sample bottles are tightly capped.

6. Be sure all bottle labels are completed.

7. While packing cooler, fill out chain-of-custody form.

8. Wrap sample bottles in bubble pack and place in cooler.

9. Pack bottles with extra bubble pack, vermiculite, or styrofoam "peanuts." Be sure to pack trip blank if applicable.

10. Keep samples refrigerated in cooler with bagged ice or frozen cold packs. Do not use ice for packing material; melting will cause bottle contact and possible breakage.

11. Separate sampler's copy of chain-of-custody and keep with field notes.

12. Tape paperwork (COC, manifest, return address) in ziplock bag to inside cooler lid.

13. Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open cooler.

14. Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

B. **Shipping.** Because holding times are very important for accurate laboratory analyses, it is imperative that samples arrive at the lab as soon as possible following sampling. All samples must be hand delivered on the same day as sampling or sent via overnight mail.

When using a commercial carrier, follow the steps below:

1. Securely package samples and complete paperwork.

2. Weigh coolers for air transport.

3. Complete air bill for commercial carrier (air bills can be partially completed in office prior to sampling to avoid omissions in field). If necessary, insure packages.

4. Keep customer copy of air bill with field notes and chain-of-custody form.

5. When coolers have been released to transporter, call receiving laboratory and give information regarding samplers' names, method of shipment, cooler identification numbers, and expected time of arrival.

6. Call lab on day following shipment to be sure all samples arrived intact. If bottles are broken, locations can be determined from chain-of-custody and resampled.

3.10 LABORATORY QC SAMPLES

During sampling, only dedicated equipment will be used to take samples. This significantly reduces the potential for sample or cross contamination at the site. The use of dedicated equipment eliminates the need for a field blank.

A trip blank will be prepared before the sample bottles are sent by the laboratory. It consists of a sample of distilled, deionized water which accompanies the sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of samples where sampling and analysis for Target Compound List (TCL) volatiles is planned (water matrix only). The trip blank will be analyzed for TCL volatile organics compounds as a measure of the internal laboratory procedures and their effect on the results.

Duplicate samples of each matrix (groundwater, soil, etc) will be collected at the rate of one duplicate per 20 samples per matrix, with a minimum of one duplicate per matrix being collected during each sampling event. The date of collection of each duplicate will be noted on the bottle and chain of custody. The location of each duplicate will be recorded in the field book only. Duplicates will be shipped to the lab and undergo the analyses required for its matrix.

3.11 REPORTING AND DELIVERABLES

The analytical report will be prepared in accordance with ELAP standards. The appropriate forms for reporting results, QA/QC data, and additional documentation will be included in each report. All samples collected at each individual site during a sampling event are planned to be analyzed as a set and reported in a single report package.

3.12 LABORATORY AND DATA AUDITS

Quality assurance audits are performed by the project quality assurance group under the direction and approval of the Stearns & Wheler project quality assurance officer (PQAO). Functioning as an independent body and reporting directly to company quality assurance management, the PQAO will plan, schedule and approve system and performance audits based upon company procedure customized to the project requirements. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities and documentation of the measurement system(s). At times, the PQAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit. Any deviation from the O&M plan must receive prior approval from the NYSDEC Quality Assurance Officer (QAO).

A. **System Audits.** System audits, performed by the PQAO or designated auditors, will encompass evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field quality control procedures and associated documentation will be system audited. These audits will be performed at least once during the performance of the project. However, if conditions adverse to quality are detected between planned audits, or if the project manager requests the PQAO to perform unscheduled visits, these activities will be instituted.

B. **QA Management Assessment.** In addition to the ongoing system audits, quality assurance management assessments will be performed regularly by Stearns & Wheler. Such assessments will inform both company and project management that overall quality assurance requirements have been properly implemented and audited by the project QA group.

C. **Changes To Work Plan.** Any change or deviation from the agreed protocols detailed in the Monitoring Plan must be approved by both Stearns & Wheler's PQAO and the NYSDEC QAO.

TABLE 3-1

SITE MONITORING PLAN

Sample Location	Sampling Frequency Q	S**	A***	C	Analytical Determination	EPA Method	EPA Parameters
MW-8		X	X		LAB	502.2/8270	VOC, PAH
MW-17	X			X	LAB	502.2/8270/200	VOC, PAH, Iron
MW-18		X	X		LAB	502.2/8270	VOC, PAH
MW-19	X			X	LAB	502.2/8270/200	VOC, PAH, Iron
MW-20	X*			X	LAB	502.2/200	VOC, Iron
MW-21	X*			X	LAB	502.2/200	VOC, Iron
SS-1 (Soil)				X	LAB	8021/8270	VOC, PAH
SS-2 (Soil)				X	LAB	8021/8270	VOC, PAH
SS-3 (Soil)				X	LAB	8021/8270	VOC, PAH
SS-4 (Soil)				X	LAB	8021/8270	VOC, PAH
User Survey ****	X		X		NA	NA	NA

Q = Quarterly
S = 2 times per year
A = Annual
C = Closure

* Quarterly sampling to begin when off-site (in situ) treatment has begun.

** Semi -annual sampling to begin when on-site groundwater treatment is discontinued.

*** Annual sampling to begin when SVE system operation is discontinued.

**** See Chapter 4 for User Survey procedures.

TABLE 3-2
SVE SYSTEM MONITORING PLAN

Sample Designation	Sample Location	Matrix		Sampling Sched.					Sampling Method
		Air	Soil	SU	W	M	Q	S	
SVE-A-1	Influent	●		X*		X			PID
									GC
SVE-A-2	Influent	●		X*		X			PID
									GC
SVE-A-3	Influent	●		X*		X			PID
									GC
SVE-A-4	Influent	●		X*		X			PID
									GC
SVE-A-5	Influent	●		X*		X			PID
									GC
SVE-A-6	Influent	●		X*		X			PID
									GC
SVE-A-7	Influent Manifold	●		X*	X***	X			PID
				X**			X		GC
SVE-A-8	Between Carbon	●		X*	X***	X			PID
				X**			X		GC
SVE-A-9	Stack	●		X*	X***	X			PID
				X**			X		GC
VM-1			●	X*			X		Manometer
VM-2			●	X*			X		Manometer
VM-3			●	X*			X		Manometer
VM-4			●	X*			X		Manometer
VM-5			●	X*			X		Manometer
VM-6			●	X*			X		Manometer
VM-7			●	X*			X		Manometer
VM-8			●	X*			X		Manometer
VM-9			●	X*			X		Manometer
VM-10			●	X*			X		Manometer

*Refer to Figure 3-3

SU= Start up
S=Semi-annually
M= Monthly if on-line

W= Weekly
Q= Quarterly

X* = Daily during start up
X** = Once during start up
X*** = Weekly during months 1-3
Monthly during months 4-6

TABLE 3-3

GROUNDWATER TREATMENT SYSTEM MONITORING

Sample Designation	Sample* Location	Type of Sample			Frequency						Analytical	EPA Method	
		GW	W	A	SU	W	B	M	Q	C	Determination	Type	Parameters
GW-W-1	MW-18	●			X^1						IAT		BTEX, PAH
	Influent								X	X	Lab	502.2/8270	VOC, PAH
GW-W-2	RW-1	●			X^1						IAT		BTEX, PAH
	Influent								X	X	Lab	502.2/8270	VOC, PAH
GW-W-3	After Filter		●		X^1						IAT		BTEX, PAH
	(Air Stripper Influent)				X^2	X^3			X	X	Lab	502.2/8270	VOC, PAH
GW-W-4	Air Stripper		●		X^1						IAT		BTEX, PAH
	Effluent				X^2	X^3	X^5		X	X	Lab	502.2/8270	VOC, PAH
GW-W-5	Between		●		X^1						IAT		BTEX, PAH
	Carbon Drums				X^2	X^3	X^5		X	X	Lab	502.2/8270	VOC, PAH
GW-W-6	Effluent		●		X^1						IAT		BTEX, PAH
					X^2	X^4	X^6	X^7		X	Lab	502.2/8270/200	VOC, PAH, Metals
GW-A-1	Stripper Off-gas			●	X^1	X^4	X^6	X^7			PID		
GW-A-2	Between Carbon			●	X^1	X^4	X^6	X^7			PID		
GW-A-3	Stack			●	X^1	X^4	X^6	X^7			PID		

* Refer to Figure 3-4

GW= Groundwater

W= Water

A= Air

SU = Start up

W = Weekly

B = Biweekly

M = Monthly

Q = Quarterly

C = Closure

X^1 = Daily during startup

X^2 = Once during startup

X^3 = Weekly for 1 month

X^4 = Weekly for 3 months

X^5 = Bi-weekly for months 2-6

X^6 = Bi-weekly for months 4-6 (contingent on NYSDEC approval)

X^7 = Monthly after month 6 (contingent on NYSDEC approval)

IAT = Immunoassay Techniques

X

TABLE 3-4

EQUIPMENT FOR GROUNDWATER SAMPLING FROM TREATMENT SYSTEM SAMPLING PORTS

	Field notebook, pencil, ballpoint, and marker
	Data sheets
	Microcassette recorder (for quick and creative note-taking)
	Spare microcassettes and batteries
	Photoionization meter or OVA
	Paper towels/rags/oil sorbent pads
	Folding table
	Conductivity meter
	Thermometer (and thermos bottle kit)
	pH meter electrode and buffer solutions
	Spare batteries, if necessary
	Beakers, stirrers, wash bottle, Chem-wipes
	Flow-through beaker
	Nitrile gloves (size 9-10) and glove inserts (cold weather)
	Surgical gloves (Latex)
	Power pack or compressed air
	Sponges
	Garbage bags
	Garden hose
	Trip blanks and spiked samples for volatile samples
	Preservative acids and biocides
	Chest or six-pack cooler, ice, and maximum/minimum thermometer
	Decontamination vessel
	Washwater (1-1/2 gallons per sampling point)
	Alconox detergent solution
	Deionized water (1-1/2 gallons per sampling point)

TABLE 3-4 (Continued):

	Garden spray cans for wash fluids
	Tyvek suits
	Gloves, boots, respirator
	Raingear or warm clothing
	Camera and film
	Toolbox, including hacksaw
	Knife
	Pipe wrenches (at least two). What size might you need?
	Flashlight
	Calculator
	ID card or business card
	Money

TABLE 3-5

EQUIPMENT FOR GROUNDWATER SAMPLING

	Field notebook, pencil, ballpoint, and marker
	Data sheets
	Microcassette recorder (for quick and creative note-taking)
	Spare microcassettes and batteries
	Map of well locations
	Keys for wells; graphite lubricate for locks
	Photoionization meter or OVA
	Water level gauge and spare battery
	Long steel tape measure and chalk
	Interface probe (for wells with pure product)
	Paper towels/rags/oil sorbent pads
	Folding table
	Conductivity meter
	Thermometer (and thermos bottle kit)
	pH meter electrode and buffer solutions
	Spare batteries, if necessary
	Beakers, stirrers, wash bottle, Chem-wipes
	Flow-through beaker
	Nitrile gloves (size 9-10) and glove inserts (cold weather)
	Surgical gloves (PVC)
	Rope (polypropylene)
	Clear plastic bailer (if you expect oil)
	Power pack or compressed air
	Bailers and bottom emptying tubes
	Buckets (calibrated in gallons or liters)
	Containers for purged water
	Sponges

TABLE 3-5 (Continued):

	Garbage bags
	Garden hose
	Trip blanks and spiked samples for volatile samples
	Preservative acids and biocides
	Chest or six-pack cooler, ice, and maximum/minimum thermometer
	Decontamination vessel
	Washwater (1-1/2 gallons per well)
	Alconox detergent solution
	Deionized water (1-1/2 gallons per well)
	Garden spray cans for wash fluids
	Tyvek suits
	Gloves, boots, respirator
	Raingear or warm clothing
	Camera and film
	Toolbox, including hacksaw
	Knife
	Pipe wrenches (at least two). What size might you need?
	Flashlight
	Calculator
	ID card or business card
	Money
	Booklet, "How to Sample Groundwater and Soils"

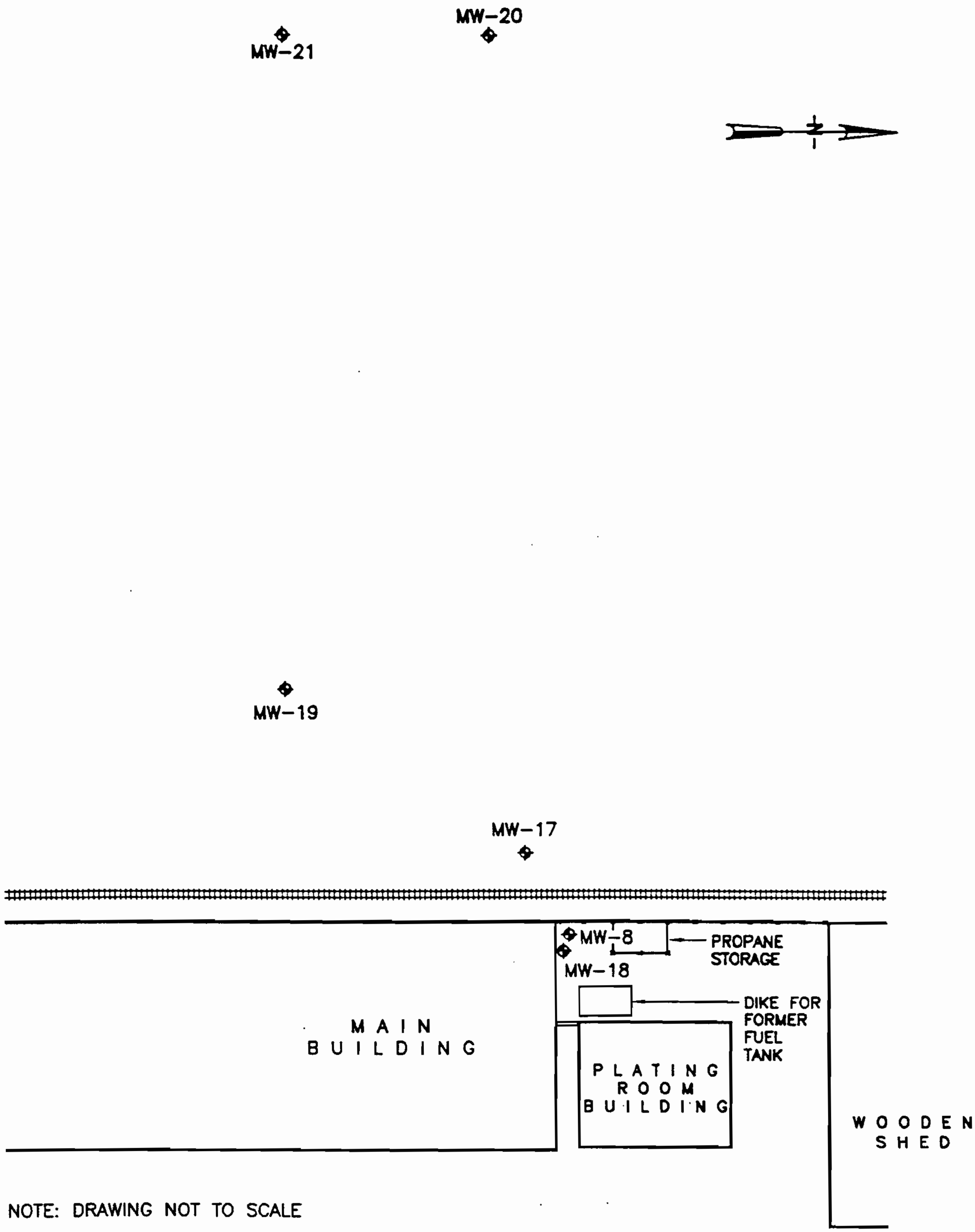
TABLE 3-6

EQUIPMENT FOR SOIL SAMPLING

	Field notebook, pencil, ballpoint and marker
	Data sheets
	Microcassette recorder (for quick and creative note-taking)
	Spare microcassettes and batteries
	Map of sample locations
	Photoionization meter or explosimeter
	Paper towels/rags/oil sorbent pads
	Folding table
	Spare batteries, if necessary
	Nitrile gloves (size 9-10) and glove inserts (cold weather)
	Surgical gloves
	Garbage bags
	Garden hose
	Chain-of-custody and other forms
	Sample containers (bring 20 percent more than needed) all sealed, clean and labeled
	Trip blanks and spiked samples for volatile samples
	Chest or six-pack cooler, ice, and maximum/minimum thermometer
	Decontamination vessel
	Washwater (1-1/2 gallons per well)
	Alconox detergent solution
	Deionized water (1-1/2 gallons per well)
	Garden spray cans for wash fluids
	Tyvek suits
	Gloves, boots, respirator
	Raingear or warm clothing
	Camera and film
	Toolbox, including hacksaw

TABLE 3-6 (Continued):

	Knife
	Flashlight
	Calculator
	ID card or business card
	Money
	Booklet, "How to Sample Groundwater and Soils"
	Tape measure



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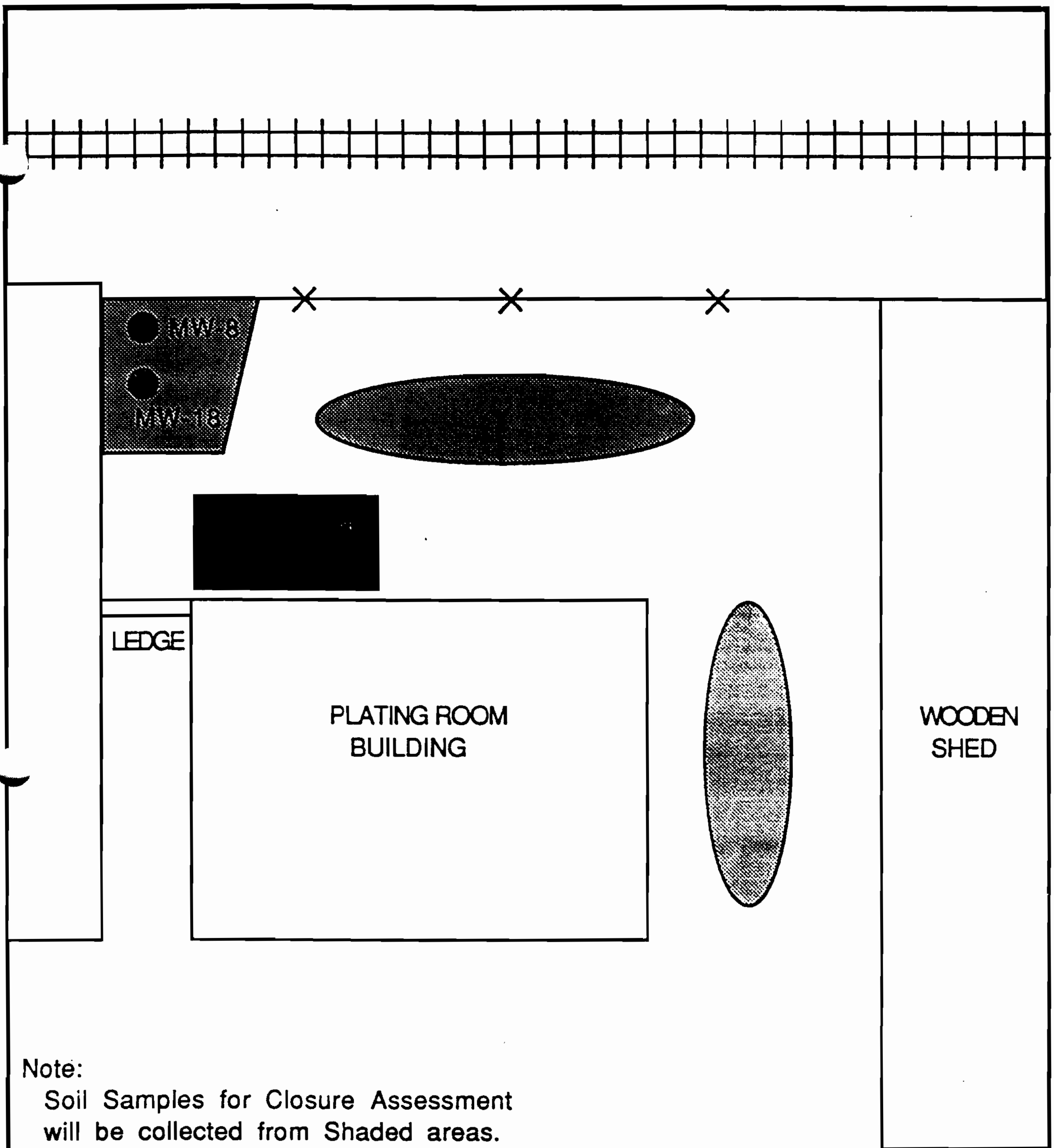
DATE: 3/95 JOB No.: 1587

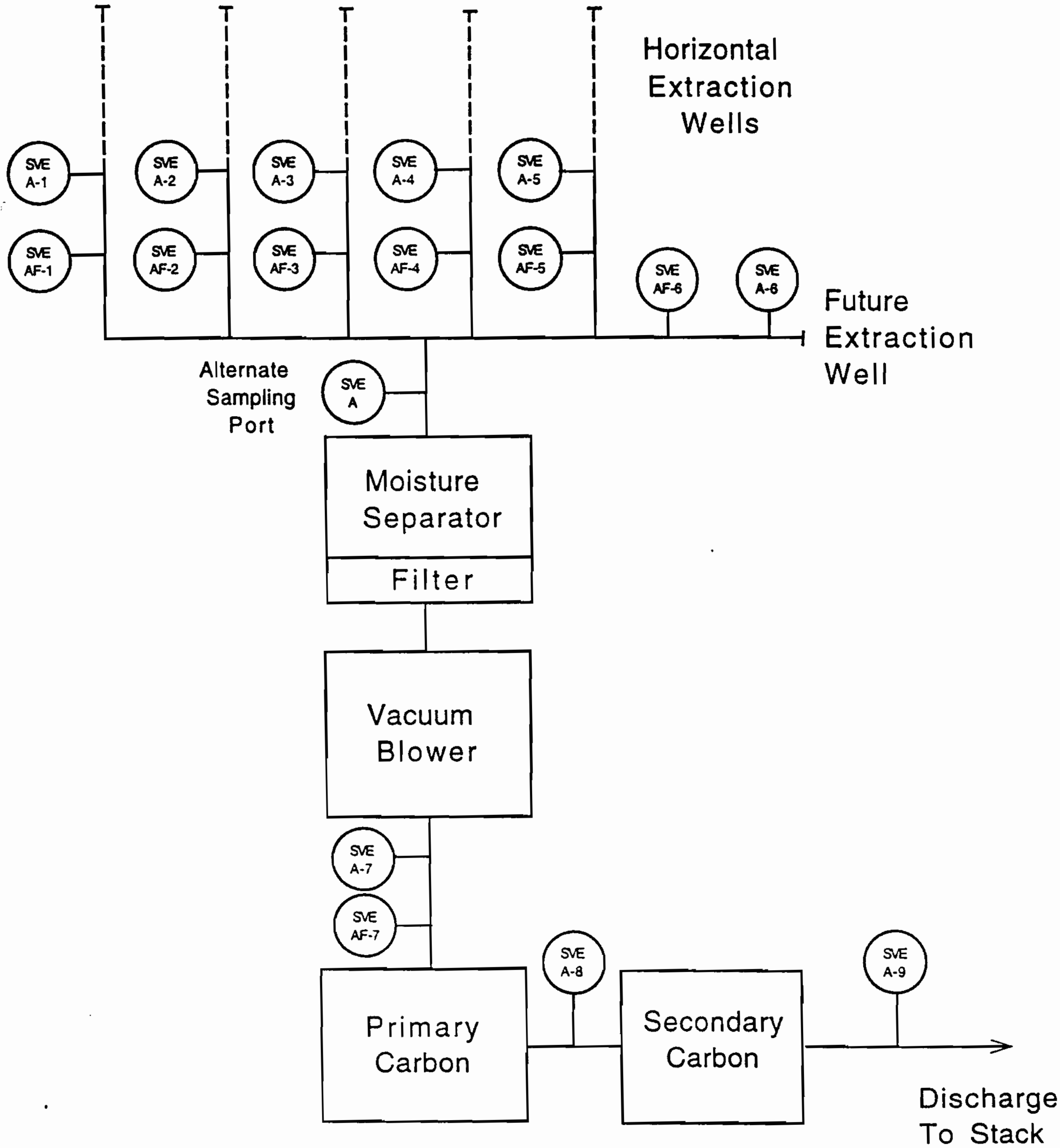
GENERAL INSTRUMENT CORPORATION
SHERBURNE, NEW YORK
REMEDIAL DESIGN IMPLEMENTATION REPORT

FIGURE 3-1
LOCATION OF
MONITORING WELLS



Note:
Soil Samples for Closure Assessment will be collected from Shaded areas.

Figure 3-2 Location of Soil Samples
General Instrument Corporation O, M, & M Manual
Stearns & Wheler ENVIRONMENTAL ENGINEERS & SCIENTISTS



SVE A-9 Air Sampling Port

SVE AF-7 Air Flow Meter

Figure 3-3
Schematic: SVE System

General Instrument Corporation
O, M, & M Manual

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ENVIRONMENTAL ENGINEERS & SCIENTISTS

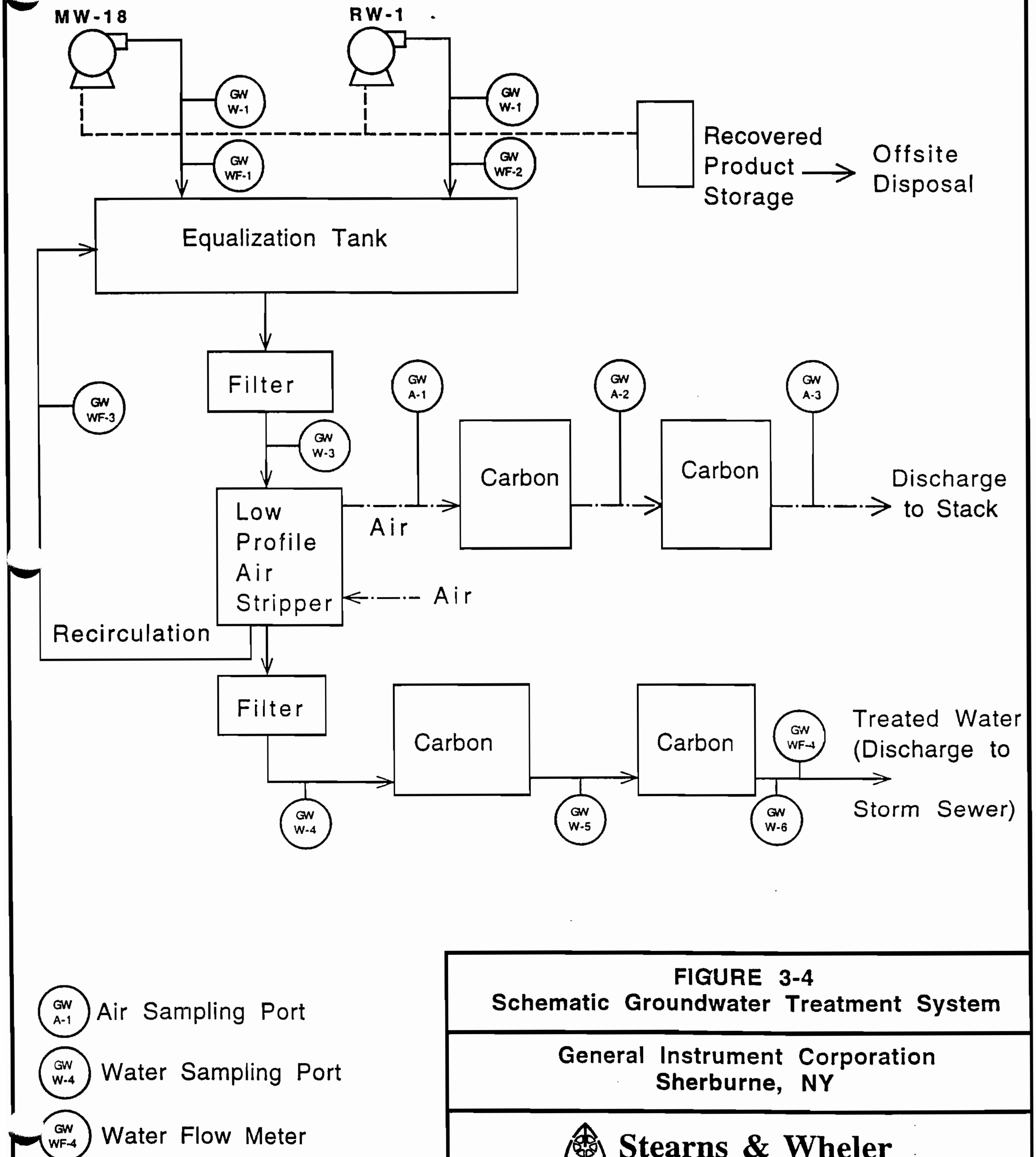


FIGURE 3-4
Schematic Groundwater Treatment System

General Instrument Corporation
Sherburne, NY

Stearns & Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS

CHAPTER 4

GROUNDWATER USER SURVEY

Currently, there are no private well users downgradient of the site. Quarterly visual survey of adjacent properties, and annual questioning of the Town Clerk and Water Board will be used to identify possible new groundwater users in the vicinity of the site.

CHAPTER 5

DISPOSAL OF USED MATERIALS AND WASTES

Wastes generated during the operation, maintenance, and monitoring activities will be handled as described in the following sections.

5.1 SOILS

Soils generated during installation of the SVE and groundwater treatment system will be backfilled in the SVE trenches to the extent possible. All excess soil was sampled and analyzed for site-related contaminants. Laboratory results indicated the material is clean. The soil will be stored on-site for later disposal at an off-site location.

5.2 DECONTAMINATION AND PURGE WATER

Decontamination and purge water will be drummed and allowed to settle. Decanted water will then be run through the groundwater treatment system and then discharged to the storm sewer. Any sediment remaining in the drums will be treated with the SVE system by placing the sediment in the AST secondary containment structure with soil excavated during construction of the remediation system.

5.3 SOLID WASTE

Filters, PPE, and other solid wastes will be drummed and disposed of according to local, state, and federal regulations.

Spent carbon will be transported off-site and managed (disposed or regenerated) in accordance with General Instrument Corporation Company policies and according to local, state, and federal regulations. Similarly recovered fuel oil will be recycled or disposed of in accordance with local, state, and federal regulations and in a manner approved by General Instrument Corporation.

CHAPTER 6

REPORTS

6.1 GENERAL

During remediation, monthly, quarterly, and annual reports will be forwarded to the NYSDEC. In addition, a five-year review report will be prepared and forwarded to the NYSDEC. Reports will be submitted to Mr. Charles Branagh, P.E., Regional Hazardous Waste Engineer, NYSDEC Region 7, and copies will be sent to Mr. David Chiusano, NYSDEC Albany. These reports will be used to provide the NYSDEC with analytical results of periodic monitoring and testing performed at the facility. The format and contents of monthly, quarterly, and annual reports is summarized below in Sections 6.2 through 6.5.

Weekly, monthly, quarterly, semi-annual, and yearly checklists have been prepared to facilitate data collection and maintenance of the remediation systems. Copies of these checklists are provided in Appendix A. These checklists will be completed by the technician(s) responsible for maintenance and monitoring of the remediation systems.

6.2 START-UP REPORTS

During start-up (defined as the first four weeks of operation), copies of equipment checklists and handwritten daily field reports will be sent weekly to both NYSDEC Region 7 and NYSDEC Albany offices.

6.3 MONTHLY REPORTS

Monthly reports will be prepared in letter report format. The monthly report will consist of a brief letter summarizing activities at the site during the subject month, and one copy of: (1) the monthly checklist; (2) weekly checklists prepared during the month (if applicable); (3) analytical results from laboratory analysis of samples collected during the subject month; and (4) chain-of custody forms for samples collected during the month; and (5) monthly treated water discharge monitoring summary report (Appendix D contains sample).

6.4 QUARTERLY REPORTS

Similar to monthly reports, quarterly reports will be prepared in letter report format. Quarterly reports will consist of a brief letter summarizing activities at the site during the subject quarter, and one copy of: (1) the quarterly checklist; (2) the monthly checklist completed during the month the quarterly report is prepared; (3) weekly checklists prepared during the month (if applicable); (4) the semi-annual checklist prepared during the quarter (if applicable); (5) analytical results from laboratory analysis of samples collected for monthly and quarterly sampling; (6) chain-of-custody forms for samples collected for monthly and quarterly sampling; (7) monthly discharge monitoring summary reports; and (8) a log of significant site activities and/or events occurring during the subject quarter. A monthly report will not be prepared for months quarterly reports are submitted.

6.5 ANNUAL REPORTS

Annual reports will be prepared in short report format to compile data obtained during one year periods. Results of sample analyses will be summarized in table format within the annual reports. Data collected during the year will also be discussed to determine the progress towards remediation goals accomplished in the subject year.

CHAPTER 7

CITIZEN PARTICIPATION

7.1 GENERAL

General information regarding the GIC site in Sherburne, NY is provided in Chapters 1 and 2 of this O&M Manual. These chapters provide a description of the site, site history, hydrogeology, contaminants of concern, remedial actions, and remedial goals. The following information in this chapter of the O&M Manual is provided to promote public understanding of and participation in remedial activities at the site.

7.2 IDENTIFICATION OF INTERESTED/AFFECTED PARTIES

The NYSDEC has compiled a public contact list to allow for distribution of information and notices regarding site activities. The list includes the names, addresses, and telephone numbers of people and organizations which may be affected by and/or interested in the remedial activities at the GI, Sherburne, NY facility. This list includes elected officials, essential public officials, citizens, businesses, and interested organizations.

A copy of the list is provided for public review at the document repositories identified in Section 7.4.

7.3 NYSDEC AND NYSDOH CONTACTS

A list of the names, addresses, and telephone numbers of contact persons within the NYSDEC and NYSDOH who can provide information on the GI, Sherburne, NY facility follows:

NYSDEC Mr. George Harris, P.E., Chief Western Field Services Section NYSDEC 50 Wolf Road Albany, NY 12233-7010 (518) 457-9285	***NYSDOH*** Ms. Henriette Hamel NYSDOH Office of Public Health 217 South Salina Street Third Floor Syracuse, NY 13202 (315) 426-7612
NYSDEC Region 7 Mr. Charles Branagh, P.E. Regional Hazardous Waste Engineer NYSDEC 615 Erie Blvd. West Syracuse, NY 13204-2400 (315) 426-7551	***NYSDEC Toll Free Information Number*** (800) 342-9296 (Leave a message with your name, telephone number, and who you need to contact.)

7.4 DOCUMENT REPOSITORY

Project documents are available for public review at the following locations:

NYSDEC Region 7 Office 615 Erie Boulevard West Syracuse, NY 13204	***Village of Sherburne*** Municipal Building West State Street Sherburne, NY 13460

7.5 FOIL REQUESTS

Requests for access to government records, including records regarding the GI Sherburne facility, can be made to the NYSDEC through the Freedom of Information Law (FOIL). FOIL provides rights of access to most government records. Generally, FOIL provides access to existing records, which means that the DEC is not required to create a record in response to a request. A copy of the NYSDEC Application for Access to Records under FOIL is included in this O&M Manual as Appendix B to facilitate citizen participation in remedial activities at the GI Sherburne facility.

CHAPTER 8

PERSONNEL

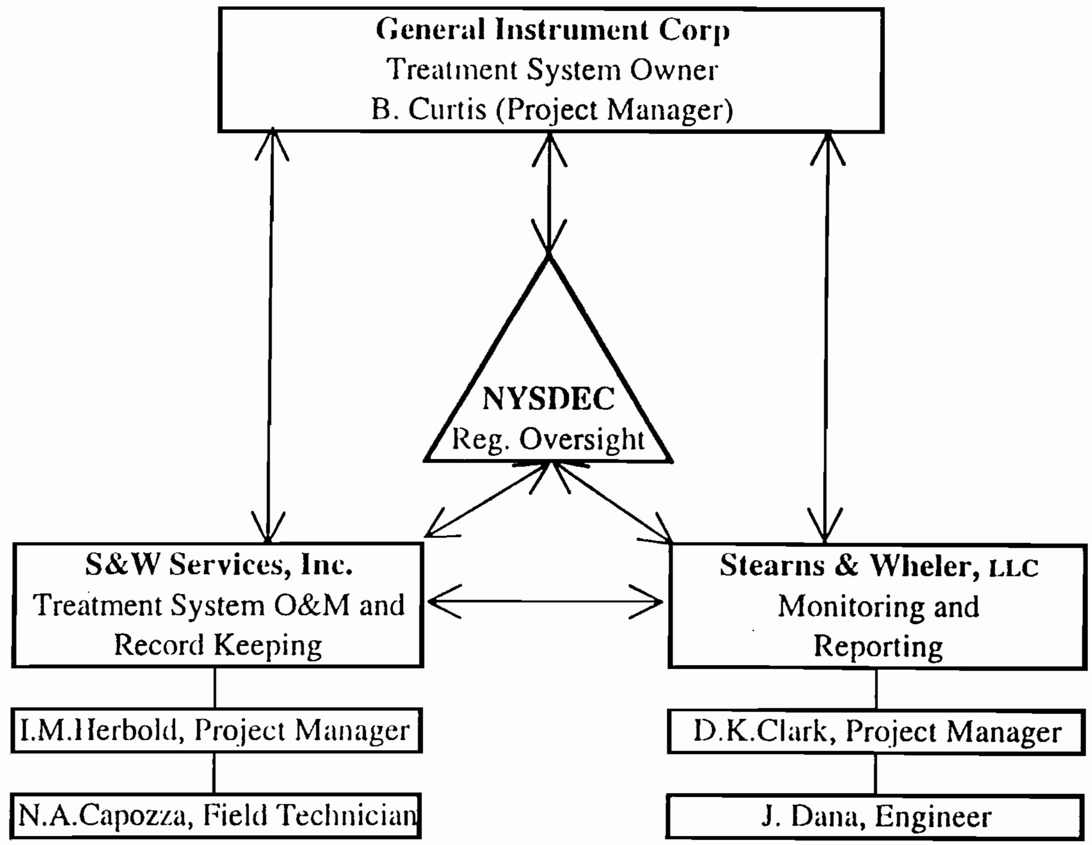
Because of the number of parties involved in the operation, maintenance, and monitoring of the remedial systems at the Sherburne site, a responsibility matrix has been prepared (see Table 8-1) which details responsibilities of each of the groups associated with the ongoing remedial projects at the site. Operation, maintenance, and monitoring of the on-site treatment systems (groundwater pump and treat system and soil vapor extraction system) will be conducted by representatives of S&W Services, Inc. Maintenance of the landfarm cells will be conducted by the property owner, Mr. Jack Howard, with inspections to be conducted by S&W Services personnel as part of the regularly scheduled visits to the on-site treatment systems. All data collected by S&W Services will be reviewed and evaluated by Stearns & Wheler personnel. Monthly, quarterly, and annual reports will be prepared by Stearns & Wheler based on the operating and monitoring data. Finally, following review by General Instrument Corporation, the reports will be submitted to the NYSDEC.

TABLE 8-1

PROJECT RESPONSIBILITY MATRIX

ORGANIZATION	PERSONNEL	TECHNICAL	ADMINISTRATIVE
General Instrument Corporation	Barbara Curtis	• Review, comment, and approve reports generated on system operation. • Approval of system/operational changes.	• Maintain agreements with current site owners.
S&W Services, Inc.	Michael Howell Ilene Herbold Nick Capozza	• Operate, maintain, and monitor on-site treatment systems. • Inspect and monitor landfarm cell. • Collect data, maintain operating logs, and record monitoring data.	• Provide information to GIC and Stearns & Wheler regarding system operation status. • Coordinate field technical time. • Interface with all parties.
Stearns & Wheler, LLC	Larry Hineline Diane Clark John Dana	• Prepare reports for GIC review and submittal to NYSDEC. • Provide field oversight when needed. Assist in groundwater sampling. • Decisions regarding system/operational modifications and on termination of sampling/remedial activities.	• Interface with all parties. • Negotiate with current site owners. • Public participation.
NYSDEC	Dave Chiusano Karen Maiurano Charles Branagh	• Provide technical comments on reports. • Approve changes to system operations, including decisions to terminate remedial activities.	• Public participation.
West Field Property Owner	Jack Howard	• Landfarm cell maintenance.	• N/A

FIGURE 8-1
ON-SITE TREATMENT SYSTEMS PERSONNEL
Organizational Chart



Revised 8/26/96

CHAPTER 9

HEALTH AND SAFETY PLAN

9.1 GENERAL

A Site Specific Health and Safety Plan has been prepared by Stearns & Wheler for all field work conducted at the former GI, Sherburne facility. The purpose of the safety plan is to establish personnel protection standards and mandatory safety practices and procedures for the GI, Sherburne facility. In addition, the safety plan also establishes standards and practices for community protection. A copy of the Site Specific Health and Safety Plan is included in this O&M Manual under Appendix C. The plan includes the following elements:

1. Emergency Contacts
2. Risk Analysis
3. Health and Safety Plan Purpose and Policy
4. Site Security Plan
5. Physical Site Security
6. Preventive Health Monitoring
7. Site Work Zones
8. Communication Procedures
9. Accident Prevention
10. Site Standard Operating Procedures
11. General Operating Procedures
12. Excavation Activities' Procedures
13. Contingency Plan
14. Excavation Routes and Procedures
15. Decontamination Procedures
16. Electrical Lockout/Tag-out Procedures

CHAPTER 10

EMERGENCY CONTINGENCY PLAN

A Site-Specific Health and Safety Plan (HSP) has been prepared by Stearns & Wheler for all field work conducted at the former GI facility in Sherburne, NY. As part of the HSP, a contingency plan is included to identify procedures to be used in the event that an emergency develops at the site. Emergency conditions are considered to exist if any member of the field team is involved in an accident or experiences any adverse effects or symptoms of exposure while on the site. Emergency conditions are also defined as occurring when a condition is discovered that suggests the existence of a situation more hazardous than anticipated. Included in the contingency plan procedures is a list of evacuation routes and procedures, and a list of procedures to be followed in the event of chemical exposure, fire, or explosion. The HSP, including the Emergency Contingency Plan, is included as Appendix C to this manual.

CHAPTER 11

RECORD DRAWINGS AND SITE MAPS

Record Drawings and maps of the site are contained in the back of this document.

CHAPTER 12

OFF-SITE, IN SITU GROUNDWATER TREATMENT SYSTEM

12.1 DESCRIPTION

As discussed in Chapter 2, the groundwater plume that has migrated off site is being remediated by an in situ treatment system consisting of a permeable reaction wall using granular iron for destruction of chlorinated VOCs of concern. The permeable wall consists of a trench constructed throughout the entire saturated thickness of the aquifer and located perpendicular to the direction of groundwater flow and across the width of the dissolved, chlorinated solvent plume. The trench is filled with granular iron extending from a depth of 3 feet below grade to a depth of 21 feet below grade. The depth of 21 feet is based on the maximum depth to the underlying clay layer, while the 3-foot depth corresponds to a normal high groundwater elevation. As groundwater flows naturally through this permeable wall of granular iron, the chlorinated VOCs are electrochemically reduced resulting in the formation of a mixture of aliphatic hydrocarbons and dissolved chloride ions. The aliphatic hydrocarbons are subsequently mineralized by native soil microorganisms.

Results of a 12-month pilot scale test of a funnel-and-gate, in situ treatment system employing granular iron conducted at the site indicated that a three-day residence time would be sufficient for destruction of the maximum concentration of total chlorinated VOCs in the plume. To date, the maximum concentrations of chlorinated solvents have been detected in samples of groundwater collected in November 1996 from one temporary sampling point (S-1) located approximately south of the pilot scale system (4,610 μg/L total VOCs), and from piezometer P-8, located upgradient within the capture zone of the pilot scale system (5,100 μg/L total VOCs). Using degradation half-lives that were estimated from bench and pilot scale testing of site groundwater and the groundwater seepage velocities calculated from slug tests and down-hole velocity measurements undertaken at the site, it was determined that a iron thickness of 1 foot would provide over three days residence time in the iron and be sufficient to degrade up to 100 μg/L of PCE, 2,600 μg/L of TCE, 3,600 μg/L of cDCE, and 870 μg/L of VC, along with breakdown products of cDCE and TCE. These influent concentrations were selected for design purposes because they were the maximum concentrations of each individual VOC detected in S-1 and P-8. However, because the 1-foot thickness only provided a safety factor of 23 percent, the full scale system is designed with a second reactive iron wall across the most contaminated portion of the plume. In summary, the full-scale, in situ treatment system consists of a 1-foot thickness of iron extending 370 feet across the entire width of the plume, with a second 1-foot thickness of iron wall extending approximately 120 feet across the portion of the plume exhibiting the highest concentrations of total chlorinated VOCs based on the sampling undertaken in November 1996 and January 1997. Figure 12-1 indicates the location of the in situ groundwater treatment system.

As part of the construction of the full-scale in situ treatment system, portions of the pilot-scale funnel-and-gate system were decommissioned. The sheet piling associated with the funnel portion of the system was pulled, decontaminated, and removed from the site. The monitoring wells were cut off below grade and filled in place with sand. The granular iron gate section was left in place, providing further treatment to this portion of the chlorinated solvent plume.

To monitor remediation status, seven monitoring wells are installed in the vicinity of the treatment system. Monitoring wells MW-29, MW-30, and P-8 are located upgradient of the treatment system. The purpose of these three wells is to provide sampling locations for the long-term monitoring program that are indicative of the groundwater quality influent to the treatment system. Monitoring wells MW-23, MW-24, and MW-25 are located downgradient of the treatment system. The purpose of these three wells is to provide sampling locations for the long-term monitoring program that are indicative of the groundwater quality after treatment by the treatment system and to determine if clean-up goals have been met. The seventh well, MW-22, is located approximately 14 feet to the south of the reactive iron wall. The purpose of MW-22 is to monitor whether the plume is passing around the treatment system, and therefore, escaping treatment. Finally, seven pressure transducers are placed in piezometers and located adjacent to the reactive wall as illustrated in Figure 12-1. Two additional piezometers (P-9 and P-10) were installed in December 1998 for groundwater elevation monitoring (see Figure 12-1). The purpose of these piezometers is to allow long-term evaluation of groundwater elevation and to allow a determination of if, and when, permeability of the subsurface wall has decreased due to inorganic precipitation on the iron surface. If mounding is occurring due to reduced permeability in the upgradient surface of the iron, then measures will be required to restore the permeability of the wall.

Record drawings from construction of the full-scale in situ treatment system are included in Chapter 11 of this manual.

12.2 GOALS FOR OFF-SITE GROUNDWATER TREATMENT

As discussed above, the purpose of the in situ treatment system is to remediate the chlorinated solvent plume that has migrated from the former GIC property to the west onto the Howard property (the West Field). Groundwater monitoring undertaken as part of the 1996/1997 predesign subsurface investigation has indicated that the plume is approximately 370 feet wide in the vicinity of the treatment system, with total dissolved, chlorinated VOC concentrations in samples from piezometer P-8, located upgradient and within the capture zone of the pilot-scale funnel-and-gate system, being 5,100 µg/L. Contaminants of concern detected at the highest concentrations in samples of groundwater from temporary sampling points located in the West Field include: trichloroethene (TCE) at concentrations up to 2,600 µg/L, cis-Dichloroethene (cDCE) at concentrations up to 3,600 µg/L, and vinyl chloride (VC) at concentrations up to 870 µg/L, along with low concentrations of 1,1,1-trichloroethane (TCA), 1,1-dichloroethane (DCA), and tetrachloroethene (PCE). Groundwater cleanup goals for the organic chemicals of concern in the West Field are based on the TOGS 1.1.1, New York State ambient water quality standards and guidance values. Groundwater contaminants of concern, and their respective clean-up goals (NY State Class GA Standards), are as follows:

CONTAMINANT OF CONCERN	CLEANUP GOAL
1,1,1-Trichloroethane (TCA)	5 µg/L
Trichloroethene (TCE)	5 µg/L
Tetrachloroethene (PCE)	5 µg/L
cis-1,2-Dichloroethene (cDCE)	5 µg/L
trans-1,2-Dichloroethene (tDCE)	5 µg/L
Vinyl chloride (VC)	2 µg/L

12.3 MONITORING PROGRAM

Once the in situ treatment system construction is complete and monitoring wells have been installed, long-term groundwater monitoring will be undertaken to verify the in situ treatment wall is performing as designed. Figure 12-1 illustrates the location of monitoring wells and pressure transducer piezometers with respect to the permeable iron wall, while Table 12-1 presents the groundwater monitoring plan, as described below.

A. **Sampling Program.** For the first two years, groundwater samples will be collected on a quarterly basis from each of the seven monitoring wells associated with the in situ treatment system (three upgradient wells, three downgradient wells, and one well located south of the system) and the four West Field monitoring wells. Each sample will be analyzed for chlorinated VOCs of concern to verify when clean-up goals are being reached, and to determine removal efficiencies. The samples will also be analyzed for naphthalene, a PAH associated with the fuel oil impacts in the West Field, and MTBE, a contaminant attributed to an unidentified off-site source. Although an additional goal of this monitoring is to evaluate when treated water has passed through the system, because of retardation effects, it may be many months before enough treated water has passed through the aquifer to result in flushing of residual contaminants sorbed to the aquifer. Until sufficient pore volumes of treated water can flush these residual contaminants from the aquifer, it is likely that samples from downgradient wells will continue to have low levels of detectable VOCs. Samples will also be collected on a quarterly basis for the first 2 years from all 11 wells and analyzed for field parameters (Eh, pH, specific conductance, temperature, and dissolved oxygen) and groundwater elevations. After the initial two years of monitoring, the sampling frequency for these parameters (VOCs, naphthalene, field parameters, and groundwater elevation) will be decreased to semi-annual (two times per year) for the next three years. After the initial five years of monitoring, sampling frequency will be decreased to once/year.

Following construction, samples will also be collected from each upgradient and downgradient well (total of six monitoring wells) on a semi-annual basis (two times/year) and analyzed for metals (iron, calcium, and magnesium) and alkalinity. The purpose of this sampling is to evaluate the groundwater chemistry with respect to the potential for inorganic fouling (precipitation) and potential clogging of the in situ treatment system. Following the initial two years of monitoring, this inorganic monitoring will be decreased to once/year.

Additional monitoring of inorganic parameters will be undertaken on an annual basis only. The purpose of this monitoring will be to supplement the semi-annual inorganic monitoring program by providing an annual baseline of major groundwater cations and anions. Included in this annual monitoring will be collection of samples from each upgradient and downgradient monitoring well (total of six monitoring wells) with analysis conducted for sodium, potassium, sulfate, and chloride.

Groundwater elevations will also be monitored in each of the pressure transducer piezometers on a quarterly basis. The purpose of this monitoring will be to determine if groundwater mounding is occurring upgradient of the permeable wall. If groundwater elevations indicate there is mounding, then monthly monitoring of groundwater elevations and Fe, Ca, Mg, and alkalinity will be undertaken for a period of four months.

B. **Groundwater Sampling Procedures.** Detailed methods for sampling monitoring wells are listed in Chapter 3, Sections 3.7 and 3.8. Sample shipping and handling procedures are described in Section 3.9.

C. **Laboratory QA/QC, Deliverables, and Data Audits.** QA/QC procedures associated with sampling and laboratory analytical services are described in Chapter 3, Sections 3.10 and 3.11. Analytical work for all sampling conducted as part of this long-term monitoring program will be conducted by a NYSDOH ELAP certified laboratory. If a data report shows an unexpected or unexplainable variation in results, the analytical work for the next sampling event will be done by a NYSDOH ELAP CLP certified laboratory, with results prepared in accordance with a Category B deliverable package.

D. **Groundwater User Survey.** In accordance with the December 1994 Record of Decision for the site, a long-term groundwater user survey is required to identify possible new groundwater users in the field west of the site. The groundwater user survey will be conducted as described in Chapter 4 for the first five years following installation of the in situ treatment system. Following the first five years, the visual survey of the adjacent properties will be reduced to an annual basis.

E. **Reporting.** Results from the initial two years of monitoring will be summarized in reports submitted to the NYSDEC on a quarterly basis. While the on-site treatment systems are being operated, the information from the monitoring will be incorporated into the reports for the SVE and pump and treat system. Following the first two years, the frequency of the reporting will be reduced to two times per year, consistent with the groundwater monitoring frequency. Finally, after five years, annual reports will be prepared to summarize system performance.

F. **Closure.** As discussed above, after five years, groundwater monitoring frequency will decrease to annual sampling only. Once groundwater standards for site-specific compounds have been reached upgradient of the wall, a request to the Department for suspension of monitoring and decommissioning the system will be made.

12.4 MAINTENANCE

If four months of monitoring of groundwater elevations or analytical results from inorganic analyses from sampling monitoring wells MW-23 through MW-30 and P-8 indicate that groundwater mounding may be occurring, then corrective measures will be recommended within 60 days and implemented when practicable. Core samples may also be collected from the iron wall to verify precipitation or other plugging has occurred. At the present time, the most likely corrective action is use of drilling augers to mix the front edge of the iron wall. However, if monitoring data and core sample data indicate mounding is occurring, EnviroMetal Technologies, Inc. will be contacted for recommendations on alternative corrective measures prior to implementing any maintenance actions at the site.

X

TABLE 12-1
IN SITU GROUNDWATER TREATMENT SYSTEM MONITORING PLAN

SAMPLE LOCATION	SAMPLE FREQUENCY Quarterly [1]	Semi-Annual	Annual [4]	ANALYTICAL METHOD	PARAMETERS
MW-17 (Upgradient of Wall)	X	X[2]	X	8260	Chlorinated VOCs,
	X	X[2]	X	8260	MTBE, Naphthalene
	X	X[2]	X	N/A	Field Parameters[5]
MW-20 (Downgradient of Wall)	X	X[2]	X	8260	Chlorinated VOCs,
	X	X[2]	X	8260	MTBE, Naphthalene
	X	X[2]	X	N/A	Field Parameters[5]
MW-21 (Downgradient of Wall)	X	X[2]	X	8260	Chlorinated VOCs,
	X	X[2]	X	8260	MTBE, Naphthalene
	X	X[2]	X	N/A	Field Parameters[5]
MW-22 (South of Wall)	X	X[2]	X	8260	Chlorinated VOCs
	X	X[2]	X	8260	MTBE, Naphthalene
	X	X[2]	X	N/A	Field Parameters[5]
MW-23 (Downgradient of Wall)	X	X[2]	X	8260	Chlorinated VOCs
	X	X[2]	X	8260	MTBE, Naphthalene
		X[3]	X	200	Fe, Ca, Mg,
		X[3]	X	310.1	Alkalinity
			X	200	Na, K,
			X	375.4 / 325.2	SO_4^{-2}, Cl
	X	X[2]	X	N/A	Field Parameters[5]
MW-24 (Downgradient of Wall)	X	X[2]	X	8260	Chlorinated VOCs
	X	X[2]	X	8260	MTBE, Naphthalene
		X[3]	X	200	Fe, Ca, Mg,
		X[3]	X	310.1	Alkalinity
			X	200	Na, K,
			X	375.4 / 325.2	SO_4^{-2}, Cl
	X	X[2]	X	N/A	Field Parameters[5]

[1] Quarterly Monitoring of for a period of two years only.

[2] Following the initial two years of monitoring, frequency will be reduced to 2 times/year for three years.

[3] Semi-Annual Sampling for inorganics (Fe, Ca, Mg, and Alkalinity) for initial two years of operation.

[4] Annual Sampling for inorganics (Na, K, SO_4, Cl); annual sampling for other inorganics following first two years of operation, annual sampling of VOCs and field parameters following first five years of monitoring.

[5] Field parameters include Eh, pH, specific conductivity, temperature, and Dissolved Oxygen.

TABLE 12-1, (continued)

MW-25 (Downgradient of Wall)	X	X^2	X	8260	Chlorinated VOCs
	X	X^2	X	8260	MTBE, Naphthalene
		X^3	X	200	Fe, Ca, Mg,
		X^3	X	310.1	Alkalinity
			X	200	Na, K,
			X	375.4 / 325.2	SO_4^{-2}, Cl
	X	X^2	X	N/A	Field Parameters[5]
MW-29 (Upgradient of Wall)	X	X^2	X	8260	Chlorinated VOCs
	X	X^2	X	8260	MTBE, Naphthalene
		X^3	X	200	Fe, Ca, Mg,
		X^3	X	310.1	Alkalinity
			X	200	Na, K,
			X	375.4 / 325.2	SO_4^{-2}, Cl
	X	X^2	X	N/A	Field Parameters[5]
MW-30 (Upgradient of Wall)	X	X^2	X	8260	Chlorinated VOCs
	X	X^2	X	8260	MTBE, Naphthalene
		X^3	X	200	Fe, Ca, Mg,
		X^3	X	310.1	Alkalinity
			X	200	Na, K,
			X	375.4 / 325.2	SO_4^{-2}, Cl
	X	X^2	X	N/A	Field Parameters[5]
P-8 (Upgradient of Wall)	X	X^2	X	8260	Chlorinated VOCs
	X	X^2	X	8260	MTBE, Naphthalene
		X^3	X	200	Fe, Ca, Mg,
		X^3	X	310.1	Alkalinity
			X	200	Na, K,
			X	375.4 / 325.2	SO_4^{-2}, Cl
	X	X^2	X	N/A	Field Parameters[5]

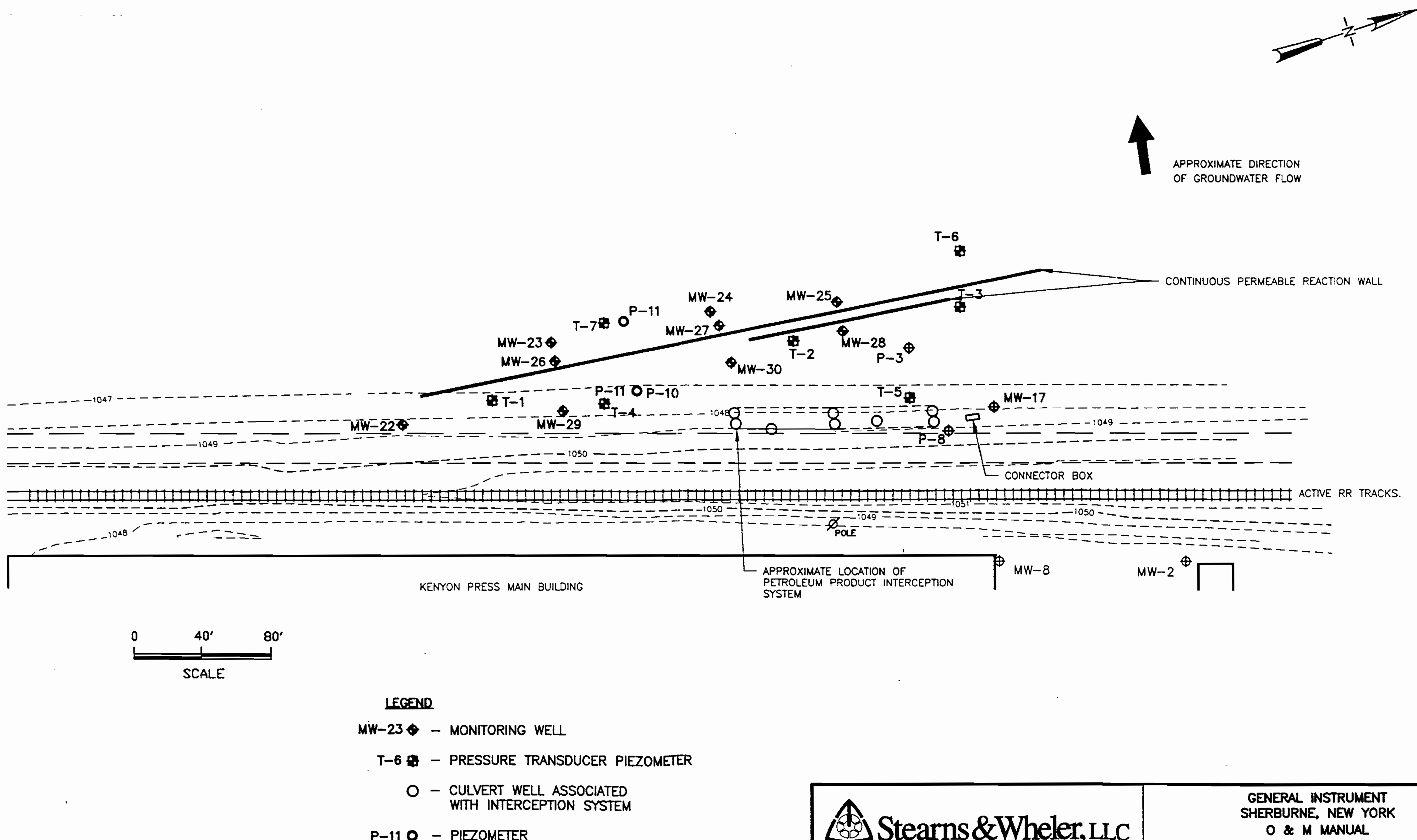
[1] Quarterly Monitoring of for a period of two years only.

[2] Following the initial two years of monitoring, frequency will be reduced to 2 times/year for three years.

[3] Semi-Annual Sampling for inorganics (Fe, Ca, Mg, and Alkalinity) for initial two years of operation.

[4] Annual Sampling for inorganics (Na, K, SO_4, Cl); annual sampling for other inorganics following first two years of operation, annual sampling of VOCs and field parameters following first five years of monitoring.

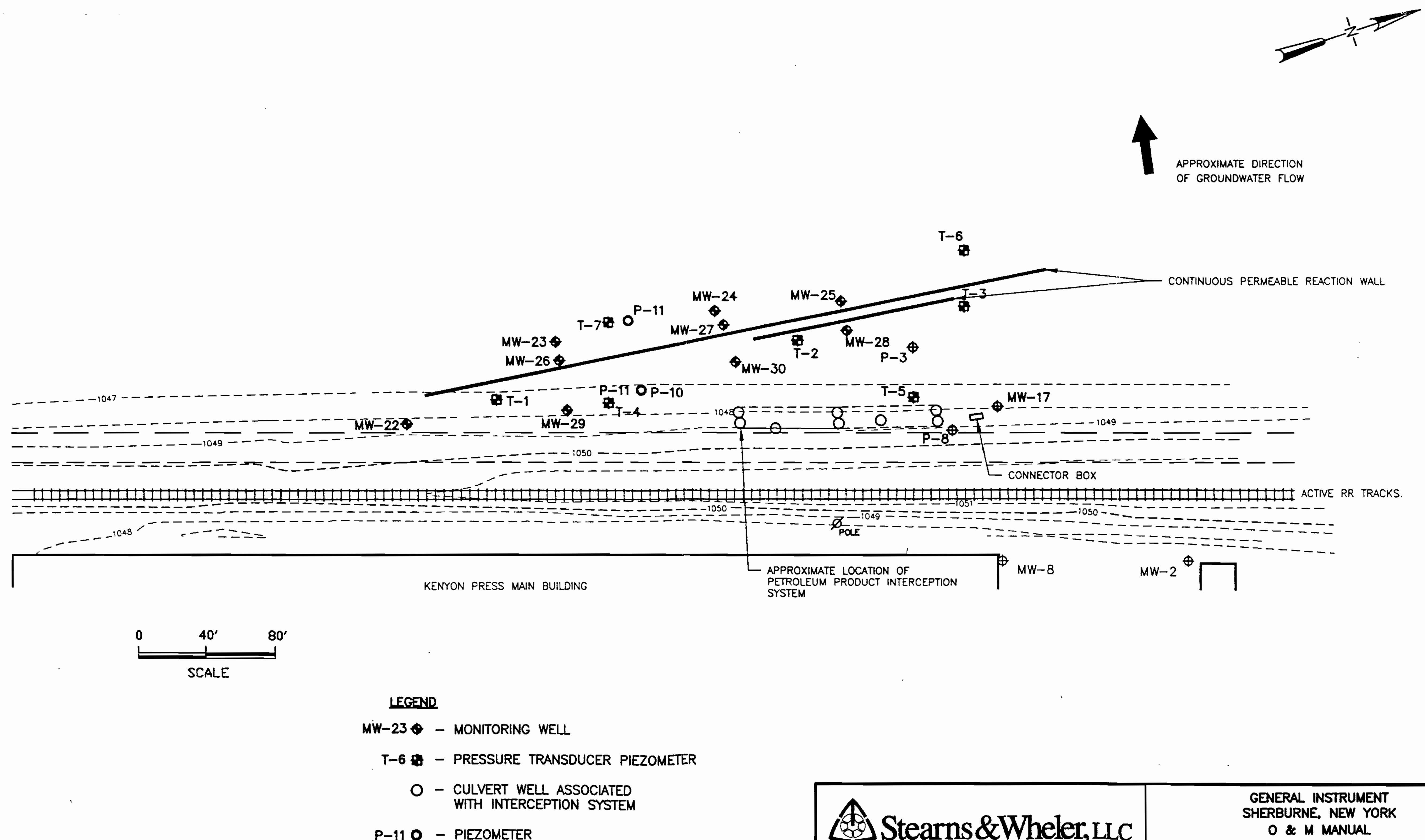
[5] Field parameters include Eh, pH, specific conductivity, temperature, and Dissolved Oxygen.



Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK
DATE: 3/99 JOB NO.: 41587ZA

GENERAL INSTRUMENT
SHERBURNE, NEW YORK
O & M MANUAL

FIGURE 12-1
IN SITU GROUNDWATER TREATMENT SYSTEM



Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK
DATE: 3/99 JOB NO.: 41587ZA

GENERAL INSTRUMENT
SHERBURNE, NEW YORK
O & M MANUAL

FIGURE 12-1
IN SITU GROUNDWATER TREATMENT SYSTEM

APPENDIX A

DAILY FIELD REPORT FORM AND SITE MONITORING CHECKLISTS

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

DAILY FIELD REPORT

REPORT NO.			
DATE		CONTRACT NO.	
JOB			
CONTRACTOR			
PROJECT REPRESENTATIVE			
SIGNATURE			

1. What significant construction work was accomplished today and where? (process unit, street, building, manhole (numbers), sewer, water main, etc. Specifically locate pipeline work by street name, length installed, stationing, or manholes, if applicable.)

2. What manpower and equipment were used today? (total men each contractor, major power equipment, job superintendent)

ALARM RESPONSE RECORD

S&W Services, Inc.

Project Site: ______________________

Job No: ____________

Date Alarm Received: ______________

Time Alarm Received: ______________

Alarm Condition: ______________

Describe Cause of Alarm:

Describe Actions (Repair/Maintenance) required to resolve alarm condition:

Date Restarted: ______________________

Time Restarted: ______________________

System Components Running at Restart:

(Circle One)

MW-18 Recovery Pump	Active	Inactive
RW-1 Recovery Pump	Active	Inactive

(Circle One)

SVE-1	Active	Inactive
SVE-2	Active	Inactive
SVE-3	Active	Inactive
SVE-4	Active	Inactive
SVE-5	Active	Inactive
SVE-6	Active	Inactive

WEEKLY CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System

Job No:

Date:

Time:

Weekly
Report No.:

SYSTEM OPERATING PARAMETERS

Groundwater Treatment System

(Circle One)

MW-18 Recovery Pump	Active	Inactive
RW-1 Recovery Pump	Active	Inactive

SVE System

(Circle One)

SVE-1	Active	Inactive
SVE-2	Active	Inactive
SVE-3	Active	Inactive
SVE-4	Active	Inactive
SVE-5	Active	Inactive
SVE-6	Active	Inactive

GROUNDWATER TREATMENT SYSTEM MONITORING & MAINTENANCE

☐ 1. Check groundwater treatment system air discharges

Air Sampling Location	PID Reading (ppm)
GW-A-1	
GW-A-2	
GW-A-3	

SVE SYSTEM MONITORING AND MAINTENANCE

☐ 1. Check SVE system air discharges

Air Sampling Location	PID Reading (ppm)
SVE-A-7	
SVE-A-8	
SVE-A-9	

MONTHLY CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System
Job No: ______

Date: ______
Time: ______

Monthly
Report No.: ______
Page 1 of ____

OPERATING PARAMETERS

(Circle One)

SVE System	Active	Inactive
GW Pump & Treat System	Active	Inactive
Offsite Treatment System	Active	Inactive

GROUNDWATER TREATMENT SYSTEM MONITORING & MAINTENANCE

☐ 1. Check pressure drop across Bag Filter 1

		Before Filter Change	After Filter Change
Pressure before filter (GW-WP1):		PSIG	PSIG
Pressure after filter (GW-WP2):		PSIG	PSIG
Pressure drop:		PSIG	PSIG
Bag Filter 1 changed (Y/N):			

☐ 2. Check pressure drop across Bag Filter 2

		Before Filter Change	After Filter Change
Pressure before filter (GW-WP3):		PSIG	PSIG
Pressure after filter (GW-WP4):		PSIG	PSIG
P-drop:		PSIG	PSIG
Bag Filter 2 changed (Y/N):			

☐ 3. Air temperature at outlet of Air Stripper (GW-T1): ______ °F

☐ 4. Check pressure drop across liquid phase carbon treatment system vessels

Pressure before units (GW-WP4):	PSIG
Pressure between units (GW-WP5):	PSIG
Pressure after units (GW-WP6):	PSIG
P-drop across first unit	PSIG
P-drop across second unit	PSIG

☐ 5. Check air flow rate (GW-AF1) (check while air stripper is operating):

	Flowrate (cfm)
GW-AF1	

MONTHLY CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System

Date: ____________

Time: ____________

(Pump & Treat System Monitoring & Maintenance cont.)

☐ 6. Check pressure drop across vapor phase carbon treatment system vessels

Pressure before units (GW-VP1):	in. H2O
Pressure between units (GW-VP2):	in. H2O
Pressure after units (GW-VP3):	in. H2O
P-drop across first unit	in. H2O
P-drop across second unit	in. H2O

☐ 7. Check water flow rates

Time: ____________

	Flowrate (gpm)	Total Flow (gal.)
GW-WF1 (inlet MW-8)		
GW-WF2 (inlet RW-1)		
GW-WF3 (recycle)		
GW-WF4 (discharge)		

☐ 8. Obtain samples from effluent (GW-W-6) if System operated this calendar month:

Sampling Location	Required Analysis	EPA Method	Date sent for Analysis	Date Analysis Received
GW-W-6	VOCs	502.2		
	PAHs	8270 B/N		
	Al, Fe, Pb	200		
	TDS, TSS, pH	Not applicable		

☐ 9. Check level of product in product storage drum:

Approximate level in drum: _________gal.

Water present in drum: Yes / No

Drum changed: Yes / No

Final level in drum: _________gal.

☐ 10. Is free product present in equalization tank: Yes / No

If 'Yes', shut down remediation system and notify Stearns & Wheler Project Manager.

MONTHLY CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System

Date: ____________

Time: ____________

SVE SYSTEM MONITORING & MAINTENANCE

☐ 1. Check SVE Well flowrate, temperature, vacuums, pressures, and vapor concentrations:

Air Sampling Location	Flowrate (cfm)	Temperature (°C)	Vacuum (in. H2O)	Pressure (in. H2O)	PID Reading (ppm)
SVE-A-1					
SVE-A-2					
SVE-A-3					
SVE-A-4					
SVE-A-5					
SVE-A-6					
SVE-A-7					
SVE-A-8					
SVE-A-9					

☐ 2. Check vacuum and temperature at inlet of moisture separator:

SVE-V1 [in. H2O]
SVE-T1 [°F]

☐ 3. Check liquid level in moisture separators: ____________ (Interior separator)
____________ (Exterior separator)

☐ 4. Check Differential Pressure across Air Filter:

SVE-DP1 [in. H2O]

☐ 5. Check pressure and temperature at SVE Blower outlet:

SVE-P1 [in. H2O]
SVE-T2 [°F]

☐ 6. Check vapor flowrate at outlet of SVE Blower:

SVE-AF1 [ ]

MONTHLY CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System

Date: ____________

Time: ____________

(SVE System Monitoring & Maintenance cont.)

☐ 7. Check Differential Pressures across Vapor Phase Carbon Treatment units:

Pressure across first unit (SVE-DP2):	in. H2O
Pressure across second unit (SVE-DP3):	in. H2O

☐ 8. Check temperature at vapor phase discharge stack:

SVE-T3 [°F]

☐ 9. Check SVE Blower elapsed time meter:

SVE-TIME1 [hrs.]

SITE MONITORING AND MAINTENANCE

☐ 1. Complete weekly checklists

☐ 2. Record Groundwater Elevations and Product Thicknesses (Biweekly).

Well ID	Depth to Water	Depth to Product	Well ID	Depth to Water	Depth to Product
MW-18			C-1		
MW-8			C-2		
RW-1			C-3		
P-1			C-4		
			C-5		
			C-6		

*GW = groundwater **FP = Free Product

☐ 3. Inspect passive groundwater recovery system (West Field)

Additional pages attached: Yes / No

QUARTERLY CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System

Job No:

Date:

Time:

Quarterly
Report No.:
Page 1 of ____

OPERATING PARAMETERS

(Circle One)

SVE System	Active	Inactive
GW Pump & Treat System	Active	Inactive
Offsite Treatment System	Active	Inactive

GROUNDWATER TREATMENT SYSTEM MONITORING & MAINTENANCE

☐ 1. Collect groundwater samples from monitoring wells

Well ID	Required Analysis	EPA Method	Date Sent for Analysis
MW-17*	VOCs, MTBE, Fe, PAHs	8260, 200, 8270B/N	
MW-20*	VOCs, MTBE, Iron	8260, 200	
MW-21*	VOCs, MTBE, Iron	8260, 200	
MW-22*	VOCs, MTBE, naphthalene	8260	
MW-23*	VOCs, MTBE, naphthalene	8260	
MW-24*	VOCs, MTBE, naphthalene	8260	
MW-25*	VOCs, MTBE, naphthalene	8260	
MW-29*	VOCs, MTBE, naphthalene	8260	
MW-30*	VOCs, MTBE, naphthalene	8260	
P-8*	VOCs, MTBE, naphthalene	8260	

*** Monitor groundwater elevation and field parameters in all wells sampled.**

☐ 2. Record groundwater elevations using pressure transducers

Location	Reading	Location	Reading
T-1		T-5	
T-2		T-6	
T-3		T-7	
T-4			

☐ 3. Collect water samples from groundwater treatment system, if operating

Sample Location	Description	Required Analysis	EPA Method	Date Sent for Analysis
GW-W-3	Stripper Influent	VOCs PAHs	502.2, 8270B/N	
GW-W-4	Stripper Effluent	VOCs PAHs	502.2, 8270B/N	
GW-W-5	Between Carbons	VOCs PAHs	502.2, 8270B/N	
GW-W-6*	System Effluent	VOCs PAHs	502.2, 8270B/N	

* Monthly Sampling Point (see Monthly checklist)

QUARTERLY CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System
Date: ____________
Time: ____________

(Pump & Treat System Monitoring and Maintenance, continued)

☐ 4. Measure product thickness in MW-18 and RW-1 (if Groundwater Pump & Treat System is inactive)

Sample Location	Depth to Product (ft)	Depth to Water (ft)	Product Thickness
MW-18			
RW-1			

SVE SYSTEM MONITORING & MAINTENANCE

☐ 1. Obtain sample from SVE-A-7 for GC analysis

Sample Location	Description	Required Analysis	EPA Method	Date Sent for Analysis	Date Analysis Received
SVE-A-7	Before GAC	Field GC	NA	NA	
SVE-A-8	Between 1° &2°	Field GC	NA	NA	
SVE-A-9	Stack	Field GC	NA	NA	

☐ 2. Record flowrate at SVE-AF-7

	Flowrate (cfm)
SVE-AF-7	

☐ 3. Measure vacuum levels in vacuum monitoring points

VM Location	(in. H2O)
VM-1	
VM-2	
VM-3	
VW-4	
VM-5	
VM-6	
VM-7	
VM-8	
VM-9	
VM-10	

QUARTERLY CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System
Date: ______________
Time: ______________

SITE MONITORING AND MAINTENANCE

☐ 1. Complete Groundwater User Survey
(Conduct visual survey of adjacent properties for new groundwater users)

Notes:

☐ 2. **Complete monthly checklist**

☐ 3. **Complete weekly checklist**

Additional pages attached: Yes / No

SEMIANNUAL CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System
Job No: ____________

Date: ____________
Time: ____________

Semiannual
Report No.: ____

OPERATING PARAMETERS

(Circle One)

SVE System	Active	Inactive
GW Pump & Treat System	Active	Inactive
Offsite Treatment System	Active	Inactive

GROUNDWATER TREATMENT SYSTEM MONITORING & MAINTENANCE

☐ 1. Collect Semi-annual samples from monitoring wells

Sample Location	Required Analysis	EPA Method	Date Sent for Analysis	Date Analysis Received
MW-8 *	VOCs PAHs	502.2, 8270B/N		
MW-18 *	VOCs PAHs	502.2, 8270B/N		
MW-23	Fe, Ca, Mg, Alk.	200, 310.1		
MW-24	Fe, Ca, Mg, Alk.	200, 310.1		
MW-25	Fe, Ca, Mg, Alk.	200, 310.1		
MW-29	Fe, Ca, Mg, Alk.	200, 310.1		
MW-30	Fe, Ca, Mg, Alk.	200, 310.1		
P-8	Fe, Ca, Mg, Alk.	200, 310.1		

* Samples to be collected 2 times/yr after on-site groundwater treatment suspended.
Sample frequency to change to annual basis after SVE operations suspended.

☐ 2. **Complete Quarterly Checklist**

☐ 3. **Complete Monthly Checklist**

☐ 4. **Complete Weekly Checklist**

Additional pages attached: Yes / No

ANNUAL CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System
Job No: ______

Date: ______
Time: ______

Annual Monitoring
Report No.: ____
Page 1 of ____

OPERATING PARAMETERS

(Circle One)

SVE System	Active	Inactive
GW Pump & Treat System	Active	Inactive
Offsite Treatment System	Active	Inactive

GROUNDWATER TREATMENT SYSTEM MONITORING & MAINTENANCE

☐ 1. Collect groundwater treatment system samples

Sample Location	Required Analysis	EPA Method	Date Sent for Analysis
MW-8*	VOCs PAHs	502.2, 8270B/N	
MW-18*	VOCs PAHs	502.2, 8270B/N	
MW-23	Na, K, SO_4^{-2}, Cl	200, 375.4, 325.2	
MW-24	Na, K, SO_4^{-2}, Cl	200, 375.4, 325.2	
MW-25	Na, K, SO_4^{-2}, Cl	200, 375.4, 325.2	
MW-29	Na, K, SO_4^{-2}, Cl	200, 375.4, 325.2	
MW-30	Na, K, SO_4^{-2}, Cl	200, 375.4, 325.2	
P-8	Na, K, SO_4^{-2}, Cl	200, 375.4, 325.2	

*Collect samples on annual basis only when SVE system operation is discontinued

SITE MONITORING AND MAINTENANCE

☐ 1. Complete Groundwater User Survey
Visual survey of adjacent properties for new groundwater users
Notes:

ANNUAL CHECKLIST

Project ID: GIC - Sherburne GW Pump & Treat & SVE System

Job No: ____________

Date: ____________

Groundwater User Survey (continued)

Review of Town Clerk and Water Board Records
Notes:

☐ 2. **Complete Weekly Checklist**

☐ 3. **Complete Monthly Checklist**

☐ 4. **Complete Quarterly Checklist**

☐ 5. **Complete Semiannual Checklist**

Additional pages attached: Yes / No

APPENDIX B

NYSDEC APPLICATION FOR ACCESS TO RECORDS

33-19-1 (11/87)—9d

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

APPLICATION FOR ACCESS TO RECORDS

(See Instructions on Reverse Side)

NUMBER

APPLICANT

• TO THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION:

I hereby apply to inspect the following records under the provisions of the Freedom of Information Law:

____

____

____

____

____

After inspection, should I desire copies of all or part of the records inspected, I will identify the records to be copied and hereby offer to promptly pay the established fees. (Cost of reproduction or 25c per page as applicable). Contact me if cost will exceed $ __________.

Name (Print or type) __________ Telephone No. __________

Attention of: __________

Mailing Address __________

Signature __________ Date __________

RECORDS CUSTODIAN

• TO THE APPLICANT:

—Records Provided

☐ The reproduction costs for the records provided are $ __________

☐ Records have been (partially, fully) provided. (If not fully provided, date when records are expected to be fully provided: __________)

—Records Not Available

☐ Records cannot be found after diligent search

☐ The Department is not the custodian for records indicated

—Records Denied

I hereby certify that access to the records—or part of the records—circled above has been denied to the applicant for the reason(s) checked below:

☐ Specifically exempt by other statute

☐ Unwarranted invasion of personal privacy

☐ Would impair present or imminent contract awards or collective bargaining negotiations

☐ Are examination questions or answers

☐ Are inter-agency or intra-agency materials that are not:

- statistical or factual tabulations or data
- instructions to staff that affect the public
- final agency policy or determinations; or
- external audits,including but not limited to audits performed by the comptroller and the federal government

☐ Are trade secrets

☐ Would endanger the life or safety of any person

☐ Are compiled for law enforcement purposes and which, if disclosed would:

- interfere with law enforcement investigations or judicial proceedings
- deprive a person of the right to a fair trial or impartial adjudication
- identify a confidential source or disclose confidential information relating to a criminal investigation, or
- reveal criminal investigative techniques or procedures, except routine techniques and procedures

☐ Are computer access codes

Identification of records withheld (attach listing if additional space is required) and/or explanation if appropriate:

____

____

____

Records Custodian Signature __________ Title __________ Date __________

APPENDIX C

HEALTH AND SAFETY PLAN

GENERAL HEALTH AND SAFETY POLICY

HEALTH AND SAFETY PLAN PURPOSE AND POLICY

The purpose of this safety plan is to establish personnel protection standards and mandatory safety practices and procedures for the General Instrument site. This plan assigns responsibilities, established standard operating procedures, and provides for contingencies which may arise during installation of the pilot system and subsequent monitoring activities.

The requirements and provisions of this plan are mandatory for all phases of investigation and construction, and all Stearns & Wheler personnel shall abide by it. All safety plans written by the Contractor shall meet the requirements of the Stearns & Wheler safety plan as a minimum. This plan must be reviewed and understood by all personnel who participate in investigation and construction activities. Guidelines of this safety plan will be followed at all times during the investigation of the General Instrument site.

PROJECT OUTLINE

Site Description

The General Instrument site is a former industrial facility that was used for antenna manufacture and research and development. The site was designated a Class 2 inactive hazardous waste site due to the presence of metals and volatile organic compounds in the soil and groundwater. See Figure 1.

Hazardous Substance Identification

Hazardous substances encountered at this site and in the West Field are listed on Tables 1 and 2 of this section.

Scope of Work

Tasks to be performed by Stearns & Wheler at the General Instrument site include the following:

- Installation of monitoring wells.
- Collection of groundwater samples.
- Construction of in situ groundwater treatment system.
- Construction of groundwater/free product collection and treatment system.
- Construction of soil vapor extraction and treatment system.
- Treatment system operation, maintenance, and monitoring.

Project Team Organization

Table 3 describes the responsibilities of all on-site personnel. The names of principal on-site personnel associated with this project are delineated below:

Construction Manager:	Michael E. Howell
Project Manager:	Ilene Herbold
Maintenance Leader:	Nicholas Capozza
Site Safety Officer:	John Conklin

Individuals have been trained in first aid and hazardous waste safety procedures and are experienced with the types of field work to be employed at the site.

SITE SECURITY PLAN

Purpose

The purpose of a site security plan is: (1) to establish procedures and define responsibilities for controlling access to the General Instrument site during investigation and construction activities; and (2) to prevent unauthorized access to the area. The former General Instrument facility is now owned and operated by Kenyon Press. Therefore, several individuals not involved with this project are on the former General Instrument property. Site security and access and continued reference to "the site" in this plan refer specifically to the work areas in the vicinity of the plating building and in the West Field, where continuing activity will occur. Access to these areas will be restricted in accordance with this plan. Site security will be achieved through a combination of organizational measures and physical site controls.

Site Security Organization Responsible Personnel

The individual primarily responsible for day-to-day site security will be the on-site Project Manager. The Project Manager will be responsible for the enforcement of site security and maintaining physical site security controls. The Project Manager will delegate responsibilities, providing support as needed, to implement and enforce the site security plan. All authorized personnel are responsible for assisting the project manager and implementing and enforcing the site security.

Lines of Communication

The Project Manager will be responsible for ensuring that all individuals present at the site are familiar with all aspects and requirements of the site security plan. All concerns of on-site personnel regarding site security shall be brought to the attention of the Project Manager for resolution.

Authorized Personnel

The Project Manager is responsible for designating authorized personnel relative to site access. In general, authorized access will be limited to those individuals whose presence on the site is required in order to conduct work activities.

Non-Authorized Personnel

Non-authorized personnel seeking access to the site will be directed to the Project Manager for access consideration. Access permission will be granted on a case-by-case basis, taking into account safety and the need for access. All safety considerations, such as access, may be restricted to limited areas within the site. All non-authorized personnel must be accompanied by the Project Manager or designee of the Project Manager.

Enforcement of Site Security

All violations of site security shall be brought to the attention of the Project Manager by authorized personnel. The Project Manager will be responsible for stopping the violation and taking measures to prevent reoccurrence. The Project Manager will document all violations. If necessary, the

Sherburne Police Department or County Sheriff will be requested to help enforce site security measures. The Project Manager will determine if involvement of law enforcement personnel is necessary.

PHYSICAL SITE SECURITY

Site Entry/Exit Procedures

All authorized personnel will be required to inform the Project Manager or delegate when they enter or exit the site so that a current record of site access is maintained. A daily sign-in/sign-out sheet may be used to document the time of entry and exit, the purpose of the visit, the location(s) visited within the site, and personnel contacted.

PREVENTIVE HEALTH MONITORING

Stearns & Wheler will utilize the services of a licensed occupational health physician with knowledge and/or experience in the hazards associated with the project to provide the medical examinations and surveillance specified herein. During field activities, the Site Safety Officer of each respective company will be responsible for monitoring temperature-related stress and exposure to potentially hazardous substances.

Medical Examination

Personnel involved in this operation will be provided with medical surveillance prior to participation in on-site operations and at 12-month intervals. The initial medical examination will include a complete medical and work history and a standard occupational physical; examination of all major organ systems; complete blood count with differential (CBC); and a SMAC/23 blood chemistry screen which includes calcium, phosphorus, glucose, uric acid, BUN, creatinine, albumin, SGPT, SGOT, LDH, globulin, A/G ratio, alkaline phosphatase, total protein, total bilirubin, triglyceride, cholesterol, and a creatinine/BUN ratio. Additionally, a pulmonary function test will be performed by trained personnel to record Forced Vital Capacity (FVC) and Forced Expiratory Volume in one second (FEV 1.0). An audiogram and visual acuity measurement, including color perception, will be provided. The medical exam will be performed under the direction of a licensed occupational health physician. A medical certification as to fitness or unfitness for employment on this job, or any restrictions on his/her utilization that may be indicated, will be provided by the physician. This evaluation will be repeated as indicated by substandard performance or evidence of particular stress that is evident by injury or time loss illness on the part of an worker.

Site-Specific Training

The Site Safety Officer will be responsible for developing a site-specific occupational hazard training program and providing initial training to all Stearns & Wheler personnel that are to work at the site. Responsibilities of project personnel are outlined on Table 1. This training will include the following topics:

- Names of personnel responsible for site safety and health.
- Safety, health, and other hazards at the site.
- Proper use of personal protective equipment.
- Work practices by which the employee can minimize risk from hazards.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds at the site.
- Decontamination procedures.

Protective Equipment

This section describes hazardous level classifications. Table 4 shows minimum equipment requirements necessary for the specified protection levels.

Regardless of level of protection, every field team should be equipped with a first aid kit including, but not limited to, bandages, compresses, tape, scissors, disinfectant and eyewash.

Level A

Level A protection should be worn when the highest available level of both respiratory, skin and eye contact protection is needed. While Level A provides the maximum available protection, it does not protect against all possible airborne or splash hazards. For example, suit materials may be rapidly permeable to certain chemicals in high air concentrations or heavy splashes.

Level B

Level B protection should be selected when the highest level of respiratory protection is needed, but cutaneous or percutaneous exposure to the small unprotected areas of the body (i.e., neck and back of head) is unlikely or where concentrations are known within acceptable exposure standards.

Level C

Level C protection should be selected when the type(s) and concentration(s) of respirable material is known or reasonably assumed to be not greater than the protection factors associated with air-purifying respirators; and if exposure to the few unprotected areas of the body (i.e., neck and back of head) is unlikely to cause harm. Continuous monitoring of site and/or individuals should be established to ensure this minimum protection level is still acceptable throughout the exposure.

Level D

Level D is the basic work uniform and should be worn for all site operations. Level D protection should only be selected when sites are positively identified as having no toxic hazards. All protective clothing should meet applicable OSHA standards.

All personal protective equipment used during the course of this field investigation must meet the following applicable OSHA standards:

TYPE OF PROTECTION	REGULATION	SOURCE
Eye and face	29 CFR 1910.133	ANSI Z87.1-1968
Respiratory	29 CFR 1910.134	ANSI Z88.1-1980
Head	29 CFR 1910.135	ANSI Z89.1-1969
Foot	29 CFR 1910.136	ANSI Z41.1-1967

ANSI = American National Standards Institute

Level C respiratory protection consists of wearing a full-face air purifying respirator with compound specific cartridges. Both the respirator and chemical cartridges must be approved by NIOSH and MSHA.

Air purifying respirators cannot be used under the following conditions:

- Oxygen deficiency.
- IDLH concentration.
- High relative humidity.
- Contaminant levels exceed designated maximum use concentrations.

Individuals who use air purifying respirators must wear a respirator which has been successfully fitted to their faces. An improperly fitted respirator provides little respiratory protection. In the event that organic vapor levels exceed the upper limit for Level C protection (20 ppm), all field personnel are to stop work while the Site Safety Officer consults with the Office Health and Safety Representative.

The Site Health and Safety Officer shall approve all personal protective equipment prior to initiating field activities.

Heat Stress

The use of protective equipment may create heat stress. Monitoring of personnel wearing impermeable clothing should commence when the ambient temperature is 70°F or above. Table 5 presents the suggested frequency for such monitoring. Monitoring frequency should increase as the ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a person with a current first aid certification who is trained to recognize heat stress symptoms. For monitoring the body's recuperative abilities to excess heat, one or more of the following techniques will be used. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature (WBGT) index from American Conference of Governmental Industrial Hygienist (ACGIH) TLV Booklet can be used.

To monitor the worker, measure:

1. Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.

    - If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one third and keep the rest period the same.

- If the heart rate exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one third.

2. Oral temperature. Use a clinical thermometer (three minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

- If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one third without changing the rest period.

- If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one third.

- Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

Prevention of Heat Stress

Proper training and preventive measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat-related illness. To avoid heat stress, the following steps should be taken:

1. Adjust work schedules.

   - Modify work/rest schedules according to monitoring requirements.

   - Mandate work slowdowns as needed.

   - Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

2. Provide shelter (air conditioned, if possible) or shaded areas to protect personnel during rest periods.

3. Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature at 50° to 60°F (10° to 16.6°C).

- Provide small disposable cups that hold about 4 ounces (0.1 liter).

- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.

- Urge workers to drink a cup or two every 15 to 20 minutes or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight. Urge workers to salt their food appropriately.

4. Train workers to recognize the symptoms of heat-related illnesses.

Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally labeled frostbite.

1. Hypothermia. Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include shivering, apathy, listlessness, sleepiness and unconsciousness.

2. Frostbite. Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale and solid.

Prevention of Cold-Related Illnesses

1. Educate worker to recognize the symptoms of frostbite and hypothermia.

2. Identify and limit known risk factors:

   - Prohibit phenothiazine use.
   - Identify/warn/limit beta blocker use.

3. Assure the availability of enclosed, heated environment on or adjacent to the site.

4. Assure the availability of dry changes of clothes.

5. Develop capability for temperature recording at the site.

6. Assure the availability of warm drinks.

Monitoring

Start (oral) temperature recording at job site:

1. At the Field Team Leader's discretion when suspicion is based on changes in worker's performance or mental status.

2. At worker's request.

3. As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F or wind-chill less than 30°F with precipitation).

4. As a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 91°F) cannot return to work for 48 hours.

Air Monitoring Requirements

Initial site monitoring will be required utilizing Level D protection. Prior to performing site activities, ambient air monitoring will be performed and site work zones will be established. Periodic monitoring will be performed when:

1. A different type of operation is initiated (e.g., groundwater sampling as opposed to well installation or trench excavation).

2. The weather conditions change.

3. Work begins on a different portion of the site.

4. At 5-foot intervals during well installation and excavating.

A photoionization detector and explosimeter will be the monitoring instruments used on site.

SITE WORK ZONES

To reduce the spread of hazardous materials by workers from the contaminated areas to the clean areas, zones will be delineated at the site where different types of operations will occur. The flow of personnel between the zones should be controlled. The establishment of work zones will help ensure that personnel are properly protected against the hazards present where they are working, work activities and contamination are confined to the appropriate areas, and personnel can be located and evacuated in an emergency.

Exclusion Zone

The exclusion zone is an area where contamination does or could occur. An exclusion zone will be established for all drilling, groundwater, and trench excavation activities. Access into the exclusion zone will be controlled to ensure that personnel entering the areas are wearing the proper protection (e.g., hard hat, gloves, Tyvek[R], respirators). Unprotected onlookers should be located 50 feet upwind of site activities.

Contamination Reduction Zone

This will be established by Site Safety Officer as a buffer zone between the exclusion zone and the support zone. Contamination reduction zone will contain the personnel and equipment decontamination station described below. The contamination reduction zone should always be located upwind of the exclusion zone in an area devoid of air contaminants.

Support Zone

The support zone will include the remaining areas of the job site. Break areas, operational direction and support facilities (to include supplies, equipment storage and maintenance areas) will be located in this area. No equipment or personnel will be permitted to enter the clean zone from the contamination reduction zone without passing through the personnel or equipment decontamination station. Eating, smoking and drinking will be allowed only in this area.

COMMUNICATION PROCEDURES

Because communications are extremely important and, at the same time, may be difficult due to background noise and personal protective equipment, both audio and visual signals have been established for on-site communication. Audio signals include verbal expression and equipment airhorns. Where equipment noise is a problem, radios which are certified and consequently safe for the situation of intended use will be used. Visual signals will be listed below. A telephone line or a mobile phone will be available for off-site communications. The following hand signals will be used:

SIGNAL	MEANING
Hand gripping throat	Cannot breathe
Gripping partner's wrist or both hands around waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	Yes; I'm all right; I understand
Thumbs down	No

ACCIDENT PREVENTION

All field personnel will receive health and safety training prior to the initiation of any site activities. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially-hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, regular meetings shall be held. Attendance at these meetings is mandatory. Attendance records will be maintained by the Site Health and Safety Coordinator. Discussion will include:

1. Tasks to be performed.

2. Time constraints (e.g., rest breaks, cartridge changes).

3. Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals.

4. Work zone boundaries.

5. Emergency procedures.

6. PPE decontamination procedures.

Each site activity may present unique hazards which the field team should be vigilant.

SITE STANDARD OPERATING PROCEDURES

Standard operating procedures are developed and supplied in writing to the Project Manager before site activities commence. Operations will follow the regulations set forth in OSHA 29 CFR 1910 and 1926 as well as the USEPA Standard Operating Safety Guide, Field Standard Operating Procedures, and the National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Manual for Hazardous Waste Site Activities. General standard operating procedures for the site are listed below. As the need for additional standard operating procedures are identified, the standard operating procedures will be developed and submitted to the Site, Health and Safety Officer for approval prior to implementation. General standard operating procedures personnel precautions:

1. Eating, drinking, gum chewing, tobacco, smoking or any practice that increase the probability of hand to mouth transfer and digestion of material is prohibited in any area designated "Contaminated."

2. Hands and face must be thoroughly washed upon leaving the work area.

3. Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

4. No facial hair which interferes with the satisfactory fit of the masked to face seal is allowed on personnel required to wear respirators.

5. Contact with contaminated or suspected contaminated surfaces will be avoided whenever possible. Do not walk through puddles, leachate, discolored surfaces, kneel on the ground, lean, sit, or place equipment on drums, containers, or on the ground.

6. Medicine and alcohol can worsen the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel at hazardous waste operations where the potential for adsorption, inhalation, or ingestion of toxic substances exist, unless specifically approved by a qualified physician. Alcoholic beverages shall be avoided.

7. All personnel must adhere to the information contained in the Site Safety Plan.

8. Contact lens cannot be worn when respirator protection is required when the hazard of a splash exists.

9. Personnel will be made aware of symptoms for toxic chemicals on site and for heat and cold stress.

10. Respirators shall be clean and disinfected after each day's use or more often, if necessary.

11. Prior to donning, respirators will be inspected for worn or deteriorated parts. Emergency respirators and self-contained breathing apparatuses shall be inspected at least once a month and before and after each use.

12. Employees and site personnel shall provide documentation that they have passed a respirator fitness test program. Documents of the respirator fit tests shall be provided to the Site Safety and Health Officer.

GENERAL OPERATING PROCEDURES

1. All personnel going on site must be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.

2. Any required respiratory protective devices and clothing must be worn by all personnel going into areas designated for wearing protective equipment.

3. Personnel on site must use the buddy system when wearing respirator protective equipment. As a minimum, a third person suitably equipped as a safety backup is required during extremely hazardous entries.

4. Visual contact must be maintained between buddies on site and safety personnel. Entry team members should remain close together to assist each other during emergencies.

5. During continual operation, on site workers in the "hot zone" act as safety backup to each other. Personnel in the "support zone" provide emergency assistance.

6. Personnel should practice unfamiliar operations prior to performing the actual procedure.

7. Entrance and exit locations must be designated an "Emergency Escape Routes" delineated.

8. Personnel and equipment in the contaminated area should be minimized and consistent with effective site operations.

9. Wind indicators visible to all personnel should be strategically located throughout the site.

10. Procedures for leaving a contaminated area must be planned and implemented prior to going on site. Work areas and decontamination procedures have been established and are based on expected site conditions.

11. Frequent and regular inspections of site operations will be conducted to insure compliance with the Site Health and Safety Plan. If any changes in operation occur, the Site Health and Safety Plan must be modified to reflect the change. The Site Health and Safety Officer is responsible for implementing changes to the Site Health and Safety Plan.

EXCAVATION ACTIVITIES PROCEDURES

Activities to be conducted by personnel in an excavation area will be performed in accordance with 29 CFR Part 1926, Subpart P excavations. The safety measures include, but are not limited to:

1. Removal or support of surface encumbrances.

2. Location of utilities and other underground installations.

3. Provisions of access and egress means.

4. Prevention of exposure to falling loads.

5. Establishment of a warning system for mobile equipment.

6. Provision of emergency rescue equipment.

7. Protection from hazards associated with water accumulation.

8. Provisions for the stability of adjacent structures.

9. Provisions of fall protection.

10. Protection of loose soil or rock.

Confined Space

Contractor is required to comply with Title 29 of the Code of Federal Regulations (CFR) Part 1910-146 and know all appropriate procedures and precautions to enter and exit confined spaces. Contractor shall develop and incorporate a confined space evaluation program; permit system; emergency procedures; and appropriate work practices, controls, and personal protective equipment in accordance with 29 CFR 1910-146 to properly enter a confined space.

Drilling and Construction Activities

Prior to any drilling or construction activity, efforts should be made to determine whether underground installations (i.e., telephone cables, sewer lines, fuel pipes, electrical lines, etc.) will be encountered and, if so, where these installations are located. The Field Team Leader must coordinate with the site owner or utility companies to locate underground utilities prior to performing drilling or construction activities. The Field Team Leader or Site Safety Officer will provide constant on-site observation of all subcontractors to encourage that they meet the health and safety requirements. If deficiencies are noted, work will be stopped and corrective action will be taken (e.g., retrain, purchase additional safety equipment). Reports of health and safety deficiencies and the correction action taken will be forwarded to the Project Manager. Periodic air monitoring will be performed by the Site Safety Officer to verify that proper personal protection is being utilized.

Sampling

The Site Safety Officer will ensure that entry into any exclusion zone is controlled to make certain that personnel entering this zone don the proper protective clothing. Periodic air monitoring will be conducted to determine whether atmospheric chemical conditions have changed from the initial air characterization. The Safety Officer will post the emergency phone numbers (phone numbers of the physicians, hospitals, ambulances, etc.) in a conspicuous place. The field team will be trained in emergency contingencies. Constant monitoring of field activities will be performed to verify compliance with the safety plan.

CONTINGENCY PLAN

Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

1. Any member of the field crew is involved in an accident or experiences any adverse effects of symptoms of exposure while on site.

2. A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

General emergency procedures and specific procedures for personal injury and chemical exposures are described in the Health and Safety Plan.

EVACUATION ROUTES AND PROCEDURES

All site personnel will be evacuated from the exclusion and contamination reduction zones if the Site Health and Safety Officer decides that their personal safety is in danger. If evacuation is necessary, personnel will be notified and the following procedures will apply:

- Evacuation will take place through normal contamination reduction corridor and the normal decontamination procedures will be followed.

- In the event that use of the normal contamination reduction corridor is deemed unsafe, evacuation will be through a designated emergency exit. Decontamination team personnel will proceed to the alternate exit immediately upon being advised by the Site Health and Safety Officer.

- Immediately upon completion of decontamination procedures, personnel will proceed to the assembly area adjacent to Project Manager's project coordination point.

- Personnel not requiring decontamination will proceed immediately to that area.

- Upon arriving to the Project Manager's coordination meeting, personnel must check in and remain in that area until advised otherwise.

- The buddy system should be followed throughout the evacuation procedures.

- First aid technicians must identify themselves to the Project Manager or the Site Health and Safety Officer upon arrival.

Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure, the procedures outlined below should be followed:

1. Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via two-way radio or hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.

2. Precautions should be taken to avoid exposure of other individuals to the chemical.

3. If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.

4. If the chemical has contacted the skin, the skin should be washed with copious amounts of water.

5. In case of eye contact, an emergency eyewash should be used. Eyes should be washed for at least 15 minutes.

6. All chemical exposure incidents must be reported in writing to the Office Health and Safety Representative. The Site Safety Officer or Field Team Leader is responsible for completing the accident report.

Personal Injury

In case of personal injury at the site, the following procedure should be followed:

1. Another team member (buddy) should signal the Field Team Leader (via two-way radio or hand signals) that an injury has occurred.

2. A field team member trained in first aid can administer treatment of an injured worker.

3. The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.

4. For less severe cases, the individual can be taken to the site dispensary (i.e., engineer's trailer office, plant infirmary, or field worker's vehicle equipped with first aid kit).

5. The Field Team Leader or Site Safety Officer is responsible for making certain that an accident report form is completed. This form is to be submitted to the Office Health and Safety Representative. Follow-up action should be taken to correct the situation that caused the accident.

Fire or Explosion

1. Notify paramedics and/or fire department as necessary.

2. Signal the evacuation procedure previously outlined and implement the entire procedure.

3. Isolate the area.

4. Stay upwind of any fire.

5. Keep area surrounding the problem source clear after the incident occurs.

6. Complete accident report form and distribute to appropriate personnel.

Smoking, eating, and the use of contact lenses or cosmetics will not be permitted on site.

Evacuation

1. The Field Team Leader will initiate evacuation procedures by signaling (via two-way radio or whistle) to leave the site.

2. All personnel in the work area should evacuate the area and meet in the common designated area.

3. All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts of missing persons determined immediately.

4. Further instruction will then be given by the Field Team Leader.

DECONTAMINATION PROCEDURES

Personnel

To prevent harmful materials from being transferred into clean areas or from exposing unprotected workers, all field personnel exiting an area of potential contamination will undergo decontamination. The extent of decontamination depends on a number of factors, the most important being the type and concentration of the contaminant involved.

Soft-bristled scrub brushes and long handle brushes will be used to remove contaminants from personnel. Buckets of water or garden sprayers will be used for rinsing. Large plastic garbage bags will be used to store contaminated clothing (gloves, etc.) and equipment. Metal or plastic cans or drums will be used to store contaminated liquids. Washing and rinsing are done in combination with a sequential doffing of clothing starting at the first decon station with the most heavily contaminated article and progressing to the last station with the least contaminated article. Decontamination will be required for Level D activities. An exclusion zone will be established for drilling and Level C activities to prevent personnel from entering these areas without proper safety equipment (e.g., hard hat, steel-toe boots, respirators, etc.).

Decontamination procedures will be divided into 13 stations. Level C decontamination at all sites will consist of the following. Figures 3 and 4 illustrate typical Levels C and D and PPE decontamination steps.

Station 1: Segregated Equipment Drop

Deposit equipment used on the site (tools, sampling devices and containers, monitoring instruments, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination. Necessary equipment includes:

- Containers of various sizes
- Plastic liners
- Plastic drop cloths

Section 2: Suit/Safety Boot and Outer Glove Wash

Thoroughly wash chemically resistant suit, safety boots and outer gloves. Scrub with long handle, soft bristle scrub brush and copious amounts of alconox/water solution. Necessary equipment includes:

- Container (30 gallon)
- Alconox/water solution
- Long handle, soft bristle scrub brushes
- Isopropanol

Station 3: Suit/Safety Boot and Outer Glove Rinse

Rinse off alconox/water solution using copious amounts of water. Repeat as many times as necessary. Necessary equipment includes:

- Container (30 gallon)
- Spray unit
- Water
- Long handle, soft bristle scrub brushes

Station 4: Outer Gloves Removal

Remove the outer gloves and deposit in individually marked plastic bags. Necessary equipment includes:

- Plastic bag
- Bench or stool

Station 5: Canister or Mask Change

If a worker leaves the exclusion zone to change a canister (or mask), this is the last step in the decontamination procedures. The worker's canister is exchanged, new outer glove donned, and joints taped. Worker returns to duty. Otherwise the worker proceeds to Station 6. Necessary equipment includes:

- Canister (or mask)
- Tape
- Boot covers
- Gloves

Station 6: Safety Boot Removal

Remove safety boots and deposit in individually marked plastic bags. Necessary equipment includes:

- Container (30 gallon)
- Plastic liners
- Bench or stool

Station 7: Removal of Chemically Resistant Suit

With assistance of helper, remove suit. Deposit in container with plastic liner. Necessary equipment includes:

- Container (30 gallon)
- Chair
- Plastic liner

Station 8: Inner Glove Wash

Wash inner gloves with alconox/water solution that will not harm skin. Repeat as many times as necessary. Necessary equipment includes:

- Alconox/water solution
- Container
- Long handle, soft bristle brushes

Station 9: Inner Glove Rinse

Rinse inner gloves with water. Repeat as many times as necessary. Necessary equipment includes:

- Water
- Basin
- Small table

Station 10: Respirator Removal

Remove facepiece. Avoid touching face. Wash respirator in clean, sanitized solution. Allow to dry and deposit facepiece in plastic bag. Store in clean area. Necessary equipment includes:

- Plastic bags
- Sanitizing solution
- Cotton

Station 11: Inner Glove Removal

Remove inner gloves and deposit in container with plastic liner. Necessary equipment includes:

- Container
- Plastic liners

Station 12: Field Wash

Wash hands and face. Necessary equipment includes:

- Water
- Soap
- Tables
- Wash basins or buckets
- Clean towels

Station 13: Redress

If re-entering exclusion zone, put on clean field clothes (e.g., Tyvek^R , gloves, etc. Necessary equipment includes:

- Table
- Chairs
- Clothing

Modification can be made to the 13-station decontamination process depending upon the extent of contamination. The effectiveness of the decontamination process can be checked visually or by the use of a photoionization detector.

Personnel breaking for lunch will be required to wash hands and face prior to eating. Personnel should shower upon return to their hotels at the end of the work day.

Equipment

Excavating and trench construction equipment will be steam cleaned and decontaminated prior to moving to the site. Equipment will be steam cleaned to remove gross contamination and air dried before use.

All sampling equipment will be decontaminated prior to use at each sampling location. The methodology used to decontaminate sampling equipment is similar to that used for downhole equipment; the exception being that the first step, steam cleaning, is not necessary for decontaminating sampling equipment.

ELECTRICAL LOCKOUT/TAG-OUT PROCEDURE

The purpose of this procedure is to protect individuals from electrical shock, injury from the unexpected movement of equipment, and other potential injuries from electrically driven equipment. For the purpose of this procedure, "lockout" means the de-energizing of electrically driven equipment or electric circuits by padlocking the line switch, switchgear, or circuit breakers.

It is the responsibility of all site workers to follow the procedures outlined herein whenever performing inspection, maintenance, or other work on electric equipment of 400 volts or above. Any equipment utilizing a lower voltage should be locked out if it is physically possible to do so safely. It is the responsibility of Stearns & Wheler/S&W Services, Inc. project managers, site supervisors, and other supervisors to ensure employees are trained in these procedures, and that the procedures are followed. At sites where a Hot Work Permit System is in place, the supervisor issuing the Hot Work Permit will make certain of compliance with the lockout/tag-out procedure before issuing the permit.

Lockout Procedures

1. Locate all disconnects and combination motor starters leading to electrical equipment that must be turned off. Disconnects are often located at the main power meter at the site boundaries at smaller sites. Combination motor starters are the electrical cubicles located either in a central motor control center, or in a field-mounted starter unit, and contain fuses/circuit breakers and the motor starter.

2. Turn all disconnects or starters to the off position and lock with a padlock, or a lockplate to accommodate more than one lock, if more than one person is involved with the operation and/or maintenance of the equipment. The equipment must be checked to verify that it has been de-energized by either checking the voltage on the load side of the disconnect with a meter or by attempting to start the equipment.

3. Hang a durable weatherproofed "Do Not Operate" tag on the handle of disconnect or starter with the employee name, date, company name, and any other necessary information. All tags must utilize non-reusable ties having at least a 50-pound strength. Hang similar tags on pushbutton stations at the equipment being maintained.

4. Only the person placing the lock on the locked-out equipment shall remove the lock once maintenance is completed. Before the lock is removed, all work must be completed. and the equipment must be ready to be operated safely. The approval of the Site Supervisor or Project Manager is required to remove another person's lock.

Safety equipment must be available and must be used when working on motor control centers or combination motor starters. This equipment includes:

1. Safety glasses
2. Rubber-soled shoes or work boots that are in dry, dust-free condition
3. Appropriate multi-meter
4. Warning tags ("Do Not Operate" tags)
5. Fuse pullers (if applicable).

During the performance of maintenance of locked-out electrical equipment, the following procedures must be followed:

1. Fuses must be removed with approved fuse pullers.

2. When working on any equipment that can be locked out, if possible, the equipment will be locked out. However, if the control panel, lighting panel, or other switching device has no provision for locks, a warning sign shall be hung at the panel and at the field start-stop station.

3. Whenever possible, two people will be present when a motor control center or combination motor starter is opened.

4. All employees shall be trained in the provisions of this procedure as part of their initial training. This training will be repeated periodically whenever there is a job change or a variation in the process, and annually to ensure that the procedures are followed.

5. Inspections of the implementation of Stearns & Wheler/S&W Services Inc. lockout/tag-out procedures and training documentation will be reviewed by the Health & Safety Coordinators no less than once per year.

Hearing Conservation Policy

The Hearing Conservation program has been established to monitor, protect, and inform Stearns & Wheler/S&W Services, Inc. personnel of the potential hazards associated with the overexposure to noise both at work and at home. The policies outlined meet the requirements of 29 CFR 1910.95.

Definitions

Sound:	Produced when a sound source sets the air nearest to it in motion. Sound travels in air at a speed of 340 meters per second.
Frequency (Hz):	The number of vibrations per second, measured in units of hertz (Hz).
Decibel (dB):	The unit measurement of sound levels. Instruments used to measure sound usually measure the "A weighted sound level" in nits referred as dB(A).

Standard Threshold Shift (STS):	The average shift or change in either ear of 10 dB or more at 2000, 3000, or 4000 Hz.

Stearns & Wheler will provide hearing protection to employees who:

1. Are required to work in areas containing sound levels of 85-90 decibels or higher, as determined by sound level monitoring (dBA).

2. Work in or around operating vacuum extraction units and pumps.

3. Request the use of hearing protection.

Each employee is ultimately responsible to have available and wear the hearing protection provided to them in all operating units, posted areas, and when instructed by the Health and Safety Coordinator or supervisor. Essentially, employees should have access to hearing protection at all times while working on a job site.

Supervisors must identify and post areas where hearing protection is required based on the results of sound level monitoring. In addition, supervisors must document that all personnel, including subcontractors, have been informed of the specific areas which require hearing protection and ensure that personnel have access to hearing protection. The Health and Safety Coordinator should be informed of problem areas and/or consulted for additional information.

Sound Level Monitoring

Whenever the possibility exists of an employee being exposed to potentially loud or hazardous noises, supervisors must either assume that the area/task is a hazard and require hearing protection or measure sound levels with instrumentation. If a sound level indicator is used, it must be calibrated both before and after use, and all information must be noted in the project log.

Permissible Noise Exposures

29 CFR 1910.950 Section (a)(2) outlines the following permissible noise exposure limits based upon an eight-hour work day:

DURATION PER DAY, HOURS	SOUND LEVEL DBA SLOW RESPONSE
8	85-90
6	92
4	95
3	97
2	100
1.5	102
1	105
1	105
0.5	110
0.25 or less	115

Note: When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect, rather than the individual effect, should be considered.

Hearing protection must be worn by all personnel exposed to 85-90 dB or greater during an eight-hour time-weighted average (TWA) and by employees who have incurred standard threshold shifts since their susceptibility to noise has been demonstrated.

There are three main types of hearing protection available to employees:

1. **Disposable Plugs.** Disposable plugs are placed inside the ear canal to block out noise. They are commonly made of expandable foam. One size fits almost everyone and is designed to be used once and then thrown away.

2. **Reusable Plugs.** Reusable plugs are preformed to fit the ear. They are usually made of flexible rubber or silicon. They may be flanged or cone shaped. The plugs must be cleaned after each use following the manufacturer's instructions.

3. **Muffs.** Ear muffs resemble stereo headphones. The soft plastic cushions are filled with either a foam or a liquid. The fit should be checked carefully to ensure a tight fit around the outside of the ear.

Training

Employees with the potential to be exposed to a TWA of 85-90 dB and above will be trained regarding hearing conservation upon initial employment and again annually. The effects of noise, the types of hearing protection; selection, fit and care of protectors; the purpose and procedures of audiometric testing; and Stearns & Wheler/S&W Services, Inc.'s Hearing Conservation Policy will be discussed.

APPENDIX D

GROUNDWATER TREATMENT SYSTEM EFFLUENT PERMIT

X

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

uring the period beginning Start of remedial system operation

and lasting until Termination of groundwater extraction activities

the discharges from the treatment facility to Potash Creek shall be limited and monitored by the operator as specified below:

Outfall Number & Effluent Parameter Type	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample
001 - Discharge from groundwater and soil vapor extraction treatment systems					
Flow	Monitor	Monitor	GPM	Continuous	Meter
pH (Range)	6.5 - 8.5		SU	Weekly	Grab
Solids, Total Suspended	Monitor	50	mg/l	Weekly	Grab
Solids, Total Dissolved	Monitor	500	mg/l	Weekly	Grab
Temperature	Monitor	Monitor	deg F	Weekly	Grab
Aluminum, Total	Monitor	10	mg/l	Weekly	Grab
Copper, Total *	Monitor	0.2	mg/l	Weekly	Grab
Iron, Total	Monitor	0.3	mg/l	Weekly	Grab
Lead, Total	Monitor	0.025	mg/l	Weekly	Grab
Vanadium, Total *	Monitor	0.14	mg/l	Weekly	Grab
Zinc, Total *	Monitor	0.3	mg/l	Weekly	Grab
Vinyl Chloride	Monitor	0.002	mg/l	Weekly	Grab
Methylene Chloride	Monitor	0.005	mg/l	Weekly	Grab
1,1-Dichloroethane	Monitor	0.005	mg/l	Weekly	Grab
cis-1,2-Dichloroethene	Monitor	0.005	mg/l	Weekly	Grab
trans-1,2-Dichloroethene	Monitor	0.005	mg/l	Weekly	Grab
1,1,1-Trichloroethane	Monitor	0.005	mg/l	Weekly	Grab
Trichloroethene	Monitor	0.005	mg/l	Weekly	Grab
Tetrachloroethene	Monitor	0.005	mg/l	Weekly	Grab
Benzene	Monitor	0.0007	mg/l	Weekly	Grab
Toluene	Monitor	0.005	mg/l	Weekly	Grab
Xylenes, total	Monitor	0.005	mg/l	Weekly	Grab
Phenols, total *	Monitor	0.008	mg/l	Weekly	Grab
Naphthalene	Monitor	0.01	mg/l	Weekly	Grab
Phenanthrene	Monitor	0.05	mg/l	Weekly	Grab
Fluorene	Monitor	0.05	mg/l	Weekly	Grab
Anthracene	Monitor	0.05	mg/l	Weekly	Grab
Acenaphthalene	Monitor	0.05	mg/l	Weekly	Grab
Fluoranthene	Monitor	0.05	mg/l	Weekly	Grab
Pyrene	Monitor	0.05	mg/l	Weekly	Grab
Chrysene	Monitor	0.05	mg/l	Weekly	Grab

* Subsequently removed from Monitoring Requirements.

Special Conditions:

(1) Discharge is not authorized until such time as an engineering submission showing the method of treatment is approved by the Department. The discharge rate may not exceed the effective treatment system capacity. All monitoring data, engineering submissions and modification requests must be submitted to the followi DHWR contact person: ______________________.

(2) Only site generated wastewater is authorized for treatment and discharge.

(3) Authorization to discharge is valid only for the period noted above but may be renewed if appropriate. A request for renewal must be received 6 months prior to the expiration date to allow for a review of monitoring data and reassessment of monitoring requirements.

(4) Both concentration (mg/l or µg/l) and mass loadings (lbs/day) must be reported to the Department for all parameters except Flow, pH, and Temperature.

(5) Samples and measurements, to comply with the monitoring requirements specified above, shall be taken from the effluent side of the groundwater extraction/treatment system prior to discharge to Potash Creek, Class C.

(6) The minimum measurement frequency for all the parameters (except flow) shall be MONTHLY following a period of 24 consecutive WEEKLY sampling events showing no exceedances of the stated discharge limitations. If a discharge limitation for any parameter is exceeded the measurement frequency for all parameters shall again be WEEKLY, until a period of 8 consecutive sampling events shows no exceedances at which point MONTHLY monitoring may resume.

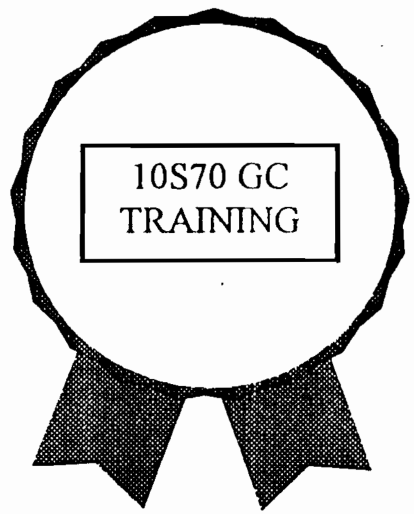
APPENDIX E

QUALIFICATIONS OF GAS CHROMATOGRAPH OPERATORS

PHOTOVAC MONITORING INSTRUMENTS

This is to certify that the undernamed has completed an eight hour training course on the calibration and operation of the 10S70 portable Gas Chromatograph, conducted by Photovac Monitoring Instruments.

Scott L. Graham
Stearns & Wheler



Joyce D. Austin, Supervisor

February 26, 1996

Kimberly A. Hayden, Trainer

PHOTOVAC MONITORING INSTRUMENTS

This is to certify that the undernamed has completed an eight hour training course on the calibration and operation of the 10S70 portable Gas Chromatograph, conducted by Photovac Monitoring Instruments.

Michael J. Whiffen
Stearns & Wheler

10S70 GC
TRAINING

Joyce D. Austin, Supervisor

February 26, 1996

Kimberly A. Hayden, Trainer

PHOTOVAC MONITORING INSTRUMENTS

This is to certify that the undernamed has completed an eight hour training course on the calibration and operation of the 10S70 portable Gas Chromatograph, conducted by Photovac Monitoring Instruments.

Cathy E. Ferguson
Stearns & Wheler

Joyce D. Austin, Supervisor

February 26, 1996

Kimberly A. Hayden, Trainer

Template of Effluent Sample Report

General Instrument Sherburne Site (DHWR Site No. 7-09-010)

On-Site Groundwater Treatment System

Monthly Water Effluent Monitoring Report, GW-W-6

Effluent Parameter	Discharge Limit	Unit	EPA Method	Sampling Date			
Flow	Monitor	gpm					
pH	6.5 - 8.5	SU	150.1				
TSS	50	mg/L	160.2				
TDS	500	mg/L	160.1				
Temperature	Monitor	°F					
Aluminum, Total	10	mg/L	200.7				
Iron, Total	0.3	mg/L	200.7				
Lead, Total	0.025	mg/L	200.7				
Vinyl Chloride	2	µg/L	502.2				
Methylene Chloride	5	µg/L	502.2				
1,1-Dichloroethane	5	µg/L	502.2				
cis-1,2-Dichloroethene	5	µg/L	502.2				
trans-1,2-Dichloroethene	5	µg/L	502.2				
1,1,1-Trichloroethane	5	µg/L	502.2				
Trichloroethene	5	µg/L	502.2				
Tetrachloroethene	5	µg/L	502.2				
Benzene	0.7	µg/L	502.2				
Toluene	5	µg/L	502.2				
Xylenes, Total	5	µg/L	502.2				
Naphthalene	10	µg/L	8270				
Phenanthrene	50	µg/L	8270				
Fluorene	50	µg/L	8270				
Anthracene	50	µg/L	8270				
Acenaphthalene	50	µg/L	8270				
Fluoranthene	50	µg/L	8270				
Pyrene	50	µg/L	8270				
Chrysene	50	µg/L	8270				