S&W
Redevelopment LLC

Report

Operations, Monitoring, & Maintenance Plan Buildings 1231 &1253 NYSDEC Site #633046 Verona Research Facility Verona, New York

October 2001

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OPERATIONS, MONITORING, AND MAINTENENANCE PLAN

BUILDINGS 1231 & 1253

NYSDEC SITE #633046

VERONA RESEARCH FACILITY

TOWN OF VERONA, NEW YORK

Prepared for

ROME LABORATORY REASEARCH FACILITY

Prepared by

S&W Redevelopment, LLC
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October 2001

Project No 10105

TABLE OF CONTENTS

		Page
SECTION 1 - INTRODUCTION		1
1.1	Background	1
SECTION 2 – SITE CHARACTERISTICS		3
2.1	Physical Setting	3
2.2	Site Geology	4
2.3	Site Hydrogeology	4
2.4	Groundwater Use	5
SECTION 3 - SITE REMEDIAL ACTION		5
3.1	Oxidation - Reduction	6
3.2	Biologically Mediated Reactions	7
3.3	Summary	8
SECTION 4 – MONITORING PLAN		8
4.1	Monitoring Locations	8
4.2	Sampling and Analysis Plan	12
4.3	Monitoring Well Inspection and Maintenance	13
SECTION 5 - REPORTING		13

LIST OF APPENDICES

Appendix	
A	Post-PSA Semi-Annual Monitoring Results
B	Site Boring Logs
C	Well Decommissioning Procedures
D	Field Sampling and Analysis Plan
E	Site Health and Safety Plan
F	Facility Spill Prevention Control and Countermeasure Plan
G	NYSDEC Correspondence – January 30, 2001

LIST OF TABLES

Table No.	
1-1	Historical Data – PSA Sampling Results

LIST OF FIGURES

Figure No.	
1-1	Site Location
1-2	Previous Investigation, 1231
1-3	Previous Investigation, 1253
2-1	Shallow Groundwater Contours
4-1	Building 1231 Well Network
4-2	Building 1253 Well Network

OPERATIONS, MONITORING, AND MAINTENANCE PLAN
VERONA RESEARCH FACILITY
BUILDINGS 1231 & 1253
NYSDEC #6-33-046

SECTION 1 – INTRODUCTION

This Operations, Monitoring, and Maintenance (OM&M) Plan has been prepared to govern the implementation of remedial activities at the Verona Research Facility (VRF) Buildings 1231 and 1253 (NYSDEC Site I.D. #6-33-046). Some form of remedial action is warranted in response to the detection of several chlorinated aliphatic compounds in groundwater at those buildings. Investigations regarding the nature of the detected compounds have indicated that they are being naturally degraded, or attenuated, as a result of natural chemical reactions that occur within the groundwater. These reactions are significant enough to rely on natural attenuation monitoring of groundwater as the site remedy. Groundwater will be sampled on an ongoing basis, to demonstrate that detected constituents continue to be degraded. This plan sets forth the sampling procedures, sampling schedule, and analytical and reporting requirements for the natural attenuation monitoring program. The OM&M Plan also lays out the data evaluation criteria that will be used to verify that natural attenuation continues to be an effective site remedy.

1.1 – BACKGROUND

The Rome Laboratory Verona Research Facility (formerly the Griffiss Air Force Base Verona Test Annex) was founded in the early 1950s on 513 acres of former farmland adjacent to Germany Road in the Town of Verona, New York (Figure 1-1). The site consists of approximately 35 buildings, many of them former electronics laboratories, constructed along a 1-mile long road in the eastern section of the property. The facility was used for electronic research and development since 1952.

The laboratory buildings were heated with individual fuel oil-fired boilers. Each of the boilers is connected to individual fuel oil tanks. As a result of a heating oil replacement project several years ago, a groundwater investigation was completed to determine if the previous tanks had leaked (Parsons Engineering Science, 1995). Four groundwater monitoring wells were installed at each of several buildings being investigated (Buildings 1203, 1225, 1231, 1245, 1253, and 1277). The wells were installed to monitor the shallow groundwater system in proximity to the tanks.

Groundwater sampling results indicated that the tanks had not leaked, as there was fairly little indication of organic compounds associated with fuel oil. However, a number of chlorinated aliphatic compounds were detected which indicated the presence of solvents, which are known to have been used on site to clean electronic components. Due to the unexpected occurrence of organic compounds not associated with fuel oil, the scope and focus of the investigation was modified to include an interpretation of the chlorinated aliphatic compounds at the site.

In 1996 a Preliminary Site Assessment (PSA) was completed by Stearns & Wheler to investigate the nature and extent of the identified compounds at the VRF. The PSA included the installation of a total of 13 additional groundwater monitoring wells and 3 deep soil borings, at four of the original 6 buildings: 1203, 1231, 1245, and 1253. The new wells were sampled along with the wells previously installed at each of the buildings, to confirm or refute the previous investigation findings.

Groundwater analytical results from the PSA are summarized on Table 1-1, and confirmed the presence of chlorinated compounds, including cis-1,2-dischloroethene; trans-1,2 dichloroethene; and tretrachloroethene at buildings 1231 and 1253. Groundwater samples from the other two buildings were generally free of these compounds, except for a trace (below standards) amount of cis-1,2-dichloroethene at Building 1245. Figures 1-2 and 1-3 show the locations of monitoring wells at Buildings 1231 and 1253, respectively, from which previous groundwater samples were collected.

The PSA indicated that further assessment would be needed at Buildings 1231 and 1253, to determine a proper course of corrective action. Accordingly, a two-year monitoring program was implemented in 1999. Two monitoring wells (MW-001 and MW-1231C) were sampled at Building 1231 semi-annually, and two monitoring wells (MW-002 and MW-004) were sampled at Building 1253 semi-annually, for a total of four sampling events over the 2-year period. In addition, surface water samples were collected at Brandy Brook, which is the local area downgradient of the sites where shallow groundwater is expected to discharge.

The 2-year monitoring program was completed in September 2000. Monitoring summary reports completed as part of the 2-year sampling program are included as Appendix A. The results of that program, together with data collected from the sites since 1996, were reviewed to determine an appropriate groundwater remedy. It was readily apparent that the detected compounds were not present in the brook. This in itself indicated that impacts from the site were

Table 1-1
Historical Data - PSA Sampling Results (1997)
OM&M Plan
Verona Research Facility
Buildings 1231 & 1253

BUILDING 1203

Analyte (ug/L)	Class GA Std	MW-001	MW-002	MW-003	MW-004	MW-1203A	MW-1203B
Acetone	50G	12 J	7 J	14 J			
Benzene	1					1 J	
Dichlorodifluoromethane	5			*13 **			

BUILDING 1231

Analyte (ug/L)	Class GA Std	MW-001	MW-002	MW-003	MW-004	MW-1231A	MW-1231C	MW-1231D
Methylene chloride	5		0.8 J					1 J
Acetone	50G	44 J						
cis-1,2-dichloroethene	5	*26**					2 J	
Tetrachloroethene	5						*57 **	
Chlorobenzene	5	*290 **						
1,4-dichlorobenzene	4.7	*6 J **						

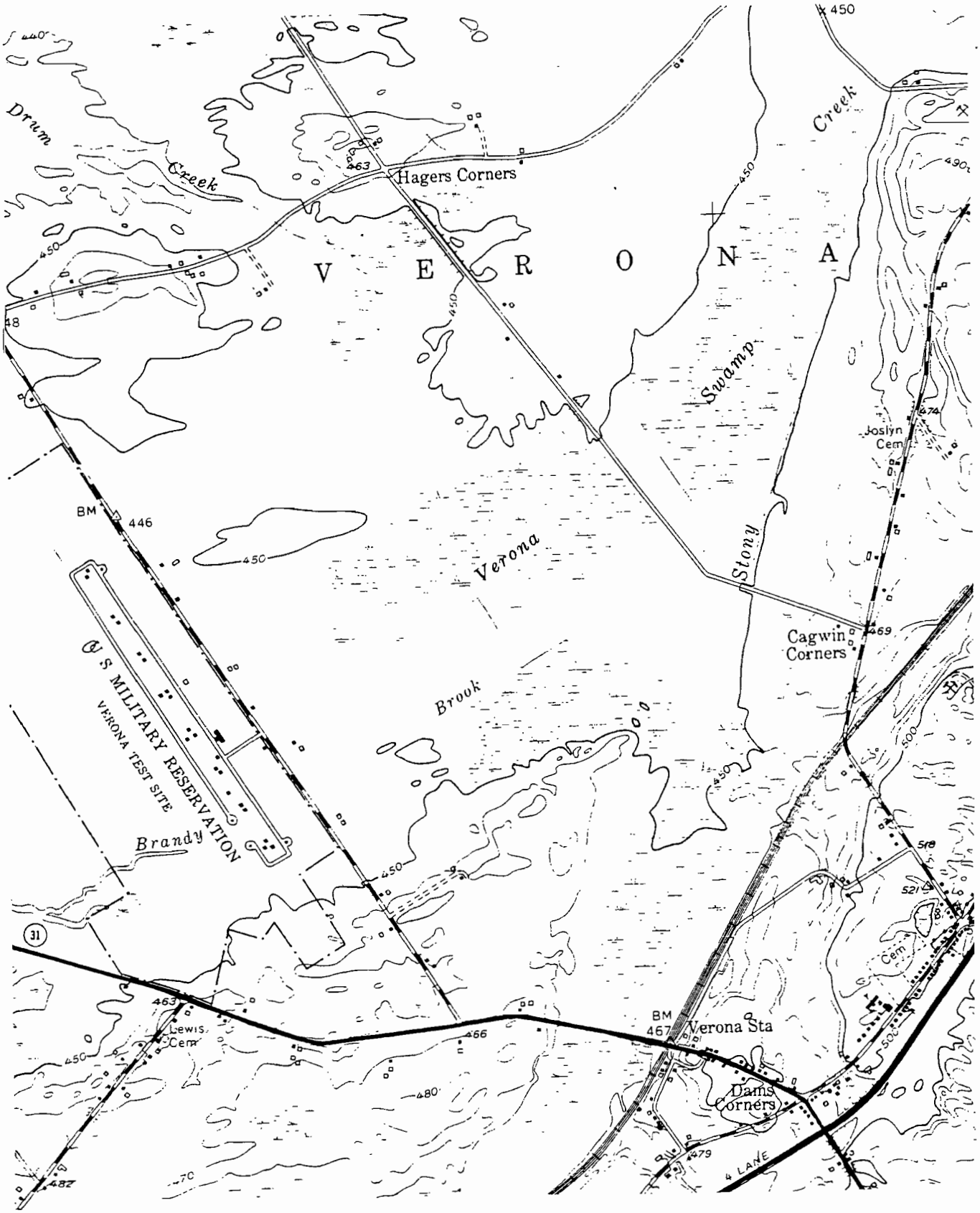
BUILDING 1245

Analyte (ug/L)	Class GA Std	MW-001	MW-002	MW-003	MW-004	MW-1245A	MW-1245B
cis-1,2-dichloroethene	5		2 J	4 J			

BUILDING 1253

Analyte (ug/L)	Class GA Std	MW-001	MW-002	MW-003	MW-004	MW-1253C	MW-1253D
Methylene chloride	5	1 J	1 J			2 J	
1,1-dichloroethane	5		*9 J **	3 J			
cis-1,2-dichloroethene	5	*17 **	3 J	4 J	*9 J **		
trans-1,2-dichloroethene	5	*10*	2 J	*9 J **	1 J		
Trichloethene	5		2 J	3 J	*7 J **		

Above analyte listings are partial, for convenience of presentation. Only detected compounds are presented.
Blank cells indicate compounds that were anlyzed for, but not detected.
J indicates an estimated value.
* indicates compound present above Class GA water quality standards (NYS TOGS 1.1.1)



VERONA
7.5 MINUTE
QUADRANGLE

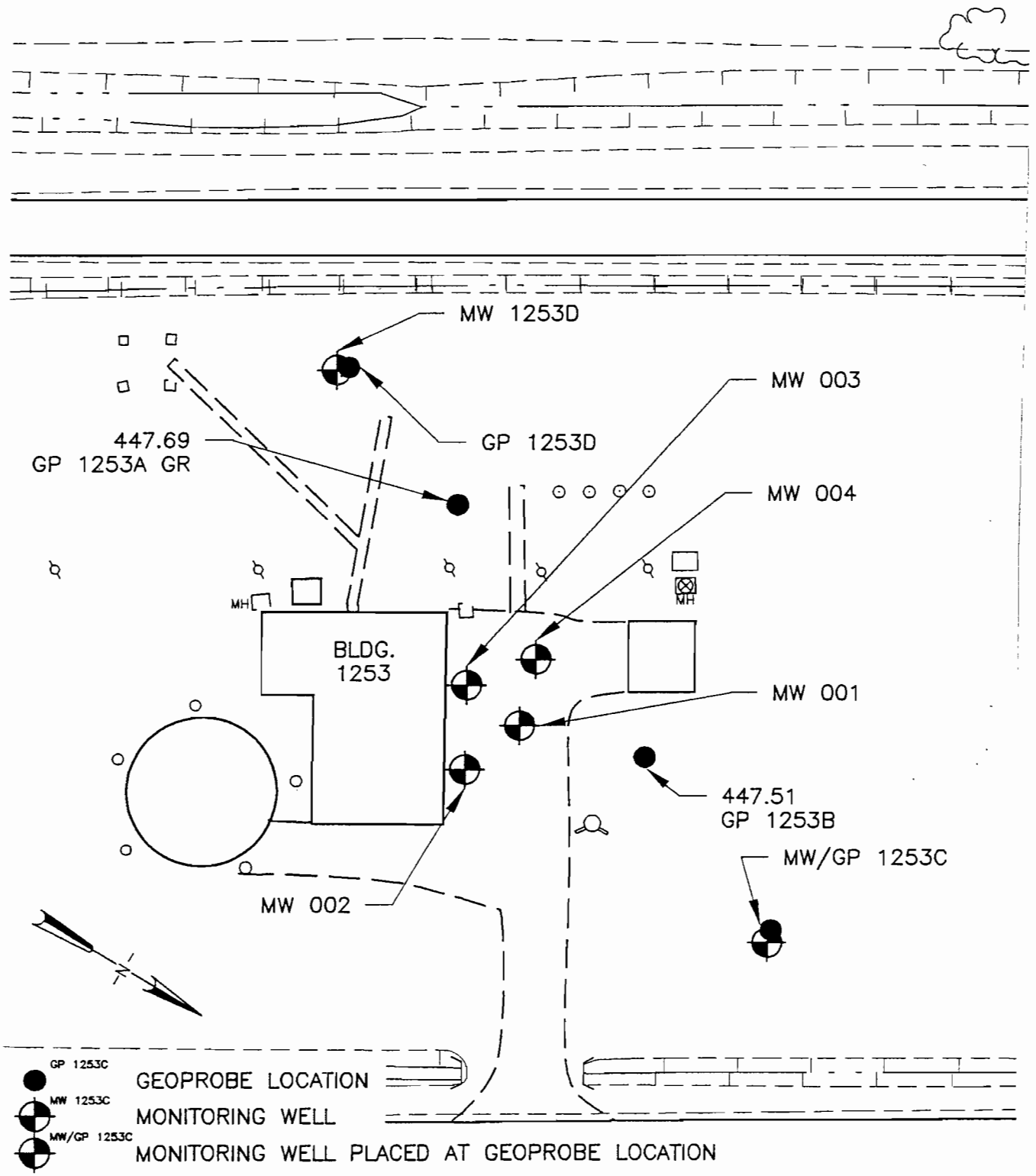
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FIGURE 1-1
SITE LOCATION



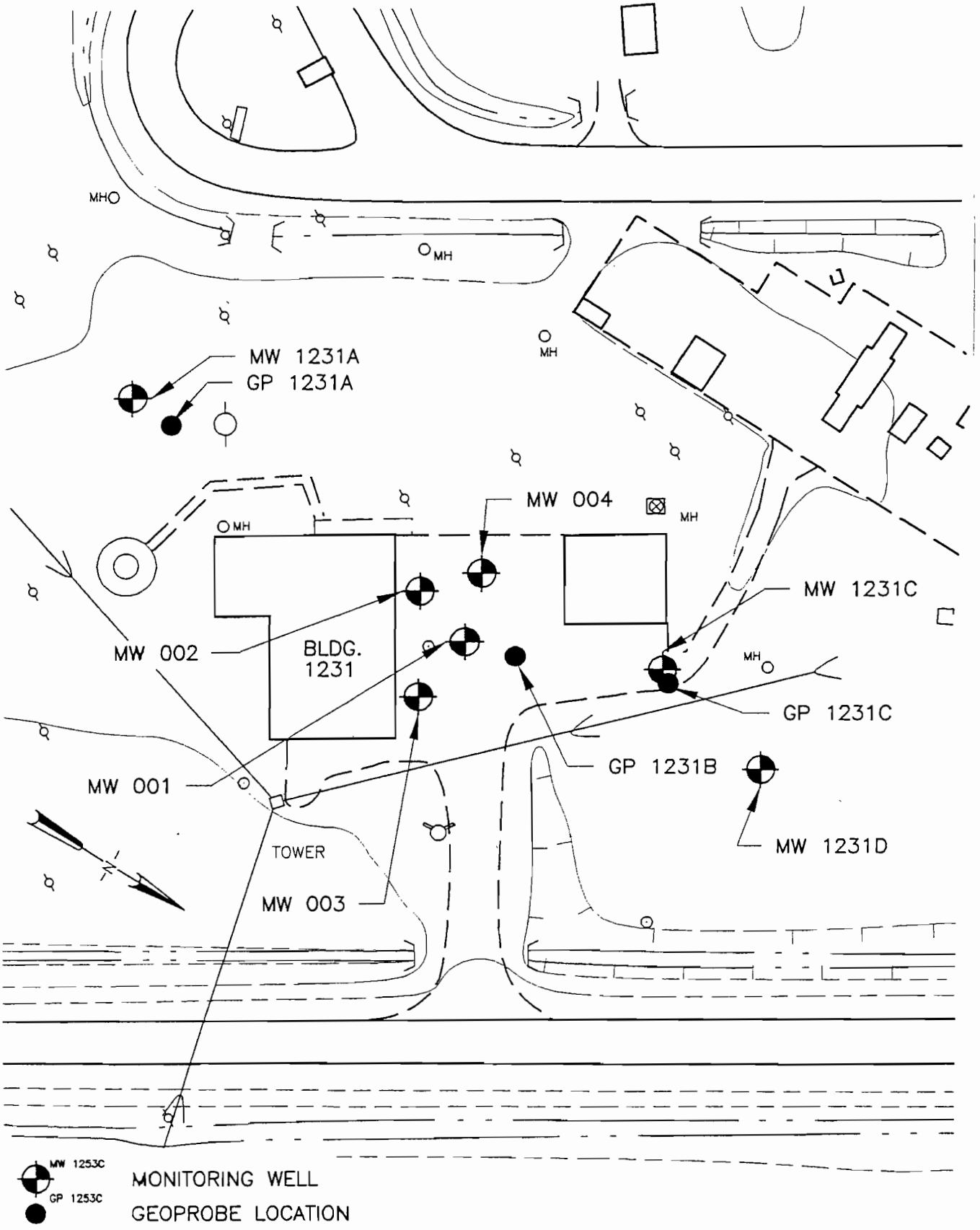
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FIGURE 1-3
PREVIOUS INVESTIGATION, 1253



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FIGURE 1-2
PREVIOUS INVESTIGATION, 1231

being attenuated before groundwater reached the brook. The groundwater data indicated that the concentrations of chlorinated aliphatic compounds, including tetrachloroethene (PCE), trichloroethene (TCE), and dichloroethene (DCE), were variable over the period, in part due to water table fluctuations. However, the overall pattern in the data indicated that natural attenuation was indeed occurring in the groundwater at the sites. Lines of evidence included a general decline of the concentrations of the individual compounds. There was also variation in the ratios of compounds to their respective degradation by products (eg. the ratio of TCE to DCE), which suggested that the compounds might be degrading via reductive de-halogenation.

In January 2001 NYSDEC acknowledged their review of the results of the 2-year monitoring program, and indicated that natural attenuation was supported by the analytical data (Appendix A). To implement a monitored natural attenuation approach, an OM&M Plan was required that set forth the required elements of such a program.

SECTION 2 – SITE CHARACTERISTICS

2.1 – PHYSICAL SETTING

The VRF site is located on approximately 513 acres in the Town of Verona, Oneida County, New York (Figure 1-1). Structural improvements on the site include 54 structures totaling well over 100,000 square feet. Site topography is generally flat with an approximate mean elevation of 447 feet above mean sea level.

The VRF site is situated within the Oneida Lake watershed. The majority of surface drainage flows towards Brandy Brook, which passes through the southern section of the site. Brandy Brook drains into Oneida Creek, which in turn drains into Oneida Lake. A small portion of the facility drains into Drum Creek, which is located north of the site. Drum Creek also drains into Oneida Lake, which is approximately 6 miles from the facility.

A soil survey map obtained from the Oneida County office of the US Department of Agriculture Soil Conservation Service indicates that the Verona site soils are primarily Rhinebeck, Canandaigua, Naigara, Collamer, Arkport, Appleton, Palms Muck, and Minoa series.

2.2 - SITE GEOLOGY

The VRF lies on lacustrine silt and clay deposits. This type of sediment is deposited in proglacial lakes during glacial retreat. The bulk of the soil encountered during the PSA well installations was a mixture of silt and fine-grained sand. A glacial till was also encountered between approximately 15 and 27 feet deep in soil borings that were advanced during the PSA. The till layer was determined to be a confining unit (PSA, Stearns & Wheler, 1997). Site stratigraphy is generally described as clay overlaying silt, which is underlain by the dense glacial till layer. Boring logs from the PSA are included in Appendix B. Gray shale underlies the till. The shale was determined to be of the Clinton Group, per geologic maps of the area. Within the Clinton Group are two shale sequences – the Willowville and Sauquoit formations.

2.3 - SITE HYDROGEOLOGY

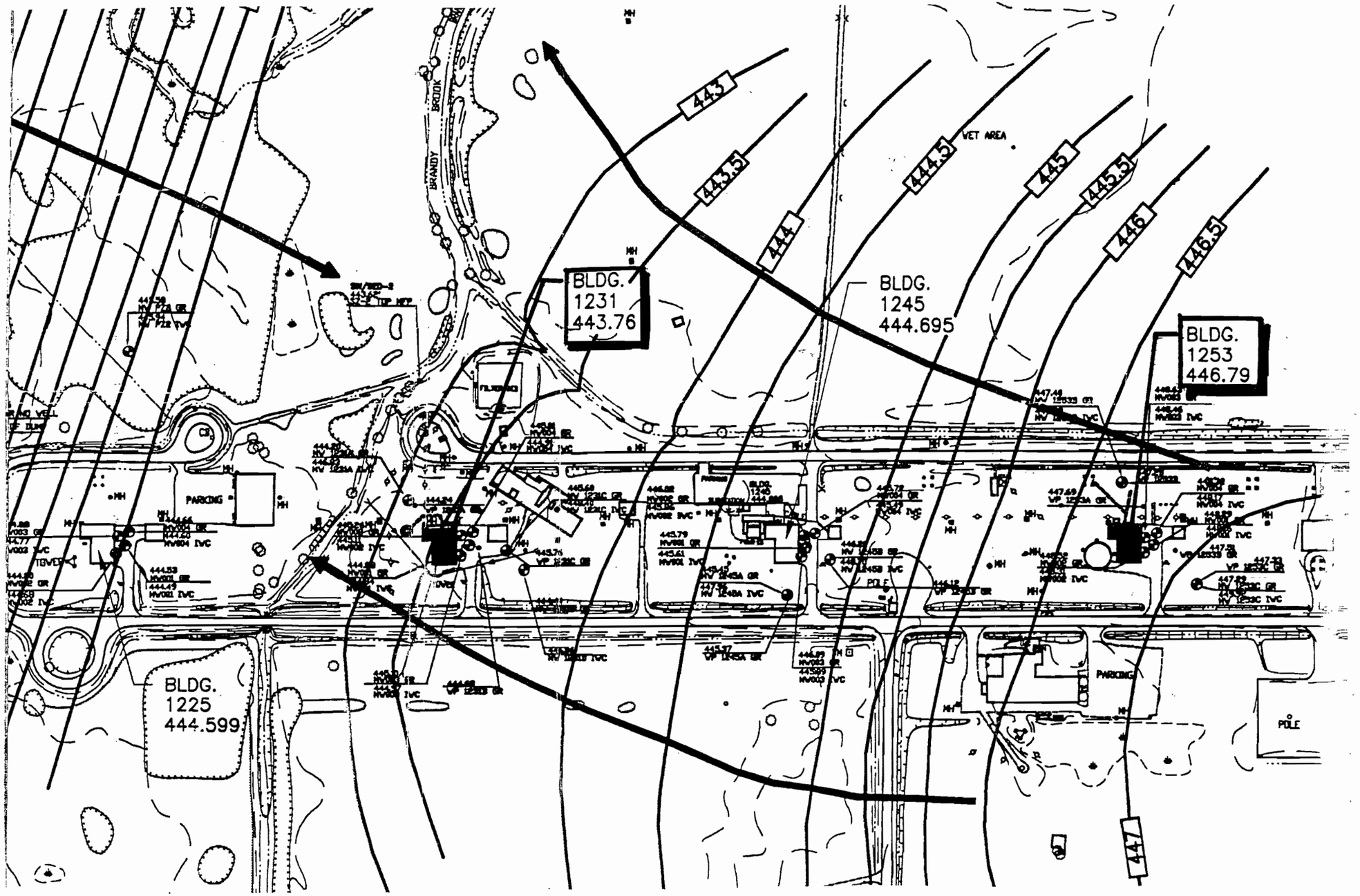
Figure 2-1 illustrates the potentiometric surface at the VRF. Groundwater north of Brandy Brook, which includes the Building 1231 and 1253 areas, flows from north to south, towards the brook. The brook is a local groundwater discharge area and hydrogeologic divide.

Hydraulic conductivity of subsurface soils was determined by in-situ permeability tests completed as part of the PSA. The tests completed were rising head tests that utilized groundwater monitoring wells at Buildings 1203, 1231, 1245, and 1253. The hydraulic conductivities at Buildings 1231 and 1252 were fairly uniform, ranging between 1×10^{-3} and 2×10^{-3} cm/sec. Generally, the calculated conductivities at the four building sites ranged from 1×10^{-3} to 1×10^{-2} cm/sec.

The groundwater seepage velocity was calculated based on the hydraulic conductivity measurements, plus the measured hydraulic gradient:

$V = KI/n,$

where v = seepage velocity
K = hydraulic conductivity
I = hydraulic gradient
n = effective soil porosity



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FIGURE 2-1
SHALLOW GROUNDWATER CONTOURS

Owing to the low hydraulic gradient the flow velocity across the area is low. The average seepage velocity (determined by the average hydraulic conductivity) is estimated to be approximately 25 feet per year (0.069 ft/day). Groundwater flow in the areas of interest occurs primarily in the silt/sand that overlays the confining till unit.

2.4 – GROUNDWATER USE

Drinking water at the VRF is supplied by the City of Oneida water system. The area downgradient of the sites (Buildings 1231 and 1253) includes undeveloped land north of Brandy Brook. Groundwater flowing under the sites migrates southward towards the brook, which is a local hydrogeologic discharge area, and hence the downgradient limit of groundwater migration from the sites. There are no water supply wells in the area downgradient of the sites. There are, however, a number of area residents that are known to use groundwater as a drinking water supply, via private wells located in areas cross-gradient of the site. Two surveys of residential drinking water wells near the VRF have been completed by the New York State Department of Health (DOH). In the first survey, in June 1990, four residential wells and a mobile home park water supply well were sampled and analyzed for volatile organic compounds (VOCs), including the compounds found on site. These wells are located east of Germany Road, which is not downgradient of the on-site subject areas. Analytical results indicated that the wells were free of site-related impacts. The second survey occurred in May 1996, and included 6 residential wells located along Route 31, west of the intersection of Route 31 and Germany Road. Consistent with the first survey, laboratory analysis showed no evidence of site-related impacts.

SECTION 3 – SITE REMEDIAL ACTION

Operations, monitoring, and maintenance are regarded as the last phase of remediation, and are carried out until remedial action objectives (RAOs) for the project are met. For the areas of interest, including groundwater near Buildings 1231 and 1253, an aggressive groundwater monitoring program will be implemented to meet the principal RAO: to prevent groundwater at Buildings 1231 and 1253, that is impacted by organic compounds above Class GA standards, from migrating off site and into Brandy Brook. A second RAO will be to provide a means for showing when attenuation of on-site impacts has occurred to the point that continued monitoring is no longer required. Both of these RAOs can be achieved by continued groundwater monitoring for natural attenuation. Existing groundwater data indicate that natural attenuation will be sufficient to prevent site-related impacts from affecting off-site areas, including the brook. The monitoring program will provide a means of assuring natural attenuation continues

to be effective in the future, and when it will no longer be required. The following discusses the chemical reactions that govern the natural attenuation of detected solutes at the sites. In reality, it is likely the combinations of the following processes are occurring at the site, as is the case for most sites. However, understanding of the most probable sets of reactions will help determine an appropriate analytical program that can adequately monitor attenuation, without necessarily requiring that specific reaction sequences by unequivocally identified.

3.1 OXIDATION – REDUCTION

Oxidation – reduction ("redox") reactions can occur in the absence of biological activity, and in this case are thus considered "abiotic". Abiotic reactions generally occur slower than biological reactions, which will be discussed below, however, they can still occur to a significant degree. Redox denotes the chemical state of water with respect to the presence of electrons that may participate in chemical reactions. Electrons, having a negative charge, will decrease the charge (i.e. increase charge negativity) of an atom or compound that they combine with. Oxic groundwater can be thought of as not having an abundance of free electrons. This is because oxic groundwater contains a high proportion of dissolved constituents that "consume" available electrons. These constituents which have a strong tendency to acquire electrons are known as "electron acceptors", of which oxygen is one of the strongest (hence, the water is termed "oxic"). Other common electron acceptors include nitrate (NO_3^{2-}), tri-valent iron (Fe^{3+}), and sulfate (SO_4^{2-}). In contrast, water that is "reducing" will generally contain more electrons that are available for reactions. Reducing water therefore contains a higher proportion of constituents that can provide electrons, known as "electron donors". Common electron donors are iron (Fe^{2+}), manganese (Mn^{2+}), sulfide (S^{2-}), and carbon dioxide (CO_2). For every constituent that gains an electron (i.e. becomes reduced), there is a constituent that loses an electron (i.e. becomes oxidized). As a rule, the more oxidized (or reduced) a constituent is, the greater its tendency will be to become reduced (or oxidized).

The redox state of groundwater can be evaluated by analyzing it for the constituents listed above. For example, if groundwater contains abundant oxygen and/or abundant nitrogen, but very little dissolved iron (Fe^{2+}), the water is oxic. In contrast, if the groundwater contains very little oxygen and nitrate, but contains measurable iron, manganese, and sulfide, the water is reducing.

The aliphatic compounds are relatively oxidized forms of carbon by the presence of halogen (chlorine) atoms in their molecular structure. (Chlorine, like oxygen, is a strong electron acceptor, and therefore like oxygen it oxidizes molecules it combines with). The more halogens

present in the molecule, the more oxidized the compound becomes. As oxidized molecules, halogenated aliphatics will tend to become reduced as discussed above. Molecules such as PCE (four chlorine atoms) will have a stronger tendency to be reduced than TCE (three chlorine atoms), as so forth.

Aliphatics that undergo reduction reactions are said to be undergoing "reductive de-halogenation" to denote the process by which PCE is degraded to TCE, which is subsequently degraded to DCE. As the aliphatic compounds are degraded (i.e. reduced) there will be electron donors (see above) that become oxidized. Thus, the likelihood that these reactions are occurring can be assessed by looking not only at the levels of aliphatics present, but also the inorganic electron acceptors and donors present in the groundwater.

3.2 BIOLOGICALLY MEDIATED REACTIONS

Although the above redox reactions can occur without biological mediation, biological activity greatly enhances them. In reality, the driving force behind oxidation-reduction reactions resulting in chlorinated aliphatic degradation is microbially-mediated electron transfer (Wiedemeier et al, 1997). Microbes derive energy from electron transfer reactions, which is there essential "food" source. Ordinarily, native carbon serves as an electron donor in these transfer reactions, and common electron acceptors discussed previously (oxygen, nitrate, tri-valanet iron, sulfate) are used as electron acceptors. Chlorinated aliphatic compounds can sometimes be used as electron acceptors in these biologically-mediated reactions.

In some cases, the aliphatic compound is used more directly as an electron donor, in place of native carbon, which causes the compound to be oxidized. This is especially possible for less-halogenated compounds, for example vinyl chloride. Vinyl chloride (VC -- 1 chlorine atom) is eventually produced as DCE (2 chlorine atoms) is reduced, and may subsequently be converted (mineralized) to carbon dioxide via oxidation reactions. However, VC may also be reductively degraded. Thus, it is by a combination of reduction and oxidation that the following degredation sequence can be completed:

PCE → TCE (reduction)
TCE → DCE (reduction)
DCE → VC (reduction)
VC → mineralization (oxidation/reduction)

3.3 SUMMARY

The most obvious way of assessing natural attenuation is to look at the levels of impact over time. The concentrations of constituents will gradually decrease over the course of the monitoring program, and also with distance from the source. It is noted, however, that physical dilution can usually account for some of the observed decrease. Understanding the chemical state of groundwater with respect to inorganic redox indicators is critical for determining whether natural attenuation is occurring, regardless of whether the reactions are abiotic or biologically-mediated. The OM&M analytical program (Section 4.2.B) will incorporate the need for both organic and inorganic analysis.

SECTION 4 – MONITORING PLAN

The monitoring plan describes the methods that will be used to measure the performance and effectiveness of the natural attenuation remedy. For natural attenuation, the monitoring strategy will be implemented to monitor plume characteristics and movement, and the chemical reactions that naturally degrade the plume.

The monitoring program will be carried out as described below, and in accordance with the following supporting documents appended to this OM&M Plan:

Appendix C – New York State Well Decommissioning Procedures
Appendix D – Field Sampling and Analysis Plan
Appendix E – Site Health and Safety Plan
Appendix F – Spill Prevention Control and Countermeasure Plan

4.1 MONITORING LOCATIONS

Monitoring wells for natural attenuation need to be located as follows:

1. At least one well needs to be located within the source area of the plume.
2. At least one well needs to be located downgradient of the source area, but still within the plume.
3. At least one well needs to be installed at the fringe of the plume, defined as where impacts are below standards, criteria, or guidance (SCGs). It is allowable to have a

single well to satisfy this criterion as well as criterion 2 above, depending on site-specific circumstances.

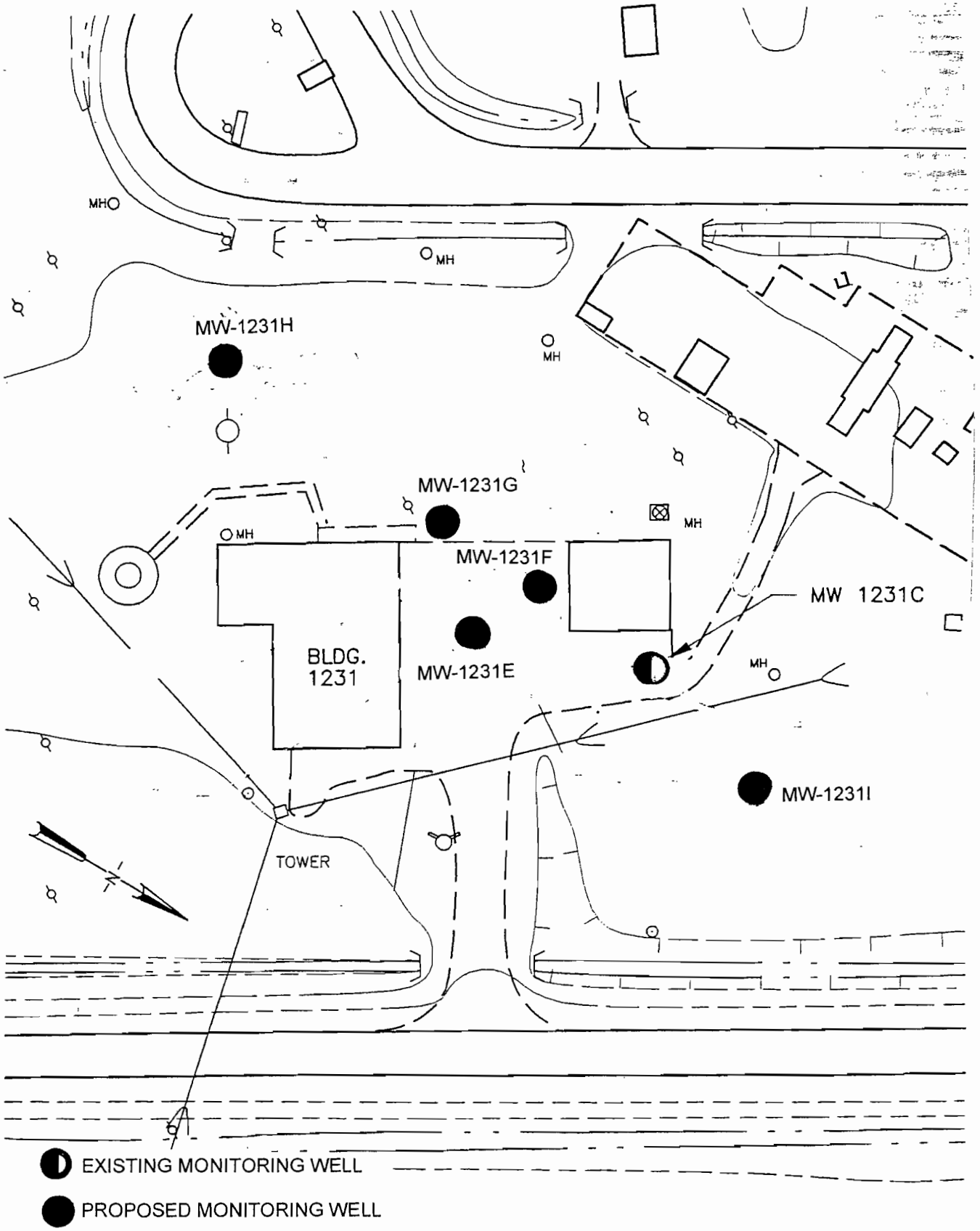
4. At least one monitoring well needs to be located downgradient, as a "sentinel" well beyond the impacted groundwater zone. The groundwater concentrations must remain below standards in the sentinel well for natural attenuation to be considered effective. The sentinel well should be no more than five years' travel time from the source area, based on estimated groundwater flow velocity. The sentinel well will essentially provide evidence that the remedial action objective pertaining to no off-site migration of impacts is met.
5. At least one well needs to be along the center line of the plume.

Additional monitoring wells will need to be installed at buildings 1231 and 1253 to satisfy the above criteria. In addition, Brandy Brook will continue to be monitored.

All new monitoring wells will be installed by NYSDEC-approved methods. The basic well installation approach will include the advancement of borings by 4 ¼ inch diameter hollow stem augers. Soil samples will be collected by split spoon samplers continuously throughout the soil boring. Soil descriptions will be recorded in a field observation log by a hydrogeologist. Upon boring completion, 2-inch diameter continuous-wrap PVC well screen (0.020 inch slot size) will be placed in the borehole. As the augers are withdrawn, a filter sand pack material will be placed in the space between the open borehole wall and the well screen, from the bottom of the boring upward. The sand pack will extend to a minimum of 1 foot above the top of the well screen. A two-foot bentonite plug will be placed on top of the sand pack, and protective steel casings will be cemented in place at ground surface, with locking covers.

A. BUILDING 1231 MONITORING NETWORK

Figure 4-1 illustrates the proposed groundwater monitoring network at Building 1231. From a recent site visit, it is apparent that most of the monitoring wells that had been utilized in the past (Figure 1-2) are no longer there. In general, any existing wells that are not to be included in future monitoring efforts will be decommissioned following approved New York State procedures (Appendix C, NYSDEC 1996). The following six (6) monitoring wells (1 existing, 5 to be installed) are proposed for the OM&M program at Building 1231. All of the wells will be installed to a depth of approximately 15 feet deep, consistent with previous monitoring programs at the site:



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BUILDINGS 1231 AND 1253

FIGURE 4-1
BUILDING 1231 WELL NETWORK

MW-1231E, -1231F (To Be Installed). These two wells will be located within and close to the center of the plume, and satisfy criteria 1 and 5 above.

MW-1231G (To Be Installed). A well is proposed between existing wells MW-1231F (source area) and MW-1231H (sentinel well, see below), to serve as a well on the fringe of the plume, to satisfy criteria 2 and 3 above, and oriented along its centerline.

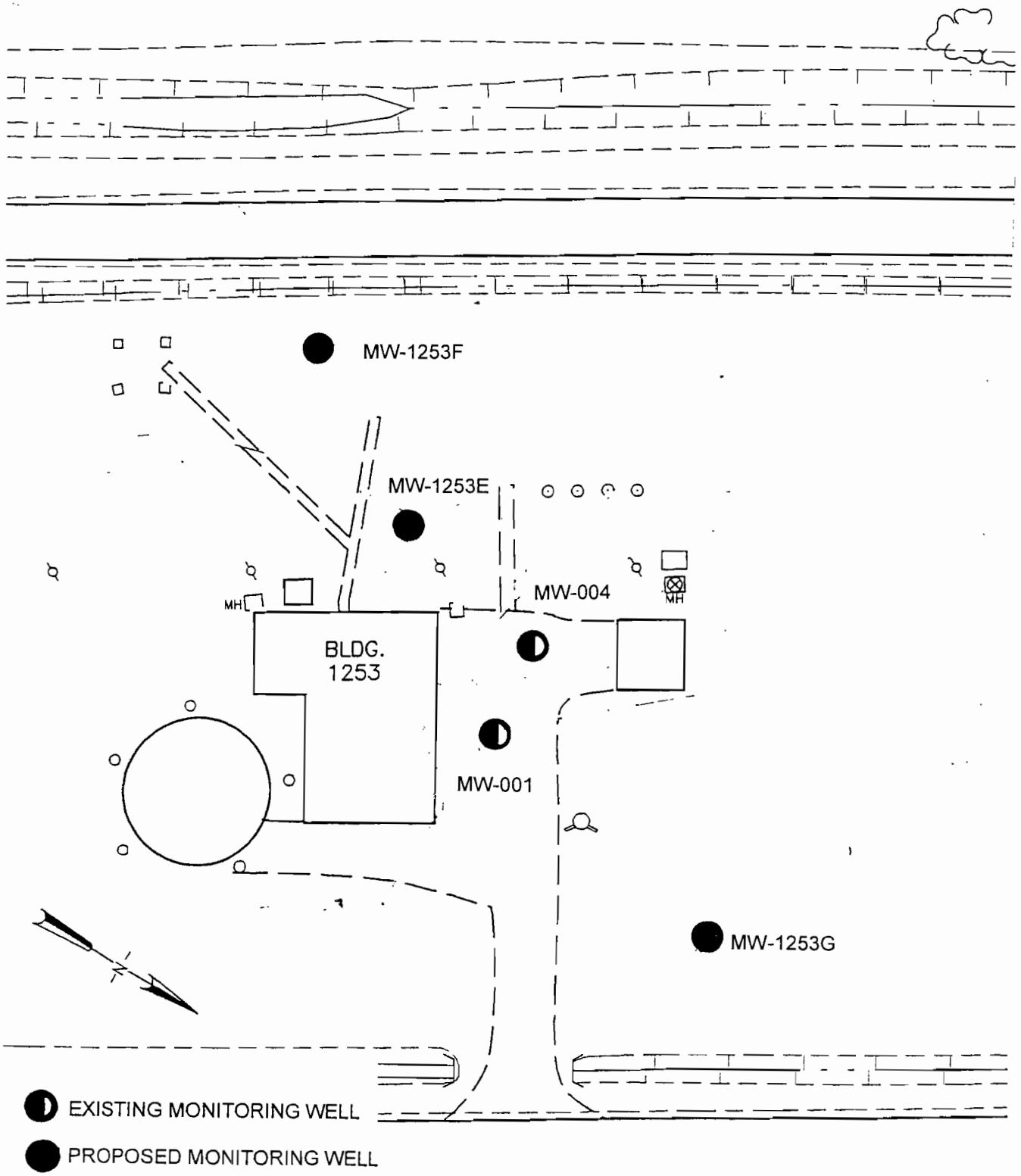
MW-1231H(To Be Installed). This well is located approximately 100 feet downgradient of the source area in an area that is unaffected by the plume. Considering the estimated groundwater flow velocity (25 feet per year), it would take groundwater approximately 4 years to migrate from the source area to well MW-1231H. This well is suitable as a sentinel well, and thus satisfies criterion 4 above.

MW-1231C (Existing). This well exists near the upgradient edge of the plume, and is recommended for inclusion in the monitoring network, as historical data indicates it can provide a good assessment of natural attenuation processes.

MW-1231I (Upgradient, To Be Installed). In addition to the above wells, it is recommended that an upgradient well, MW-1231I, be installed. Having an upgradient background well will be an essential element for evaluating natural attenuation capacity of groundwater, as it will reveal the ambient hydrogeochemical conditions, and enable an assessment of whether natural conditions remain suitable to sustain natural attenuation reactions. Further discussion is provided later regarding the data evaluation techniques that are to be employed.

B. BUILDING 1253 MONITORING NETWORK

Figure 4-2 illustrates the proposed groundwater monitoring network at Building 1253. From a recent site visit, it is apparent that most of the monitoring wells that had been utilized in the past (Figure 1-3) are no longer there. In general, any existing wells that are not to be included in future monitoring efforts will be decommissioned following approved New York State procedures (Appendix C, NYSDEC 1996). The following five (5) monitoring wells (2 existing, 3 to be installed) are proposed for the OM&M program at Building 1253. All of the new wells



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FIGURE 4-2
BUILDING 1253 WELL NETWORK

will be installed to a depth of approximately 15 feet deep, consistent with previous monitoring programs at the site:

MW- 001, MW-004 (Existing). These two existing wells are located within and close to the center of the plume, and satisfy criteria 1 and 5 above. From a recent site visit, it is apparent that these wells may need to be repaired. The protective casings will need to be replaced, along with the concrete pads. In the event that further inspection reveals more substantial damage, these two wells will be replaced altogether.

MW-1253E (To Be Installed). A single well is proposed to satisfy criteria 2 and 3 above. The well would be located mid-way between existing well MW-004 and proposed sentinel well MW-1253F (see below), and would therefore be at or near the presumed fringe of impact. This well could also be located with respect to the center line of the plume to assist in satisfying criterion 5.

MW-1253F (To Be Installed). This well will be located approximately 100 feet downgradient of the source area in an area that is unaffected by the plume. Considering the estimated groundwater flow velocity (25 feet per year), it would take groundwater approximately 4 years to migrate from the source area to well MW-1253D. This well will be suitable as a sentinel well, and thus will satisfy criterion 4 above.

MW-1253G (Upgradient, To Be Installed). In addition to the above wells, it is recommended that well MW-1253G be installed as an upgradient well. Well MW-1253G will provide useful data for evaluating natural attenuation capacity of site groundwater, as noted above.

At the conclusion of the post-closure monitoring period, all remaining monitoring wells will be decommissioned by appropriate New York State approved methods.

C. BRANDY BROOK

Water samples will be collected from Brandy Brook to verify that no site-related impacts occur there.

4.2 SAMPLING AND ANALYSIS PLAN

This section sets forth the basic elements of the sampling and analytical programs that are to be followed during the OM&M period. Appendix D includes a detailed Field Sampling Plan for groundwater and surface water samples, which discusses equipment and materials to be used, and provides step-by-step procedures for sampling.

A. SAMPLING SCHEDULE

Groundwater and surface water samples are to be collected quarterly for a minimum period of two years. After the first two years of analytical data are collected, the monitoring frequency will be reviewed, and appropriate adjustments to the monitoring schedule can be made, subject to NYSDEC approval.

B. ANALYTICAL PROGRAM

Groundwater and surface water samples will be analyzed for Target Compound List (TCL) volatile organic compounds, including the target aliphatic compounds, by USEPA Method 8260. In addition, appropriate inorganic parameters will be analyzed for, in order to provide geochemical information regarding the underlying conditions that are causing the compounds to degrade:

Dissolved oxygen
Iron
Manganese
Nitrate
Sulfate
Carbon dioxide

In addition to the EPA 8260 parameters, organic compounds ethane and ethene should be included, as they are produced during reductive dechlorination.

Finally, the field parameters pH, Eh, temperature, and conductivity should be measured at each monitoring location during each sampling event.

4.3 MONITORING WELL INSPECTION AND MAINTENANCE

Each quarter that samples are collected, the sampling personnel will complete a visual inspection of each monitoring well to determine whether repairs or replacement are needed. The inspection will include a visual examination of the following:

locking well covers and well caps to determine whether the wells remain secure;
concrete pad to ensure that it is not excessively cracked;
padlocks in good working condition;
wells areas generally clear of excessive vegetation growth;
wells remain plumb and straight, and the interior is free of obstruction;
bottom of well not accumulating sediments.

Any items in need of attention, repair or replacement will be called out in the quarterly reports (Section 5).

SECTION 5 – REPORTING

Quarterly monitoring reports will be prepared following the completion of each quarterly sampling event. The report will include a discussion of the methods used to collect the samples, as well as field observation sheets (Appendix D). The field observations will include the field parameter measurements. Any needed repairs or maintenance to the monitoring wells will also be described.

Water elevation measurements from the monitoring wells will be used to produce a groundwater contour map for each of the two separate building sites.

Laboratory analysis reports will be included with the quarterly reports. In addition, the analytical results will be presented on summary tables that identify the monitoring locations and results for each parameter, and which highlight the individual parameters that exceed applicable water quality standards. Separate summary tables will be presented for each of the two sites, and will include not only the current analytical results but also the results of previous sampling quarters. This will enable water quality trends to be evaluated.

In addition to the tabular presentation of the data, time-dependent plots will be prepared to show the changes in concentration of key parameters over time, including PCE, TCE, and DCE, at each well location where they are present. It is noted that there are numerous sources of data variability that could cause an apparent change in concentration for a particular parameter, even in the absence of a real change. For example, fluctuations in water table elevations can cause concentrations within a well to increase or decrease, depending on the water column height. Analytical precision and random errors add to the variability. For this reason, additional plots will also be prepared that reflect the relative proportions of the key constituents, including the ratios of PCE to TCE (PCE/TCE) and TCE to DCE (TCE/DCE) over time at each well. The ratio plots are necessary to demonstrate the changes in the relative proportions of each constituent with its degradation produce. It is further noted that ratios of parameters in water are less sensitive to random variability than the absolute concentration of individual parameters. For example, if the concentrations of TCE and DCE each increase due to some source of seasonal or procedural variability, their ratio will generally remain the same. Thus, ratio plots will be relied upon to filter out potential variability, as well as to help verify degradation trends.

The reports will contain a section that specifically discussed the nature of the inorganic analytical results in the context of natural attenuation reactions. The presence of electron donors and acceptors, as well as field parameter data (pH, Eh, temperature, conductance) will be evaluated to provide a geochemical model for site groundwater as it relates to sustaining natural attenuation of the organic hydrocarbons.

The report following the fourth quarter event will be prepared as an annual report. The annual report will include:

- A site location map
- A site map for Buildings 1231 and 1253
- Groundwater contour maps
- A description of the sampling and analysis methods
- A narrative discussion of analytical results and chemical trends, along with appropriate figures and plots as described above for the quarterly reports

A conclusions section of the quarterly and annual reports will summarize evidence of on-going attenuation, the effectiveness of attenuation as a remedy, and the overall effectiveness of the monitoring program.

In the event that contamination is detected in either the Building 1231 or Building 1253 sentinel well, it would be recommended that an additional monitoring well be installed in the direction of groundwater flow and along the approximate center line of the plume, downgradient of the sentinel well. This new well would be installed prior to the next quarterly sampling event, and added to the quarterly monitoring network. Following the completion of the next two quarterly sampling events that include the new well, recommendations will be made concerning further action, if necessary.

APPENDICES

Appendix A

Post-PSA Semi-Annual Monitoring Results

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

One Remington Park Drive • Cazenovia, NY 13035
(315) 655-8161 • fax (315) 655-4180

January 10, 2001

Mr. Bruce H. Mero, REM
Air Force Research Laboratories
Rome Research Site
150 Electronics Parkway
Rome, NY 13441-4516

Re: Semiannual Monitoring Analytical Summary Report
Verona Research Facility
S&W No. 90060.0

Dear Mr. Mero:

This letter report provides a comprehensive summary of the groundwater analytical results for samples collected from the Verona Research Facility from October 1996 to September 2000 (see Figure 1 for site location map). Stearns & Wheler has compiled and reviewed the groundwater analytical data from eight sampling events that occurred during that period. Groundwater sampling was implemented based on the detection of volatile organic compounds, as reported in a February 1997 Preliminary Site Assessment (PSA) report completed by Stearns & Wheler. Groundwater samples were collected from Well MW-001and MW-1231C at Building 1231, and Wells MW-002 and MW-004 at Building 1253 (see Figures 2 and 3 for monitoring well locations). In addition, one sample was collected from Brandy Brook during each sampling event. Analytical results were presented in summary reports prepared by Stearns & Wheler following each of the sampling events. Consistent with those summary reports, this comprehensive summary focuses on four contaminants of concern: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2 dichloroethene (DCE), and chlorobenzene (CB).

RESULTS

A summary of the eight rounds of analytical data is presented in Table 1. Instances when water samples could not be obtained due to dry conditions are indicated with "NS." Figure 4 presents the results for the contaminants of concern.

Brandy Brook

The sampling point for the Brandy Brook sampling location is located approximately 200 feet south (down gradient) of Building 1231. No VOCs were detected in Brandy Brook during the sampling period.

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BUILDING 1231

MW-001

Samples could not be collected in 1999 (well was dry) and September of 2000 (well not found). However, other data indicate that concentrations of VOCs have decreased below NYSDEC groundwater standards since the October 1996 sampling event, and no VOCs were present above detection limits in February 2000.

MW-1231C

Concentrations of PCE and TCE are highly variable through the sample period. However, concentrations of DCE have steadily decreased below NYSDEC groundwater standards since October 1997 from 14 ppb to 3 ppb in September 2000. CB has not been present above detection limits since April of 1998.

BUILDING 1253

MW-002

Contaminants of concern have remained below NYSDEC standards during the period. Otherwise, concentrations of 1,1,1 trichloroethane (TCA) have decreased below detection limits. Although, 1,1-dichloroethane (DCA) was recently detected at 8 ppb, it has decreased from 16 ppb compared to the March 1999 sampling event.

MW-004

As seen in Figure 2, concentrations of contaminants of concern have generally declined. An exception occurs during the September 1999 sampling event, when anomalous high concentrations of TCE and DCE were detected. These anomalous levels are likely related to dry conditions during this period and the resultant low water table.

DISCUSSION OF RESULTS

Factors impacting migration, degradation, and potential remediation of chlorinated compounds at this site include the water table gradient, local groundwater discharge points, the nature of the overburden, and the geochemical state of the groundwater.

As reported in the February 1997 PSA report, Brandy Brook is the local groundwater discharge point for the site and the greatest distance over which migration could occur. The data indicates that contaminated groundwater has not significantly impacted the brook during this period.

The variability in the PCE and TCE data reported from MW-1231C and MW-004 tends to obscure chemical evidence of attenuation. It appears that variation may be caused in part by water table fluctuations. For example, in September of 1999 high levels of VOCs in the wells is likely the result of dry conditions and low water table levels. Despite this variability, there is chemical evidence of natural degradation of contaminants of concern. For example, chlorinated compounds are not as easily degraded under aerobic (oxygen rich) conditions as compared to anaerobic (low oxygen) conditions. Figure 5 shows a graphical representation of the ratio of TCE/DCE plotted versus dissolved oxygen. If compounds are being attenuated at the site, one would expect that as dissolved oxygen decreases the ratio of TCE/DCE would decrease also, reflecting the degradation of TCE into DCE. This is observed in Figure 5.

RECOMENDATIONS

The concentration of compounds detected at the site during the eight sampling events has shown either a decreasing trend or significant variation. There is chemical evidence to support that some degree of natural attenuation is occurring, and site impacts have not been observed in the brook. Given the sites rural setting, limited migration potential, and lack of impact to its groundwater discharge point (Brandy Brook) exposure pathways to contaminants are incomplete. Therefore, Stearns & Wheler recommends that actions at the site be limited to continued monitoring, with a focus on Wells MW-001, MW-1231C (Building 1231), and MW-002 (Building 1253). It is suggested that the above three wells and Brandy Brook undergo continued monitoring, semi-annually for two years. Following two more years of sampling, data can be reevaluated to assess whether there is continued improvement.

If you have any questions regarding the results of this sampling event, please do not hesitate to contact us.

Very truly yours,

David R. Frostclapp
Engineer

DRF/jlb

Enclosures

cc: Don Sorbello, S&W Redevelopment (w/ enc.)

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Table 1
Historical Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Jan-01

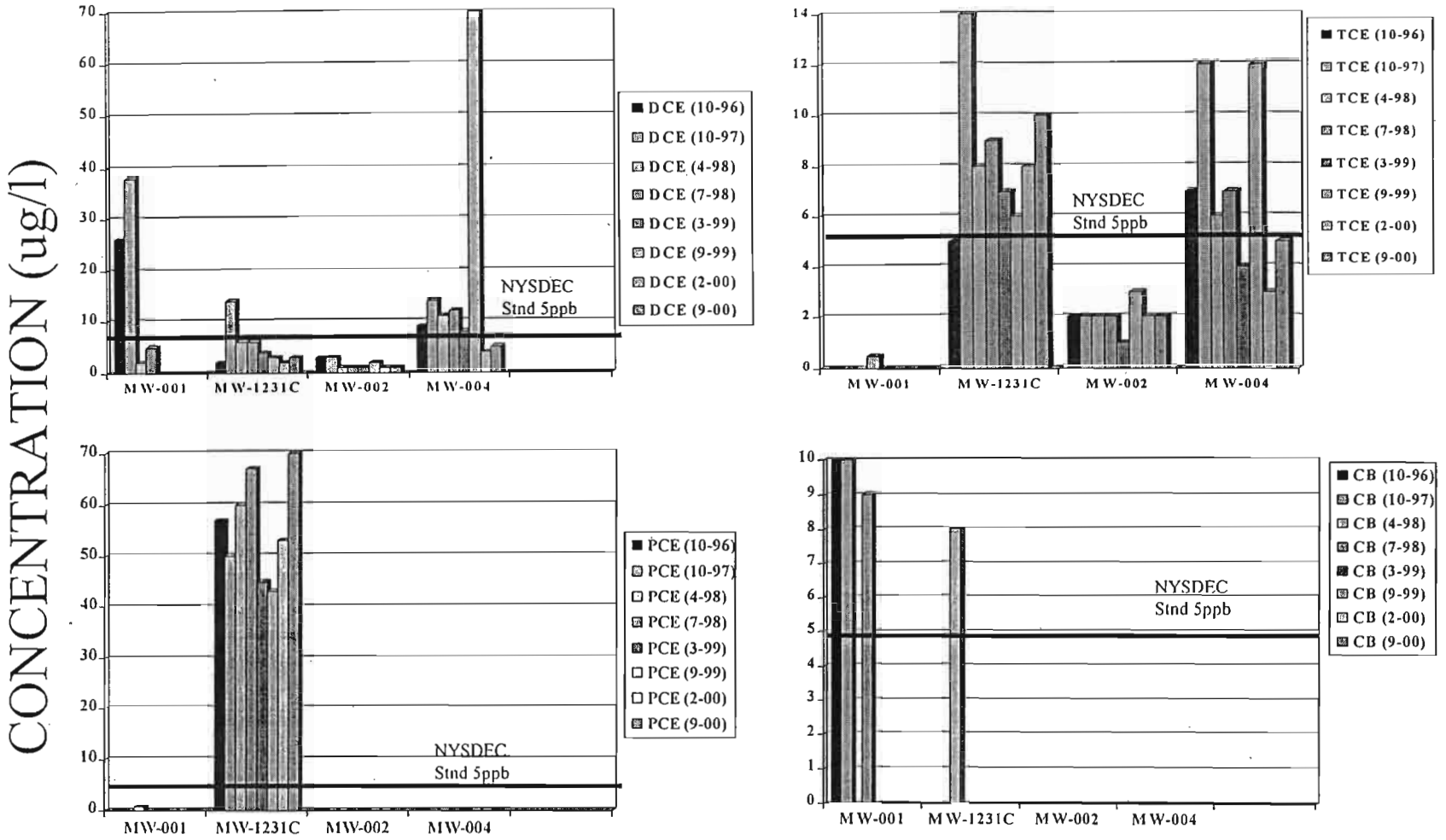
	BUILDING 1231																GW
	MW-001								MW-1231C								
Compound (ug/l)	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Std.
Chloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
Bromomethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Vinyl Chloride	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	2
Chloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	2 J	5
Methylene Chloride	U	UJ	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	5 J	5
Acetone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
Carbon Disulfide	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
Vinyl Acetate	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	NOINE
1,1-Dichloroethene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
1,1-Dichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
cis-1,2-Dichloroethene	26	38 J	2 J	5 J	NS	NS	U	NS	2	14	6 J	6 J	4 J	3 J	2 J	3	5
trans-1,2-Dichloroethene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Chloroform	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	7
1,2-Dichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.6
2-Butanone	U	U	U	U	NS	NS	U	NS	U	U *	U	U	0.8 J	U	U	U	5
1,1,1-Trichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Carbon Tetrachloride	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Bromodichloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
1,2-Dichloropropane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.4
Trichloroethene	5 J	8 J	U	0.5 J	NS	NS	U	NS	5	14	8 J	9 J	7	6	8	10	5
Dibromochloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
Benzene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.4
Bromoform	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
2-Hexanone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
Tetrachloroethene	U	U	0.7 J	U	NS	NS	U	NS	57	50	60	67	45	43	53	70	5
Toluene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Chlorobenzene	290	930 J	U	9 J	NS	NS	U	NS	U	U	8 J	U	U	U	U	U	5
Ethylbenzene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Styrene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Xylene (total)	U	U	U	0.7 J	NS	NS		NS	U	U	U	U	U	U	U	U	5
Total VOCs	321	976	2.7	14.5	-	-	0	-	64	78	82	82	56.8	52	63	90	
Depth to Groundwater (ft.)		6.25	2.48	3.24	DRY	DRY	1.34	NA	NA	9.8	6.01	6.89	4.89	12.89	4.84	NA	

NS: Not Sampled (1999 well was dry; September 2000 well was not located.
* Treated as UOC
G NYSDEC guidance value.
ND No Detectable amounts allowed
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998.
Shaded areas indicate exceedances of standards
U - not present above detectio limits
J - reported value is an estimate
NA - information not available

Table 1 (cont'd)
Historical Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Jan-01

	BUILDING 1253																GW
	MW-002								MW-004								
Compound (ug/l)	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Std.
Chloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50
Bromomethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Vinyl Chloride		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	2
Chloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Methylene Chloride	1 J	U	0.7 J	U	U	U	U	U	U	U	U	U	U	0.7 J	U	0.4 J	5
Acetone		U	16 B	U	U	U	U	U	U	U	U	U	U	2 JB	U	4 J	50G
Carbon Disulfide		U	0.5 J	U	U	U	U	U	U	U	U	U	U	U	U	U	50
Vinyl Acetate		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NOTNE
1,1-Dichloroethene		18	30	26	U	U	U	U	U	U	U	U	U	U	U	U	5
1,1-Dichloroethane	9 J	3 J	2 J	2 J	16	14 J	8	8	U	26	U	U	U	U	U	U	5
cis-1,2-Dichloroethene	3 J	3 J	1 J	1 J	1 J	2 J	1 J	1 J	9 J	7	11	12	8	71	4 J	5	5
trans-1,2-Dichloroethene	2 J	1 J	U	U	U	2 J	0.8 J	0.5 J	1 J	U	2 J	2 J	2 J	15	0.7 J	1 J	5
Chloroform		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	7
1,2-Dichloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6
2-Butanone		U	100	29	U	U	U	U	U	U	U	U	0.8 J	U	U	U	5
1,1,1-Trichloroethane		22	80	U	2 J	1 J	U	U	U	U	U	U	U	U	U	U	5
Carbon Tetrachloride		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Bromodichloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
1,2-Dichloropropane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4
Trichloroethene	2 J	2 J	2 J	2 J	1 J	3 J	2 J	2 J	7 J	12	6 J	7 J	4 J	12	3 J	5	5
Dibromochloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
Benzene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4
Bromoform		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
2-Hexanone		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
Tetrachloroethene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Toluene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Chlorobenzene		J	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Ethylbenzene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Styrene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Xylene (total)		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Total VOCs	16	49	215.5	60	20	22	11.8	11.5	17	45	19	21	14.8	98	7.7	11	
Depth to Groundwater (ft)	4.74	5.52	2.43	2.99	1.55	8.9	1.51	NA	2.88	5.64	2.64	3.56	NA	8.83	1.28	NA	

NS: Not Sampled (1999 well was dry; September 2000 well was not located.
* Treated as UOC
G: NYSDEC guidance value
ND: No Detectable amounts allowed
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998
Shaded areas indicate exceedances of standards
U - not present above detectio limits



Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
Cazenovia, NY
Date: 1/01 JOB No. 90060.10

Verona Research Facility
Town of Verona, New York

FIGURE 4
HISTORICAL TRENDS

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

FILE

One Remington Park Drive • Cazenovia, NY 13035
(315) 655-8161 • fax (315) 655-4180

December 19, 2000

Mr. Bruce H. Mero, REM
Rome Research Site
150 Electronics Parkway
Rome, NY 13441-4516

Re: Semiannual Groundwater Monitoring
Verona Research Facility
S&W No. 90060.0

Dear Mr. Mero:

This letter report provides a discussion of groundwater sampling results at the Verona Research Facility for the September 2000 sampling event. Groundwater sampling at this site was implemented based on findings of the Preliminary Site Assessment. The objective of these sampling events has been to determine if concentrations of organic compounds are decreasing.

Four monitoring wells were chosen to be sampled semi-annually during the course of two years. These wells were selected because each had a history of being impacted by volatile organic compounds (VOCs). Enclosed are summary tables that include analytical results from the previous five rounds of groundwater sampling. Groundwater samples were collected from Monitoring Wells MW-1231C at Building 1231, and Wells MW-002 and MW-004 at Building 1253. In addition, one surface water sample was collected from Brandy Brook. MW-001 could not be located during the September 2000 sampling event and, therefore, was not sampled. It is believed that Monitoring Well MW-001 was destroyed during excavation activities at the site. In addition to analytical sampling, Stearns & Wheler personnel performed a bail test to aid in determining the hydraulic conductivity of soils around the screened interval in monitoring well MW-1231C. Using the hydraulic conductivity, seepage velocity has been determined for this particular monitoring well.

The results from the September 2000 sampling of the compounds of specific concern (trichloroethene, tetrachloroethene, chlorobenzene, and 1,2-dichloroethene) are summarized below. Laboratory results from Brandy Brook for these specific compounds were non-detects and will not be discussed further.

Stearns & Wheler Companies
50th Anniversary

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Trichloroethene (TCE). TCE concentrations exceeded the NYSDEC groundwater standard at Monitoring Well MW-1231C. The reported concentration was 10 ppb. Monitoring Wells MW-002 and MW-004 had detectable concentrations of TCE (2 ppb and 5 ppb, respectively); however, neither of these exceeded the NYSDEC groundwater standard of 5 ppb.

Tetrachloroethene (PCE). PCE was detected above NYSDEC groundwater standards 5 ppb at MW-1231C, which had a reported concentration of 70 ppb. Concentrations of PCE were not detected in any of the remaining monitoring wells.

Chlorobenzene (CB). Chlorobenzene was not detected in any of the wells sampled during this final sampling event.

Cis-1,2-Dichloroethene (DCE). None of the groundwater samples collected contained levels of DCE that exceeded the NYSDEC groundwater standard of 5 ppb. However, three of the wells sampled had detectable concentrations. Wells MW-1231C, MW-002, and MW-004 had reported concentrations of 3 ppb, 1 ppb, and 5 ppb, respectively.

A graphical presentation of these specific compounds of concern can be found in Figure 1. The analytical results from the previous five founds of groundwater sampling are provided in Tables 1 and 2.

HYDRAULIC CONDUCTIVITY AND SEEPAGE VELOCITY

Water level data collected from the bail test performed in Monitoring Well MW-1231C was reduced using Aquifer Test®, a commercially available software package and is provided as an enclosure. The data was analyzed using the Bouwer-Rice method and indicated that soils in proximity to the well-screened interval had a hydraulic conductivity of 1.45×10^{-3} ft/min. This value, in combination with porosity and hydraulic gradient data, can be used to calculate seepage velocity (V) of groundwater using the following equation:

$V=KI/n$
K = hydraulic conductivity (distance/time) → 1.45×10^{-3}
I = hydraulic gradient (dimensionless) → 0.002
n = porosity (dimensionless) → 0.3

The seepage velocity at MW-1231C during this sampling event was 9.7×10^{-6} feet/min or 1.40×10^{-2} ft/day.

If you have any questions regarding the results of this sampling event, please do not hesitate to contact us.

Very truly yours,

David R. Frostclapp
Engineer

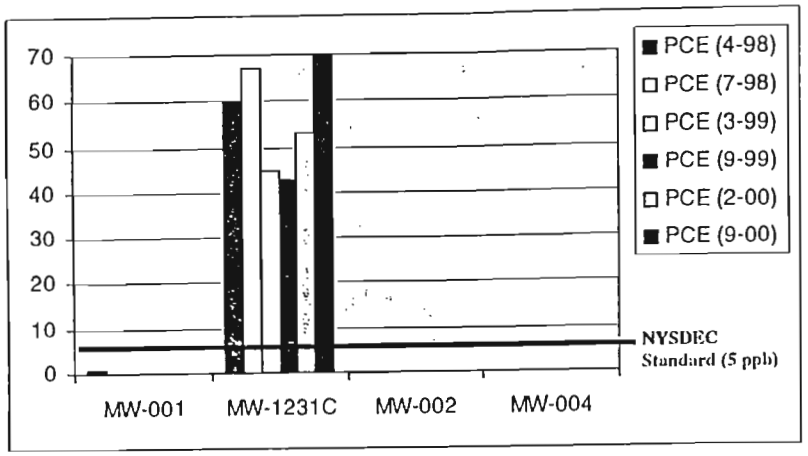
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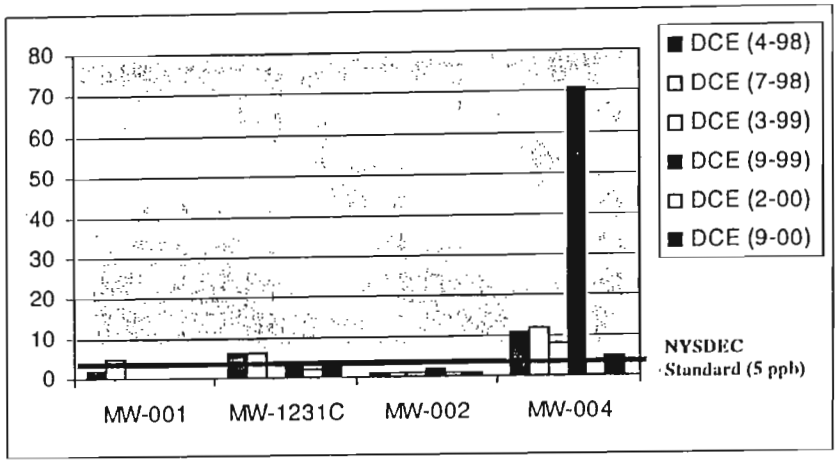
Enclosures

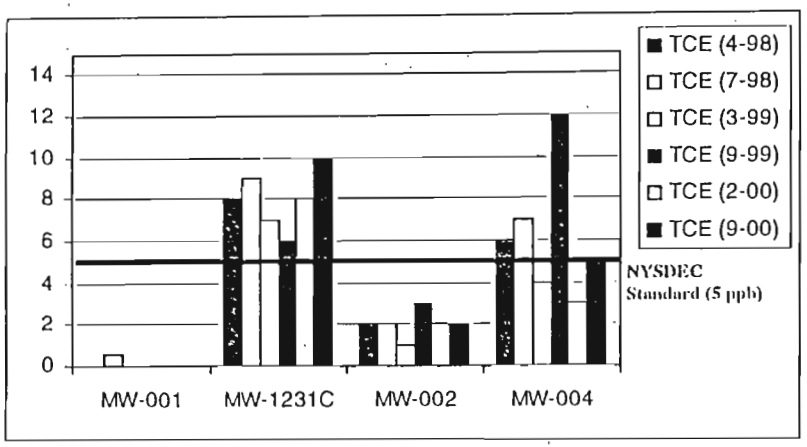
cc: Donald Sorbello, S&W Redevelopment (w/ enc.)

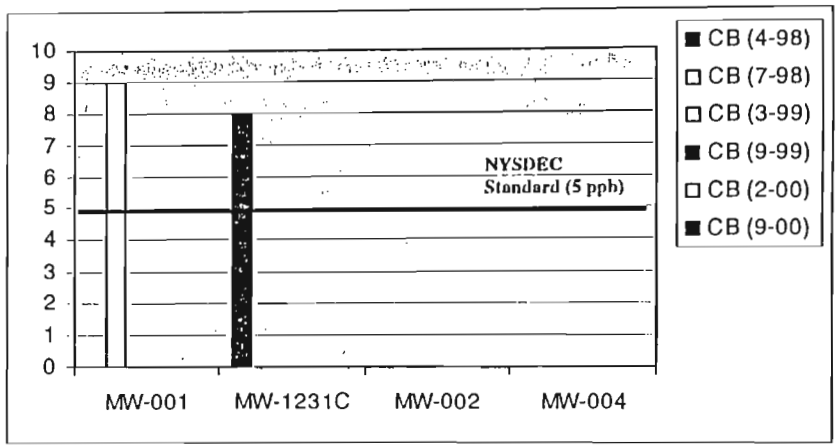
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Notes:
1) All measurements are in parts per billion (ppb)
2) TCE - trichloroethene, PCE - tetrachloroethene, DCE- 1,2-dichloroethene, CB - chlorobenzene
3) Due to site conditions, MW-001 was not sampled for 9-99 and 9-00

Stearns &Wheler, LLC
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DATE: 12/00 JOB No: 90060.10

VERONA RESEARCH FACILITY
VERONA, NY

FIGURE 1
Concentrations of VOCs in Groundwater

Table 1 (cont'd)
Historical Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Jan-01

	BUILDING 1253																GW
	MW-002								MW-004								
Compound (ug/l)	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Std.
Chloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50
Bromomethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Vinyl Chloride		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	2
Chloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Methylene Chloride	1 J	U	0.7 J	U	U	U	U	U	U	U	U	U	U	0.7 J	U	0.4 J	5
Acetone		U	16 B	U	U	U	U	U	U	U	U	U	U	2 JB	U	4 J	50G
Carbon Disulfide		U	0.5 J	U	U	U	U	U	U	U	U	U	U	U	U	U	50
Vinyl Acetate		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NONE
1,1-Dichloroethene		18	30	26	U	U	U	U	U	U	U	U	U	U	U	U	5
1,1-Dichloroethane	9 J	3 J	2 J	2 J	16	14 J	8	8	U	26	U	U	U	U	U	U	5
cis-1,2-Dichloroethene	3 J	3 J	1 J	1 J	1 J	2 J	1 J	1 J	9 J	7	11	12	8	71	4 J	5	5
trans-1,2-Dichloroethene	2 J	1 J	U	U	U	2 J	0.8 J	0.5 J	1 J	U	2 J	2 J	2 J	15	0.7 J	1 J	5
Chloroform		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	7
1,2-Dichloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6
2-Butanone		U	100	29	U	U	U	U	U	U	U	U	0.8 J	U	U	U	5
1,1,1-Trichloroethane		22	80	U	2 J	1 J	U	U	U	U	U	U	U	U	U	U	5
Carbon Tetrachloride		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Bromodichloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
1,2-Dichloropropane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4
Trichloroethene	2 J	2 J	2 J	2 J	1 J	3 J	2 J	2 J	7 J	12	6 J	7 J	4 J	12	3 J	5	5
Dibromochloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
Benzene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4
Bromoform		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
2-Hexanone		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
Tetrachloroethene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Toluene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Chlorobenzene		J	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Ethylbenzene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Styrene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Xylene (total)		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Total VOCs	16	49	215.5	60	20	22	11.8	11.5	17	45	19	21	14.8	98	7.7	11	
Depth to Groundwater (ft.)	4.74	5.52	2.43	2.99	1.55	8.9	1.51	NA	2.88	5.64	2.64	3.56	NA	8.83	1.28	NA	

NS: Not Sampled (1999 well was dry; September 2000 well was not located.
* Treated as UOC
G: NYSDEC guidance value.
ND No Detectable amounts allowed
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998.
Shaded areas indicate exceedances of standards
U - not present above detectio limits

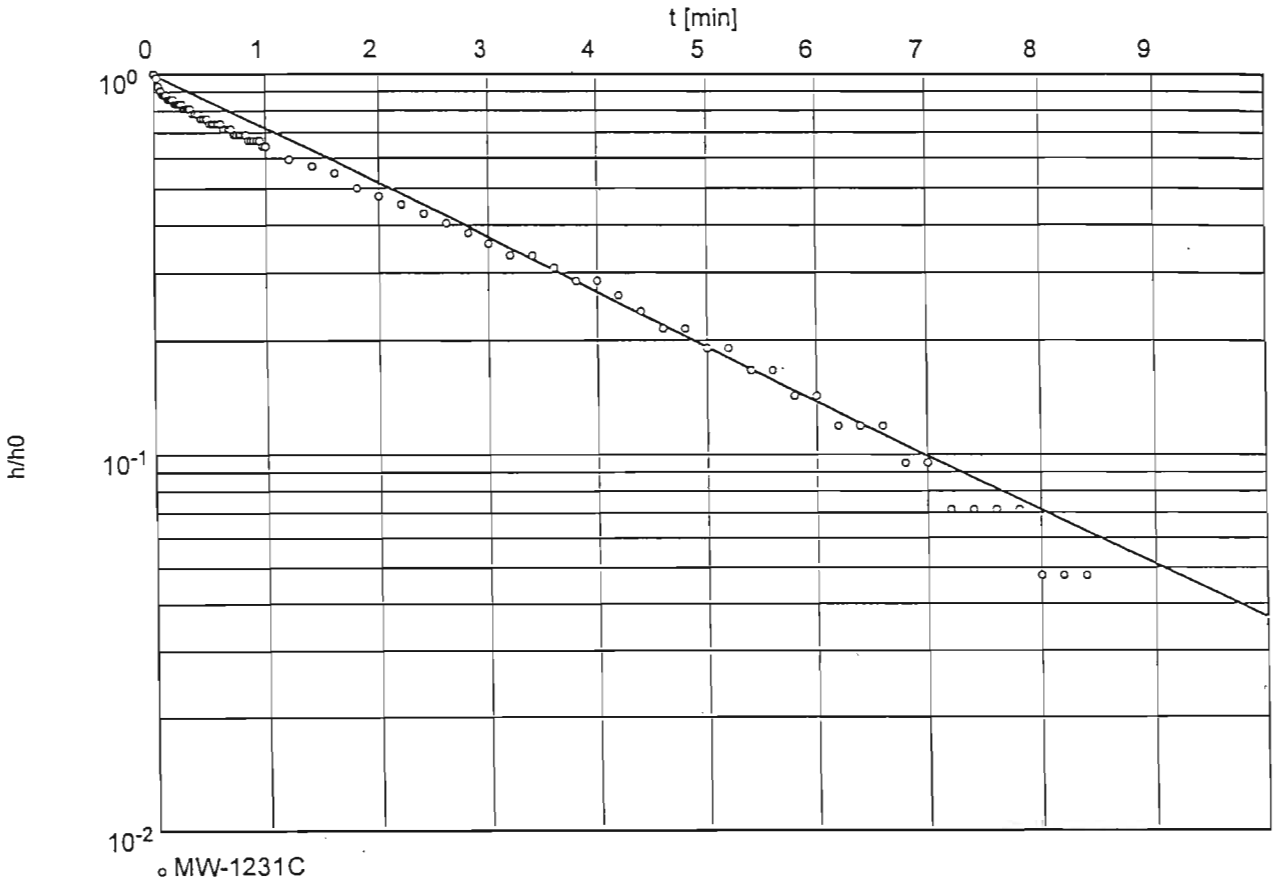
Table 1
Historical Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Jan-01

	BUILDING 1231																GW
	MW-001								MW-1231C								
Compound (ug/l)	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Std.
Chloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
Bromomethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Vinyl Chloride	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	2
Chloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	2 J	5
Methylene Chloride	U	UJ	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	5 J	5
Acetone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
Carbon Disulfide	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
Vinyl Acetate	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	NOINE
1,1-Dichloroethene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
1,1-Dichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
cis-1,2-Dichloroethene	26	38 J	2 J	5 J	NS	NS	U	NS	2	14	6 J	6 J	4 J	3 J	2 J	3	5
trans-1,2-Dichloroethene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Chloroform	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	7
1,2-Dichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.6
2-Butanone	U	U	U	U	NS	NS	U	NS	U	U	U	U	0.8 J	U	U	U	5
1,1,1-Trichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Carbon Tetrachloride	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Bromodichloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
1,2-Dichloropropane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.4
Trichloroethene	5 J	8 J	U	0.5 J	NS	NS	U	NS	5	14	8 J	9 J	7	6	8	10	5
Dibromochloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
Benzene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.4
Bromoform	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
2-Hexanone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
Tetrachloroethene	U	U	0.7 J	U	NS	NS	U	NS	57	50	60	67	45	43	53	70	5
Toluene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Chlorobenzene	290	930 J	U	9 J	NS	NS	U	NS	U	U	8 J	U	U	U	U	U	5
Ethylbenzene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Styrene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Xylene (total)	U	U	U	0.7 J	NS	NS		NS	U	U	U	U	U	U	U	U	5
Total VOCs	321	976	2.7	14.5	-	-	0	-	64	78	82	82	56.8	52	63	90	
Depth to Groundwater (ft.)		6.25	2.48	3.24	DRY	DRY	1.34	NA	NA	9.8	6.01	6.89	4.89	12.89	4.84	NA	

NS: Not Sampled (1999 well was dry; September 2000 well was not located.
* Treated as UOC
G. NYSDEC guidance value.
ND: No Detectable amounts allowed.
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998.
Shaded areas indicate exceedances of standards
U - not present above detectio limits
J - reported value is an estimate
NA - information not available

STEARNS & WHELEF 1 REMINGTON PARK DR... CAZENOVIA, NY 13035 ph.(315) 655-8161	slug/bail test analysis BOUWER-RICE's method	Date: 12/03\00	Page 1
		Project: Verona	
		Evaluated by: dss	

Slug Test No. 1	Test conducted on:
MW-1231C	



Hydraulic conductivity [ft/min]: 1.45×10^{-3}

STEARNS & WHELEI 1 REMINGTON PARK DRIVE CAZENOVIA, NY 13035 ph.(315) 655-8161	slug/bail test analysis BOUWER-RICE's method	Date: 12/03\00	Page 2
		Project: Verona	
		Evaluated by: dss	

Slug Test No. 1	Test conducted on:
MW-1231C	MW-1231C

Static water level: 100.00 ft below datum

	Pumping test duration [min]	Water level [ft]	Drawdown [ft]
1	0.00	100.42	0.42
2	0.01	100.42	0.42
3	0.02	100.41	0.41
4	0.03	100.41	0.41
5	0.04	100.39	0.39
6	0.05	100.39	0.39
7	0.06	100.38	0.38
8	0.07	100.38	0.38
9	0.08	100.37	0.37
10	0.09	100.37	0.37
11	0.10	100.37	0.37
12	0.11	100.37	0.37
13	0.12	100.37	0.37
14	0.13	100.36	0.36
15	0.14	100.36	0.36
16	0.15	100.36	0.36
17	0.16	100.36	0.36
18	0.17	100.36	0.36
19	0.18	100.36	0.36
20	0.19	100.35	0.35
21	0.20	100.35	0.35
22	0.21	100.35	0.35
23	0.22	100.35	0.35
24	0.23	100.35	0.35
25	0.24	100.35	0.35
26	0.25	100.35	0.35
27	0.26	100.35	0.35
28	0.27	100.34	0.34
29	0.28	100.34	0.34
30	0.29	100.34	0.34
31	0.30	100.34	0.34
32	0.31	100.34	0.34
33	0.32	100.34	0.34
34	0.33	100.34	0.34
35	0.35	100.33	0.33
36	0.37	100.33	0.33
37	0.38	100.33	0.33
38	0.40	100.33	0.33
39	0.42	100.32	0.32
40	0.43	100.32	0.32
41	0.45	100.32	0.32
42	0.47	100.32	0.32
43	0.48	100.32	0.32
44	0.50	100.31	0.31
45	0.52	100.31	0.31
46	0.53	100.31	0.31
47	0.55	100.31	0.31
48	0.57	100.31	0.31
49	0.58	100.31	0.31
50	0.60	100.31	0.31

STEARNS & WHELE! 1 REMINGTON PARK DR. . E CAZENOVIA, NY 13035 ph.(315) 655-8161	slug/bail test analysis BOUWER-RICE's method	Date: 12/03\00	Page 3
		Project: Verona	
		Evaluated by: dss	

Slug Test No. 1	Test conducted on:
MW-1231C	MW-1231C

Static water level: 100.00 ft below datum

	Pumping test duration [min]	Water level [ft]	Drawdown [ft]
51	0.62	100.30	0.30
52	0.63	100.30	0.30
53	0.65	100.30	0.30
54	0.67	100.30	0.30
55	0.68	100.30	0.30
56	0.70	100.30	0.30
57	0.72	100.29	0.29
58	0.73	100.29	0.29
59	0.75	100.29	0.29
60	0.77	100.29	0.29
61	0.78	100.29	0.29
62	0.80	100.29	0.29
63	0.82	100.29	0.29
64	0.83	100.29	0.29
65	0.85	100.28	0.28
66	0.87	100.28	0.28
67	0.88	100.28	0.28
68	0.90	100.28	0.28
69	0.92	100.28	0.28
70	0.93	100.28	0.28
71	0.95	100.28	0.28
72	0.97	100.27	0.27
73	0.98	100.27	0.27
74	1.00	100.27	0.27
75	1.20	100.25	0.25
76	1.40	100.24	0.24
77	1.60	100.23	0.23
78	1.80	100.21	0.21
79	2.00	100.20	0.20
80	2.20	100.19	0.19
81	2.40	100.18	0.18
82	2.60	100.17	0.17
83	2.80	100.16	0.16
84	3.00	100.15	0.15
85	3.20	100.14	0.14
86	3.40	100.14	0.14
87	3.60	100.13	0.13
88	3.80	100.12	0.12
89	4.00	100.12	0.12
90	4.20	100.11	0.11
91	4.40	100.10	0.10
92	4.60	100.09	0.09
93	4.80	100.09	0.09
94	5.00	100.08	0.08
95	5.20	100.08	0.08
96	5.40	100.07	0.07
97	5.60	100.07	0.07
98	5.80	100.06	0.06
99	6.00	100.06	0.06
100	6.20	100.05	0.05

STEARNS & WHELEI 1 REMINGTON PARK DRIVE CAZENOVIA, NY 13035 ph.(315) 655-8161	slug/bail test analysis BOUWER-RICE's method	Date: 12/03\00	Page 4
		Project: Verona	
		Evaluated by: dss	

Slug Test No. 1	Test conducted on:
MW-1231C	MW-1231C

Static water level: 100.00 ft below datum

	Pumping test duration [min]	Water level [ft]	Drawdown [ft]
101	6.40	100.05	0.05
102	6.60	100.05	0.05
103	6.80	100.04	0.04
104	7.00	100.04	0.04
105	7.20	100.03	0.03
106	7.40	100.03	0.03
107	7.60	100.03	0.03
108	7.80	100.03	0.03
109	8.00	100.02	0.02
110	8.20	100.02	0.02
111	8.40	100.02	0.02

Stearns & Wheler, LLC
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90060.0

May 3, 2000

Mr. Bruce H. Mero, REM
Air Force Research Laboratories
Rome Research Site
150 Electronics Parkway
Rome, NY 13441-4516

Re: Semi-annual Monitoring of Groundwater
At the Verona Research Facility
S&W No. 90060.0

Dear Mr. Mero:

This letter report provides a discussion of the groundwater sampling results at the Verona Research Facility since October 1997. Groundwater sampling has been implemented based on findings of the Preliminary Site Assessment. Four monitoring wells and Brandy Brook (surface water) are to be sampled semi-annually during the course of two years to determine if concentrations of organic compounds are decreasing. The wells were selected because each had a history of being impacted by volatile organic compounds (VOCs). Attached are summary tables of the analytical results from the previous five rounds of groundwater sampling. Groundwater samples were collected from monitoring wells MW-001 and MW-1231C at Building 1231, and wells MW-002 and MW-004 at Building 1253. In addition, one surface water sample was collected from Brandy Brook. This letter report incorporates results from the February 2000 sampling. The final sampling will occur during the fourth quarter of 2000.

The results from the February 2000 sampling of the compounds of specific concern (trichloroethene [TCE], tetrachloroethene [PCE], chlorobenzene [CB], and 1,2-dichloroethene [DCE]) are summarized below. Laboratory results from Brandy Brook for these specific compounds were non-detects and will not be discussed further.

Trichloroethene (TCE): TCE concentrations exceeded the NYSDEC groundwater standard at monitoring well MW-1231C. The reported concentration was 8 ppb. Monitoring wells MW-002 and MW-004 had detectable concentrations of TCE (2 ppb and 3 ppb, respectively); however, both were below the NYSDEC groundwater standard of 5 ppb.

Tetrachloroethene (PCE): PCE was detected above NYSDEC groundwater standards only at monitoring well 1231C, which had a reported concentration of 53 ppb. The concentrations of PCE at the other sampling locations were reported as non-detect.

Chlorobenzene (CB): Chlorobenzene concentrations were reported as non-detect at all sampling locations and are therefore below the NYSDEC groundwater standard of 5 ppb.

cis-1,2-dichloroethene (DCE): Laboratory results indicate that none of the samples collected had levels of DCE that exceeded the NYSDEC groundwater standard of 5 ppb. Monitoring wells MW-1231C, MW-002, and MW-004 had reported concentrations of 2 ppb, 1 ppb, and 4 ppb, respectively.

A graphical trend analysis of these specific compounds of concern can be found in Figure 1. The analytical results from the previous five rounds of groundwater sampling are provided in Tables 1 and 2. The next sampling event is planned for the fall of 2000.

If you have any questions regarding the results of this sampling event, please do not hesitate to contact me.

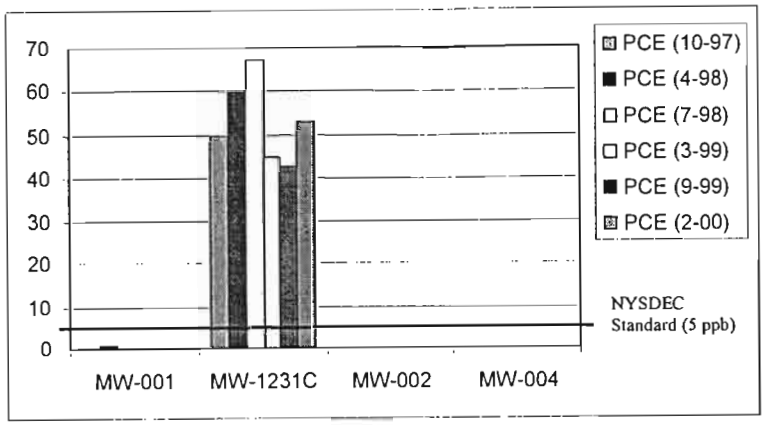
Very truly yours,

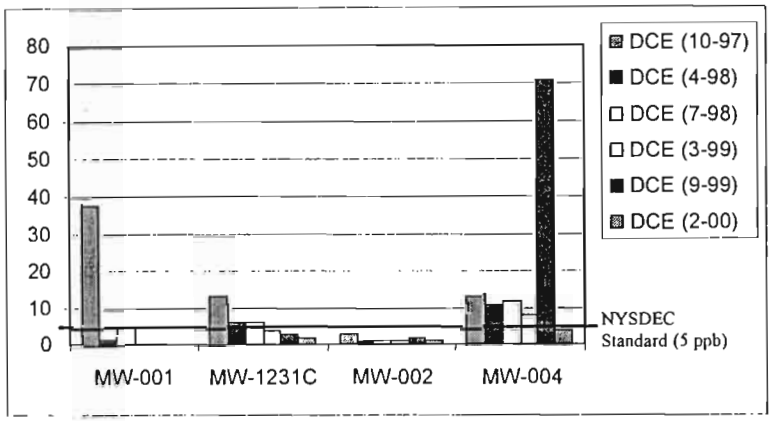
David R. Frostclapp
Engineer

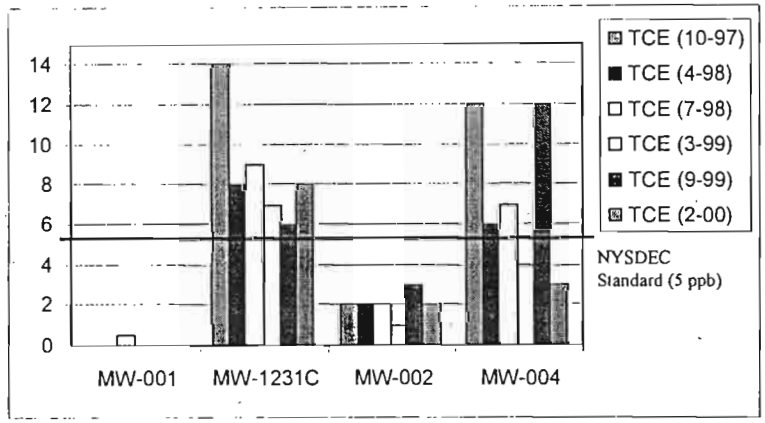
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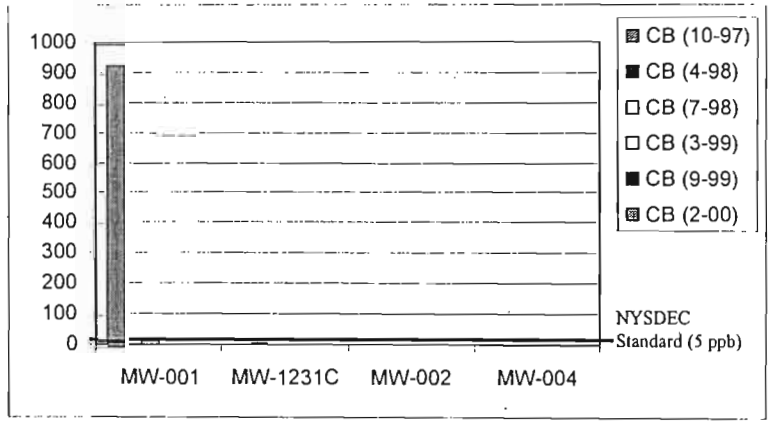
Enclosures

pc: Donald S. Sorbello, Environmental Technician, S&W Redevelopment (w/enc.)









Notes:
1) All measurements are in parts per billion (ppb)
2) TCE - trichloroethene, PCE - tetrachloroethene, DCE- 1,2-dichloroethene, CB - chlorobenzene
3) Due to dry conditions, MW-001 was not sampled for 9-99

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK

DATE: 04/00 JOB No: 90060.10

VERONA RESEARCH FACILITY
VERONA, NY

FIGURE 1
Concentrations of VOCs in Groundwater

Table 2
Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY

	BUILDING 1253												GW
	MW-002						MW-004						
Compound (ug/l)	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Std.
Chloromethane	U	U	U	U	U	U	U	U	U	U	U	U	50
Bromomethane	U	U	U	U	U	U	U	U	U	U	U	U	5
Vinyl Chloride	U	U	U	U	U	U	U	U	U	U	U	U	2
Chloroethane	U	U	U	U	U	U	U	U	U	U	U	U	5
Methylene Chloride	U	0.7 J	U	U	U	U	U	U	U	U	0.7 J	U	5
Acetone	U	16 B	U	U	U	U	U	U	U	U	2 JB	U	50G
Carbon Disulfide	U	0.5 J	U	U	U	U	U	U	U	U	U	U	50
Vinyl Acetate	U	U	U	U	U	U	U	U	U	U	U	U	NOINE
1,1-Dichloroethene	18	30	26	U	U	U	U	U	U	U	U	U	5
1,1-Dichloroethane	3 J	2 J	2 J	16	14 J	8	26	U	U	U	U	U	5
cis-1,2-Dichloroethene	3 J	1 J	1 J	1 J	2 J	1 J	7	11	12	8	71	4 J	5
trans-1,2-Dichloroethene	1 J	U	U	U	2 J	0.8 J	U	2 J	2 J	2 J	15	0.7 J	5
Chloroform	U	U	U	U	U	U	U	U	U	U	U	U	7
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U	U	U	0.6
2-Butanone	U	100	29	U	U	U	U	U	U	0.8 J	U	U	5
1,1,1-Trichloroethane	22	80	U	2 J	1 J	U	U	U	U	U	U	U	5
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	U	U	U	5
Bromodichloromethane	U	U	U	U	U	U	U	U	U	U	U	U	50G
1,2-Dichloropropane	U	U	U	U	U	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	U	U	0.4
Trichloroethene	2 J	2 J	2 J	1 J	3 J	2 J	12	6 J	7 J	4 J	17	3 J	5
Dibromochloromethane	U	U	U	U	U	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane	U	U	U	U	U	U	U	U	U	U	U	U	1
Benzene	U	U	U	U	U	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	U	U	0.4
Bromoform	U	U	U	U	U	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone	U	U	U	U	U	U	U	U	U	U	U	U	50G
2-Hexanone	U	U	U	U	U	U	U	U	U	U	U	U	50G
Tetrachloroethene	U	U	U	U	U	U	U	U	U	U	U	U	5
Toluene	U	U	U	U	U	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	U	U	U	U	U	5
Chlorobenzene	J	U	U	U	U	U	U	U	U	U	U	U	5
Ethylbenzene	U	U	U	U	U	U	U	U	U	U	U	U	5
Styrene	U	U	U	U	U	U	U	U	U	U	U	U	5
Xylene (total)	U	U	U	U	U	U	U	U	U	U	U	U	5
Depth to Groundwater (ft.)	5.52	2.43	2.99	1.55	8.9	1.51	5.64	2.64	3.56	NA	8.83	1.28	

NS: Not Sampled
* Treated as UOC
G: NYSDEC guidance value.
ND: No Detectable amounts allowed.
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998
Shaded areas indicate exceedances of standards
See attachment for other qualifiers

Table 1
Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY

	BUILDING 1231												GW
	MW-001						MW-1231C						
Compound (ug/l)	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Std.
Chloromethane	U	U	U	NS	NS	U	U	U	U	U	U	U	50
Bromomethane	U	U	U	NS	NS	U	U	U	U	U	U	U	5
Vinyl Chloride	U	U	U	NS	NS	U	U	U	U	U	U	U	2
Chloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U	5
Methylene Chloride	UJ	U	U	NS	NS	U	U	U	U	U	U	U	5
Acetone	U	U	U	NS	NS	U	U	U	U	U	U	U	50G
Carbon Disulfide	U	U	U	NS	NS	U	U	U	U	U	U	U	50
Vinyl Acetate	U	U	U	NS	NS	U	U	U	U	U	U	U	NOINE
1,1-Dichloroethene	U	U	U	NS	NS	U	U	U	U	U	U	U	5
1,1-Dichloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U	5
cis-1,2-Dichloroethene	38 J	2 J	5 J	NS	NS	U	14	6 J	6 J	4 J	3 J	2 J	5
trans-1,2-Dichloroethene	U	U	U	NS	NS	U	U	U	U	U	U	U	5
Chloroform	U	U	U	NS	NS	U	U	U	U	U	U	U	7
1,2-Dichloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U	0.6
2-Butanone	U	U	U	NS	NS	U	U	U	U	0.8 J	U	U	5
1,1,1-Trichloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U	5
Carbon Tetrachloride	U	U	U	NS	NS	U	U	U	U	U	U	U	5
Bromodichloromethane	U	U	U	NS	NS	U	U	U	U	U	U	U	50G
1,2-Dichloropropane	U	U	U	NS	NS	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene	U	U	U	NS	NS	U	U	U	U	U	U	U	0.4
Trichloroethene	U	U	0.5 J	NS	NS	U	14	8 J	9 J	7	6	8	5
Dibromochloromethane	U	U	U	NS	NS	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U	1
Benzene	8 J	U	U	NS	NS	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene	U	U	U	NS	NS	U	U	U	U	U	U	U	0.4
Bromoform	U	U	U	NS	NS	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone	U	U	U	NS	NS	U	U	U	U	U	U	U	50G
2-Hexanone	U	U	U	NS	NS	U	U	U	U	U	U	U	50G
Tetrachloroethene	U	0.7 J	U	NS	NS	U	50	60	67	45	43	53	5
Toluene	U	U	U	NS	NS	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U	5
Chlorobenzene	930 J	U	9 J	NS	NS	U	U	8 J	U	U	U	U	5
Ethylbenzene	U	U	U	NS	NS	U	U	U	U	U	U	U	5
Styrene	U	U	U	NS	NS	U	U	U	U	U	U	U	5
Xylene (total)	U	U	0.7 J	NS	NS	U	U	U	U	U	U	U	5
Depth to Groundwater (ft.)	6.25	2.48	3.24	DRY	DRY	1.34	9.8	6.01	6.89	4.89	12.89	4.84	

NS. Not Sampled
* Treated as UOC
G: NYSDEC guidance value.
ND: No Detectable amounts allowed
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Shaded areas indicate exceedances of standards

See attachment for other qualifiers

ORGANICS APPENDIX

U - Indicates that the compound was analyzed for but not detected.

J - Indicates that the compound was analyzed for and determined to be present in the sample. The mass spectrum of the compound meets the identification criteria of the method. The concentration listed is an estimated value, which is less than the specified minimum detection limit but is greater than zero.

B - This flag is used when the analyte is found in the blanks as well as the sample. It indicates possible sample contamination and warns the data user to use caution when applying the results of this analyte.

M - Indicates that the compound was analyzed for but not requested as an analyte. Value will not be listed on tabular result sheet.

S - Estimated due to surrogate outliers.

X - Matrix spike compound.

(1) - Cannot be separated.

(2) - Decomposes to azobenzene. Measured and calibrated as azobenzene.

A - This flag indicates that a TIC is a suspected aldol condensation product.

E - Indicates that it exceeds calibration curve range.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

C - Confirmed by GC/MS.

T - Compound present in TCLP blank.

P - This flag is used for a pesticide/aroclor target analyte when there is a greater than 25 percent difference for detected concentrations between the two GC columns (see Form X).

90060.0 255

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

COPY

December 21, 1999

Mr. Bruce H. Mero, REM
Air Force Research Laboratories
Rome Research Site
150 Electronics Parkway
Rome, NY 13441-4516

Re: Semi-annual Monitoring of Groundwater
at the Verona Research Facility
S&W No. 90060.0

Dear. Mr. Mero:

This letter report provides a discussion of the groundwater sampling results at the Verona Research Facility since October 1997. Groundwater sampling has been implemented based on findings of the Preliminary Site Assessment. Four monitoring wells are to be sampled semi-annually during the course of two years to determine if concentrations of organic compounds are decreasing. The wells were selected because each had a history of being impacted by volatile organic compounds (VOCs). Groundwater samples were collected from well MW-1231C at Building 1231 and wells MW-002 and MW-004 at Building 1253. Samples were supposed to be collected from MW-001 (at Building 1231) and from Brandy Brook; however, due to dry conditions, there was not enough water at MW-001 or Brandy Brook for sampling during the September 1999 semi-annual sampling event.

The results of the compounds of specific concern (trichloroethene [TCE], tetrachloroethene [PCE], chlorobenzene [CB], and 1,2-dichloroethene [DCE]) are summarized below.

Trichloroethene (TCE): TCE concentrations exceed the NYSDEC groundwater standard at wells MW-1231C and MW-004. The concentration at the two wells were 6 ppb (part per billion) and 12 ppb, respectively, versus the NYSDEC groundwater standard of 5 ppb.

Tetrachloroethene (PCE): The concentration of PCE (12 ppb) at well MW-1231C continues to exceed NYSDEC groundwater standards (NYSDEC TOGS, June 1998). Concentrations of PCE at the other wells tested are below groundwater standards. The NYSDEC groundwater standard is 5 ppb.

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Chlorobenzene (CB): Chlorobenzene concentrations are less than NYSDEC groundwater standards for the wells tested. The NYSDEC groundwater standard is 5 ppb.

1,2-dichloroethene (DCE): Analytical results regarding DCE indicate exceedance of groundwater standards at MW-004. The concentration at MW-004 is 71 ppb. DCE concentrations at the other wells are less than NYSDEC groundwater standards (5 ppb).

A graphical trend analysis of these specific compounds of concern is included in Figure 1. The analytical results from the previous five rounds of groundwater sampling are provided in Tables 1 and 2. The next sampling event is planned for the spring of 2000.

If you have any questions regarding the results of this sampling event, please do not hesitate to contact me.

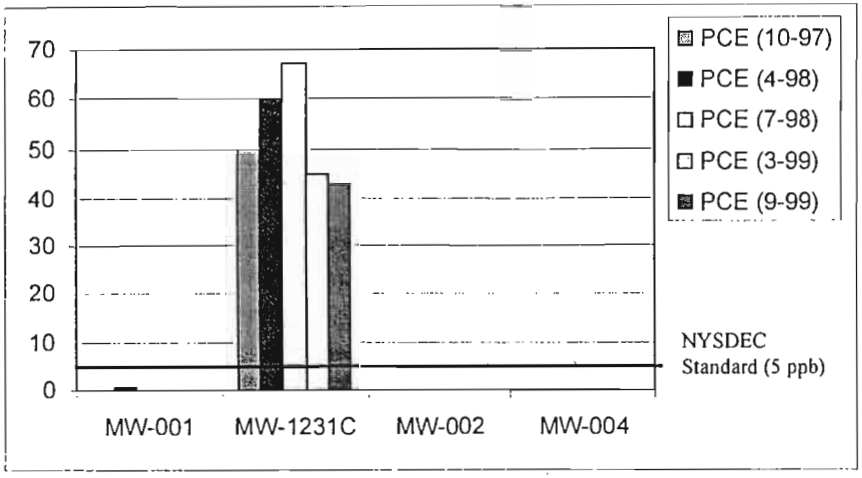
Very truly yours,

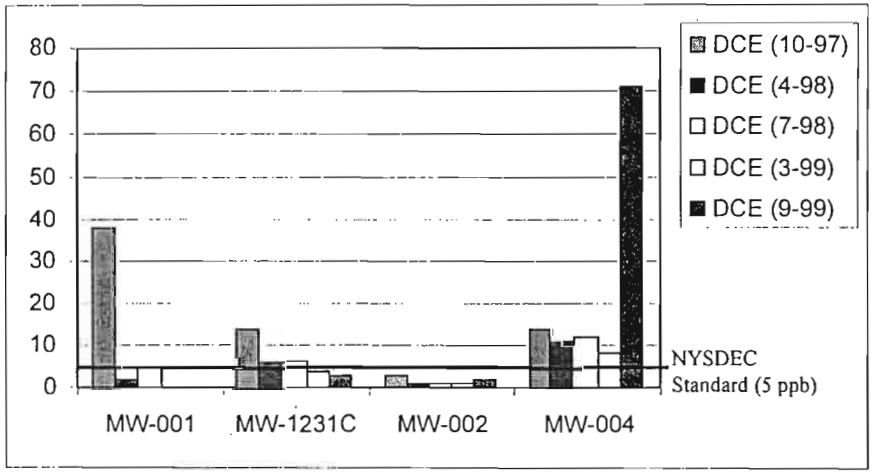
Gregory S. Corso, P.E.
Project Manager

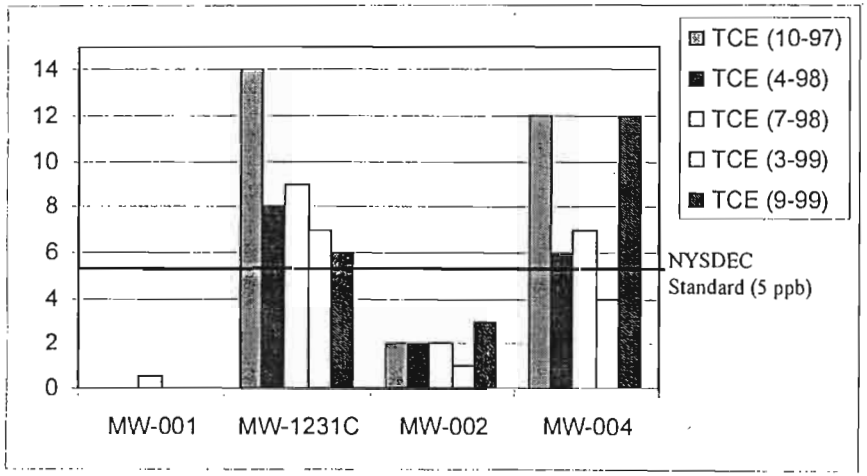
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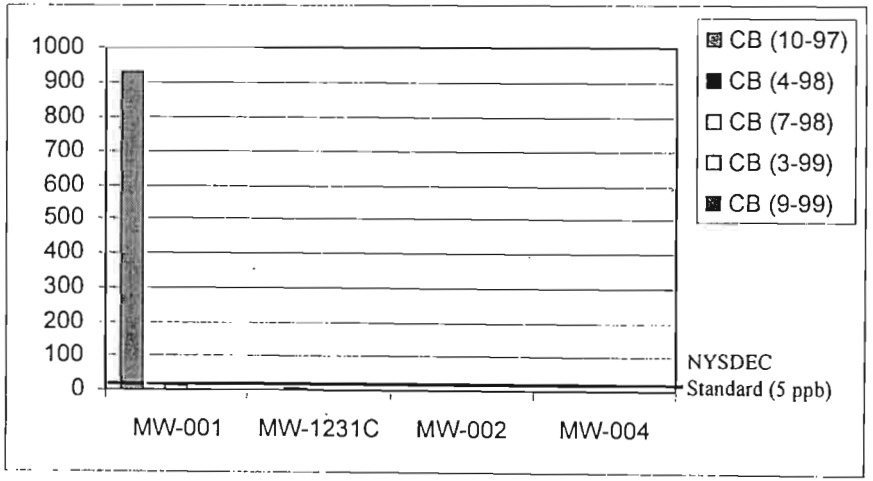
Enclosures

pc: Donald S. Sorbello, Environmental Technician, Stearns & Wheler, LLC (w/enc.)









Notes:
1) All measurements are in parts per billion (ppb)
2) TCE - trichloroethene, PCE - tetrachloroethene, DCE- 1,2-dichloroethene, CB - chlorobenzene
3) Due to dry conditions, MW-001 was not sampled for 9-99

Stearns & Wheeler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK

DATE: 12/99 JOB No: 90060.10

VERONA RESEARCH FACILITY
VERONA, NY

FIGURE 1
Concentrations of VOCs in Groundwater

Table 2
Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY

	BUILDING 1253										GW
	MW-002					MW-004					
Compound (ug/l)	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Std.
Chloromethane	U	U	U	U	U	U	U	U	U	U	50
Bromomethane	U	U	U	U	U	U	U	U	U	U	5
Vinyl Chloride	U	U	U	U	U	U	U	U	U	U	2
Chloroethane	U	U	U	U	U	U	U	U	U	U	5
Methylene Chloride	U	0.7 J	U	U	U	U	U	U	U	0.7 J	5
Acetone	U	16 B	U	U	U	U	U	U	U	2 JB	50G
Carbon Disulfide	U	0.5 J	U	U	U	U	U	U	U	U	50
Vinyl Acetate	U	U	U	U	U	U	U	U	U	U	NOINE
1,1-Dichloroethene	18	30	26	U	U	U	U	U	U	U	5
1,1-Dichloroethane	3 J	2 J	2 J	16	14 J	26	U	U	U	U	5
cis-1,2-Dichloroethene	3 J	1 J	1 J	1 J	2 J	7	11	12	8	71	5
trans-1,2-Dichloroethene	1 J	U	U	U	2 J	U	2 J	2 J	2 J	15	5
Chloroform	U	U	U	U	U	U	U	U	U	U	7
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U	0.6
2-Butanone	U	100	29	U	U	U	U	U	0.8 J	U	5
1,1,1-Trichloroethane	22	80	U	2 J	1 J	U	U	U	U	U	5
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	U	5
Bromodichloromethane	U	U	U	U	U	U	U	U	U	U	50G
1,2-Dichloropropane	U	U	U	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	0.4
Trichloroethene	2 J	2 J	2 J	1 J	3 J	12	6 J	7 J	4 J	12	5
Dibromochloromethane	U	U	U	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane	U	U	U	U	U	U	U	U	U	U	1
Benzene	U	U	U	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	0.4
Bromoform	U	U	U	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone	U	U	U	U	U	U	U	U	U	U	50G
2-Hexanone	U	U	U	U	U	U	U	U	U	U	50G
Tetrachloroethene	U	U	U	U	U	U	U	U	U	U	5
Toluene	U	U	U	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	U	U	U	5
Chlorobenzene	J	U	U	U	U	U	U	U	U	U	5
Ethylbenzene	U	U	U	U	U	U	U	U	U	U	5
Styrene	U	U	U	U	U	U	U	U	U	U	5
Xylene (total)	U	U	U	U	U	U	U	U	U	U	5
Depth to Groundwater (ft.)	5.52	2.43	2.99	1.55	8.9	5.64	2.64	3.56	NA	8.83	

NS: Not Sampled
* Treated as UOC
G: NYSDEC guidance value
ND: No Detectable amounts allowed.
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998.
Shaded areas indicate exceedances of standards
See attachment for other qualifiers

Table 1
Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY

	BUILDING 1231										GW
	MW-001					MW-1231C					
Compound (ug/l)	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Std.
Chloromethane	U	U	U	NS	NS	U	U	U	U	U	50
Bromomethane	U	U	U	NS	NS	U	U	U	U	U	5
Vinyl Chloride	U	U	U	NS	NS	U	U	U	U	U	2
Chloroethane	U	U	U	NS	NS	U	U	U	U	U	5
Methylene Chloride	UJ	U	U	NS	NS	U	U	U	U	U	5
Acetone	U	U	U	NS	NS	U	U	U	U	U	50G
Carbon Disulfide	U	U	U	NS	NS	U	U	U	U	U	50
Vinyl Acetate	U	U	U	NS	NS	U	U	U	U	U	NOINE
1,1-Dichloroethene	U	U	U	NS	NS	U	U	U	U	U	5
1,1-Dichloroethane	U	U	U	NS	NS	U	U	U	U	U	5
cis-1,2-Dichloroethene	38 J	2 J	5 J	NS	NS	14	6 J	6 J	4 J	3 J	5
trans-1,2-Dichloroethene	U	U	U	NS	NS	U	U	U	U	U	5
Chloroform	U	U	U	NS	NS	U	U	U	U	U	7
1,2-Dichloroethane	U	U	U	NS	NS	U	U	U	U	U	0.6
2-Butanone	U	U	U	NS	NS	U	U	U	0.8 J	U	5
1,1,1-Trichloroethane	U	U	U	NS	NS	U	U	U	U	U	5
Carbon Tetrachloride	U	U	U	NS	NS	U	U	U	U	U	5
Bromodichloromethane	U	U	U	NS	NS	U	U	U	U	U	50G
1,2-Dichloropropane	U	U	U	NS	NS	U	U	U	U	U	1
cis-1,3-Dichloropropene	U	U	U	NS	NS	U	U	U	U	U	0.4
Trichloroethene	U	U	0.5 J	NS	NS	14	8 J	9 J	7	6	5
Dibromochloromethane	U	U	U	NS	NS	U	U	U	U	U	50G
1,1,2-Trichloroethane	U	U	U	NS	NS	U	U	U	U	U	1
Benzene	8 J	U	U	NS	NS	U	U	U	U	U	1
trans-1,3-Dichloropropene	U	U	U	NS	NS	U	U	U	U	U	0.4
Bromoform	U	U	U	NS	NS	U	U	U	U	U	50
4-Methyl-2-Pentanone	U	U	U	NS	NS	U	U	U	U	U	50G
2-Hexanone	U	U	U	NS	NS	U	U	U	U	U	50G
Tetrachloroethene	U	0.7 J	U	NS	NS	50	60	67	45	43	5
Toluene	U	U	U	NS	NS	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	U	U	NS	NS	U	U	U	U	U	5
Chlorobenzene	930 J	U	9 J	NS	NS	U	8 J	U	U	U	5
Ethylbenzene	U	U	U	NS	NS	U	U	U	U	U	5
Styrene	U	U	U	NS	NS	U	U	U	U	U	5
Xylene (total)	U	U	0.7 J	NS	NS	U	U	U	U	U	5
Depth to Groundwater (ft.)	6.25	2.48	3.24	DRY	DRY	9.8	6.01	6.89	4.89	12.89	

NS: Not Sampled
* Treated as UOC
G: NYSDEC guidance value.
ND: No Detectable amounts allowed.
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998.
Shaded areas indicate exceedances of standards

See attachment for other qualifiers

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

FILE COPY

May 24, 1999

Mr. Bruce H. Mero, REM
Rome Laboratories
150 Electronic Parkway
Rome, NY 13441-4516

Re: Semiannual Monitoring of Groundwater
at the Verona Research Facility
S&W No. 90060.0

Dear Mr. Mero:

Following is a discussion of the results of the first of four rounds of groundwater sampling to be completed at the Verona Research Facility. This semiannual sampling requirement is the result of the completion of the Preliminary Site Assessment, which required that four monitoring wells be sampled during the course of two years to determine if concentrations of organic compounds are decreasing. The wells were selected because each had a history of being impacted by VOCs. Attached are summary tables of the analytical results from the first round of groundwater monitoring being completed at the Verona Research Facility. Included in the results are graphs of the trends of specific compounds of concern (trichloroethene, tetrachloroethene, chlorobenzene, and 1,2-dichloroethene). As noted on Figure 1, the concentrations have been monitored since October 1996.

Groundwater samples were collected from well MW-1231C at Building 1231 and wells MW-002 and MW-004 at Building 1253. A sample was supposed to be collected from well MW-001 at Building 1231, however, due to snowplow damage to the well, the top portion of the water column was exposed and frozen, prohibiting the collection of a sample. In addition to groundwater, a single surface water sample, (SW-1) was collected near the outfall of the chlorine dosing chamber/sand filter to determine if impacted groundwater was migrating to Brandy Brook.

Table 1 illustrates the results of the groundwater analysis. The March 1999 results indicate that concentrations of TCE (7 ppb) and PCE (45 ppb) at well MW-1231C exceed groundwater standards (NYSDEC June 1998). Analytical results of the sample collected from well MW-002 at Building 1253 indicate that the concentration of 1,1-DCA (16 ppb) was above groundwater

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standards. The results from well MW-004 at Building 1253 indicate that the concentration of cis-1,2-DCE (8 ppb) was above groundwater standards.

As stated earlier, a single surface water sample was collected at the site. The analysis of groundwater from this location indicated that there were no exceedances of standards for any VOCs in Brandy Brook.

Figure 1 illustrates the concentration changes of the four compounds of concern during the last four sampling events. PCE concentrations at well MW-1231C have remained fairly consistent during the sampling events. TCE concentrations appear to be decreasing at wells MW-1231C and MW-004 to concentrations near or below the groundwater standard of 5 ppb. DCE concentrations are approaching standards at well MW-004 and have fallen below groundwater standards at wells MW-001, MW-1231C and MW-002. Chlorobenzene concentrations have dropped below standards at well MW-001.

The next sampling event is planned for the fall of 1999.

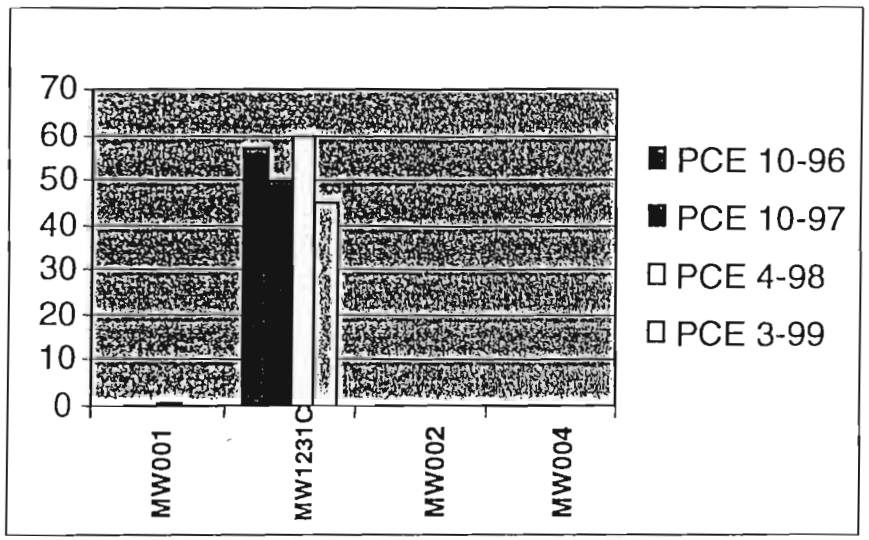
If you have any questions regarding the results of this sampling event, please do not hesitate to call either Scott L. Graham, Hydrogeologist; or me.

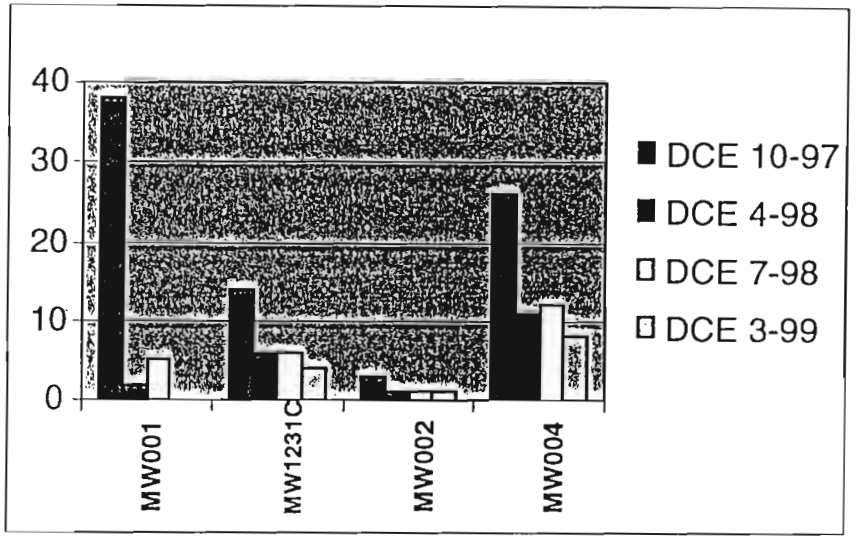
Very truly yours,

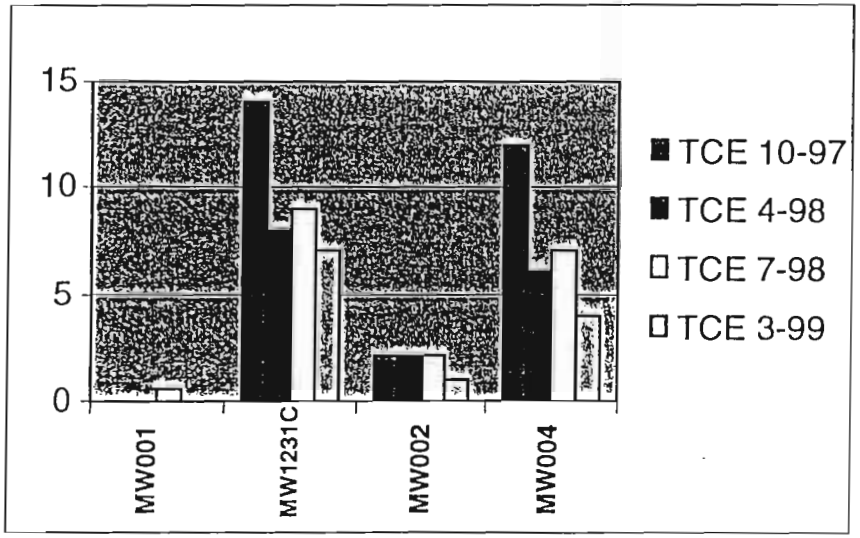
Gregory S. Corso, P.E.
Project Manager

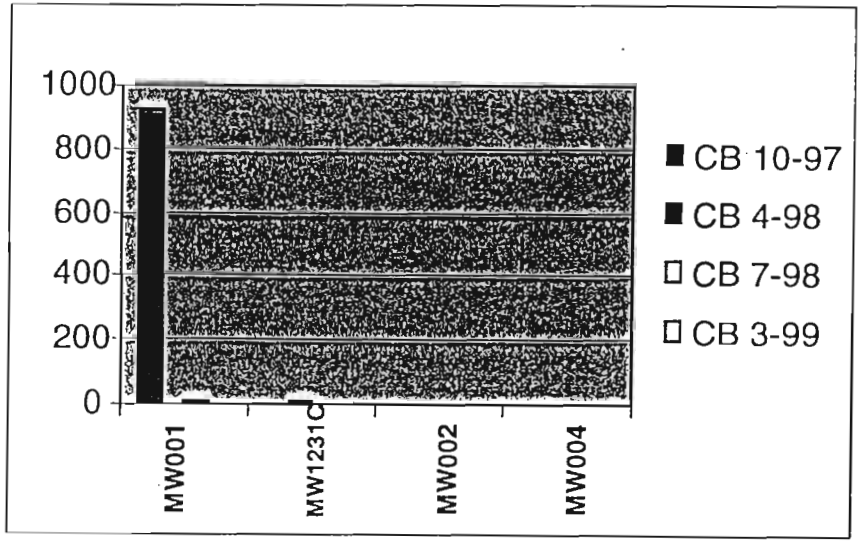
GSC/smp

Enclosures









Note:
1. All measurements are in parts per billion (ppb)
2. TCE - trichloroethene PCE - tetrachloroethene
   DCE - 1,2-dichloroethene CB - chlorobenzene

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK

DATE: 4/99 JOB No: 90060.10

VERONA RESEARCH FACILITY
VERONA, NY

FIGURE 1
Concentrations of VOCs in Groundwater

Table 1
Groundwater
Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Mar-99

	Building 1231										GW Std
Compound (ug/l)	MW-001/Oct 96	MW-001/Oct-97	MW-001/Apr-98	MW-001/Jul-98	MW-001/Mar-99	MW1231C/Oct-96	MW1231C/Oct 97	MW1231C/Apr-98	MW1231C/Jul-98	MW1231C/Mar-99	(ug/l)
Chloromethane	U	100U	U	U	NS	UJ	10U	U	U	U	50
Bromomethane	U	100U	U	U	NS	U	10U	U	U	U	5
Vinyl Chloride	U	100U	U	U	NS	U	10U	U	U	U	2
Chloroethane	UJ	100U	U	U	NS	UJ	10U	U	U	U	5
Methylene Chloride	U	100UJ	U	U	NS	U	10U	U	10U	U	5
Acetone	44J	100U	U	U	NS	UJ	10U	U	U	U	50G
Carbon Disulfide	U	100U	U	10U	NS	UJ	10U	U	U	U	50
Vinyl Acetate	U	100U	U	U	NS	U	10U	U	U	U	NONE
1,1-Dichloroethene	U	100U	U	U	NS	U	10U	U	U	U	5
1,1-Dichloroethane	U	100U	U	U	NS	U	10U	U	U	U	5
cis-1,2-Dichloroethene	24	38J	2J	5J	NS	2J	14	5J	6J	4J	5
Trans-1,2-Dichloroethene	U	100U	U	U	NS	U	10U	U	U	U	5
Chloroform	U	100U	U	U	NS	U	10U	U	U	U	7
1,2-Dichloroethane	U	100U	U	U	NS	U	10U	U	U	U	5
2-Butanone	U	100U	U	U	NS	U	10U	U	U	.8J	5
1,1,1-Trichloroethane	U	100U	U	U	NS	U	10U	U	U	U	5
Carbon Tetrachloride	U	100U	U	U	NS	U	10U	U	U	U	5
Bromodichloromethane	U	100U	U	U	NS	U	10U	U	U	U	50G
1,2-Dichloropropane	U	100U	U	U	NS	U	10U	U	U	U	5
cis-1,3-Dichloropropene	U	100U	U	U	NS	U	10U	U	U	U	5
Trichloroethene	U	100U	U	.5J	NS	5J	14	8J	9J	7J	5
Dibromochloromethane	U	100U	U	U	NS	U	10U	U	U	U	5
1,1,2-Trichloroethane	U	100U	U	U	NS	U	10U	U	U	U	50G
Benzene	U	1J	U	U	NS	U	10U	U	U	U	5
trans-1,3-Dichloropropene	5J	100U	U	U	NS	U	10U	U	U	U	0.7
Bromoform	U	100U	U	U	NS	U	10U	U	U	U	5
4-Methyl-2-Pentanone	U	100U	U	U	NS	U	10U	U	U	U	50G
2-Hexanone	UJ	100U	U	U	NS	UJ	10U	U	U	U	50
Tetrachloroethene	U	100UJ	.7J	U	NS	57	50	40J	67	45	5
1,1,2,2-Tetrachloroethane	U	100U	U	U	NS	U	10U	U	U	U	5
Toluene	U	100U	U	U	NS	U	10U	U	U	U	5
Chlorobenzene	290	230J	U	2J	NS	U	10U	8J	U	U	5
Ethylbenzene	U	100U	U	U	NS	U	10U	U	U	U	5
Styrene	U	100U	U	U	NS	U	10U	U	U	U	5
Xylene (total)	U	100U	U	U	NS	U	10U	U	U	U	5
Dichlorodifluoromethane	U	100U	U	U	NS	U	10U	U	U	U	5
1,4-Dichlorobenzene	U	100U	.7J	.8J	NS	U	10U	U	U	U	4.7
Depth to groundwater (ft)	2.83	6.25	2.48	3.24	NS	3.68	9.8	6.01	6.89	4.89	

* Treated as UOC
G: NYSDEC guidance value.
ND: No Detectable amounts allowed.
All groundwater standards in this table are based upon NYSDEC standards as of June 1998.
**Indicate increase in concentration

NS: Not sampled

Table 1 (continued)
Groundwater
Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Mar-99

	Building 253										
Compound (ug/l)	MW-002/Oct-96	MW-002/Oct 97	MW-002/Apr-98	MW-002/Jul-98	MW-002/Mar-99	MW-004/Oct-96	MW-004/Oct 97	MW-004/Apr-98	MW-004/Jul-98	MW-004/Mar-99	NYS
Chloromethane	U	10U	U	U	U	UJ	10U	U	U	U	50
Bromomethane	U	10U	U	U	U	U	10U	U	U	U	5
Vinyl Chloride	U	10U	U	U	U	U	10U	U	U	U	2
Chloroethane	UJ	10U	U	U	U	UJ	10U	U	U	U	5
Methylene Chloride	1J	10U	.7J	U	U	U	10U	U	U	U	5
Acetone	UJ	10U	16B	U	U	UJ	10U	U	U	U	50G
Carbon Disulfide	U	10U	.5J	U	U	U	10U	U	U	U	50
Vinyl Acetate	U	10U	U	U	U	U	10U	U	U	U	NONE
1,1-Dichloroethene	U	10U	3J**	2J	U	U	10U	U	U	U	5
1,1-Dichloroethane	9J	18	2J	2J	1J	U	10U	U	U	U	5
cis-1,2-Dichloroethene	3J	3J	1J	1J	1J	9J	2J	11J	12	5	5
Trans-1,2-Dichloroethene	2J	1J	U	U	U	1J	7J	2J	2J	2J	5
Chloroform	U	10U	U	U	U	U	10U	U	U	U	7
1,2-Dichloroethane	U	10U	U	U	U	U	10U	U	U	U	5
2-Butanone	U	10U	100**	29J	U	U	10U	U	U	U	5
1,1,1-Trichloroethane	U	22J	80**	U	2J	U	10U	U	U	U	5
Carbon Tetrachloride	U	10U	U	U	U	U	10U	U	U	U	5
Bromodichloromethane	U	10U	U	U	U	U	10U	U	U	U	50G
1,2-Dichloropropane	U	10U	U	U	U	U	10U	U	U	U	5
cis-1,3-Dichloropropene	U	10U	U	U	U	U	10U	U	U	U	5
Trichloroethene	2J	2J	2J	2J	1J	7J	12	6J	7J	4J	5
Dibromochloromethane	U	10U	U	U	U	U	10U	U	U	U	5
1,1,2-Trichloroethane	U	10U	U	U	U	U	10U	U	U	U	50G
Benzene	U	10U	U	U	U	U	10U	U	U	U	5
trans-1,3-Dichloropropene	U	10U	U	U	U	U	10U	U	U	U	0.7
Bromoform	U	10U	U	U	U	U	10U	U	U	U	5
4-Methyl-2-Pentanone	U	10U	U	U	U	U	10U	U	U	U	50G
2-Hexanone	UJ	10U	U	U	U	UJ	10U	U	U	U	50
Tetrachloroethene	U	10U	U	U	U	U	10U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	10U	U	U	U	U	10U	U	U	U	5
Toluene	U	10U	U	U	U	U	10U	U	U	U	5
Chlorobenzene	U	10U	U	U	U	U	10U	U	U	U	5
Ethylbenzene	U	10U	U	U	U	U	10U	U	U	U	5
Styrene	U	10U	U	U	U	U	10U	U	U	U	5
Xylene (total)	U	10U	U	U	U	U	10U	U	U	U	5
Dichlorodifluoromethane	U	10U	U	U	U	U	10U	U	U	U	5
1,4-Dichlorobenzene	U	10U	U	U	U	U	10U	U	U	U	4.7
Depth to groundwater (ft)	1.58	5.52	2.43	2.99	1.55	1.31	5.64	2.64	3.56	NA	

* Treated as UOC
G: NYSDEC guidance value.
ND: No Detectable amounts allowed.
All groundwater standards in this table are based upon NYSDEC standards as of June 1998.
**Indicate increase in concentration

Table 2
Surface Water
Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Mar-99

	Sample ID	SW
Compound (ug/l)	SW-1	Std.
Chloromethane	U	NS
Bromomethane	U	5
Vinyl Chloride	U	.3G
Chloroethane	U	5
Methylene Chloride	.7	5
Acetone	U	50G
Carbon Disulfide	U	NS
Vinyl Acetate	U	NS
1,1-Dichloroethene	U	.7G
1,1-Dichloroethane	U	5
cis-1,2-Dichloroethene	U	5
Trans-1,2-Dichloroethene	U	5
Chloroform	U	7
1,2-Dichloroethane	U	0.6
2-Butanone	U	50G
1,1,1-Trichloroethane	U	5
Carbon Tetrachloride	U	.4G
Bromodichloromethane	U	50G
1,2-Dichloropropane	U	1
cis-1,3-Dichloropropene	U	5
Trichloroethene	U	40**
Dibromochloromethane	U	50G
1,1,2-Trichloroethane	U	1
Benzene	U	10
trans-1,3-Dichloropropene	U	NS
Bromoform	U	50G
4-Methyl-2-Pentanone	U	NS
2-Hexanone	U	50G
Tetrachloroethene	U	1**
1,1,2,2-Tetrachloroethane	U	.2G
Toluene	U	6000**
Chlorobenzene	U	400**
Ethylbenzene	U	17G
Styrene	U	5G
Xylene (total)	U	5
Dichlorodifluoromethane	U	5G
1,4-Dichlorobenzene	U	5

*Class A water standard (NYSDEC, June 1998)
**Class, B,C,D water standard (NYSDEC, June 1998)
All standards in this table are based upon NYSDEC standards as of June 1998.

Appendix B

Site Boring Logs

ENGINEERING–SCIENCE DRILLING RECORD

BORING SB001W (MW001)

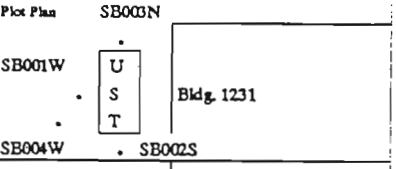
Contractor: North Star Drilling
Driller: Dave Lyons
Inspector: Scott Dillman
Rig Type: CME 45
Method: Hollow Stem Auger

PROJECT NAME Griffiss AFB, Verona Test Annex
Building 1231
PROJECT NUMBER SY431.02.01

Location: West of tank

Weather mid 30's, cloudy, winds 5–10 mph
Date/Time Start 12/6/93 13:45
Date/Time Finish 12/6/93 15:09

Plot Plan



GROUNDWATER OBSERVATIONS

Water Level	SEE APPENDIX B			
Date				
Time				
Meas. From				

Pheonex Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL SCHEMATIC	COMMENTS
		2					
							inside lock on PVC, no outer lock, flushmount bolts down
		1					
		0		A	0		
40+ NR			–	SS			concrete, 0–0.75'
		1		6	gray FILL, sand and gravel, little clay		2" pvc riser, 0.5–2', lock, cap
				8			bent. pellets, 0.75–1.75
		2		5	reddish brown SILT, some–little clay		
40+ NR			75	5	reddish brown SILT, little clay, trace gray silt, trace brown rust stain, moist		
		3		4	slow streaming cut		
				5			
		4		5			
–			80	6	reddish brown SILT, litt!–trace clay, wet, trace brown rust stain		sand pack, 1.75–12'
		5		5			
				6			
		6		6			
18.2			60	4	reddish brown SILT,		
		7		6			2", 0.01 slot pvc screen
				9			2–12'
		8		7	fine SAND		
29	SB001W–		50	2	reddish brown SILT and fine SAND, wet (saturated), black mineral bands		
	1231B	9		2			
				5			
		10		7			
20			75	5	reddish brown SILT, trace fine sand, wet (saturated)		
		11		6			
				8			
		12		10			threaded PVC end cap
					boring terminated at 12'		TD 12'

STANDARD PENETRATION TEST
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED
NR = NOT RELIABLE (due to moisture and temperature)

SUMMARY:
0–1.3': FILL
1.3–7.9': SILT
7.9–8': SAND
8–10': SILT and SAND
10–12': SILT

ENGINEERING–SCIENCE DRILLING RECORD

BORING SB004W (MW004)

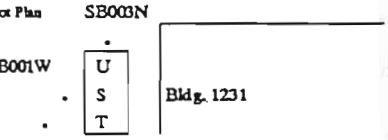
Contractor: North Star Drilling
Driller: Dave Lyons
Inspector: Scott Dillman
Rig Type: CME 45
Method: Hollow Stem Auger

PROJECT NAME Griffiss AFB, Verona Test Annex
Building 1231
PROJECT NUMBER SY43L02.01

Location: West of tank

Weather Overcast, 30's
Date/Time Start 12/7/93 12:15
Date/Time Finish 12/7/93 12:33

Plot Plan



GROUNDWATER OBSERVATIONS

Water Level	SEE APPENDIX B		
Date			
Time			
Meas. From			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL SCHEMATIC	COMMENTS
		2					
							inside lock on PVC, no outer lock, flushmount bolts down
		1					
		0		A	0		
				SS			concrete, 0–0.75'
0		1	50	8	tan brown GRAVEL, some sand, little silt, wet, strong streaming cut		2" pvc riser, 0.5–2', lock, cap
				9			bent. pellets, 0.75–1.75
		2		11			
0			20	5	reddish brown SILT, trace–little clay, moist–wet, rusty brownish stain, wet		
		3		6	moderate streaming cut		
				8			
		4		12			
0			30	10	reddish brown SILT, some lenses grading to fine sand, some rusty brown staining		sand pack, 1.75–12'
		5		10	wet, weak streaming cut		
				8			
		6		5			
0			60	8	as above		
		7		9			2", 0.01 slot pvc screen
				12	reddish brown SILT, wet		2–12'
		8		14			
0			70	3	reddish brown SILT, grading to reddish brown fine SAND, very wet, slight halo cut		
		9		5			
				6			
		10		8			
0			75	7	reddish brown fine SAND interbedded with SILT		
		11		10			
				9			
		12		12			threaded PVC end cap
					boring terminated at 12'		TD 12'

STANDARD PENETRATION TEST
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED
NR = NOT RELIABLE (due to moisture and temperature)

SUMMARY:
0–2': GRAVEL
2–8': SILT
8–12': SILT and SAND

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/3/96 Time 1600
Finish
Date 10/3/96 Time 1730

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1231A

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

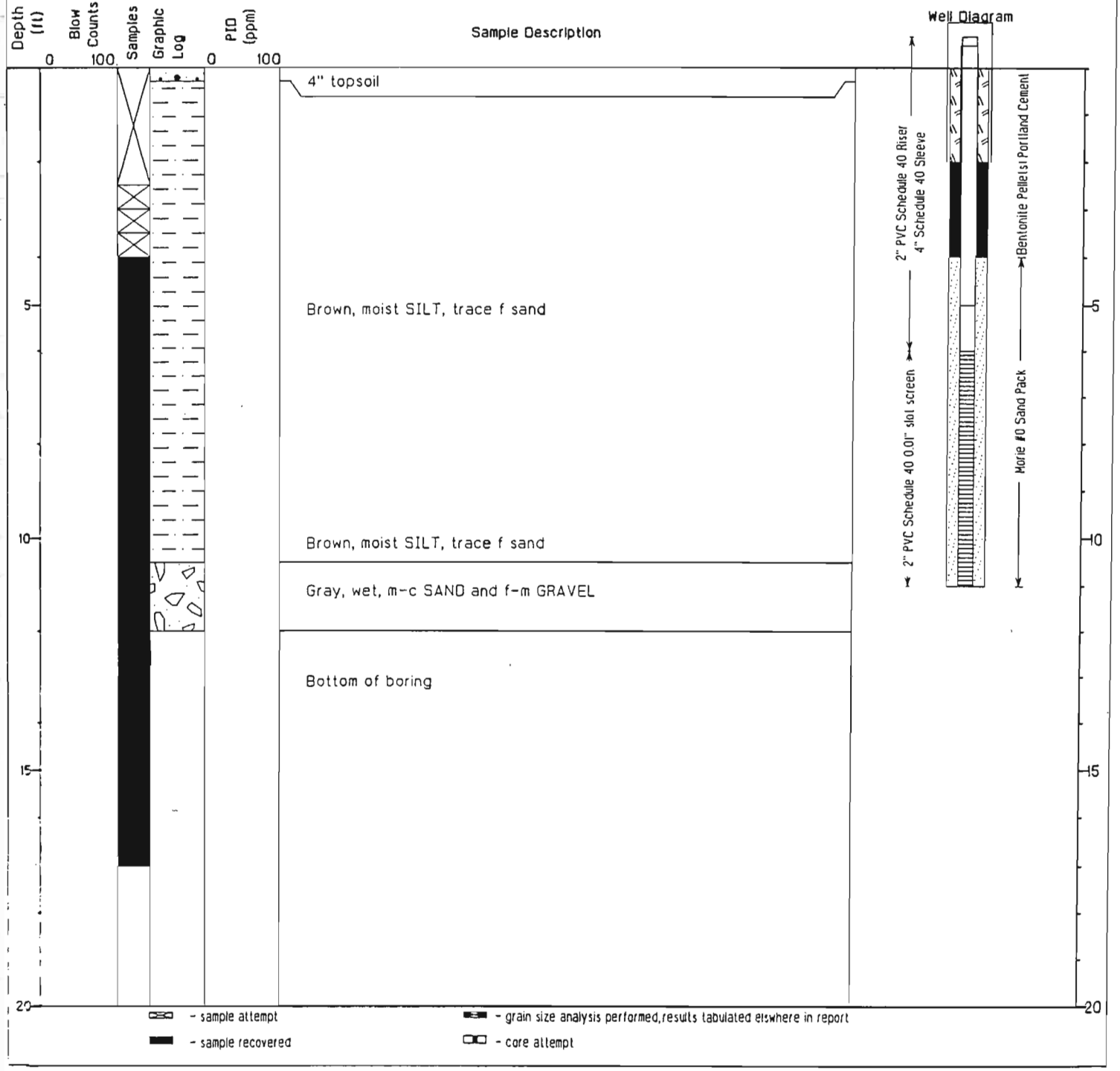
Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 35F, HARD FROST

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date :
Casing Depth: 11.0
Boring Depth: 12
Water Depth :



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/4/96 Time 0830
Finish
Date 10/4/96 Time 1010

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1231C

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 35F, HARD FROST

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date :
Casing Depth: 15.0
Boring Depth: 15
Water Depth :

Depth (ft)	Blow Counts	Samples	Graphic Log	PID (ppm)	Sample Description
0	0 100			0 100	
					3" topsoil, f-c SAND and GRAVEL, some silt, FILL
5					Red-brown, wet, loose, silty f SAND, some mottling, some coarser sand layers
10					Gray, wet, loose, silty f SAND
15					
					Bottom of boring
20					

Well Diagram

2" PVC Schedule 40 Riser
4" PVC Schedule 40 Sleeve
2" PVC Schedule 40 0.01" slot screen
Bentonite Pellets
Portland Cement
Morie #0 Sand Pack

5
10
15
20

- sample attempt
- sample recovered
- grain size analysis performed, results tabulated elswhere in report
- core attempt

Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/4/98 Time 1130
Finish
Date 10/4/98 Time 1345

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1231D

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

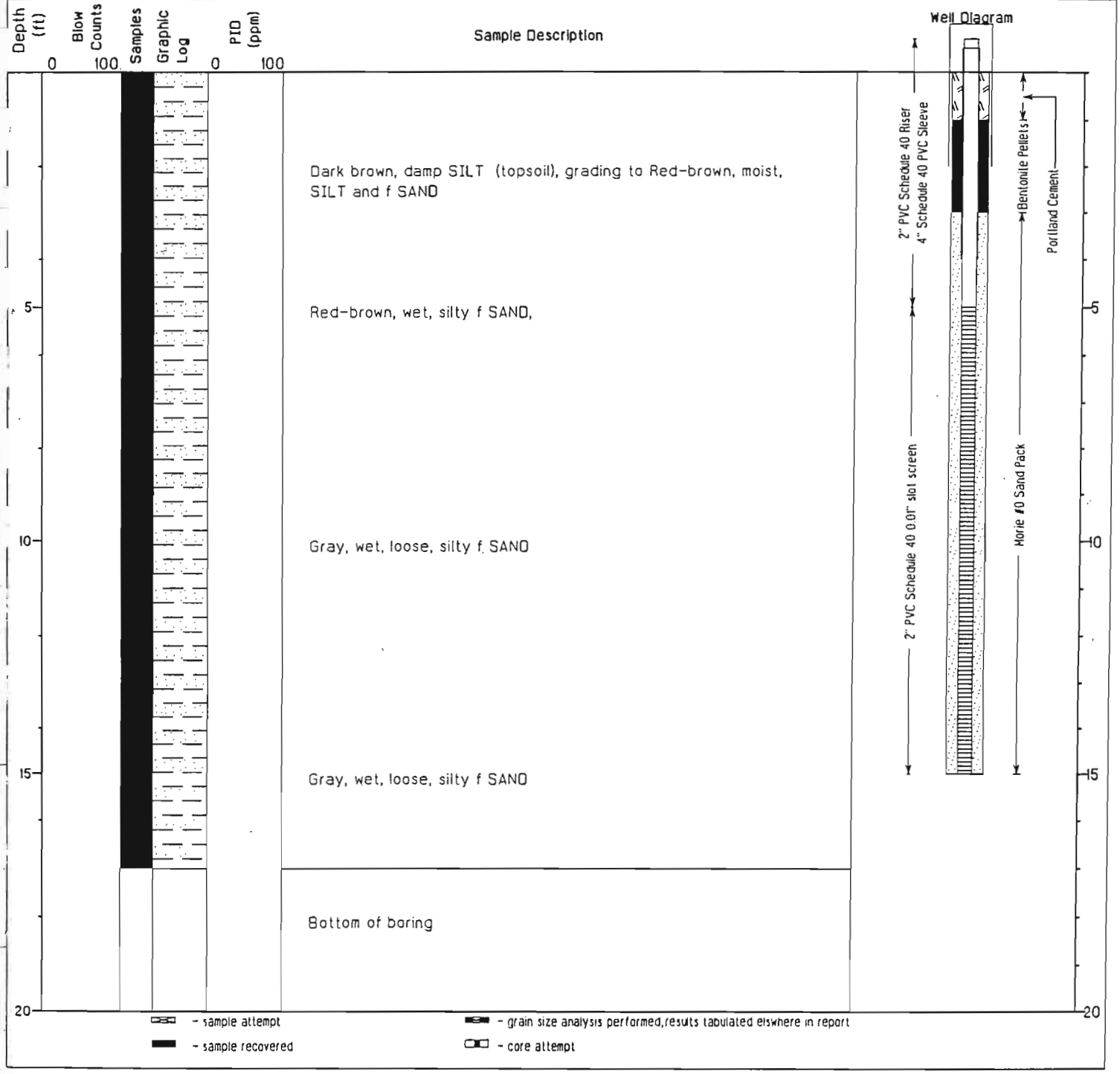
Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 35F, HARD FROST

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date :
Casing Depth: 15.0
Boring Depth: 15
Water Depth :



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

ENGINEERING–SCIENCE DRILLING RECORD

BORING SB001W (MW001)

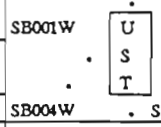
Contractor: North Star Drilling
Driller: Dave Lyons
Inspector: Scott Dillman
Rig Type: CME 45
Method: Hollow Stem Auger

PROJECT NAME Griffiss AFB, Verona Test Annex
Building 1253
PROJECT NUMBER SY431.02-01

Location: West of tank

Weather Clear, 30's
Date/Time Start 12/9/93 7:20
Date/Time Finish 12/9/93 9:00

Plot Plan



GROUNDWATER OBSERVATIONS			
Water Level	SEE APPENDIX B		
Date			
Time			
Meas. From			

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL SCHEMATIC	COMMENTS
		2					
							inside lock on PVC, no outer lock, flushmount bolts down
		1					
		0		A	0		
				SS			concrete, 0–0.75'
1.4		1	50	12	tan GRAVEL, some sand, little silt, trace clay, upper 4" black stain, damp,		2" pvc riser, 0.5–2', lock. cap
				12	little odor, slow streaming cut		bent. pellets, 0.75–1.75
		2		9			
0.5			80	5	reddish brown SILT, trace clay, little fine sand, rusty brown staining, slow		
		3		6	streaming cut		
				6			
		4		7			
5.6			75	7	reddish brown SILT, wet, layers of very fine sand and of silt, trace clay,		sand pack, 1.75–12'
		5		6	reddish brown staining		
				3			
		6		4			
0.6			70	3	as above		
		7		4			2", 0.01 slot pvc screen
				7			2–12'
		8		10			
3.8			10	2	reddish brown SILT and very fine SAND, very wet, trace coarse sand and		
		9		3	gravel, slight streaming cut, halo cut		
				6			
		10		5			
11.2	SB001W–		80	7	reddish brown SILT and very fine SAND, trace gravel, saturated, slight streaming		
	1253C	11		8	cut, strong halo cut		
				9			
		12		12			threaded PVC end cap
					boring terminated at 12'		TD 12'

STANDARD PENETRATION TEST
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED
NR = NOT RELIABLE (due to moisture and temperature)

SUMMARY:
0–2': GRAVEL
2–8': SILT
8–12': SILT and SAND

ENGINEERING–SCIENCE DRILLING RECORD

BORING SB004W (MW004)

Contractor: North Star Drilling
Driller: Dave Lyons
Inspector: Scott Dillman
Rig Type: CME 45
Method: Hollow Stem Auger

PROJECT NAME Griffiss AFB, Verona Test Annex
Building 1253
PROJECT NUMBER SY43L02.01

Location: West of tank

GROUNDWATER OBSERVATIONS

Water Level	SEE APPENDIX B		
Date			
Time			
Meas. From			

Weather Clear, 30's
Date/Time Start 12/9/93 15:04
Date/Time Finish 12/9/93 15:26

Plot Plan SB002N
SB001W . U S T . Bldg. 1253
SB004W . SB003S

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	BPT	FIELD IDENTIFICATION OF MATERIAL	WELL SCHEMATIC	COMMENTS
		2					
							inside lock on PVC, no outer lock, flushmount bolts down
		1					
		0		A	0		
				SS			concrete, 0–0.75'
13.1		1	50	7	FILL, tan gravel, some sand, little silt, upper 2" stained		2" pvc riser, 0.5–2', lock. cap
				7	SILT, some clay, black stained		bent. pellets, 0.75–1.75
		2		5			
24.1	SB004W-		80	4	reddish brown SILT, little clay,		
	1243A	3		5			
				4	reddish brown very fine SAND		
		4		6			
12.6			70	6	reddish brown SILT, little clay, wet		sand pack, 1.75–12'
		5		6			
				2			
		6		2			
2.5			75	3	greenish gray SILT, plant material, little–trace clay, moist–wet, slight halo cut		
		7		4			2", 0.01 slot pvc screen 2–12'
				6			
		8		7	reddish brown SILT and very fine SAND		
2.2			65	2	greenish gray SILT, plant material, wet		
		9		3			
				3	reddish brown SILT and very fine SAND		
		10		3			
23			75	3	reddish brown SILT and very fine SAND, wet		
		11		6			
				8			
		12		9			threaded PVC end cap
					boring terminated at 12'		TD 12'

STANDARD PENETRATION TEST
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED
NR = NOT RELIABLE (due to moisture and temperature)

SUMMARY:
0–1.75': FILL
1.75–3': SILT
3–4': SAND
4–7.5': SILT
7.5–8': SILT and SAND
8–9': SILT
9–12': SILT and SAND

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/7/96 Time 1420
Finish
Date 10/7/96 Time 1615

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1253C

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

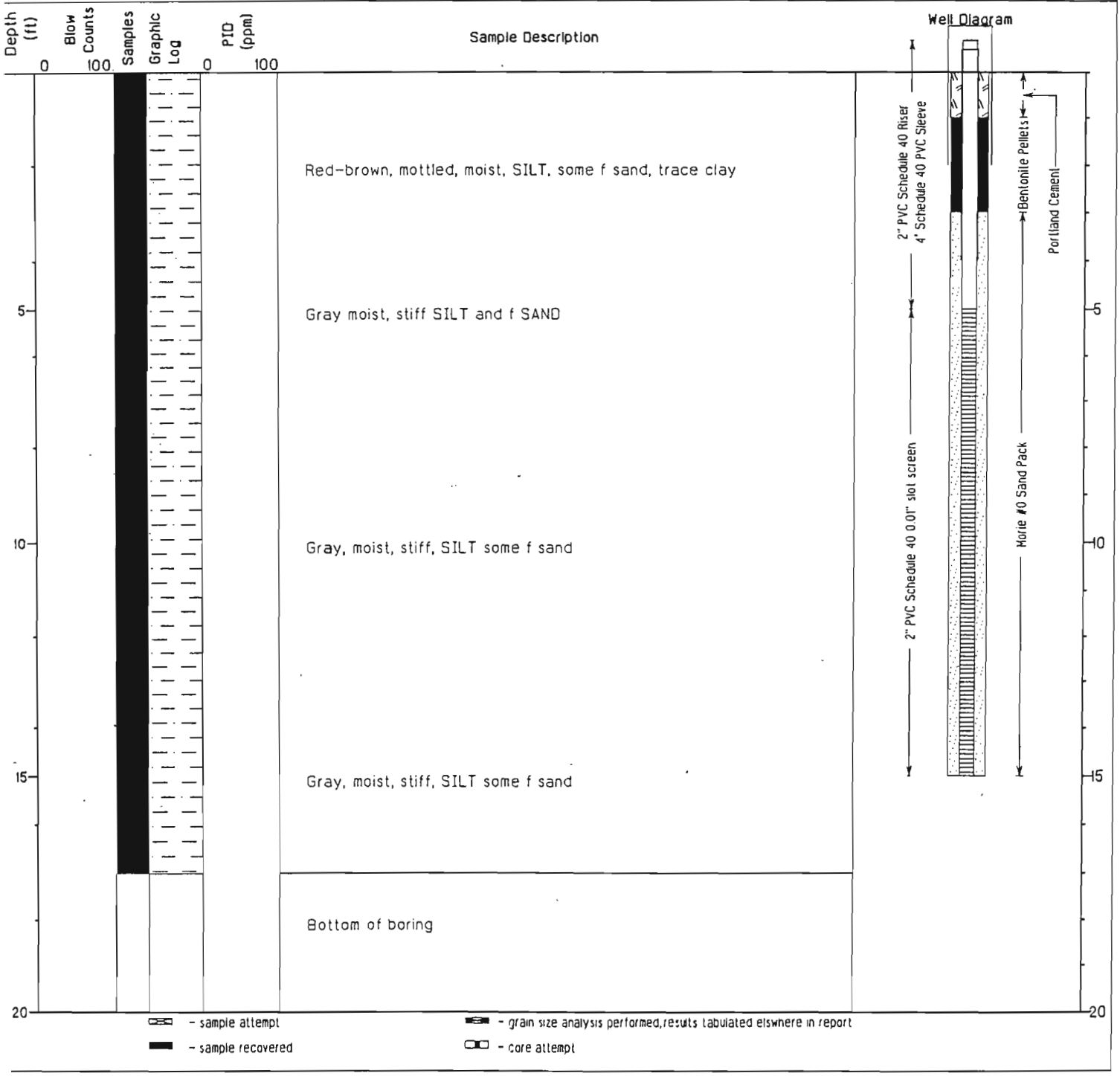
Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 45F

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date : 10/9/96
Casing Depth: 15.0
Boring Depth: 15
Water Depth : 4.69



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/7/96 Time 1047
Finish
Date 10/7/96 Time 1212

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1253D

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

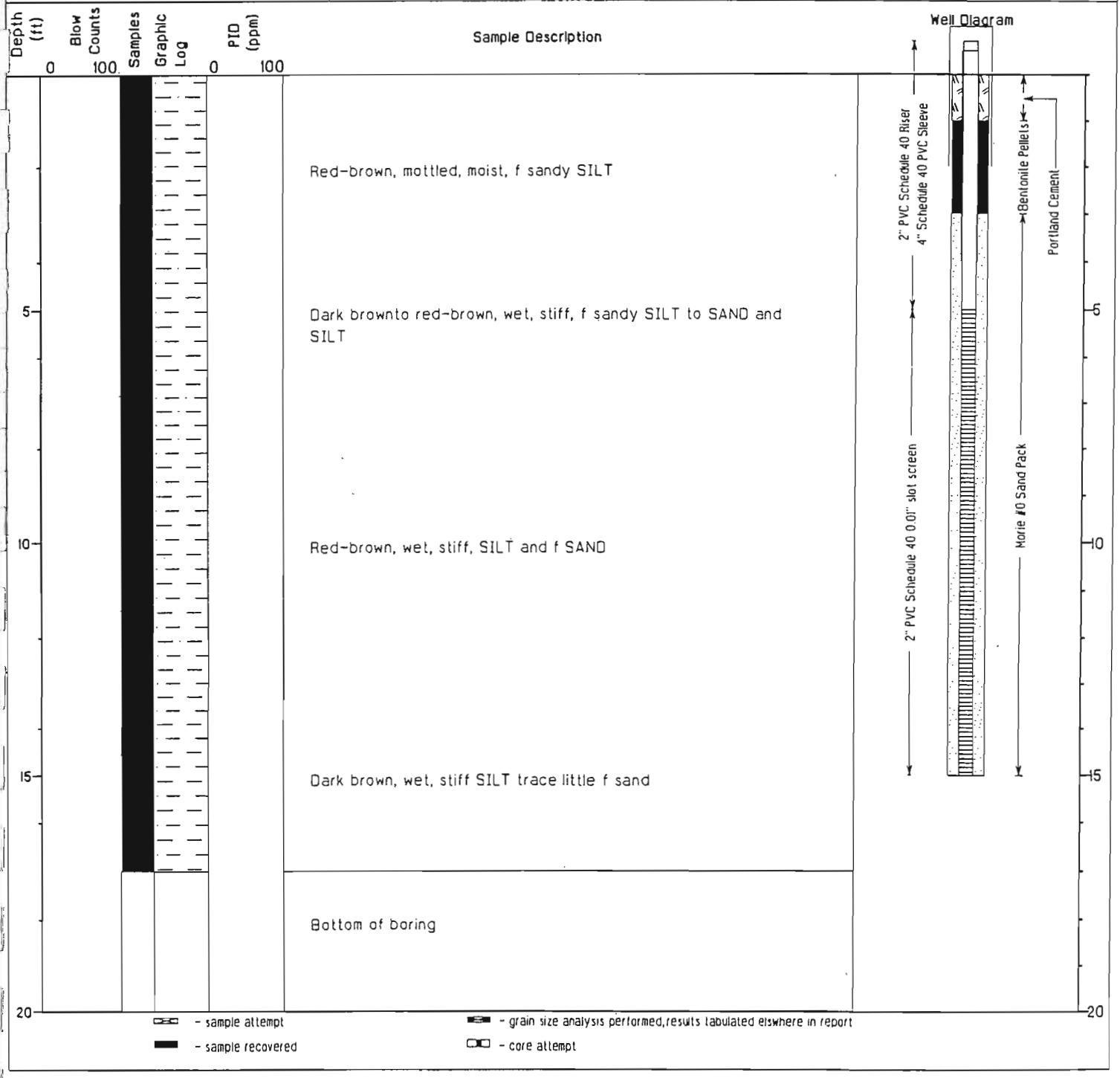
Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 45F

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date : 10/9/96
Casing Depth: 15.0
Boring Depth: 15
Water Depth : 5.72



Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Appendix C

Well Decommissioning Procedures

DECOMMISSIONING PROCEDURES

NYS SUPERFUND STANDBY CONTRACT
WORK ASSIGNMENT D002852-10

NPL SITE MONITORING WELL DECOMMISSIONING

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION

MAY 1995
Revised October 1996

0266-317-002

1.0 REVIEWING SITE DATA

The first step in selecting the well decommissioning process consists of reviewing all pertinent site information; boring and well logs, field inspection sheets, and laboratory analytical results performed on site soil and groundwater samples. This site information will form the basis for decisions throughout the decommissioning process. Field inspection of the wells prior to decommissioning is also recommended to verify the characteristics and conditions of the wells. Special conditions such as access problems, well extensions through capped and covered landfills, and cap conditions due to seasonal weather patterns should be assessed. At well locations that have been extended, the burial of a previous concrete pad may require the excavation of soil to the top of the concrete pad to remove the well. Decommissioning work requiring the use of heavy vehicular equipment on RCRA landfill caps should be scheduled during dry weather if possible so as to minimize damage to the cover. If work must be performed during the Spring, Winter or inclement weather, special measures such as placement of plywood to reduce ruts should be employed to maintain the integrity of the completed landfill cover system. A sample Monitoring Well Field Inspection Log indicating the minimum information to be collected during field verification activities is included as Figure 1.

2.0 SELECTING THE WELL DECOMMISSIONING METHOD

The primary rationale for well decommissioning is to prevent contaminant migration along the disturbed construction zone created by the original well boring. This requires selection of a decommissioning procedure that takes into account factors such as:

- The hydrogeological conditions at the well site.
- The presence or absence of contamination in the groundwater.
- The original well construction details.

This section presents a summary of the well decommissioning methods and the selection process, which is illustrated in the flow chart presented as Plate 1. The primary well decommissioning procedures consist of:

- Casing pulling.
- Overdrilling.
- Grouting the casing in-place.
- Perforating the casing followed by grouting in-place.

A general discussion of each decommissioning procedure is presented in Sections 2.1 through 2.4.

2.1 CASING PULLING

In general, casing pulling is the preferred method for decommissioning wells where: no contamination is present; contamination is present but the well does not penetrate a confining layer; and when both contamination and a confining layer are present but the contamination cannot cross the confining layer. Additionally, the well construction materials and well depth must be such that pulling can be effected without breaking the riser.

Casing pulling involves removing the well casing by lifting. The procedure for removing the casing must allow grout to be added during pulling. The grout will fill the space once occupied by the material being withdrawn. Grout mixing and placement must be performed according to the procedures in Section 9.0.

An acceptable procedure to remove casing involves puncturing the bottom of the casing, flushing with water to remove sand (if necessary to mitigate lock-up of the casing during pulling), filling the casing with grout tremied from the bottom of the well, using jacks to free casing from the hole, and lifting the casing out by using a drill rig, backhoe, crane, or other suitable equipment. Additional grout must be added to the casing as it is withdrawn. In wells or wellpoints in which the bottom cannot be punctured, the casing or screened interval will be perforated prior to being filled with grout. This procedure should be followed for wells installed in collapsible formations or for highly contaminated wells. At site locations in which the borehole does not collapse it may not be necessary to perforate the well casing prior to pulling the well (i.e., grouting the borehole can be completed after the well materials have been removed). However, measurements of the borehole depth must

TE NAME:

SITE ID.:
INSPECTOR:
DATE/TIME:
Well ID.:

MONITORING WELL FIELD INSPECTION LOG
NYSDEC WELL DECOMMISSIONING PROGRAM

	YES	NO
ELL VISIBLE? (If not, provide directions below)		
ELL I.D. VISIBLE?		
ELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back)		

ELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL:

	YES	NO
JRFACE SEAL PRESENT?		
JRFACE SEAL COMPETENT? (If cracked, heaved etc., describe below)		
ROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		

EADSPACE READING (ppm) AND INSTRUMENT USED

YPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable)

ROTECTIVE CASING MATERIAL TYPE:

IEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches):

	YES	NO
OCK PRESENT?		
OCK FUNCTIONAL?		
ID YOU REPLACE THE LOCK?		
S THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes, describe below)		
VELL MEASURING POINT VISIBLE?		

IEASURE WELL DEPTH FROM MEASURING POINT (Feet):

IEASURE DEPTH TO WATER FROM MEASURING POINT (Feet):

IEASURE WELL DIAMETER (Inches):

VELL CASING MATERIAL:

HYSICAL CONDITION OF VISIBLE WELL CASING:

ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE

ROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES

ESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY.

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

REMARKS:

be taken before and after the well is pulled to ensure that no collapse of well construction or formation materials occurred.

In the event that the casing or well screen is severed during casing pulling or if borehole collapse occurs, the remaining materials can be removed by overdrilling using the conventional augering method described in Section 2.2. In situations where well materials such as PVC screens and risers are suspected to sever, and removal of all well materials is required (i.e., at wells that are contaminated or those that penetrate an aquiclude), the contractor should install rods inside the well so that the rods would serve as a steel guide pipe for advancing augers during overdrilling.

At sites in which well casings have been grouted into a rock socket the casing pulling procedure may not be feasible. An alternative procedure involving overdrilling into the bedrock, pulling the casing, and subsequently grouting the openhole interval may be employed. For uncontaminated wells or wells with low levels of contamination, overdrilling, grinding on the rock, and grouting inside and outside of the well should be acceptable if the casing cannot be pulled. When this procedure is not acceptable and the casing must be pulled from a contaminated well, a spin and flush drilling technique may be used to advance flushpoint casing equipped with a diamond cutting shoe to the bottom of the casing socket. Water used during the spin and flush casing advancement will be controlled by the use of oversized casing, a coupling and a drilling tee. Drilling water will be containerized and disposed of in accordance with the site specific Material Handling and Disposal Plan.

2.2 OVERDRILLING

Overdrilling is used where casing pulling is determined to be unfeasible, or where installation of a temporary casing is necessary to prevent cross-contamination, such as when a confining layer is present and contamination in the deeper aquifer could migrate to the upper aquifer as the well was pulled (see Section 2.5). The overdrilling method should:

- Follow the original well bore.
- Create a borehole of the same or greater diameter than the original boring.
- Remove all of the well construction materials.

Acceptable methods for overdrilling include the following:

- Using conventional augering (i.e., a hollow stem auger fitted with a plug). The plug cutter will grind the well construction materials, which will be brought to the well surface by the auger.

- Using a conventional cable tool rig to advance casing having a larger diameter than the original boring. The cable tool kit is advanced within the casing to grind the well construction materials and soils, which are periodically removed with large diameter bailer. This method is not applicable to bedrock wells.

- Using an over-reaming tool with a pilot bit nearly the same size as the inside diameter of the casing and a reaming bit slightly larger than the original borehole diameter. This method can be used for wells with steel casings.

- Using a hollow-stem auger with outward facing carbide cutting teeth having a diameter two to four inches larger than the casing. Outward-facing cutting teeth will prevent severing the casing and drifting off center.

- Using a hollow-stem auger with a steel guide pipe inside. The casing guides the cutter head and remains inside the auger. The guide pipe should be firmly attached to the inside of the casing by use of a packer or other type of expansion or friction device.

Prior to overdrilling, an expandable J-plug or other suitable well cap will be used to prevent the introduction of soil or cuttings into the well, thereby ensuring a continuous grout column for wells that are grouted in place.

In all cases above, overdrilling should advance through the original bore depth by a distance of 0.5 feet to ensure complete removal of the construction materials. When the overdrilling is complete, the casing and screen can be retrieved from the center of the auger (American Society for Testing and Materials, Standard D 5299-92, 1992), if one of the hollow stem auger methods described above is employed. Subsequent to overdrilling at flush mount well locations where it may be impractical to remove well materials from inside the augers, a 1-2 foot deep area should be excavated by hand around the flush-mount well to facilitate a conventional well removal while tremie-grouting inside the well. Alterna-

tively, the soil within the annular space may be removed by raising the augers to allow the soil to fall out and re-advance the augers to the original target depth. Grout should then be tremied within the annular space between the augers and well casings. The grout level in the borehole should be maintained as the drilling equipment and well materials are sequentially removed. After overdrilling is completed, the borehole must be grouted according to the procedures in Section 9.0 and the upper five feet of borehole must be restored according to the procedures in Section 10.0.

2.3 GROUTING IN-PLACE

Grouting in-place is the simplest decommissioning procedure, but offers the least long-term protection of all the methods. As discussed in Section 2.5, however, this method is preferred for the bedrock portion of bedrock wells, and is used for decommissioning cased wells in certain situations. For cased wells, the procedure involves filling the casing with grout to a level of five feet below the land surface, cutting the well casing at the five-foot depth, and removing the top portion of the casing and associated well materials from the ground. The casing must be grouted according to the procedures in Section 9.0. In addition, the upper five feet of the borehole is filled to land surface and restored according to the procedures described in Section 10.0.

For wells installed in bedrock, the procedure involves filling the casing (or open hole) with grout to the top of rock according to the procedures in Section 9.0. The grout mix, however, will vary according to the hydrogeological conditions as discussed in Section 2.5.

It should be noted that for wells located on landfills regulated under 6NYCRR Part 360, the screened interval of the well must be sealed separately and hydrostatically tested to ensure its adequacy before sealing the remaining borehole. The Standard Operating Procedure (SOP) for the hydrostatic test has been included under Appendix D.

2.4 CASING PERFORATION/GROUTING IN-PLACE

At this time, casing perforation is the preferred method for wells with four-inch or larger inside diameter which are designated to be grouted in-place in accordance with the selection flow chart. The procedure involves perforating the well casing and screen then grouting the well. A wide variety of commercial equipment is available for perforating casings and screens in wells with four-inch or larger inside diameters. Due to the diversity of application, experienced contractors must recommend a specific technique based on site-specific conditions. A minimum of four rows of perforations several inches long and a minimum of five perforations per linear foot of casing or screen is recommended (American Society for Testing and Materials, Standard D 5299-92, 1992).

After perforating is complete, the borehole must be grouted according to the procedures in Section 9.0 and the upper five feet of borehole must be restored according to the procedures in Section 10.0.

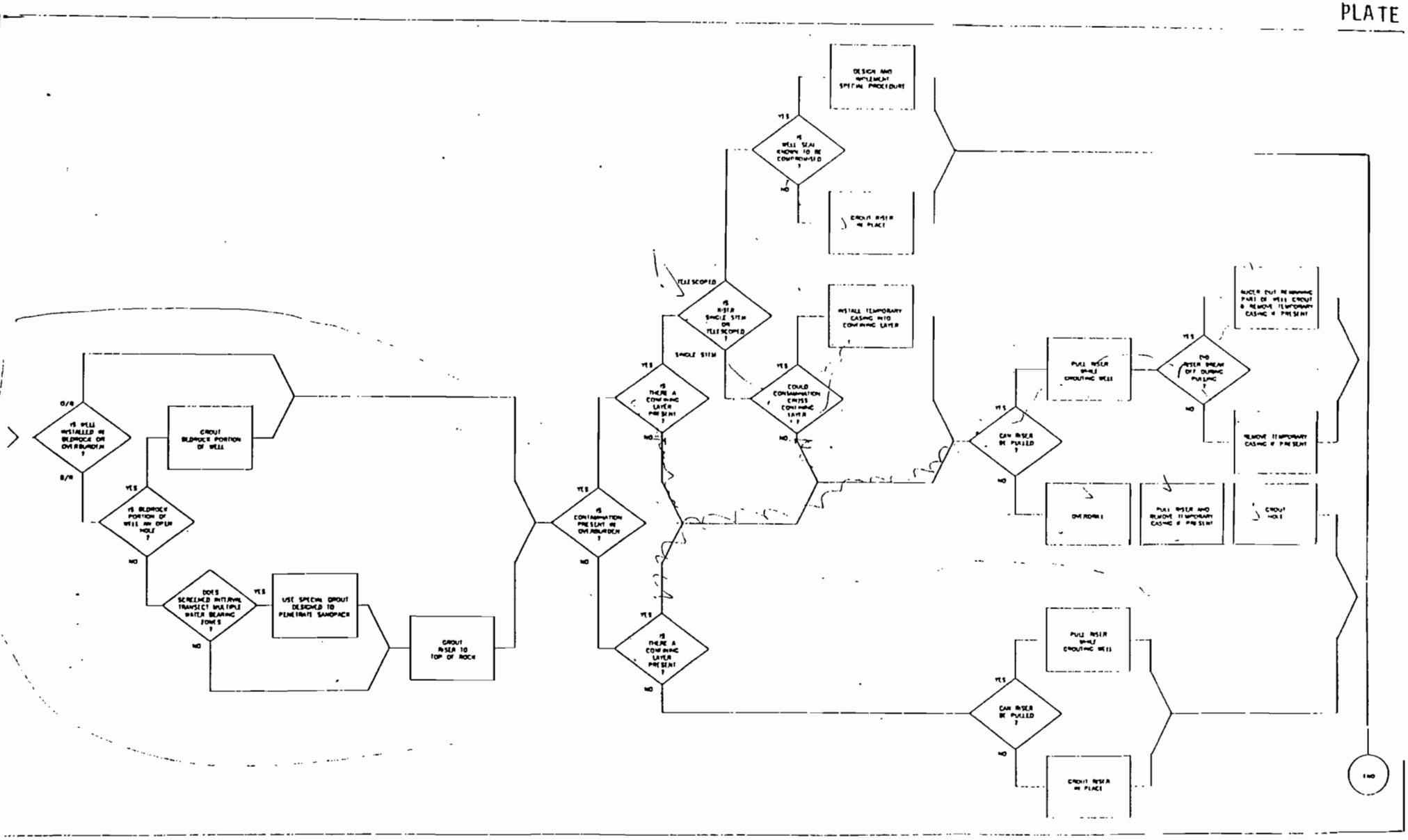
2.5 SELECTION PROCESS AND IMPLEMENTATION

Selection of the decommissioning method is governed by the flow chart presented as Plate 1. A discussion of the selection criteria and decommissioning methodology is presented below.

2.5.1 Contaminated Monitoring Wells/Piezometers

For wells and piezometers suspected or known to be contaminated with NAPL or DNAPL product, measurement of the product volume will be determined using a weighted cotton string or by using an interface probe. Subsequent to calculation of the product volume, the NAPL/DNAPL product will be removed from inside the well. Removal of the contaminant product will be accomplished by bailing, pumping or installing an absorbent passive recovery system. Subsequent to product recovery, all contaminated materials will

PLATE



MULTIPLE NPL SITES
WELL DECOMMISSIONING
DECOMMISSIONING PROCEDURE SELECTION
FLOWCHART

NYSDEC MARCH 1995

be disposed of in accordance with the segregation and containment procedures described in Section 4.1.2.

2.5.2 Bedrock Wells

As illustrated on Plate 1,if the well is constructed within a bedrock formation, the screened or the open hole portion of the well is grouted to the top of the bedrock. Prior to initiating any grouting procedure, the depth of the well will be measured to determine if any silt or debris infilling has plugged the well. If plugging has occurred, the well will be flushed with an appropriately sized roller bit or drill rods to remove or suspend the obstruction in the water column. The borehole will then be tremie grouted from the bottom of the well to the top of bedrock to insure a continuous grout column. Note that if the bedrock well is cased, the screen should be perforated to the top of the rock if the inside diameter of the casing is 4-inches or larger. Furthermore, if the screened interval transects multiple water bearing zones the special grout mix discussed in Section 9.1.3 should be used to ensure penetration of the sand pack.

After the rock hole is grouted, the overburden portion of the well is decommissioned in accordance with the following sections. If the borehole extends to the surface, no further decommissioning procedures are required; however, the boring should only be filled to within 5-feet of the ground surface and site restoration should be completed in accordance with Section 10.0.

2.5.3 Uncontaminated Overburden Wells

For overburden wells and the overburden portion of bedrock wells, the first decision point in determining the decommissioning method considers whether the overburden portion of the well exhibits evidence of contamination, as determined through historical groundwater and/or soil sampling results. If the overburden portion of the well is uncontaminated, the next criteria considers whether the well penetrates a confining layer. In the case that the overburden portion of the well does not penetrate a confining layer, the casing should be pulled (and tremie-grouted) if possible. As a general rule, PVC wells greater than 25-feet deep should not be pulled unless site-specific conditions or other factors indicate that the

well can be pulled without breaking. If the well cannot be pulled, such as in the case that a bedrock portion of the well has already been grouted in place, or if the well materials and depth prohibit pulling or will likely result in breakage, the well should be grouted in-place as accordance with Section 2.3 (if the casing is less than 4-inch in diameter) or Section 2.4 (if the casing diameter is 4-inches or larger).

If the overburden portion of the well penetrates a confining layer, the casing should be removed by pulling (if possible) in accordance with Section 2.1.. If the casing cannot be removed by pulling, the well should be removed by overdrilling. The overdrilling method used will depend on the site-specific conditions and requirements. If pulling is attempted and fails (i.e., a portion of the riser breaks) the remaining portion of the well should be removed by using the conventional augering procedure identified in Section 2.2. In all cases, after the well construction materials have been removed, the borehole will be grouted in accordance with Section 9.0 and the upper five feet will be restored in accordance with Section 10.0.

2.5.4 Contaminated Overburden Wells

If an overburden well or the overburden portion of a bedrock well is contaminated as evidenced by historical sampling results, the first decision point in selecting a decommissioning procedure is whether the well penetrates a confining layer. If the well does not penetrate a confining layer, the selection process follows the same pathway as for uncontaminated wells that penetrate a confining layer (i.e., the casing is pulled, if possible; otherwise the well is overdrilled - see Section 2.5.3). Plastic sheeting should be placed around the well surface to contain contaminated materials displaced during removal of the well.

For overburden wells that are contaminated and which penetrate a confining layer, the next selection criteria is whether the well riser is a single stem or is telescoped inside one or more outer casings. The procedures to be followed in determining the decommissioning method are presented for both situations below.

2.5.4.1 Single Stem Riser

If the riser is a single stem, the potential for cross-contamination between confining layers must be addressed. In particular, if the lower confining unit is contaminated, there is a potential that the contamination may be transferred to the upper unit as the well construction materials are removed to the ground surface. In this event, it will be necessary to install a temporary casing having a diameter larger than the original borehole into the top of the confining layer. This may be accomplished using a hollow stem auger or by employing a spin and flush technique to advance the casing. If the confining layer is less than 5 feet thick, the casing should be installed to the top of the confining layer. Otherwise, it is installed to a depth of 2 feet below the top of the confining layer. After the temporary casing has been set, the well can be removed and grouted through pulling (if possible) or through overdrilling if pulling is not feasible. Plastic sheeting should be placed around the well surface to contain contaminated materials displaced during removal of the well. As an alternative to installation of a temporary casing, the hollow-stem auger could serve the same purpose in that it would prevent the contamination from migrating to the upper unit. The hollow-stem auger would be advanced into the confining layer until the joint between the uppermost sections was nearly flush with the ground surface, and the sections would be disconnected to expose the riser prior to pulling or overdrilling.

After the casing and screen are removed and the well is grouted, the temporary casing (if used) is removed and the casing and/or hollow stem auger can be decontaminated for reuse. The upper 5 feet of the well surface should then be restored in accordance with Section 10.0.

2.5.4.2 Telescoped Riser

If the riser is telescoped in one or more outer casings, the decommissioning approach is dependent on the integrity of the well seal. For the purpose of the monitoring well decommissioning procedures, the well seal is defined as the bentonite seal above the sand pack. Although it is not possible to visually inspect or otherwise test the well seal to assess its condition, an indication of the well seal integrity may be obtained through review of the

boring logs and/or a comparison of groundwater elevations if the well is part of a cluster. Any problems noted on the boring logs pertaining to the well seal, such as bridging of bentonite pellets or running sands, or disparities between field notes (if available) and the well log would indicate the potential for a poor well seal. Alternatively, if the well is part of a cluster a comparison of groundwater elevations between the shallow and deep wells should also be performed. By observing trends at other clusters it may be possible to identify inconsistencies in groundwater elevations at the well slated for decommissioning, thereby indicating a poor well seal.

If there is no evidence that the well seal integrity is compromised, the riser should be grouted in-place in accordance with Section 2.3 or 2.4, depending on the diameter of the well casing, and the upper 5 feet of the well surface should be restored in accordance with Section 10.0. If indications are that the well seal is not competent, it will be necessary to design and implement a special procedure to remove the well construction materials, as the presence and configuration of the outer casing(s) will be specific in the individual wells and will be a key factor in the decommissioning approach. The special procedure should be designed to mitigate the potential for cross-contamination during removal of the well construction materials, and should be designed prior to initiating field work.

3.0 PREPARATION OF A SITE-SPECIFIC HEALTH AND SAFETY PLAN

Prior to initiating decommissioning activities at a site, it is necessary to prepare a site-specific health and safety plan (HASP) in accordance with the requirements of 29 CFR 1910.120. Accordingly, the HASP should include:

- The names of key personnel responsible for site health and safety, including an appointed site health and safety officer.
- A safety and health risk analysis for each site task and operation.
- Employee training requirements.
- Personal protective equipment (PPE) to be used by employees for each of the site tasks and operations being conducted.

- Medical surveillance requirements.
- Frequency and types of air monitoring, personnel monitoring and environmental sampling techniques and instrumentation to be used.
- Site control measures.
- Decontamination procedures.
- Site standard operating procedures.
- A contingency plan for responses to emergencies.
- Confined space entry procedures.

An example of a health and safety plan is attached as Appendix A. This document provides a general framework for preparing a HASP. Examples of site-specific information, such as names of responsible personnel, contaminant data, and other information which must be developed to meet the OSHA requirements discussed above are included in Appendix A but will need to be modified in the site-specific HASP.

4.0 PREPARATION OF A MATERIALS HANDLING AND DISPOSAL PLAN

Materials handling and disposal procedures for each of the wells slated for decommissioning should be identified in a site-specific materials handling and disposal plan. This plan will be used as a guideline to ensure safe and efficient control of contaminated materials, and will promote conformance with the applicable regulatory requirements for storage, characterization, labeling, transportation and disposal of materials prior to off-site transport.

4.1 MATERIALS HANDLING PROCEDURES

The materials anticipated to be generated during well decommissioning activities include decontamination fluids, disposable safety equipment (including personal protective

equipment), drill cuttings, groundwater, well construction materials (PVC and/or stainless steel casings, well screens, sand, bentonite/grout mixtures, etc.), and any spill-contaminated materials. Proper handling of these materials is effected through a series of steps, including: identification/pre-characterization of the waste materials; segregation/containment of the wastes including storage in proper containers; characterization of the waste materials through analytical testing to determine the absence/presence or nature of the contamination, and proper labeling in accordance with 49 CFR Part 172. Each of these steps is described in the following sections.

4.1.1 Identification/Pre-characterization

Prior to initiating well decommissioning activities at a site, the site history, most importantly historical analytical data from the monitoring wells, must be reviewed as well as the monitoring well construction details: number, type (overburden, bedrock), depth, diameter, and construction materials. This knowledge will aid in estimating the nature and quantities of waste materials which potentially may be generated as a result of decommissioning activities and will also assist in pre-determining the number of roll-off boxes, 55-gallon drums, and any other containers necessary to contain the wastes generated at each respective site.

4.1.2 Segregation and Containment

During well decommissioning activities, generated waste materials must be contained and segregated according to the nature of the suspected contamination. Well materials generated from decommissioning those wells with known contamination will be segregated from materials generated from those wells with little to no contamination (based on historical results). Contaminated materials will be further segregated according to contaminant type (e.g., well materials suspected of containing volatile organic contamination will be segregated from materials suspected of containing Polychlorinated Biphenyl (PCB) contamination).

For wells exhibiting contamination, all materials brought to the surface must either be decontaminated, disposed of at an appropriate Treatment, Storage and Disposal Facility

(TSDF), or properly containerized in a secure area for disposal by others. For all uncontaminated wells, the materials (except the casings) can be left at the surface near the former well unless the surrounding land use prohibits this disposal (e.g., if the well is located in an area where people could be exposed to the materials left on the surface; or if recovered decommissioning materials would not be consistent with the intended use of the land). In this case, the materials must be disposed of in a 6NYCRR Part 360 landfill. For contaminated wells, PVC and/or steel casing materials may be decontaminated for disposal in a Part 360 landfill, provided that the decontamination effort is thorough and cost effective. Requirements for characterization and disposal of contaminated materials are discussed in Sections 4.1.3 through 4.1.5.

Containment methods will be based on the estimated quantity of materials anticipated to be generated at each respective site. Solid waste materials (i.e., well construction materials, soils, drill cuttings, PPE), will typically be contained in roll-off boxes or 55-gallon drums. Since federal DOT regulations (49 CFR Part 177) generally limit the combined truck and cargo weight to 80,000 lbs, most hazardous waste transporters will limit the roll-off box capacity to 20 tons of hazardous waste per shipment. Thus, if the materials are to be transported off-site to a treatment, storage and disposal facility (TSDF) that accepts bulk waste, and if the anticipated quantity of waste will be large (greater than 5 tons), water-tight roll-off containers may be more practical and cost-effective for temporarily containing and transporting the waste in lieu or in combination with 55-gallon drums (e.g., 55-gallon drums may still be used for personal protective equipment or other articles not directly derived from the abandoned well). The roll-off containers should be lined with disposable HDPE liners to prevent contact with the container, and will be initially labeled according to the source(s) of the contained waste materials. Likewise, if drums are used they will be lined with a protective plastic sleeve, filled and the drum initially labeled according to the source of the contaminated materials. After the contents of the roll-offs and drums have been characterized, they should be labeled in accordance with 49 CFR Part 172. Roll-off containers will be covered with polyethylene covers and tarps with bows during temporary storage and transportation, and all drums will be sealed.

Fluids generated during the decommissioning program will generally be contained in 55-gallon drums unless extremely large volumes are expected; in this case 5,000-gallon tankers or other suitable temporary storage may be used. All drums will be initially labeled according to the wastewater source(s) and will be assumed to contain the same contaminants as the groundwater measured by the particular monitoring well being decommissioned. All 55-gallon drums containing fluids should be sealed and temporarily stored at the decontamination pad until final off-site disposal at an approved treatment facility.

4.1.3 Characterization

Hazardous waste characterization is necessary to determine the nature of the waste materials, to verify whether the materials are hazardous, and to determine proper disposition. Characterization of waste materials will be conducted at each of the sites to determine the appropriate disposal requirements. The decision as to the number, location and types of samples to be collected will be site specific and will depend on factors such as the quantity of waste generated and type of containers used, the nature of the waste, and the distribution of contaminant types across the site with respect to the origin of the waste materials. In general, the sample collection program will be designed to ensure that analytical data representative of all the materials to be disposed will be generated from the minimal number of samples. This may be accomplished by means such as:

- collection of composite samples for contaminants such as metals and PCBs (compositing is not typically acceptable for volatile organic compound analyses).
- collection of grab samples from select drums/containers suspected of elevated contaminant concentrations based on visual observation (e.g., soil staining, liquid sheen or non-aqueous product) or PID screening

Sample analysis will be based on site history and the requirements of the disposal facility. At a minimum, the samples should be analyzed for the parameters of concern indicated by past monitoring well analytical results, as well as the hazardous waste

characteristic parameters: toxicity by TCLP; ignitability; reactivity; and corrosivity in accordance with 40 CFR Part 261.

4.1.4 Labeling

Depending on the nature of the materials, proper labeling of the storage containers (roll-offs and/or drums) must be completed according to 49 CFR Part 172.

4.1.5 Disposal

Disposal of waste materials will depend on whether the waste has been characterized as hazardous or non-hazardous. Non-hazardous waste will be disposed of on-site in accordance with NYSDEC TAGM #4032 with the prior consent of the owner and the Department, or may be landfilled at a permitted 6NYCRR Part 360 facility.

For wastes that exhibit contamination, the requirements for disposal or treatment will be dependent on the waste characteristics. To determine these requirements the following procedure should be followed upon receipt of the waste characterization results:

1) Determine if the waste is characteristically hazardous (by failure of any of the criteria for toxicity, corrosivity, reactivity, or ignitability) or if it is a listed hazardous waste per the classifications identified in 40 CFR Part 261.

2) Determine the EPA hazardous waste code(s) for the applicable waste classification(s) listed in 40 CFR Part 261.

3) Determine any treatment standards for the hazardous waste code(s) per 40 CFR Part 268. Depending on the waste classification, treatment standards may be based on final concentration in the waste/waste extract or may require a specific treatment technology (e.g., incineration).

4) If the hazardous waste contains other constituents that are not listed in the treatment standards, and if landfilling is a disposal option, it should be determined if the waste is a California List waste per the criteria in 40 CFR Part 268.32 (e.g., under these regulations, nonliquid wastes must not contain total halogenated organics at or in excess of 1,000 ppm).

5) If the hazardous waste meets all treatment standards including the California List Standards (if applicable), it may be disposed of at a permitted hazardous

waste land disposal facility. For each shipment the generator is required to provide the following manifest information:

- Hazardous Waste Code(s)
- Corresponding concentration-based or technology-based treatment standards.
- Manifest number.
- Waste analysis data.
- Certification Statement per 40 CFR 268.7(a)(2)(D)(ii).

In addition, the generator is required to maintain the records specified in 40 CFR Part 268.7(a)(7) for a minimum of 5 years.

6) If the waste fails to meet any of the treatment standards listed in 40 CFR Part 268, it must be sent to a treatment, storage, or recycling facility. If the waste's treatment standard is technology-based, it must be treated in accordance with the specified method. Land disposal is not allowable unless the waste is eligible for a National Capacity Variance (40 CFR Subpart C) and meets the California List standards. In all cases, the notification and recordkeeping requirements identified above must be fulfilled by the generator.

The hazardous waste will be transported in accordance with DOT regulations (49 CFR Parts 172-173) to either a secure hazardous waste landfill or TSDF, as appropriate. The contractor will be responsible for arranging for proper transportation and the disposal of the wastes. The Engineer will sign a hazardous waste manifest, as an agent of the Owner.

Appendix D

Field Sampling and Analysis Plan

SECTION 1

DATA QUALITY OBJECTIVES AND QA/QC

Analytical procedures will be performed by a New York State Department of Health - Environmental Laboratory Approval Program (NYSDOH-ELAP) certified laboratory and in accordance with NYSDEC Analytical Services Protocol (ASP). Field blanks and duplicate samples will be collected for QA purposes according to NYSDEC requirements. Number and frequency of blanks and duplicates is itemized by matrix group in SAP Section 2, Field Sampling Procedures (FSP).

Special consideration will be given to the method detection limits for each parameter to ensure that promulgated maximum contaminant levels (MCLs) are within the detectable range wherever possible.

The quality assurance/quality control objectives for measurement data include completeness, representativeness, comparability, precision, and accuracy.

A. **Completeness.** The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study, as specified in Section 4 of the operations, Monitoring, and Maintenance (OM&M) Plan for the site.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. The data quality objective for this project is 100 percent completeness with the work plan.

B. **Representativeness.** Representative samples of the population will be obtained, and where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where volatile organic parameters are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory,

will accompany each set of sample bottles from the laboratory to the field and back. This bottle will remain sealed throughout the shipment and sampling process. This blank will be analyzed for volatile organic compounds along with the groundwater samples to ensure that contamination with volatile compounds has not occurred during the bottle preparation, shipment and sampling phase of the project. In order to check for contaminant carryover when non-dedicated sampling equipment is used, a rinsate blank will be submitted to the laboratory. This blank will also be analyzed for volatile organic compounds.

The results obtained from the determination of identical parameters in field duplicate samples can be used to further assess the representativeness of the sample data.

C. **Comparability.** Consistency in the acquisition, preparation, handling and analysis of samples is necessary in order for the results to be compared where appropriate. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available.

To provide the comparability of analytical results with those obtained in previous or future testing, all samples will be analyzed by NYSDEC-approved methods. The method-specific holding times for various analyses will be strictly adhered to.

D. **Precision And Accuracy.** The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used include gas chromatography/mass spectrometry (GC/MS), gas chromatography (GC), colorimetry, atomic spectroscopy, gravimetric and titrametric techniques. The following outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions to maintain analytical quality control.

The requirements of QA/QC are both method specific and matrix dependent. The procedures to be used are described on this basis in SAP Section 3. The number of duplicate, spiked and blank samples analyzed will be dependent upon the total number of samples of each matrix to be analyzed, but there will be at least one split per matrix. The inclusion and frequency of analysis of field blanks and trip blanks will be on the order of one per each sampling event. Samples to be analyzed for volatile organic compounds will be accompanied by trip and field blanks (water matrix) or field blanks (soil, sediment matrice).

The quality of results obtained for inorganic ion and demand parameters will be assessed by

comparison of QC data with laboratory control charts for each test.

E. **Data Validation.** In certain cases, and as required by NYSDEC, analytical data collected during this project may be subject to data validation. The purpose of data validation is twofold: 1) to determine whether proper analytical procedures have been followed and can be documented; and 2) to determine whether the data are technically reasonable.

The parameters discussed above (precision, accuracy, representativeness, comparability, and completeness) will be integrated with the geochemical analysis and site characterization in order to assess the technical reasonableness of the results.

SECTION 2

FIELD SAMPLING PROCEDURES

The sampling program for the site consists of representative sampling of groundwater, surface water, leachate, and gas. The sampling program has been developed in order to assess the impacts of landfill-related activities on the environment, if any. Samples will be handled in accordance with these Field Sampling Procedures and the Quality Assurance Plan.

Completed laboratory information and chain-of-custody sheets will be provided by the laboratory. The minimum information to be included on the chain-of-custody form is as presented on the attached standard form. The laboratory staff will insert preservation chemicals into sample bottles prior to sample collection and provide the state documentation regarding holding times and sample preservation techniques.

A. **Bottle Preparation.** It is important to use the proper sample containers in order to protect against the alteration of the groundwater chemistry between the field and the laboratory. Sample containers will be prepared by the laboratory. Proper preservation will be performed, the jars tagged, and the chain-of-custody initiated prior to shipping.

B. **Sample Designation.** Sampling locations of a particular matrix type (surface water, groundwater) 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:

MW - Groundwater
SW - Surface water

Sample bottles will be labeled individually. Each label will identify the site name, depth, matrix and sample location (i.e., MW-1, SW-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. **Monitoring Well Sampling Techniques.**

1. **Explosive and Volatile Organic Vapors.** If explosive or volative organic vapors are suspected at the site, ambient air in the well will be measured before the well is evacuated.

2. **Documented Contamination.** For wells with documented contamination, standing water in the well will be checked for immiscible layers or other contaminants that are lighter or heavier than water (floaters or sinkers). Floaters or sinkers will be sampled and analyzed by a separate method described in Section D.5.c.11 of the field sampling procedures.

D. **Sampling Equipment and Procedures.**

1. **Recordkeeping.** Field records are the responsibility of the field sampling personnel. The field personnel are responsible for keeping the field log book and preparing the chain-of-custody forms. All field records must be dated; kept in an organized, legible, and up-to-date form in the log book; and recorded with an indelible ballpoint pen.

2. **Decontamination.** The following materials and procedures should be used to decontaminate 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.

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
Alconox
Bottle brushes - 24 inch or more
Bristle scrub brush
Pesticide-grade methanol or hexane
Deionized water
PVC gloves
Nitrile gloves
Tyvek suit
Pipe wrench
Paper towels
Aluminum foil
Goggles

To avoid being splashed during decontamination, the sampler shall wear a Tyvek suit, goggles and a pair of nitrile gloves over PVC gloves. Outer gloves must undergo decontamination procedures simultaneously with equipment.

3. **Procedure.**

a. Wash in alconox 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.

4. **Groundwater Sampling by Bailer.** Below are listed step-by-step procedures for sampling monitoring wells using bailers. The protocol is designed to provide representative samples while reducing the chances for cross contamination between sampling points. 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.

5. **Bailer Sampling Procedure.**

a. **Preparation.**

1) Review sampling plan.

2) Order sample bottles from laboratory.

3) Notify interested parties (regulators, client) of sampling event.

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

5) Attend pre-sampling meeting.

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

b. **Calibration Data.** The following data must be included whenever the pH, Eh, and conductivity meters are calibrated:

1) The temperature, nominal value, and expiration date of the calibration fluids.

2) The temperature-corrected value of the calibration fluids.

3) The final (after calibration) reading of the instruments as they measure the calibration fluids and the time those readings are taken.

4) If necessary, reasons why calibration could not be achieved.

c. **Sampling.**

1) Identify the well and record the location in the field book.

2) Put on a new pair of disposable PVC gloves.

3) Put on a pair of nitrile gloves.

4) 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.

5) 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.

6) Clean meters, tools, equipment, etc. before use.

7) 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.

8) Measure water levels in all monitoring wells prior to purging any of the wells. 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.

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

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

11) 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. If floaters or sinkers are present in the well, then thoroughly describe the color, appearance, thickness, and odor in the field book. The need for and type of chemical analysis will be determined on an as needed basis depending on the nature of the non-aqueous phase liquid.

12) 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.

13) Record the physical appearance of the groundwater in the field book.

14) Initiate bailing the well from the top of the water column, making certain to keep the polypropylene rope on the plastic sheet. 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. PID readings above the site action level require that the purged water be drummed for proper disposal.

15) Continue bailing the well until a sufficient volume of groundwater in the well has 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 18. Record this information on the groundwater field sampling record.

16) Remove the sampling bottles from their transport containers and prepare the bottles for receiving samples. Inspect labels to verify 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. Filter and add preservatives to appropriate samples.

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

18) 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.

19) 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.

20) 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.

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

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

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

6. **Surface Water Sampling.** When sampling from surface water bodies, care must be exercised to collect a representative sample. The sample should cause as little disturbance to the water body as possible. Avoid taking a sample of water which shows evidence of sediment, debris or other material which may have been stirred up by the presence of the sampler.

The surface water samples should not contain bottom sediment. In shallow moving water, downstream samples will be collected first to avoid disturbing the sediment bottom.

7. **Surface Water Sampling Procedure.**

a. **Preparation.**

1) Design sampling plan.

2) Order sample bottles from laboratory.

3) Notify interested parties (regulators, client) of sampling event.

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

5) Attend pre-sampling meeting.

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

b. **Surface Water Sampling.**

1) Determine sampling locations, record on site map and in field book. Begin at farthest downstream location.

2) Properly label sample containers.

3) Put on PVC and nitrile gloves.

4) Record physical appearance of water body, sampling time, and date in the field book.

5) Screen with PID when sampling leachate seeps or springs.

6) Fill sample bottles directly, if possible, always tilted upstream. If depth of water body is insufficient to fill containers, use a clear glass beaker. Place samples immediately in a cooler on ice. If required, seal containers with a chain-of-custody seal.

7) If sample is collected from water bodies over 3 feet, check for stratification. If stratification is detected, record field parameters of each stratum for contamination. Sample each stratum that shows evidence of contamination, and if no stratification is visible, then collect a composite surface water sample.

8) Using a clean beaker or by measuring directly in water, record field parameters (pH, Eh, conductivity, temperature and turbidity). Record this information in the field book.

9) If turbidity is greater than 50 NTUs, filtered samples should be obtained for metals analysis.

10) Remove and dispose of gloves before sampling next locations.

D. **Corrective Action.** The field sampling procedure will be followed as described in this document. In the event of a problem, any corrective measures taken will be documented in the sampling report submitted to the NYSDEC. The documentation will include a description of the deficiency, the corrective action taken, and the persons responsible for implementing the corrective action. Any alterations to the field sampling procedures shall be included as an amendment to the SAP.

E. **Field QA/QC.** In addition to water samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses. The blanks will consist of 40ml VOA vials as follows:

1. **Trip 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 other 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 volatiles is planned (water matrix only). The trip blank will be analyzed for volatile organic compounds as a measure of the internal laboratory procedures and their effect on the results.

2. **Field (Wash) Blanks.** Field wash blanks are analyzed to check the effectiveness of decontamination. Each sample consists of distilled deionized water (prepared by the laboratory) poured through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure prior to sampling of a monitoring well. The wash blank can be analyzed for all or some of the compounds which the subsequent monitoring well sample is scheduled for. In the event dedicated sampling equipment (i.e., disposable bailers) is used such that decontamination procedures are not warranted, field blanks will not be included for analysis.

3. **Duplicate Samples.** One duplicate sample will be collected during each sampling event. The duplicate sample will be collected from one of the monitoring wells sampled in that event, and will be analyzed for either routine, baseline, or expanded parameters, consistent with whichever parameter list is being targeted for that particular sampling event. The sample containers for the duplicate sample will not reveal the identity of the well from which the sample is collected. The results of the duplicate analyses will be used to check for analytical integrity.

F. **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.

1. **Packaging.** Samples processed for analyses must be packaged for shipment in accordance with current U.S. Department of Transportation (DOT) regulations. 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:

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

b. Remove previously-used labels, tape and postage from cooler.

c. 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.

d. Affix return address label to cooler.

e. Check to see that sample bottles are tightly capped.

f. Be sure bottle labels are completed.

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

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

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

j. 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.

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

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

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

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

2. **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. 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.

a. Securely package samples and complete paperwork.

b. Weigh coolers for air transport.

c. 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.

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

e. 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.

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

SECTION 3

LABORATORY QUALITY ASSURANCE PLAN

The quality assurance plan of the analytical laboratory will be included as Section 3 of the Field Sampling and Analysis Plan (Appendix D - Verona Research Facility OM&M Plan) and subject to approval by NYSDEC. The analytical laboratory will carry NYSDOH-ELAP certification, and will provide NYSDEC ASP Category B deliverables. Laboratory QA/QC procedures will ensure that complete and thorough data validation can be carried out for all sampling events.

The ambient water quality standards and guidance values have been determined by the NYSDEC in order to protect the State's waters. The minimum detection limit for water parameters will be specified as the practical quantitation limits (PQLs). The PQLs are the lowest concentration of analytes in groundwater that can be reliably determined under normal laboratory practices. For any water quality parameter, if the PQL is less than the water quality standard, the minimum detection limit for the parameter will be the PQL. But if the PQL is greater than the water quality standard, the minimum detection limit will be the water quality standard.

The analytical quality assurance (AQA) and analytical quality control (AQC) interpretations for the sampling program will be provided by the laboratory analyzing the samples. The laboratory will provide a discussion the AQA/AQC programs, including AQA/AQC goals and procedures for environmental monitoring. This discussion will include such items as: 1) quality objectives of project; 2) laboratory employee qualifications; 3) AQC procedures; and 4) standard operating procedures for all aspects of environmental monitoring, including sample bottle preparation, sample preservation, holding times, and analytical methods.

Should circumstances require, specific laboratory standard operating procedures will be submitted to the NYSDEC regarding the following:

1. Receipt, storage, and handling of samples.
2. Sample scheduling to ensure holding times are met.
3. Reagent and standard preparation.
4. General laboratory techniques.
5. Description of analytical performance.
6. Equipment calibration.

7. Documentation for corrective actions taken.

SECTION 4

DATA QUALITY ASSESSMENT AND USEABILITY ANALYSIS

Data validation and data useability analyses may be performed on the analytical data at the request of NYSDEC.

The QA/QC objectives for the site data are as follows:

A. **Completeness.** The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study, as specified in Section 4 of the OM&M Plan.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. The data quality objective for this project is 100 percent completeness with the work plan.

B. **Representativeness.** Representative samples of the population will be obtained, and where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where volatile organic parameters are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory, will accompany each set of sample bottles from the laboratory to the field and back. This bottle will remain sealed throughout the shipment and sampling process. This blank will be analyzed for volatile organic compounds along with the groundwater samples to ensure that contamination with volatile compounds has not occurred during the bottle preparation, shipment and sampling phase of the project. In order to check for contaminant carryover when non-dedicated sampling equipment is used, a rinsate blank will be submitted to the laboratory. This blank will also be analyzed for volatile organic compounds.

The results obtained from the determination of identical parameters in field duplicate samples can be used to further assess the representativeness of the sample data.

C. **Comparability.** Consistency in the acquisition, preparation, handling and analysis of samples is necessary in order for the results to be compared where appropriate. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available.

To provide the comparability of analytical results with those obtained in previous or future testing, all samples will be analyzed by NYSDEC-approved methods. The method-specific holding times for various analyses will be strictly adhered to.

D. **Precision And Accuracy.** The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used include gas chromatography/mass spectrometry (GC/MS), gas chromatography (GC), colorimetry, atomic spectroscopy, gravimetric and titrametric techniques. The following outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions to maintain analytical quality control.

The requirements of QA/QC are both method specific and matrix dependent. The procedures to be used are described on this basis in SAP Section 3. The number of duplicate, spiked and blank samples analyzed will be dependent upon the total number of samples of each matrix to be analyzed, but there will be at least one split per matrix. The inclusion and frequency of analysis of field blanks and trip blanks will be on the order of one per each sampling event. Samples to be analyzed for volatile organic compounds will be accompanied by trip and field blanks (water matrix) or field blanks (soil, sediment matrice). The quality of results obtained for inorganic ion and demand parameters will be assessed by comparison of QC data with laboratory control charts for each test.

E. **Data Validation.** As required by NYSDEC, analytical data collected during this project may be subject to data validation. The purpose of data validation is twofold: 1) to determine whether proper analytical procedures have been followed and can be documented; and 2) to determine whether the data are technically reasonable. The parameters discussed above (precision, accuracy, representativeness, comparability, and completeness) will be integrated

with the geochemical analysis and site characterization in order to assess the technical reasonableness of the results.

Data validation by the laboratory will be allowed for routine sampling events, but will be performed by a person other than the laboratory for baseline or expanded sampling events.

Data useability analyses will include a discussion of data quality objectives, a comparison of current data with data from previous sampling events, an evaluation of field blank and trip blank analytical results, an evaluation of possible matrix effects, and integration of the data with known hydrogeological and meteorological data.

The data validator will be trained in appropriate data validation methodology, and will, at a minimum, be proficient at completing validation pursuant to the guidelines set forth in SW-846. In general, the validator will note the following information as part of the validation process:

1. Check all chains and supplied paperwork (notebooks, logs, etc.).
2. Check the chromatograms. (Do they look reasonably clear and exhibit good peaks?)
3. Check the retention times. (Is there a drift?)
4. Calculate the response factors (RF) and relative response factors (RRF).
5. Check integration method. (If available, peak area or peak height?)
6. Check verification standard. (Does it pass?)
7. Check tune (GC/MS only. Does it pass?)
8. Check quantification ion. (GC/MS only. Is the right one being used?)
9. Percent probability. (GC/MS only for TICs. Is it reasonable?)
10. Check alternate column verification. (GC only. Was it run? Was it required?)
11. Other verification standards. (Do they pass? LCS? QC STD? SPCC? CCC?)
12. Is the RF and RRF drifting?
13. Check matrix spike (MS) and matrix spike duplicate (MSD).
14. Check sample and sample duplicate.
15. Check the surrogates and their RF and RRF.
16. Are blanks free of contamination?

Appendix E

Site Health and Safety Plan

SITE HEALTH AND SAFETY PLAN
VERONA REASEARCH FACILITY
BUILDINGS 1231 & 1253
NYSDEC SITE # 634036

A. SITE DESCRIPTION

Date .....Date: September 2001 Revised: _____
Location .....Verona Research Facility (VRF), Town of Verona, NY
Hazards .....Dissolved volatile organic compounds in groundwater and surface water
Area Affected .....Groundwater, surface water
Surrounding Population .....Commercial/rural
Topography .....Flat
Weather Conditions .....Usually partly sunny to overcast, south winds

B. ENTRY OBJECTIVES: The objective of site entry is to complete post-closure groundwater and surface water monitoring.

C. ON-SITE ORGANIZATION AND COORDINATION. The following personnel are designated to carry out the stated job functions on site. (Note: One person may carry out more than one job function.)

Project Team Leader (VRF):	Fred Conover	(315) 330-3553
Field Team Leader:	Donald S. Sorbello, S&W Redevelopment	(315) 655-4953
Field Team Members:	Donald S. Sorbello/Jeffrey Kiggins	(315) 655-4953

D. ON-SITE CONTROL. The Field Team Leader has been designated to coordinate access control and security at the sampling sites. Control boundaries have been established as necessary. These boundaries will be identified as the VRF perimeter.

E. HAZARD EVALUATION. The following substances are known or suspected to be on site, primarily in site wastes. The primary hazards of each are identified.

SUBSTANCE	PRIMARY HAZARDS
Volatile Organics	
Tetrachlorethene (PCE)	Irrit eyes, nose throat; nausea; skin irrit; liver damage
Trichloroethene (TCE)	Eye irrit., skin; nausea, vomiting; liver damage
cis-1,2-dichloroethene	Irrit eyes, resp system
1,4 dichlorobenzene	Irrit eyes and resp system; liver & kidneys
chlorobenzene	Irrit eyes, nose, skin; drowsiness

F. **PERSONAL PROTECTIVE EQUIPMENT.** Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks:

LOCATION	JOB FUNCTION	LEVEL OF PROTECTION
Work zone	Site investigation	A B C **D** Other

Specific protective equipment for each level of protection is as follows:

Level A	Fully-encapsulating suit SCBA (disposable coveralls)
Level B	Splash gear (saranax-coated Tyvek suit) SCBA or airline respirators
Level C	Splash gear (Tyvek suit) Full-face canister respirator Boots Gloves Hard hat
Level D	Overalls Safety glasses Boots Gloves Hard hat

Action Levels. The following criteria shall be used to determine appropriate action:

VOLATILE ORGANICS IN BREATHING ZONE	LEVEL OF RESPIRATORY PROTECTION
Background (0-10 ppm)	Level D
10-200 ppm	Level C
200-1000 ppm	Level B - air line
1000+ ppm	Level B - SCBA

The following protective clothing materials are required for the involved substances:

SUBSTANCE	MATERIAL (MATERIAL NAME, E.G., VITON)
Volatile Organics	
Tetrachlorethene (PCE)	Level D, Respirator
Trichloroethene (TCE)	Level D, Respirator
cis-1,2-dichloroethene	Level D, Respirator

SUBSTANCE	MATERIAL (MATERIAL NAME, E.G., VITON)
1,4 dichlorobenzene	Level D, Respirator
chlorobenzene	Level D, Respirator

NO CHANGE TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE APPROVAL OF THE PROJECT TEAM LEADER.

G. SITE HEALTH AND SAFETY PLAN.

1. **Emergency Medical Care.** Oneida City Hospital is located 10 minutes from this location. A route map to this facility will available at the field vehicle. Directions are attached.

   First aid equipment is available on site at the following locations:

   First aid kit Field vehicle

   List of emergency phone numbers:

AGENCY/FACILITY	PHONE NUMBER
Police (Oneida County Sheriff)	911
Fire	911
Ambulance	911
Hospital (Oneida City Hospital)	(315) 363-1437

2. **Environmental Monitoring.** The following environmental monitoring instruments shall be used on site at the specified intervals:

   - MiniRAE photoionization detector (PID). Continuous during installation of soil gas monitoring probes.

3. **Emergency Procedures.** The following standard procedures will be used by on-site personnel. The Site Safety Officer shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed:

   a. **Personnel Injury in the Work Zone.** Upon notification of an injury in the Work Zone, the designated emergency signal, a continuous horn blast, shall be sounded. A rescue team will enter the Work Zone (if required) to remove the injured person to safety. Appropriate first aid shall be initiated and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall re-enter the Work Zone until the cause of the injury or symptoms is determined.

   b. **Fire/Explosion.** Upon notification of a fire or explosion on site, the designated emergency signal, a continuous horn blast, shall be sounded and all site personnel assembled at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

c. **Personal Protective Equipment Failure.** If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the Work Zone. Re-entry shall not be permitted until the equipment has been repaired or replaced.

d. **Other Equipment Failure.** If any other equipment on site fails to operate properly, the Project Team Leader and Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the Work Zone until the situation is evaluated and appropriate actions taken.

In all situations, when an on-site emergency results in evacuation of the Work Zone, personnel shall not re-enter until:

a. The conditions resulting in the emergency have been corrected.
b. The hazards have been reassessed.
c. The Site Health and Safety Plan has been reviewed.
d. Site personnel have been briefed on any changes in the Site Health and Safety Plan.

4. **Personal Monitoring.** The following personal monitoring will be in effect on site:

Personal exposure sampling: MiniRAE PID screening, sampling pumps/tubes , or organic vapor monitors.

Medical monitoring: The expected air temperature will be less than 70EF. If it is determined that heat stress monitoring is required (mandatory if over 70EF), the following procedures shall be followed: Monitoring body temperature, body weight, pulse weight.

ROUTE TO ONEIDA CITY HOSPITAL

From VRF entrance, turn LEFT on Route 31.

After approximately 1 mile, turn RIGHT on Route 365 West

After approximately 5 miles, turn RIGHT on Route 365A.

After approximately 1 mile, turn RIGHT on Route 46. Hospital is 1.2 miles after turn.

Appendix F

Spill Prevention Control and Countermeasure Plan

OIL SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN VERONA RESEARCH FACILITY

Prepared for

ARFL/IFOCV

Prepared by

Lu Engineers
2230 Penfield
Penfield, New York 14526

September 1999

Project No. 13118

GENERAL INFORMATION

1. Name of Facility: Verona Research Facility

2. Type of Facility: Onshore-aboveground and underground bulk storage facility

3. Location of Facility: Germany Road, Verona, NY 13478

4. County: Oneida

5. Distance and Direction to Nearest Town:

   Verona Station, approximately 1 mile southeast

6. Name and Address of Owner:

   Name: AFRL/IFOCV c/o Mr. Bruce H. Mero
   Address: 150 Electronic Parkway, Rome, NY 13441

7. Designated person accountable for facility spill prevention:

   Name and Title: Mr. Eugene McDonald, Real Property Manager
   Site Address: 5887 Germany Road, Verona, NY 13478

   Mailing Address: Rome Research Corp., 314 S. Jay Street, Rome, NY 13440

8. Facility has not experienced a reportable petroleum spill event during the previous 12 months.

9. Potential Spill Sources, Flow Predictions, and Controls: See Tables 5 and 6.

10. Personnel and Hours of Operation:

    7:00 a.m. - 5:00 p.m., Monday through Friday.

    Approximately 4 full-time personnel.

MANAGEMENT APPROVAL

This Spill Prevention Control and Countermeasure Plan is fully supported by Rome Research Site/IFOCV management, who will implement the Plan and amend it as needed due to facility expansions, modifications, and improvements

Signature: _____

Name: Mr. Bruce H. Mero, REM

Title: Chief Environmental Safety and Occupational Health Office

CERTIFICATION

I hereby certify that the above facility has been examined, and being familiar with the provisions of 40 CFR, Part 112, attest that this SPCC Plan has been prepared under my general supervision in accordance with good engineering practices.

Robert J. Elliott, P.E.
Printed Name of Registered Engineer

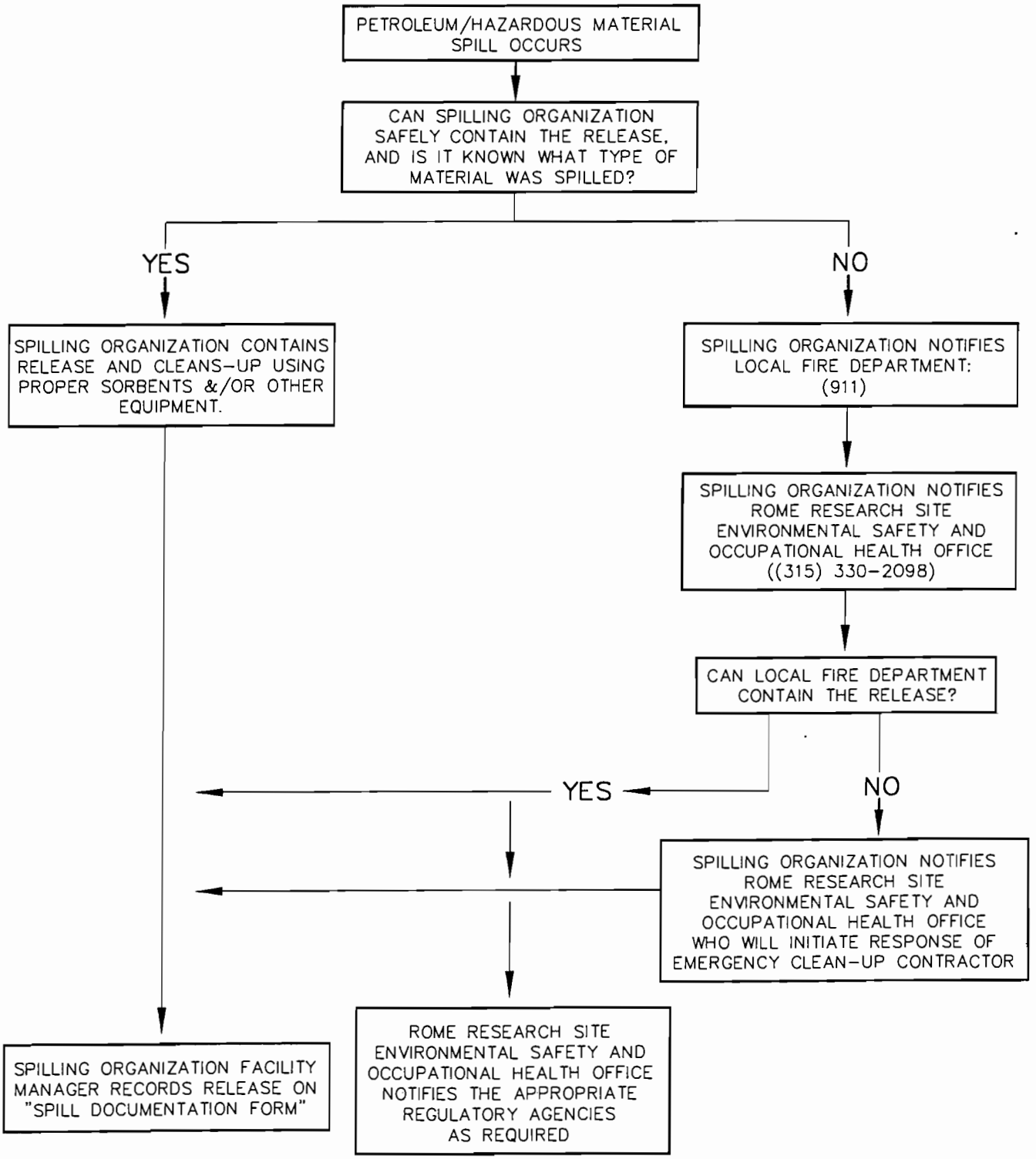
_____
Signature of Registered Engineer

Date: 10/26/99

License No.: 61038

State: New York

ROME RESEARCH SITE SPILL RESPONSE CHART VERONA



J:\13118\ENV\RESPONSECHART

DATE: 8/99 JOB NO.: 13118

LU ENGINEERS
Civil and Environmental

TABLE OF CONTENTS

Page

CHAPTER 1 - SPCC PLAN APPLICABILITY

1.1 Plan Availability 1-2

CHAPTER 2 - SITE SUMMARY DESCRIPTION

2.1 Spill Occurrences and Corrective Measures 2-2

CHAPTER 3 - FACILITY DRAINAGE

3.1 Interior Drainage 3-1
3.2 Exterior Surface Drainage 3-1
3.3 Diked Storage Areas 3-1
3.4 Unloading Areas 3-2

CHAPTER 4 - PETROLEUM STORAGE

4.1 Aboveground Tanks 4-1
4.2 Underground Tanks 4-1
4.3 Fuel Pumps and Piping 4-2

CHAPTER 5 - HAZARDOUS MATERIALS AND WASTE

5.1 Designated Hazardous Materials Storage Areas 5-1
5.2 Hazardous Waste Activities 5-1

CHAPTER 6 - PREDICTED SPILL FLOWS AND SOURCES

6.1 Petroleum Sources 6-1
6.2 Hazardous Material/Waste Spill Sources 6-1
6.3 Emergency Procedures 6-1

CHAPTER 7 - GROUNDWATER CONTINGENCY PLAN

7.1 Site Soils and Depth to Water Table 7-1
7.2 Spill Predictions 7-1
7.3 Groundwater Impact Contingency 7-1

TABLE OF CONTENTS (continued)

Page

CHAPTER 8 - SPILL PREVENTION EQUIPMENT AND PROCEDURES

8.1 Spill Response Capability 8-1
8.2 Emergency Spill Response Equipment 8-1
8.3 Equipment Inspection and Maintenance 8-3
8.4 Security 8-4
8.5 Personnel, Training, and Spill Prevention Procedures 8-4
8.6 Fuel Transfer Procedure 8-6

CHAPTER 9 - SPILL CONTINGENCY PLAN

9.1 Spill Control Procedure 9-1
9.2 Spill Reporting and Documentation 9-5

LIST OF TABLES

Table No.

1 Aboveground Storage Facilities
2 Underground Storage Facilities
3 Potential Petroleum Spill Sources, Predictions, and Controls
4 Flammable/Hazardous Materials Storage Cabinets
5 Hazardous Substance Spill Sources, Predictions, and Controls
6 Kinematic Viscosity Ratios
7 Vertical Velocities and Estimated Travel Times of Spilled Petroleum Through the Soil Column
8 Fuel Storage Facility Spill Prevention Equipment
9 Spill Emergency Equipment
10 Spill Plan Training Levels
11 Local Fire Department
12 Verona Research Facility Spill Reporting Contacts
13 Rome Research Site, Environmental Safety and Occupational Health Office Spill Reporting Contacts
14 NYSDEC Spill Reporting Summary
15 Federal Spill Reporting Summary

TABLE OF CONTENTS (continued)

LIST OF FIGURES

Figure No.

1 Site Location Map
2 Site Plan

LIST OF APPENDICES

Appendix

A Spill Documentation Form
B Petroleum Facility Inspection Checklists
C Petroleum Bulk Storage Regulations Summary
D USDOT Unloading Procedure Regulations
E Evacuation Routes
F Key Terms
G Certification of the Applicability of the Substantial Harm Criteria Checklist

CHAPTER 1

SPCC PLAN APPLICABILITY

Oil spills and spill prevention are primarily regulated under the United States Code of Federal Regulations (CFR), Title 40, Part 112, and Article 12 of the New York State Navigation Law. Under 40 CFR, Part 112-Oil Pollution Prevention, a Spill Prevention Control and Countermeasure (SPCC) Plan must be prepared by the owner or operator of a facility engaged in the storage, transfer, distribution, or consumption of oil and oil products in quantities above regulated thresholds. For the purposes of this plan, *oil* is defined as oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, oil refuse, sludge and oil mixed with wastes other than dredged spoils [40 CFR Part 112]. Additional definitions are provided in the "Key Terms" section of this Plan (Appendix F).

The quantity thresholds for SPCC Plan applicability are as follows:

- Total facility aboveground storage capacity of more than 1,320 gallons, or if a single aboveground container has a volume of more than 660 gallons.

- Total facility underground storage capacity of more than 42,000 gallons.

The facility SPCC Plan establishes procedures, methods, and equipment to be used in the prevention of and response to the discharge of oil from the facility into navigable waters or groundwaters of New York State in accordance with 40 CFR 112. In addition to preparing this SPCC Plan, Rome Research Site must be able to demonstrate to the New York State Department of Environmental Conservation (NYSDEC) and/or the United States Environmental Protection Agency (USEPA) that the Plan is being implemented at the facility. A complete copy of the Plan must be maintained at the facility and be readily available to personnel. Under 40 CFR 112, an SPCC Plan must be reviewed by a registered professional engineer every three years.

The SPCC Plan must be recertified and submitted to the USEPA and/or NYSDEC if the facility undergoes a substantial modification, the facility experiences two oil spills in a 12-month period, if an individual spill of more than 1,000 U.S. gallons occurs, or the Plan certification is more than three years old.

Although hazardous materials/waste spill prevention and response are not covered in federal or New York State SPCC regulations, they are addressed herein. Many of the specified practices and procedures for oil spill prevention and response are applicable to hazardous materials/wastes.

The purpose of this Plan is to specify the prevention, response, and reporting procedures associated with spills of petroleum and hazardous materials at the Verona Research Facility.

1.1 PLAN AVAILABILITY

A. **Facility.** A copy of this SPCC Plan shall be maintained in the site manager's office at the Verona Research Facility. The Plan shall be readily available for use and review by Rome Research Corporation employees, Rome Research Site personnel, contractors, and fuel truck operators.

B. **Local Emergency Departments.** The local police and fire departments, ambulance services, hospitals, and other applicable emergency services shall be informed that this SPCC Plan has been prepared for the Verona Research Facility. At a minimum, a copy of the facility Spill Contingency Plan (Chapter 9 of the SPCC) shall be submitted to all local and state emergency response teams that may be called upon to provide emergency services associated with a petroleum or hazardous substance spill. A complete copy of the SPCC Plan will be made available for review or recordkeeping by local emergency organizations upon request.

CHAPTER 2

SITE SUMMARY DESCRIPTION

The Verona Research Facility is owned by the Department of the Air Force Research Laboratory, Rome Research Site (AFRL), and is operated by the Rome Research Corporation. Rome Research Corporation primarily performs testing of precision antenna systems and aircraft navigation equipment at the Verona site. The site consists of 30 buildings and 513 acres of land. The site is divided into two distinct facilities: Verona Research Facility (operated by Rome Research Corporation) and Space Command. The Space Command facility, formerly operated by the federal government, was recently acquired by Rome Research Site and is currently vacant. The site is located in Oneida County, Verona, NY (Figure 1).

Petroleum bulk storage primarily consists of underground and aboveground tank systems at the Verona Research Facility. The tanks mainly store No. 2 fuel oil for building boilers. Portable containers of flammable/hazardous materials are also stored indoors on site.

Building interior floor drains are connected to an on-site septic system that ultimately discharges to Brandy Brook, which flows westerly through the site (Figure 2). There are no storm drains at the facility. Drainage ditches along the facility access roads are the main designated diversionary systems for precipitation runoff. Exterior surface drainage generally runs off paved surfaces to grassed areas (e.g., ditches) and ultimately discharges to Brandy Brook. General flow directions in petroleum bulk storage fill areas are approximately as shown in Figure 2.

Facility petroleum spill prevention includes electronic tank alarms, fill port catch basins, and tank secondary containment. Portable flammable/hazardous liquid containers are generally stored in dedicated steel cabinets.

Spill response at the facility may require the manual application of sorbent materials and the construction of temporary containment structures to prevent spilled material from reaching unpaved surfaces and facility drainage systems. Verona Research Facility personnel shall be committed to spill prevention and response activities to support this Plan, with the exception that no person shall be subjected to unsafe conditions. Spill response and reporting procedures shall be in accordance with the procedures specified in this Plan (Chapter 9).

2.1 SPILL OCCURRENCES AND CORRECTIVE MEASURES

No reportable spills have occurred at this facility in the past 12 months.

CHAPTER 3

FACILITY DRAINAGE

3.1 INTERIOR DRAINAGE

A. **Floor Drains.** Building floor drains are connected to the on-site septic system (Figure 2). In the event of an uncontrolled leak or spill of flammable/hazardous materials or petroleum, product could flow into a floor drain. There are no indoor petroleum bulk storage facilities at the site, however, fuel piping is located in building boiler areas. All facility boiler rooms have floor drains.

3.2 EXTERIOR SURFACE DRAINAGE

Surface drainage from oil storage areas generally flows as shown on Figure 2. In the event of a large petroleum surface spill, it is likely that the material would run off the paved surfaces surrounding tank filling locations onto grassed areas. The majority of anticipated spills (e.g., drips during filling) should be collected in the spill catch basin and/or dike that contains each tank fill port. To prevent oil from reaching navigable waters, it is imperative that sorbent materials be applied immediately to contain spilled product. Refer to "Commitment of Manpower and Resources." Frequent visual observations of the fuel system areas are required to check for leaks and spills.

3.3 DIKED STORAGE AREAS

Steel dikes provide secondary containment of the aboveground petroleum storage tanks at the Verona Research Facility. The diked tanks are located outdoors and are shielded from precipitation by steel canopies. The canopies do not fully enclose the tank; therefore, there is opportunity for precipitation to enter the dikes. Drainage from the diked containment areas is restrained by valves to prevent product releases. Tank containment areas (e.g., dikes) may be drained by valves, manual pumps, or ejectors. Extra care must be taken when using manual pumps or ejectors to ensure that petroleum is not spilled.

The master flow and drain valves or other controls (e.g., plugs) that permit direct outward flow of tank contents (including secondary containment areas) to the surface must be locked in a "closed" position when not in operation or in non-standby status.

Control and drainage of stormwater that accumulates in containment areas must meet the requirements of 6 NYCRR Part 613.3(c)(6). Stormwater that is drained from containment areas must be uncontaminated and free of sheen prior to discharge. Contaminated water shall be disposed of in accordance with all applicable local, New York State, and federal regulations. If there is a question as to whether the collected stormwater is contaminated, contact the Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office.

3.4 UNLOADING AREAS

Drainage from fuel unloading areas for aboveground and underground tanks is not controlled by permanent diversionary structures. A spill catch basin and/or steel dike contains each tank fill port. Additionally, impervious concrete slabs overlie each underground storage tank (UST). The fuel delivery driver shall be responsible for preventing spills and overfills during tank filling. Oil spills in unloading areas at all Rome Laboratory facilities shall be prevented through implementation of the unloading procedures specified in the facility SPCC Plan (Section 8.6). Spills in fuel transfer areas shall be controlled using the procedures specified in the Spill Contingency Plan of the facility SPCC Plan (Chapter 9).

Surface drainage directions from the fuel unloading areas are shown on the attached site plan (see Figure 2).

In the event of a spill during filling, the fuel delivery driver shall immediately contact the Facility Manager, who will initiate spill response and reporting procedures in accordance with NYSDEC and USEPA regulations. Sorbent materials shall be applied immediately (when it is safe to do so) to prevent product from reaching streets, grassed areas, drainage structures, or other potential routes of migration to water bodies.

CHAPTER 4

PETROLEUM STORAGE

All aboveground and underground petroleum storage facilities with a combined storage capacity of more than 1,100 gallons are subject to NYSDEC petroleum bulk storage (PBS) regulations (6NYCRR Parts 612, 613, and 614). The PBS regulations include requirements for tank registration, monitoring, and design. All Rome Research Sites shall strive toward full compliance with the PBS regulations.

4.1 ABOVEGROUND TANKS

There are six registered aboveground petroleum storage tanks currently at the Verona Research Facility.

TABLE 1

ABOVEGROUND STORAGE FACILITIES

TANK NO.	CAPACITY (GALLONS)	PRODUCT	MATERIALS OF CONSTRUCTION	SECONDARY CONTAINMENT	USAGE
# 1226	1,000	Gasoline	Steel	Steel Dike	Generator and vehicles
# 1250	3,000	No. 2 fuel oil	Steel	Steel Dike	Boiler fuel
# 1261	1,000	No. 2 fuel oil	Steel	Steel Dike	Boiler fuel
#1266	550	No. 2 fuel oil	Steel	Steel Dike	Boiler fuel
#1277*	1,000	No. 2 fuel oil	Steel	Steel Dike	Boiler fuel

* Moved to Building 1285
Updated 07/19/00

The listed tanks are constructed of materials that are compatible with the stored product. The tanks are equipped with product level gauges and vent whistles. The tanks shall be operated and maintained in accordance with all applicable PBS regulations.

4.2 UNDERGROUND TANKS

There are currently seven registered underground fuel storage tanks at the Verona Research Facility.

TABLE 2

UNDERGROUND STORAGE FACILITIES

TANK NO.	CAPACITY (GALLONS)	PRODUCT	MATERIALS OF CONSTRUCTION	SECONDARY CONTAINMENT	USAGE
# 1259C	6,000	No. 2 fuel oil	FRP	Double-walled	Formerly boiler fuel*
# 1259D	6,000	No. 2 fuel oil	FRP	Double-walled	Formerly boiler fuel*

* Out of service
Updated 07/19/00

The listed tanks are constructed of materials that are compatible with the stored product. The facility PBS registration indicates that the tanks are cathodically protected and have electronic leak detection systems. The tanks shall be operated and maintained in accordance with all applicable PBS regulations.

4.3 FUEL PUMPS AND PIPING

A. **Facility.** Aboveground and underground petroleum piping is used to distribute fuel between storage facilities and building boilers. The PBS registration indicates that copper underground fuel lines currently do not have external protection or leak detection. Underground fill and/or vent lines do not normally hold product. The aboveground piping is located outdoors and indoors (e.g., in boiler room). Indoor aboveground piping and pumps are located in rooms with concrete walls and floors. The majority of outdoor aboveground piping is associated with ASTs and located on paved surfaces. Fuel pumps are located on boiler burners.

B. **Aboveground Piping**. Aboveground piping shall be examined regularly for leaks and evidence of deterioration. Periodic testing (minimum 10 years) should be done on lines that would result in a spill event if ruptured. All lines removed from service should be capped or blank-flanged and marked to identify origin. Additionally, all loading/unloading pipeline connections must be securely capped or blank-flanged when not in service (or during standby

service) for an extended time period. Aboveground pipe supports must be routinely inspected for abrasion and corrosion. Pipe releases shall be immediately controlled through absorption and/or equipment shutdown.

All aboveground valves and pipelines shall be visually inspected on a regular basis. Items such as flange joints, expansion joints, pipe supports, valves, etc., must be examined. The findings of aboveground piping examinations must be documented on the attached "Monthly Aboveground Fuel System Monitoring System Inspection Report" form (Appendix B).

C. **Underground Piping**. Buried lines should have a protective wrapping, a corrosion-resistant coating, leak detection, cathodic protection, and be designed to allow tightness testing/leak monitoring, or be constructed of non-corrodible materials. Should a section of buried line be exposed for any reason, it must be examined for deterioration and corrective action taken as necessary. If deterioration is found, corrective action and additional inspection should be performed as appropriate for the magnitude of the deterioration. Any modifications to existing petroleum piping must meet the requirements of 6 NYCRR Part 614.14. Buried lines connected to all registered tanks that are not corrosion resistant must be hydrostatically tested at regular intervals (10 years for lines connected to aboveground tanks) in accordance with 40CFR Part 280 and 6 NYCRR 613.5(a) and 613.6(b).

Piping cathodic protection systems shall be monitored at least annually in accordance with 6NYCRR Part 613.5(b).

TABLE 3

POTENTIAL PETROLEUM SPILL SOURCES, PREDICTIONS AND CONTROLS
VERONA RESEARCH FACILITY

POTENTIAL SPILL SOURCE	LOCATION*	ESTIMATED TOTAL STORAGE (GALLONS)	MEANS OF SECONDARY CONTAINMENT	LIKELY SPILL CAUSE(S)	ESTIMATED MAXIMUM QUANTITY OF SPILL AND RATE OF FLOW	MEANS TAKEN TO PREVENT SPILL	PREDICTED SPILL FLOW PATH*
AST 1226	Building #1226	1,000	Steel dike	Tank/dike seam failure	1,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1245	Building #1245	1,000	Steel dike	Tank/dike seam failure	1,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1250	Building #1250	3,000	Steel dike	Tank/dike seam failure	3,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1261	Building #1261	1,000	Steel dike	Tank/dike seam failure	1,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1266	Building #1266	500	Steel dike	Tank/dike seam failure	500 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1277	Building #1285	1,000	Steel dike	Tank/dike seam failure	1,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
UST 1225	Building #1225	1,000	Double-walled	Tank system failure	1,000 gallons variable rate	Electronic leak detection, cathodic protection, vent whistle	Surrounding subsurface soils

TABLE 3 (continued)

POTENTIAL SPILL SOURCE	LOCATION*	ESTIMATED TOTAL STORAGE (GALLONS)	MEANS OF SECONDARY CONTAINMENT	LIKELY SPILL CAUSE(S)	ESTIMATED MAXIMUM QUANTITY OF SPILL AND RATE OF FLOW	MEANS TAKEN TO PREVENT SPILL	PREDICTED SPILL FLOW PATH*
UST 1231	Building #1231	1,000	Double-walled	Tank system failure	1,000 gallons variable rate	Electronic leak detection, cathodic protection, vent whistle	Surrounding subsurface soils
UST 1253	Building #1253	1,000	Double-walled	Tank system failure	1,000 gallons variable rate	Electronic leak detection, cathodic protection, vent whistle	Surrounding subsurface soils
UST 1269	Building #1269	1,000	Double-walled	Tank system failure	1,000 gallons variable rate	Electronic leak detection, cathodic protection, vent whistle	Surrounding subsurface soils
UST 1285	Building #1285	1,000	Double-walled	Tank system failure	1,000 gallons variable rate	Electronic leak detection, cathodic protection, vent whistle	Surrounding subsurface soils
UST 1259C UST 1259D	Building #1259	6,000	Double-walled	Tank system failure	6,000 gallons variable rate	Electronic leak detection, cathodic protection	Surrounding subsurface soils
Tank filling areas	See site plan	--	Catch basins/dikes at fill ports	Improper transfer procedure; hose failure	60 gallons, 60 gpm	Vent whistle; proper transfer procedures	Adjacent paved surfaces toward grassed areas
Aboveground boiler piping	Buildings #1225, #1226, #1231, #1245, #1250, #1253, #1259, #1261, #1269, #1277, #1285	--	None	Joint failure	Variable quantity, 5 gpm	Periodic inspection and maintenance	Across building floor to floor drain

TABLE 3 (continued)

POTENTIAL SPILL SOURCE	LOCATION*	ESTIMATED TOTAL STORAGE (GALLONS)	MEANS OF SECONDARY CONTAINMENT	LIKELY SPILL CAUSE(S)	ESTIMATED MAXIMUM QUANTITY OF SPILL AND RATE OF FLOW	MEANS TAKEN TO PREVENT SPILL	PREDICTED SPILL FLOW PATH*
Underground fuel piping	Buildings #1225, #1231, #1253, #1259 #1269, #1285	--	None	Joint failure, corrosion	Variable quantity and rate	Periodic testing and maintenance	Surrounding subsurface
Boiler fuel pumps	Buildings #1225, #1231, #1245, #1250, #1253, #1259, #1261, #1269, #1277, #1285	--	None	Leaking seal	Variable rate, 5 gpm	Periodic inspection and maintenance	Across building floor to floor drain
Portable containers (e.g., gasoline)	Building #1226	20	None	Container mishandling	Variable rate, 5 gpm	Proper storage and handling	Across building floor to floor drain

*Refer to attached site plan and/or floor plan(s).

UST = Underground storage tank
AST = Aboveground storage tank
gpm = Gallons per minute

CHAPTER 5

HAZARDOUS MATERIALS AND WASTE

5.1 DESIGNATED HAZARDOUS MATERIALS STORAGE AREAS

Portable containers of flammable and/or hazardous materials are primarily stored in steel "flammables cabinets" located within facility buildings (Table 4). Cabinet locations are shown on the floor plans located in Appendix E. Materials stored in the flammables cabinets typically include paints, thinners, lubricants, and miscellaneous sprays. Additional larger (e.g., 5-gallon) portable containers of paints are maintained in Building #1226 in a designated storage room.

TABLE 4

FLAMMABLE/HAZARDOUS MATERIALS STORAGE CABINETS

BUILDING	NO. OF CABINETS
#1226 (Butler Building)	8
#1245	1
#1250	1
#1285	3

Approximately 8 gallons of ethylene glycol is located in the pedestal of the inactive radar system in Building #1219.

5.2 HAZARDOUS WASTE ACTIVITIES

Small quantities of hazardous wastes are normally generated at the Verona Research Facility. Generated wastes that could be considered hazardous typically consist of used lubricating and insulating oils, spent paint thinners, and spent antifreeze. Such waste materials are primarily stored at the hazardous waste storage lockers between buildings #1255 and #1261 (Figure 2).

All petroleum and non-petroleum hazardous wastes generated on site shall be safely stored and disposed of, or treated by a properly licensed facility. The facility manager shall ensure that significant quantities of used oil and other wastes are not accumulated on site by periodically contacting Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office, at (315) 330-2098 (Table 13 in Chapter 9). The Environmental Safety and Occupational Health Office will arrange for the waste pickup.

All hazardous waste storage, handling, and disposal shall be in accordance with the facility Hazardous Waste Management Plan.

CHAPTER 6

PREDICTED SPILL FLOWS AND SOURCES

Potential sources of oil and hazardous materials spills are identified and summarized in this chapter. Additional facility-specific details are indicated in Table 5.

6.1 PETROLEUM SOURCES

The primary sources of potential spills and releases of petroleum products are as follows:

1. Underground and aboveground fuel tanks and associated piping.
2. Aboveground boiler fuel lines and associated pumps.
3. Fuel truck unloading areas.

6.2 HAZARDOUS MATERIAL/WASTE SPILL SOURCES

The primary source of potential hazardous waste releases/spills at the site would be in the area of the Arctic Tower. There is potential for hazardous/flammable materials spills/releases associated with the flammables cabinets located in the buildings listed in Table 4, and the PCB induction regulators and cooling system in Building #1253.

6.3 EMERGENCY PROCEDURES

Spill prevention, response, and reporting shall be in accordance with this SPCC Plan. In the event of a petroleum spill or hazardous material/waste emergency (e.g., spill or fire), the procedures specified in Chapter 9, Spill Contingency Plan, should be followed.

TABLE 5

HAZARDOUS SUBSTANCE SPILL SOURCES, PREDICTIONS, AND CONTROLS
VERONA RESEARCH FACILITY

POTENTIAL SPILL SOURCE	LOCATION	ESTIMATED TOTAL STORAGE (GALLONS)	MEANS OF SECONDARY CONTAINMENT	LIKELY SPILL CAUSE(S)	ESTIMATED MAXIMUM QUANTITY OF SPILL AND RATE OF FLOW	MEANS TAKEN TO PREVENT SPILL	PREDICTED SPILL FLOW PATH*
Flammables cabinets [miscellaneous portable containers of liquid cleaners, paints, and lubricants (typical)]	Buildings #1245, #1226, #1250, #1285	45 (per cabinet)	Steel cabinet with raised door sill*	Container failure, mishandling	5 gallons instantaneous	Proper storage and handling	Cabinet bottom, building floor
Radar Pedestal	Building #1219 (Arctic Tower)	8	None	Pedestal	8 gallons instantaneous	Proper storage and handling	Across wood floor to cracks; then to soils below raised floor
Radar cooling system	Building #1253	15	None	Hose rupture and/or connection failure	Variable quantity at 9 gpm	Periodic inspection and maintenance	Across room floor to concrete cable floor trench

*If all seams are liquid tight, the bottom of each flammables cabinet would provide approximately 8.5 gallons of containment.

CHAPTER 7

GROUNDWATER CONTINGENCY PLAN

7.1 SITE SOILS AND DEPTH TO WATER TABLE[1]

Soils at the Verona Research Facility generally consist of silty fine to coarse sand with some medium to coarse gravel, to an approximate depth of 25 feet. Subsurface soils gradually change to medium to fine sand at depths of more than 25 feet. Based on available soil boring logs, the depth to the water table is at approximately 2 feet below the land surface.

7.2 SPILL PREDICTIONS

Petroleum spills that are most likely to occur at the Verona Research Facility would be associated with the aboveground and underground storage tanks. The following are typical spills or releases related to bulk petroleum storage systems:

1. Leaks in tanks and/or piping.
2. Transfer accidents (e.g., overfills or hose failure).

If the above-referenced spills occurred at the facility, there is potential for spilled or released petroleum to enter soils in the vicinity of the tanks. The ground surface in the majority of tank filling areas is paved.

7.3 GROUNDWATER IMPACT CONTINGENCY

All petroleum spills and releases shall be cleaned up in accordance with this SPCC Plan. If spills are promptly reported and adequately abated, there will be little opportunity for released petroleum to reach the water table beneath the site. Relatively small spills will primarily move downward through the soil column as a result of gravity and then gradually lose momentum due to soil adsorption and exhaustion of product. If, however, spills were repeatedly ignored or releases were continuously undetected (e.g., malfunctioning monitors), petroleum could potentially reach the

[1]Information and data relative to site soils and depth to groundwater were supplied by Rome Research Site.

water table. In most instances, a "worst case scenario" would be necessary for a petroleum spill or release to impact the water table. A typical worst case would involve scenarios that may include disregard for spill prevention and response procedures specified in this SPCC Plan, malfunctioning cathodic protection systems, and inoperative tank leak detection monitors.

For reference purposes, the estimated time for spilled petroleum to reach the water table under "worst case" conditions is provided below (Table 7).

The following equations and assumptions were used to estimate vertical velocities of the petroleum products typically stored on site. The equations assume that a spill of significant magnitude has occurred and cannot be adsorbed in soil (i.e., "worst case").

The vertical velocity of water in soil can be calculated by the following equation:

$$V_w = K_v i/n$$

where:

V_w = Velocity of water

K_v = Vertical coefficient of permeability* = 10^{-4} cm/sec

i = Hydraulic gradient = 1.0 for vertical flow (routine assumption)

n = Effective porosity* = 0.37

*Source: Freeze, R.A. and J.A. Cherry, *Groundwater* (1979), Prentice-Hall, Inc., NJ.

The vertical velocity of petroleum products in soil is related to the vertical velocity of water. The method used in the above evaluation is based on a NYSDEC Guidance Paper entitled "Method for Evaluating the Acceptability of a Diking System and Recommended Permeability Standards for Secondary Containment of Gasoline, #2 Fuel Oil, #4 Fuel Oil, and #6 Fuel Oil," dated June 21, 1988.

The above-referenced report provides the following equation for determining vertical velocities of petroleum products:

$$V_p = V_w (Dw/Dp)$$

where:

V_p = Vertical velocity of product
V_w = Vertical velocity of water
Dw = Kinematic viscosity of water
Dp = Kinematic viscosity of product

TABLE 6

KINEMATIC VISCOSITY RATIOS*

Product	Dw/Dp
Gasoline	2.0
Water	1.0
No. 2 fuel oil	0.5

*Taken from NYSDEC guidance paper entitled "Method for Evaluating the Acceptability of a Diking System and Recommended Permeability Standards for Secondary Containment of Gasoline, #2 Fuel Oil, #4 Fuel Oil, and #6 Fuel Oil," dated June 21, 1988.

The following table was developed using the above equations, ratios, and assumptions:

TABLE 7

VERTICAL VELOCITIES AND ESTIMATED TRAVEL TIMES OF SPILLED PETROLEUM THROUGH THE SOIL COLUMN

PRODUCT	VELOCITY	
	APPROXIMATE FEET PER DAY	ESTIMATED MINIMUM NUMBER OF DAYS TO REACH WATER TABLE
Gasoline	1.5	1.3
No. 2 fuel oil/diesel	0.4	5

CHAPTER 8

SPILL PREVENTION EQUIPMENT AND PROCEDURES

8.1 SPILL RESPONSE CAPABILITY

Since spill response at this facility will require the manual application of sorbent materials to prevent product from reaching drainage structures, grassed areas, etc., Verona personnel shall be committed to spill prevention and response activities to support this plan, with the exception that no person shall be subjected to unsafe conditions.

All facility personnel must be knowledgeable in the use and storage locations of spill response equipment.

8.2 EMERGENCY SPILL RESPONSE EQUIPMENT

As part of the SPCC Plan, Verona Research Facility personnel will be prepared to recover a spill at the site. The necessary equipment shall be maintained and appropriately located at the facility. Equipment necessary for spill recovery is anticipated to include:

- Absorbent solids (e.g., "Speedi-Dry")
- Absorbent socks
- Absorbent pillows
- Absorbent sheets
- Absorbent wipes
- Disposal bags/containers

Appropriate sorbent materials will be selected and maintained by the Facility Manager, who will appropriately locate the equipment on site and be prepared for its proper use during a spill event. These materials should be used in accordance with sound judgment and the manufacturer's specifications.

All Rome Research Sites that generate spill residue are responsible for obtaining NYSDOT-approved steel, snap-lid type containers through the Air Force Research Laboratory

Information Directorate, Environmental Safety and Occupational Health Office. In addition, all Rome Research Sites that could incur a spill are responsible for obtaining and replenishing their own supply of sorbent materials. Containers and sorbent materials are to be prepositioned near storage and transfer areas for use in the event of a spill.

A. **Spill Prevention Equipment.** Petroleum storage tanks at the Verona Research Facility are equipped with a minimum of the following spill prevention mechanisms.

TABLE 8

FUEL STORAGE FACILITY SPILL PREVENTION EQUIPMENT

TANK	MECHANISM/EQUIPMENT*
ASTs	Steel dike, level gauge, vent whistle
USTs	Double-wall, level gauge, vent whistle (no whistles at Space Command)

*Based on facility NYSDEC PBS registration application.

B. **Spill Control and Response Equipment.** Verona Research Facility shall maintain an inventory of spill control and response equipment appropriately located at the site.

TABLE 9

SPILL EMERGENCY EQUIPMENT

EMERGENCY EQUIPMENT	LOCATION
Sorbent materials	Near petroleum transfer locations and hazardous material storage cabinets and/or areas.
Facility firefighting equipment, including carbon dioxide and dry powder fire extinguishers located according to need	Throughout facility.
Building fire alarm system	Pullboxes throughout facility.
Telephone	Buildings 1226, 1235, 1250, 1253, 1261 and 1285.

8.3 EQUIPMENT INSPECTION AND MAINTENANCE

A. **Monthly Inspection and Recording.** As part of SPCC plan implementation, monthly petroleum storage facility inspections and recording will be implemented by the Facility Manager or a designated alternate. The inspections will focus on all applicable potential spill sources and prevention equipment:

- Aboveground tanks/dikes
- Loading/unloading areas
- Aboveground petroleum product piping and supports
- Valves
- Pumps and supports
- Monitoring systems
- Absorbent supplies and accessibility
- Fire extinguishers (e.g., accessibility) and suppression system

The Monthly Aboveground Fuel System Inspection Report and Monthly UST Monitoring System Inspection Forms are attached (Appendix B) for use by designated personnel. The written inspection records should be maintained with the SPCC Plan for at least three years, then transferred to AFRL/IFOCV for indefinite storage.

B. **Tank System Testing.** All aboveground and underground petroleum storage tanks at Rome Laboratory facilities shall be periodically inspected and/or tightness tested in accordance with applicable USEPA and NYSDEC requirements. All Rome Research Sites with cathodically protected underground petroleum tanks must test the storage facility cathodic protection system(s) at least annually. If, at any time, the cathodic protection system fails to provide the necessary electrical current to prevent corrosion, the cathodic protection system must be restored within 30 days. Any tank or pipe with a non-functioning cathodic protection system will be considered unprotected. The unprotected tank/piping must be tested for tightness within one year and be retested every five years thereafter until the tank is permanently closed.

All tank monitoring systems musts be kept in proper working order. All Rome Research Sites shall inspect and test monitoring systems monthly and record the results. If at any time, the monitoring system fails to function effectively, it must be

repaired within 30 days. Any tank or piping system with a non-working monitoring system must be tested for tightness within one year and retested every five years thereafter until the tank is permanently closed.

C. **Emergency Equipment.** All facility communications or alarm systems, fire protection equipment, spill control equipment, and decontamination equipment (where required) must be tested and maintained as necessary to assure its proper operation during an emergency.

8.4 SECURITY

The Verona site is patrolled regularly (e.g., every four hours) by Rome Research Site security.

The majority of the site is not enclosed by fencing. The Space Command facility is fully encompassed by a chain link fence. All fencing and gates at the Verona Research Site shall be maintained in good working condition. Entrance gates must be locked when the facility is unattended.

To protect against releases caused by unauthorized persons and vandalism, all tank fill ports and valves that could permit direct outward flow of oil to the environment shall be locked when not in use.

8.5 PERSONNEL, TRAINING, AND SPILL PREVENTION PROCEDURES

During the training of new employees, oral instruction is given in the proper operation of equipment necessary for his or her job function. As dictated by the work being performed, the employee shall be instructed in the general importance of controlling, containing, and cleaning up diminius discharges of oil. All contractors or temporary personnel whose work could cause a spill shall be instructed in facility oil and hazardous materials spill prevention procedures.

There are seven levels of training that may be required based on personnel job functions and responsibilities. They are summarized in Table 10.

TABLE 10

SPILL PLAN TRAINING LEVELS

Level 1: First Responder (Awareness Level)	Required for personnel who must render aid at a spill sight. This is annual training given to personnel, such as the security police, to give a basic idea of the potential dangers of spills.
Level 2: First Responder (Operations Level)	Required course for all spill responders, including firefighters, on-scene commander (OSC), spill team, medical personnel, and mobile support crews. This is the eight-hour HAZWOPER annual refresher course.
Level 3: Hazardous Materials Technician	Required course for personnel performing corrective action at a release site. The course is designed to provide hands-on experience on how to control and contain a hazardous material release.
Level 4: Hazardous Materials Specialists	Required course for environmental managers who have duties parallel to those of the hazardous materials technicians.
Level 5: On-Scene Incident Commander	Required course for senior fire officials and emergency coordinators. Personnel receiving this training shall be competent in implementing the SPCC Plan.
Level 6: Spill Prevention. Control, and Countermeasure Training (SPCC)	This training is given to personnel who may be involved in the operation and maintenance of equipment that may discharge oil. The training is conducted annually and is held every year after the spill plan is updated. Training includes a thorough review of the spill plan.
Base 7: Introductory Training	This is a basic awareness course given to personnel on spill countermeasure, material safety data sheets (MSDS), and other environmental concerns. Personnel will receive this training as they receive fire prevention and safety training.

Periodic safety meetings shall be regularly conducted as a formal training program to familiarize the appropriate personnel with safety and emergency procedures and programs relative to oil and hazardous materials/waste spills. Employees are instructed in the use of procedures which must be followed in the event of an emergency. Spill prevention briefings or notifications to familiarize appropriate personnel with this SPCC Plan are planned at least

once per year. Additional notifications will occur whenever significant changes that affect the SPCC Plan are made.

Spill prevention and response instruction shall not be substituted for other required training (e.g., OSHA safety, hazardous waste operations, etc.). Personnel shall be properly instructed in the following:

1. Material types and storage facilities, including associated hazards.
2. Operation and maintenance of equipment to prevent petroleum discharges.
3. Applicable pollution control laws, rules, and regulations.
4. Use of applicable spill control equipment and materials.
5. Facility SPCC plan implementation.

Scheduled spill prevention training sessions and/or briefings for facility operating personnel will be conducted frequently enough to encourage adequate understanding of this SPCC Plan.

The SPCC Plan and facility equipment operation procedures must be reviewed with personnel at least annually. Record dates of employee training sessions below.

1999	_____	2004	_____
2000	_____	2005	_____
2001	_____	2006	_____
2002	_____	2007	_____
2003	_____	2008	_____

8.6 FUEL TRANSFER PROCEDURE

Fuel truck unloading operations are carried out at the petroleum storage tank locations shown on the attached site plan. All tanks operated by Rome Research Site shall be equipped with high level alarm systems or other mechanisms (e.g., vent whistles) which signal the fuel delivery driver when product reaches 90 percent of tank capacity. The driver must immediately stop pumping product upon triggering the high level alarm or other overfill prevention mechanism. The fuel delivery driver shall be responsible for preventing spills and over fills during tank filling. Unloading procedures shall meet the minimum

requirements and regulations established by the U.S. Department of Transportation in 49CFR Part 177.834 (Appendix D).

A warning sign must be posted in unloading/loading area(s) at all times, so it is easily and clearly visible to the truck driver and situated in a location that allows the sign to be viewed upon departure. The sign shall state, "Remember to Disconnect all Lines and Secure Valves Before Departure" (or a similar message that prevents the vehicle from leaving before complete disconnect of transfer lines).

A spill in the fuel unloading area will flow in the approximate direction shown on the attached site plan. To prevent product from reaching drainage structures or navigable waters, sorbent materials or other spill control equipment must be applied immediately to contain the product.

All petroleum loading/unloading activities conducted at Verona Research Facility shall be supervised by a tank custodian, whenever possible. The tank custodian should be prepared to prevent and help control transfer spills during unloading and be familiar with the overfill prevention devices associated with the tank being filled. To prevent spills from occurring during loading/unloading, the following spill prevention contingency procedure will be implemented:

A. **Before Loading.**

1. Extinguish all flames and sources of ignition (e.g., cigarettes).

2. Ensure that vehicle's motor and lights are turned off, and the parking brake is set.

3. Attach grounding wire to the truck body.

4. Remove ungrounded objects from the loading/unloading area.

5. Chock truck wheels.

6. Check hose and connections.

7. Check tank level gauge or stick the tank to confirm product level and ensure tank has sufficient capacity to accept transfer.

8. Ensure that the driver does not remain in the vehicle.

B. **During Loading.**

1. Transfer operator must be present and attentive at all times.

2. Because liquid volumes change with temperature, tanks shall not be filled above a level that will result in overflow after thermal expansion. Fill levels are established at 90 percent of tank capacity.

3. Inform driver to stop filling once tank reaches 90 percent capacity.

C. **After Loading.**

1. All loading valves should be closed. Note any signs of spillage. Take remedial action, if necessary.

2. Close all hatches tightly.

3. Close internal safety valves.

D. **Before Truck Departure.**

1. Check all truck drains, outlets, and connections for leakage to prevent petroleum loss in transit.

2. Check unloading area for spills and apply absorbent materials, if needed.

E. **Upon Truck Departure.**

1. Check all valves, caps, drains, and connections for closure and leakage. Relock them, if necessary.

2. Make a final check of unloading area for spills.

CHAPTER 9

SPILL CONTINGENCY PLAN

9.1 SPILL CONTROL PROCEDURE

Employees should be informed of the potential health and safety concerns associated with petroleum and hazardous substance spills. Listed below are actions to be taken in the event of an oil spill or a release of a hazardous substance.

A. **Action to be Taken by Employee(s) Discovering/Responding to Spill.**

1. Identify and locate source of spill. If unsafe conditions exist, leave the area, notify emergency personnel, and initiate spill reporting.

2. Limit discharge of product, if safely possible, by diverting discharge, creating temporary dikes, and/or through the use of sorbent materials. If secondary containment is present, verify that all valves are closed. Plug all drains and weep holes, which may provide a route for spills to reach the facility drainage system (e.g., floor drains, ditches, etc.) or the environment.

3. If the spill cannot safely be contained, contact the Verona Fire Department at (315) 363-6009, or dial 911.

4. Where applicable, notification shall be made to the Building Manager, who will contact one of the Emergency Coordinators listed in Table 12 (Section 9.2) of this SPCC Plan.

   The Building Manager and other facility personnel shall obtain the following information and report it to one of the facility Emergency Coordinators:

   a. The name of the person reporting the spill.
   b. The exact location of the spill.
   c. The type of material spilled.
   d. An estimate of the amount of material spilled or on fire.

5. If none of the listed Emergency Coordinators are available, contact one or more of the Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office personnel listed in Table 13 (Section 9.2) of this SPCC Plan for instruction relative to response efforts.

6. Should efforts to prevent a spill from reaching a floor drain or storm sewer fail, then a "spill event" may have occurred. The determination as to whether a spill event has occurred shall be made by the designated Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office personnel (Table 13). If there are any doubts as to whether a spill event has occurred, contact the Environmental Safety and Occupational Health Office for clarification.

B. **Action to be Taken by the Emergency Coordinator.**

1. If the spill has not already been reported to the Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office , the Emergency Coordinator shall do so.

2. The Emergency Coordinator will direct the start of containment procedures to prevent material from reaching a floor drain, storm sewer, or other potential migratory route using the following actions, or any other methods necessary without compromising worker safety.

   a. Stop spill at once (if possible).

   b. Extinguish all sources of ignition (e.g., flames, sparks, hot surfaces, cigarettes, etc.) when flammable materials are involved.

   c. Clear personnel from spill location and rope area off.

   d. Use available spill control equipment in an effort to ensure that fires, explosions, and releases do not occur, recur, or spread.

e. Use sorbent materials to control spill at source.

f. Construct a temporary containment dike of sorbent materials, cinder blocks, bricks, or similar materials to help contain spill.

g. Place and seal barriers over floor drains, catch basins, and grates to prevent/minimize to the drainage system infiltration.

3. Activate facility alarms (e.g., fire alarm) and building intercoms (if present) to notify personnel to evacuate area or facility, as necessary.

4. Attempt to identify the character, exact source, amount and areal extent of released materials.

5. Assess possible hazards to human health or the environment as a result of the release, fire, or explosion.

6. The Facility Manager (Emergency Coordinator) shall complete and submit a copy of the Spill Report Form to the Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office.

7. If spill response measures involve the shutting down of any operations, the Emergency Coordinator will monitor the affected equipment for leaks; pressure buildup; gas generation; or ruptures in valves, pipes, or other equipment.

8. Identification of the spilled material should be made as soon as possible so that the appropriate cleanup procedure can be determined.

9. After the spill has been contained, begin cleanup procedures.

a. Use proper waste containers stored on-site.

b. Remove bulk liquid by using vacuum, pump, sorbents, or shovel and place in properly labeled waste container. Be sure not to collect incompatible or reactive substances in the same container.

c. All cleanup materials not reclaimed on site are to be disposed of in accordance with state and federal regulations.

d. Apply sorbent materials to pick up remaining liquid after bulk liquid has been removed. Do not step on spilled material. Pick up absorbed material with shovel and place in a separate waste container. Do not mix with bulk liquid.

e. Clean up spill control equipment and containers. Be sure to replace all equipment in its proper location. Restock or reorder any sorbents used to clean up spill.

f. Carefully wash all spilled product from skin and clothing using soap. Change clothes if necessary to avoid further contact with product.

g. Disposal of the spilled product will be off site, and should be arranged through the Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office.

h. A Spill Report shall be completed, including a description of the event. A sample Spill Documentation Form is provided in Appendix A.

10. If the spill involves large amounts of material or is beyond the capability of Verona Research Facility personnel, an emergency spill cleanup contractor shall be called by the Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office.

C. **Fire or Explosion.** In the event of a fire or explosion at the facility, the Emergency Coordinator shall:

1. Ensure that the local fire department and other appropriate response personnel (e.g., ambulance, police) have been notified.

2. Report to the scene and evaluate the situation (e.g., spill character, source, etc.). Coordinate as necessary with other appropriate Verona and Rome Research Site personnel.

3. Ensure that all personnel are removed from the area.

4. Ensure that fires are safely extinguished (if possible), valves closed, and take other immediate actions to mitigate the emergency, if safe to do so.

5. Initiate all reasonable measures necessary to prevent subsequent fires, explosions, or releases from occurring or spreading to other areas of the plant. Applicable measures include stopping processes or operations, collecting and containing released oil, or removing and isolating containers.

6. Take appropriate action to monitor for leaks; pressure build-ups; gas generation; or ruptures in pipes, valves, or other equipment.

D. **Emergency Evacuation.** The materials used and stored at the Verona Research Facility may be hazardous (e.g., flammable, explosive) or toxic to personnel who are exposed to them when spilled or released (e.g., compressed gas). For instances when spill response and cleanup cannot safely be performed by facility personnel, cleanup shall be performed by more qualified organizations such as a fire department or a remediation contractor.

Some spills may warrant emergency facility evacuation. In such cases, the facility fire alarm shall be activated to initiate evacuation. Upon hearing the activated fire alarm, all personnel working in the facility must evacuate. Emergency evacuation route diagrams associated with hazardous materials/waste storage areas are provided in Appendix E of this SPCC Plan. The schematics shall be appropriately posted throughout the facility.

9.2 SPILL REPORTING AND DOCUMENTATION

The Facility Manager (Emergency Coordinator) is responsible for the initiation of all spill reporting and documentation procedures. All petroleum spills must be reported to the

NYSDEC Spill Hotline (800) 457-7362, within two hours unless they meet all of the following criteria:

- The spill is known to be less than 5 gallons; and
- The spill is contained and under control of the spiller; and
- The spill has not and will not reach the State's water or any land; and
- The spill is cleaned up within 2 hours of discovery.

A release of a "reportable quantity"[1] or unknown amount of a hazardous substance must be immediately reported to the NYSDEC Spill Hotline. Rome Research Site will document, for its own records, all spills onto its facilities regardless of volume. Verona personnel shall be informed of the need to report all spills of petroleum and hazardous materials in accordance with applicable requirements. For example, a release that results in exposure to persons solely within the work place does not need to be reported. Facility spill reporting and documentation procedures are as follows:

1. Following or during initial containment efforts, Verona Research Facility personnel shall immediately notify the local fire department (Table 11). Once the local fire department has been called, notify the primary contact and/or alternates listed below (Table 12). Attempt to notify the primary contact first before contacting listed alternates. If the listed Verona contacts cannot be reached, call the Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office at (315) 330-4284 (Table 13).

TABLE 11

LOCAL FIRE DEPARTMENT

NAME	TELEPHONE NO.
Verona Fire Department	(315) 363-6009 or dial 911

[1]A list of federal and New York State reportable quantities is available through Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office.

TABLE 12

VERONA RESEARCH FACILITY SPILL REPORTING CONTACTS

NAME AND TITLE	TELEPHONE NO.		APPLICABILITY
	OFFICE	HOME	
Mr. Gene McDonald Facility Manager	(315) 330-4098	(315) 245-0583	Emergency Coordinator (Primary)
Mr. Scott Faulkner Alt. Facility Manager	(315) 330-7521	(315) 829-3588	Emergency Coordinator (Alternate)

The notified primary (or secondary) contact will immediately contact the following Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office personnel, who shall be responsible for notifying the appropriate regulatory agencies and response organizations.

TABLE 13

ROME RESEARCH SITE,
ENVIRONMENTAL SAFETY AND OCCUPATIONAL HEALTH OFFICE
SPILL REPORTING CONTACTS

NAME AND TITLE	TELEPHONE NO.		APPLICABILITY
	OFFICE	HOME	
Mr. Michael Bamberger Natural Resource Planner	(315) 330-4557	(315) 865-5771	Primary Contact
Mr. Bruce Mero, Chief Environmental Safety and Occupational Health Office	(315) 330-4284	(315) 942-3865	Secondary Contact
Mr. Fred Conover Environmental Protection Specialist	(315) 330-3553	(315) 339-2961	Alternate Secondary Contact
Rome Research Site Civil Engineering Operations & Support	(315) 330-4664	(315) 330-2961 (after hours)	Tertiary Contact

The contact(s) listed above will make necessary regulatory notifications and arrange for a commercial spill cleanup contractor, if required.

2. Within two hours of a spill, the spill must be reported by Rome Research Site Environmental Safety and Occupational Health Office personnel to the following number:

TABLE 14

NYSDEC SPILL REPORTING SUMMARY

NAME	TELEPHONE NO.	APPLICABILITY
NYSDEC Spill Hotline (24 hours)	(800) 457-7362	Any petroleum spill to water, land, or solid surfaces and for reportable quantities of hazardous substances.

3. If the spill reaches navigable waters, or if the spill involves injury or death, a reportable quantity of hazardous waste, or property damage in excess of $50,000, the National Response Center (operated by the U.S. Coast Guard) must be notified by Rome Research Site Civil Engineering Division personnel in addition to the NYSDEC. The federal reporting number is as follows:

TABLE 15

FEDERAL SPILL REPORTING SUMMARY

NAME	TELEPHONE NO.	APPLICABILITY
National Response Center (NRC) (24-hour Hotline)	(800) 424-8802	Spills to water or for spills that involve a highway accident with injury or death.

There is criminal liability for failure to immediately report any oil spill or discharge. In addition, there is criminal liability for knowingly making a false statement or representation in regard to a spill event.

4. When a spill incident is reported by telephone, the caller should be prepared to give an honest, objective appraisal of the severity of the spill. Be prepared to provide the following information:

   a. Time and date of spill.

   b. (Probable) source of spill.

c. Location of spill:

- Water body.
- Village, town, county.
- Street address.

d. Is there a health and/or fire hazard?

e. What was spilled?

f. How much was spilled?

g. Action being taken to contain the spill.

h. Action being taken to clean up the spill.

i. Personnel on scene.

j. Who else has been notified?

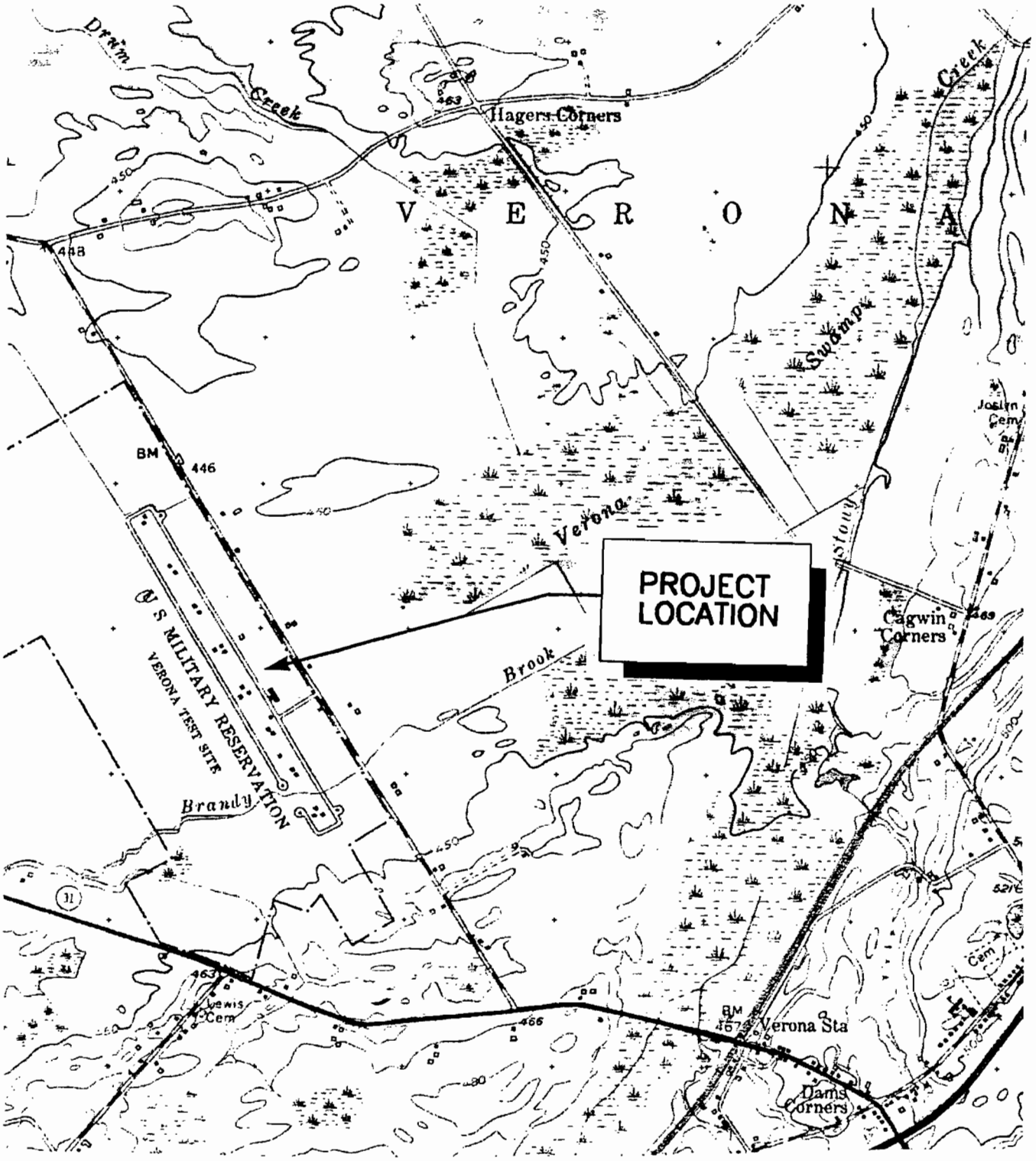
If the spill volume exceeds 1,000 gallons, or if two oil spills occur within 24 months, additional reporting procedures are required.

FIGURE 1

SITE LOCATION MAP

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK



SCALE 1:24000

0 1/2 1 MILE

0 .5 1 KM

NORTH

NEW YORK QUADRANGLE LOCATION

TRANSFER/MARTHA/13118-REPORT

LU ENGINEERS
Civil and Environmental

SITE LOCATION MAP

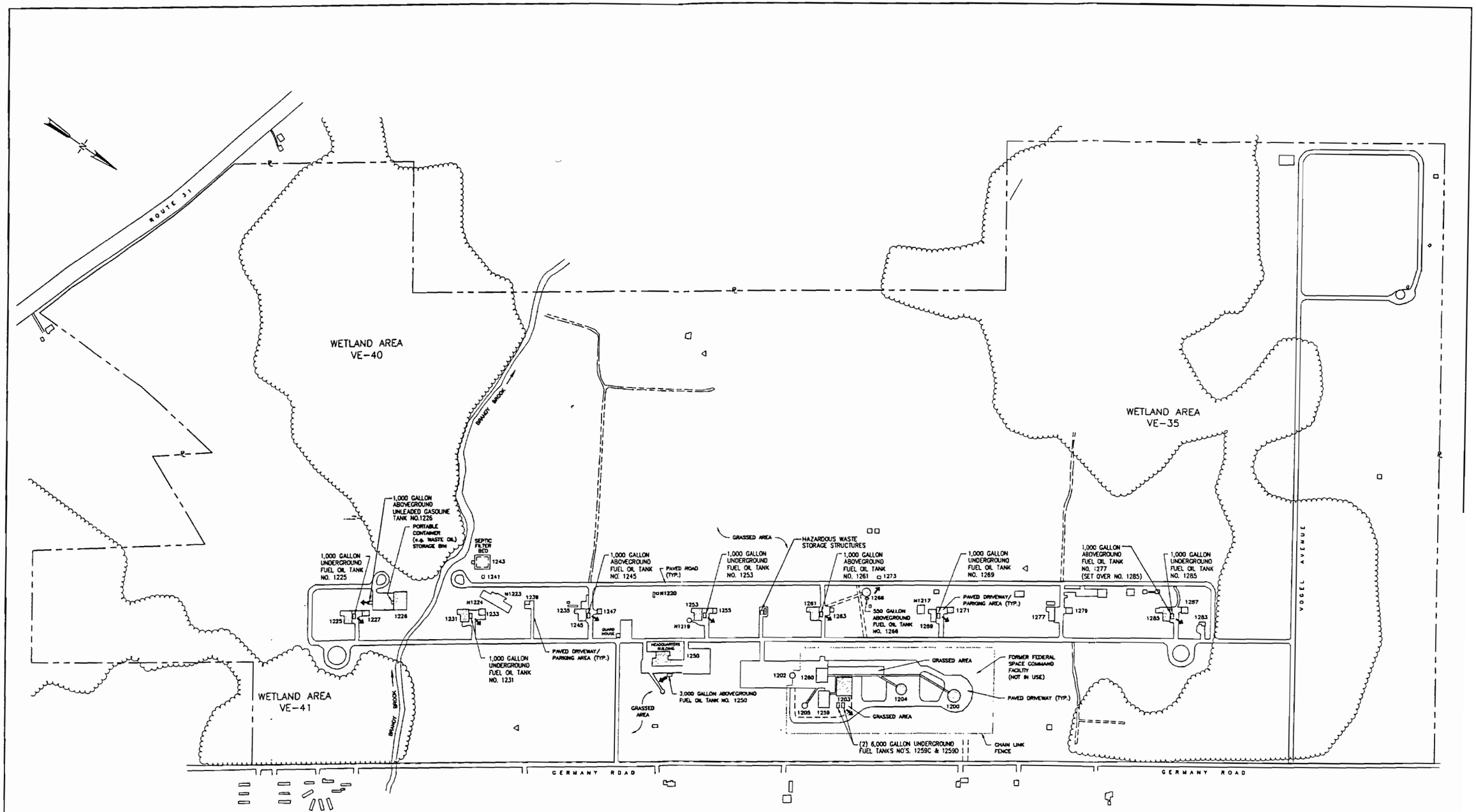
ROME RESEARCH SITE
SPCC PLAN
VERONA RESEARCH FACILITY

FIGURE 2

SITE PLAN

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK



NOTES
1) SITE PLAN BASED ON U.S. AIR FORCE ROME LABORATORY GAFB DRAWING NO. X9159J7 (6-6-91) SUPPLIED BY ROME LABORATORY.
2) TANK SIZES AND LOCATIONS ARE APPROXIMATE.
3) BUILDING FLOOR DRAINS ARE CONNECTED TO ON-SITE SEPTIC SYSTEM.

LEGEND	
TOWER	PREDICTED GENERAL SURFACE-SPILL FLOW DIRECTION
PROPERTY LINE	1204 BUILDING NUMBER
WETLAND AREA	BUILDING

0 250' 500' 750'
SCALE

NOTES:
Underground facilities, structures, and utilities have been plotted from available surveys and records, and therefore their locations must be considered approximate only. There may be others, the existence of which is presently not known.

LU ENGINEERS
Civil and Environmental

VERONA RESEARCH FACILITY
ROME RESEARCH SITE
SPCC SITE PLAN

JOB NO. 13118 | CONTRACT | SHEET FIGURE 2.

J:\13118\ENV\13118-04.dwg Fri Sep 17 16:21:11 1999 DLS

APPENDIX A

SPILL DOCUMENTATION FORM

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK

ROME RESEARCH SITE
SPILL DOCUMENTATION FORM

1. RELEASED PRODUCT

☐ Fuel
☐ Hazardous material
☐ Hazardous waste
Specify Type _____

RELEASED AMOUNT

☐ < 5 Gallons
☐ 5 – 10 Gallons
☐ 10 – 50 Gallons
☐ 50 – 100 Gallons
☐ > 100 Gallons

DID RELEASE REACH STORM DRAIN, OR SURFACE WATER?
☐ Yes ☐ No
IF YES, WAS RELEASE IN HARMFUL QUANTITY?
☐ Yes ☐ No

2. Facility Name and Spill Location _____

Date or Release _____ Time _____ ☐ A.M. ☐ P.M.

3. Receiving Watercourse or Structure _____

4. Structure or Vessel Releasing Product _____

5. Description of Damages _____

6. Description of Potential Health/Environmental Hazards _____

7. Apparent Cause of Release _____

8. Action Taken to Contain/Cleanup Spill _____

9. Amount of Product Recovered
_____ Gallons

10. Cost of Damages
☐ $ 0 - $100
☐ $100 - $1,000
☐ $1,000 - $10,000
☐ > $10,000

11. Action Taken to Prevent Recurrence _____

12. List Persons and Agencies Notified of Spill _____

Spill Reported By _____ Date/Time of Report _____

Other Personnel On Site _____

NYSDEC Spill No. _____

APPENDIX B

PETROLEUM FACILITY INSPECTION CHECKLISTS

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK

ROME RESEARCH SITE
MONTHLY ABOVEGROUND FUEL SYSTEM INSPECTION REPORT

CALENDAR YEAR _____

FACILITY ADDRESS	
FACILITY NAME	
FACILITY REGISTRATION NO. (FROM CERTIFICATE)	
TANK NUMBER	

CONDITION OF EQUIPMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Tank Shell												
Tank Supports												
Support Slab/Floor												
Containment Walls												
Piping, Valves, and Supports												
Gauge or Level Alarm												
Color Code/Labels												

NOTES

1. 'X' means that equipment item is acceptable (no leaks, cracks, rust, settlement, etc.)
2. 'N/A' means that this item is not applicable to this facility.
3. Note specific problems in remarks section below
4. Retain inspection reports for at least 10 years
5. Report all spills, leaks, and equipment problems immediately (refer to SPCC plan).

REMARKS

1.	Inspect exterior surfaces of tanks, pipes, valves, containment areas and other equipment for leaks and maintenance deficiencies (rust, cracks, etc.)
2.	Identify cracks, areas of wear, corrosion and thinning, poor maintenance and operating practices, excessive settlement of structures, separation of swelling of tank insulation, malfunctioning equipment, and structural or foundation weaknesses.
3.	Inspect all leak detection systems, cathodic protection monitoring systems, and other monitoring or warning systems.

MONTH	INSPECTOR'S SIGNATURE	DATE	INSPECTOR'S ADDRESS
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

ROME RESEARCH SITE
MONTHLY UST MONITORING SYSTEM INSPECTION REPORT

CALENDAR YEAR

FACILITY ADDRESS	
FACILITY NAME	
FACILITY REGISTRATION NO. (FROM CERTIFICATE)	
TANK NUMBER	

CONDITION OF EQUIPMENT	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Interstitial monitor(s)												
Automatic tank gauging system												
Groundwater monitoring wells												
Soil vapor monitoring system												

NOTES

1. 'X' means that equipment item is acceptable.
2. 'N/A' means that this item is not applicable to this facility.
3. Note specific problems in remarks section below.
4. Retain inspection reports for at least one year.
5. Report all spills, leaks, and equipment problems immediately (refer to SPCC plan).

REMARKS

Note any other deficiencies observed in the tank area that could potentially result in a release or spill of petroleum to the environment (e.g. leaking boiler fuel piping).

OBSERVATIONS

MONTH	INSPECTOR'S SIGNATURE	DATE	INSPECTOR'S ADDRESS
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

MONTHLY TANK INSPECTION REPORT

Month/Year: _____ Building #: _____ Tank #: _____

Issue Tank _____ /Support tank: boiler _____ Generator _____ Waste oil _____ o/w sep. _____
Other _____ Capacity _____ Gallons _____

WEEKLY INVENTORY READINGS (Inches/Gallons)

Week of	Product Level	Water Level	Total	Receipts	Issues
	/	/	/	/	/
	/	/	/	/	/
	/	/	/	/	/
	/	/	/	/	/
	/	/	/	/	/

		Yes	No
1.	Is sorbent material available for cleaning up minor spills? If not contact AFRL/IFOCV at x2098		
2.	Does the diked area require draining?		
3.	Does the water in the diked area have a sheen on it?		
4.	Is the water in the tank less than a ¼"?		
5.	Has there been a noticeable loss or gain of product?		
6.	Is the leak detection system operational (U/G tanks)?		
7.	Inspect the exterior surfaces of the tank, piping valves, and other equipment for leaks and maintenance deficiencies. Are there any problems?		
8.	Is the tank foundation settling		
9.	Is the product level gauges accurate and operational?		
10.	Are there any signs of damage to the grounding or cathodic protection system?		
11.	Are all the product identification and "no Smoking" signs in place?		

* If there any discrepancies contact the appropriate craft zones. Log the job Order Number below and carry over on future forms until the discrepancy is corrected.

Job Order No.	Description of Work	Date Identified	Date Corrected

This report is to be maintained on site for three years then transferred to Rome Research Site, Environmental Safety and Occupational Health Office (IFOCV).

This inspection report has been performed in a manner consistent with 6 NYCRR Part 613.6.

Printed Name/Rank	Signature	Date	Office Symbol	Ext

APPENDIX C

PETROLEUM BULK STORAGE REGULATIONS SUMMARY

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK

APPENDIX C

PETROLEUM BULK STORAGE REGULATIONS SUMMARY

I. Underground Storage Tank (UST) Requirements

A. Federal Regulations (40 CFR Part 280).

Applicability - All USTs over 110 gallons in capacity. Applies to all USTs storing petroleum products (including waste oil) and certain hazardous chemicals. Tanks storing heating oil used on the premises are exempt from these regulations.

New USTs (installed after 1988):

1. Must have certification that tank and piping were installed properly.
2. Must have spill and overfill protection.
3. Tank and piping must have corrosion protection.
4. Tank and piping must have leak detection.

Existing USTs (installed before 1988):

1. Must have corrosion protection and spill and overfill protection by December 1998.
2. Leak detection is required according to the following timetable:

Year of UST Installation	Leak Detection Deadline
Before 1965	December 1989
1965 - 1969	December 1990
1970 - 1974	December 1990
1975 - 1979	December 1990
1980 - 1988	December 1990

3. Leak detection for pressurized piping is required by December 1990.
4. Leak detection for suction piping must follow UST tank timetable.

B. New York State UST Regulations (6 NYCRR 613, 614).

Applicability - All UST systems with a total facility capacity of over 1,100 gallons. Applies to tanks containing petroleum products including waste oil and heating oil.

1. All new USTs must have secondary containment with leak detection.

2. Overfill protection required for new and existing USTs.

3. Fill ports must be color coded. Product transfers must be properly supervised and vent riser from tank must be equipped with ball check valves.

4. All tanks and piping subject to periodic testing and maintenance including:

   - Daily inventory (except for UST containing #5 or #6 fuel oil)
   - Monitoring systems must be tested monthly
   - Cathodic protection systems must be tested annually
   - Tank tightness test required according to the following:
     > Unprotected UST: Ten years after installation and every five years thereafter
     > Corrosion Resistant UST: 15 years after installation and every five years thereafter
     > None required for UST with secondary containment or if contains #5 or #6 fuel oil
   - UST registration submitted on five-year basis

5. New USTs must have corrosion protection. (Acceptable materials include fiberglass tanks, cathodically protected steel, fiberglass clad steel, or double-walled steel with outer wall of coated steel.)

6. Acceptable secondary containment include double-wall tank, vault, cut-off walls (when water table is above tank bottom), and impervious underground containment (when groundwater is below tank bottom).

7. Tank construction must comply with NFPA 30 (304) and NY Building Code. As-built drawings required with statement by installer that tanks meet regulations.

8. Any tank, or pipe, with non-working cathodic protection system is considered unprotected and must be tested for tightness within one year, and retested at five year intervals thereafter, until closure.

II. New York State Petroleum Bulk Storage Requirements (6 NYCRR Parts 613, 614)

Applicable to all aboveground and underground petroleum storage facilities with combined storage capacity over 1,100 gallons.

A. Requirements by 1990 - (Deadline - 12/27/90)

1. Color code all fill ports.
2. Monitoring wells must be permanently marked.
3. Shear valves must be installed under all dispensers.

4. Solenoid valves must be installed downstream of operating valves for gravity-fed dispensers.
5. All above-ground tanks must be equipped with gauges or high level alarms.
6. Safe fill values, product, and tank number must be labeled on all tanks.
7. Must have check valves on all transport unload lines.
8. Operating valves must be provided on all tanks.
9. Adequate secondary containment (110%) required for above-ground tanks.
10. Dike drains must have two manual valves and locks.
11. Ten-year inspections required for vertical tanks over 10,000 gallons (exempt if on concrete slab and can monitor leaks acceptably).

B. **Immediate Requirements**

1. Notification of activities.
2. Annual cathodic protection monitoring (keep records at plant).
3. Initial underground tank testing, repeat every 5 years.
4. Monthly inspections (keep records on premises).
5. Ten year inspections required for vertical tanks on ground.
6. As-built plan and certification by installer (613).
7. All new tanks must be tested before placing in service.
8. Overfill prevention equipment must be used on new underground tanks.
9. Leak detectors must be provided on submersible pumps.

C. **Cathodic Protection Requirements**

1. Design for 30 year's corrosion resistance.
2. Corrosion specialist must supervise installation.
3. Test ports or stations must be provided to provide annual monitoring of cathodic protection system.

D. **Reporting Requirements**

1. Must report inventory losses over 3/4%.
2. Must send tank test reports within 30 days.
3. Must report leaks and spills within two hours.
4. Maintain inspection and cathodic protection/leak detection reports.
5. Must report permanent closure within 30 days prior to closure.
6. Must notify code/fire official 24 hours before excavation or installation and must obtain adequate building permit prior to removal.
7. Must update registration within 30 days.

E. **Monthly/Ten-Year Report Forms must include the following:**

- Facility registration number
- Tank ID number
- Date of inspection
- Result of inspection/need for repair
- Certification (613.6)
- Signature and address of inspector

III. Aboveground Storage Tank (AST) Regulations (6 NYCRR 613, 614)

A. **Monthly inspections are required of aboveground storage facility including:**

- Exterior surfaces of tanks, pipes, valves, and other equipment must be inspected for leaks.
- Cracks, area of wear, corrosion, and thinning must be identified.
- All leak detection systems must be monitored.
- Inspection reports must follow II.E. (above).

B. **New AST Design and Construction Standards**

- Must be constructed of steel and meet or exceed the following design standards:

  UL No. 142,
  UL No. 58,
  API Standard No. 650,
  API Standard No. 620,
  CAN4-S601-M84, or
  CAN4-S630-M84

- Bottoms of new tanks which rest on the ground must be cathodically protected.

C. All new stationary tanks which are designed to rest on the ground must have a double bottom or be underlain by an impervious barrier.

D. All new ASTs must have equipment for monitoring between tank bottom and barrier in (C).

APPENDIX D

USDOT UNLOADING PROCEDURE REGULATIONS

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK

APPENDIX D

U.S. DEPARTMENT OF TRANSPORTATION
49 CFR 177 - SUBPART B
LOADING AND UNLOADING REQUIREMENTS SUMMARY

1. No smoking is permitted during loading or unloading of explosive or flammable materials.

2. Keep fire (e.g., lit cigarettes, lighting matches, etc.) away while loading or unloading flammable materials.

3. Securely set hand brake while loading and unloading hazardous materials. Take additional precautions as necessary to prevent vehicle from moving.

4. Do not use tools that could cause damage to packaging while loading or unloading explosive materials.

5. Cargo tanks must be attended at all times during loading and unloading

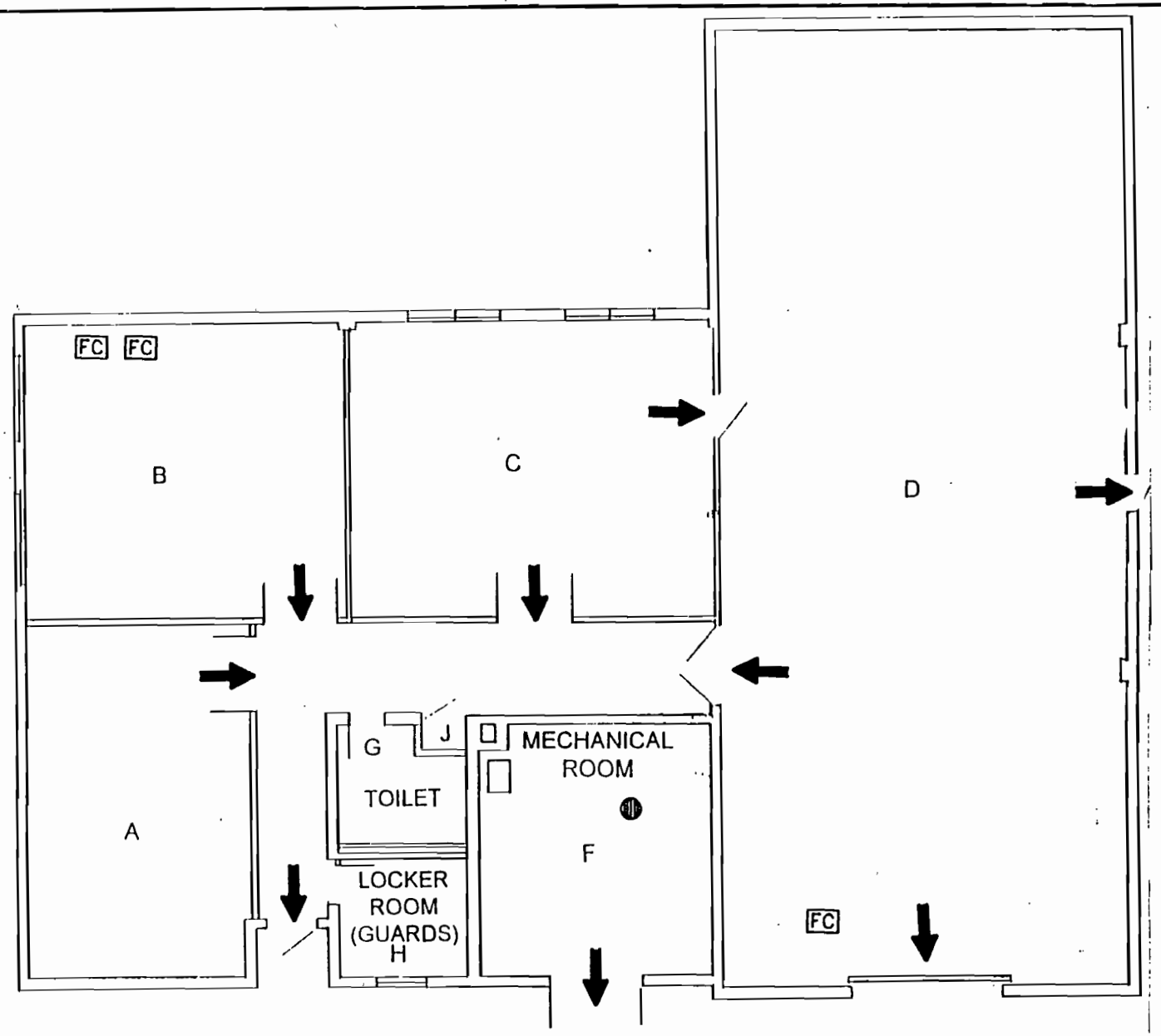
Note: The above is a summary of USDOT requirements applicable to bulk petroleum transfers. Additional regulations cover transfers and shipping of hazardous materials, portable containers, etc.

APPENDIX E

EMERGENCY EVACUATION ROUTES

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK



LEGEND

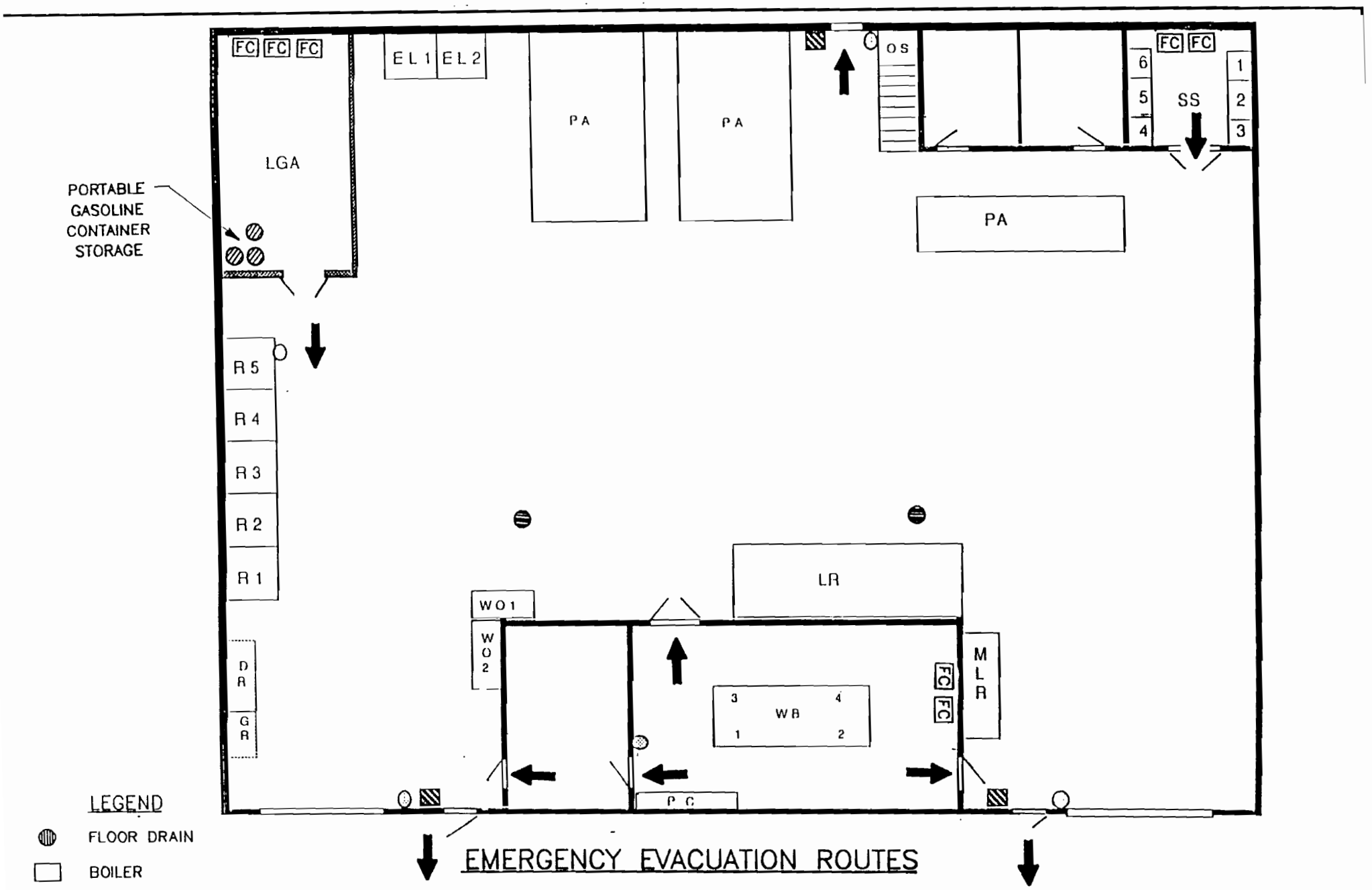
- FLOOR DRAIN
- BOILER
- FC — FLAMMABLE/HAZARDOUS MATERIALS CABINET
- COMPRESSED GAS STORAGE
- EMERGENCY EVACUATION ROUTE

EMERGENCY EVACUATION ROUTES

ROME LABORATORY

VERONA RESEARCH FACILITY
BUILDING #1245 (LAB 3)

NOT TO SCALE


FC FC FC
EL 1
EL 2
PA
PA
OS
FC FC
6
5
4
SS
1
2
3
LGA
PORTABLE GASOLINE CONTAINER STORAGE
PA
R 5
R 4
R 3
R 2
R 1
LR
WO 1
W O 2
D R
G R
3
4
W B
1
2
FC FC
M L R
P C
LEGEND
FLOOR DRAIN
BOILER
FC FLAMMABLE/HAZARDOUS MATERIALS CABINET
COMPRESSED GAS STORAGE
EMERGENCY EVACUATION ROUTE
EMERGENCY EVACUATION ROUTES
ROME LABORATORY
VERONA RESEARCH FACILITY
BUILDING #1226
NOT TO SCALE

APPENDIX F

KEY TERMS

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK

APPENDIX F

KEY TERMS

"Discharge"means any intentional or unintentional action or omission resulting in the releasing, spilling, leaking, pumping, pouring, emitting, emptying, or dumping of petroleum into the waters of the state or onto lands from which it might flow or drain into said waters, or into waters outside the jurisdiction of the state when damage may result to the lands, waters or natural resources within the jurisdiction of the state, except discharges pursuant to and in compliance with the conditions of a valid state or federal permit [6 NYCRR Part 612].

"Environment" means any water, water vapor, land including land surface or subsurface, air, fish, wildlife, biota, and all other natural resources [6 NYCRR Part 596].

A **"harmful quantity"** is defined as an amount which: 1) causes a film or sheen upon or discoloration of the water or adjoining shoreline; 2) causes a sludge or emulsion to be deposited beneath the surface of the water or upon the adjoining shoreline; or, 3) violates applicable water quality standards [40 CFR §110.3].

"Navigable waters" (of the United States) as defined in Section 502(7) of the FWPCA and includes:

(1) All navigable waters of the United States as defined in judicial decisions prior to passage of the 1972 Amendments to the FWPCA (Publ. L, 92-500) and tributaries of such waters;

(2) Interstate waters.

(3) Intrastate lakes, rivers, and streams which are utilized by interstate travelers for recreational or other purposes; and

(4) Intrastate lakes, rivers, and streams from which fish or shellfish are taken and sold in interstate commerce [40 CFR Part 112].

"Petroleum" means any petroleum-based oil of any kind which is liquid at 20°C under atmospheric pressure and has been refined, re-refined, or otherwise processed for the purpose of being burned as a fuel to produce heat or usable energy, or which is suitable for use as a motor fuel or lubricant in the operation or maintenance of an engine [6 NYCRR Part 612].

"Release" means any unauthorized pumping, pouring, emitting, emptying, overfilling, spilling, leaking, leaching or disposing, directly or indirectly, of a hazardous substance, or any other substance which results in the formation of a hazardous substance upon release so that the substance

or any related constituent thereof, or any degradation product of such a substance or of a related constituent thereof, may enter the environment [6 NYCRR Part 596].

"Reportable quantity" means the minimum amount of a hazardous substance listed in 6 NYCRR Part 597 that must be reported to the NYSDEC in the event of a release, spill, or overfill [6 NYCRR Part 596]. **Reportable quantities** of hazardous substances are defined by the Federal Government in 40 CFR 110, 117, 280, 302, 355, and 761.

A **"reportable spill"*** is defined as any pollution incident which:

- Is a threat to human health or is detrimental to aquatic or terrestrial species of plants or animals.
- Is a threat to, or results in contamination of, underground or surface water .
- Is in violation of application water quality standards.
- Causes a film, sheen, or discoloration on the water surface or adjoining shoreline.
- Could be expected to discharge substances in harmful quantities into or upon U.S., waters, shorelines, or areas off the installation [AFR 19-8].

"Sheen" means an iridescent appearance on the surface of water [40 CFR Part 110].

"Spill" or "**spillage**" means any escape of petroleum/listed substance from the ordinary containers employed in the normal course of storage, transfer, processing, or use [6 NYCRR Parts 596 and 613].

A **"spill event"** means a discharge of oil from the facility, directly or indirectly, upon the water or shorelines of the United States in harmful quantities [40 CFR Part 112].

"Waters" or "waters of the State" shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State of New York, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction [6 NYCRR Part 612].

*Note: 6 NYCRR Part 613 requires any petroleum spill, regardless of quantity, to be reported to the NYSDEC.

APPENDIX G

CERTIFICATION OF THE APPLICABILITY OF THE SUBSTANTIAL HARM CRITERIA CHECKLIST

SPCC PLAN

VERONA RESEARCH FACILITY
VERONA, NEW YORK

CERTIFICATION OF THE APPLICABILITY OF THE SUBSTANTIAL HARM CRITERIA CHECKLIST

FACILITY NAME: Verona Research Facility
FACILITY ADDRESS: P.O. Box 138 Germany Road
Verona, New York 13478

1. Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater that or equal to 42,000 gallons?
Yes ☐ No ☒

2. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground storage tank plus sufficient freeboard to allow for precipitation within any aboveground oil storage tank area?
Yes ☐ No ☒

3. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III to this appendix or a comparable formula[1]) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments? For further description of fish and wildlife and sensitive environments, see Appendices I, II, and III to DOC/NOAA's "Guidance for Facility and Vessel Response Plans: Fish and Wildlife and Sensitive Environments" (Section 10, Appendix E, 40 CFR 112 for availability) for availability) and the applicable Area Contingency Plan.
Yes ☐ No ☒

4. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III to this appendix or a comparable formula[1]) such that a discharge from the facility would shut down a public drinking water intake.[2]
Yes ☐ No ☒

5 Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?
Yes ☐ No ☒

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Bruce H. Mero, REM	
Name	Signature
Chief, Environmental Safety and Occupational Health Office	
Title	Date

[1] if a comparable formula is used documentation of the reliability and analytical soundness of the comparable formula must be attached to this form.

[2] For the purposes of 40 CFR Part 112, public drinking water intakes are analogous to public water systems as described at 40 CFR 143.2(c).

Appendix G

NYSDEC Correspondence
January 30, 2001

New York State De, rtment of Environmental Cc ervation
Division of Environmental Remediation
Bureau of Hazardous Site Control, Room 252
50 Wolf Road, Albany, New York 12233-7010
Phone: (518) 457-0639 FAX: (518) 457-8989

John P. Cahill
Commissioner

January 30, 2001

Mr. Bruce H. Mero, REM
Chief; Environmental, Safety, and Occupational Health Office
Rome Research Site
Air Force Research Laboratory
150 Electronic Parkway
Rome, NY 13441-4105

Re: **Groundwater Monitoring Data**
Verona Research Facility
NYSDEC Site ID #6-33-046

Dear Mr. Mero:

I have received and reviewed your January 19, 2001 letter (along with the January 10, 2001 summary report prepared by Stearns & Wheler, LLC) in regard to the above-referenced site.

Based on this review, it appears as though natural attenuation is occurring in the groundwater beneath Buildings 1231 and 1253. However, this process requires continued monitoring by the Department. Therefore, this site will be listed in the New York State Registry of Inactive Hazardous Waste Disposal Sites (Registry) as a class 4 site (the site is properly closed, but requires continued management).

As part of this continued management, an Operations and Maintenance (O & M) plan must be submitted to Mr. Gerald J. Rider, Jr. (Chief, O & M Section) of this office for review and approval prior to implementation of subsequent monitoring activities. Information on the site's history, previous investigations, previous monitoring results, and proposed monitoring activities (i.e. locations to be sampled, frequency of sampling, parameters to be analyzed, etc.) should be included in this plan. I have attached guidance for your use in establishing the long term monitoring plan for natural attenuation. Once this plan is received and approved, the Department will notify you in writing of the site's inclusion in the Registry as a class 4.

Please contact me at the address or telephone number listed above if you have any questions on the site's proposed classification. Questions related to the O & M plan should be referred to Ms. Sue Lasdin at (518) 457-0927, or at the address listed above.

Sincerely,

David K. Harrington, P.E.
Environmental Engineer 2
Eastern Investigation Section
Bureau of Hazardous Site Control

Attachment

cc: J. Swartwout
G. Rider
D. Sweredoski, Region 6
H. Hamel, DOH - Syracuse
E. Zuk
S. Lasdin

A:\verona6.ltr.wpd