

March 11, 2004

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SUBJECT: Final Workplan for Contract No. DACA87-02-D-0005, for Supplemental Remedial Investigations at the Radioactive Waste Burial Sites (SEAD 12), Seneca Army Depot Activity, Romulus, New York

Dear Mr. Vazquez / Mr. White:

As a result of comments received on the Draft SEAD-12 Feasibility Study, the Army is proposing additional work in the area of Buildings 813 and 814 to further investigate the presence of trichloroethene (TCE) in groundwater. In addition, samples from the EM-5 area will be collected and analyzed for certain radiological parameters. The original plan for executing this supplemental remedial investigation work was outlined in a letter workplan dated May 21, 2003. This letter is a revised workplan based on EPA comments received on August 7, 2003. NYSDEC has recently confirmed they have no comments on the draft workplan.

## 1.0 INTRODUCTION

Parsons is submitting this Workplan, under Delivery Order 11 of contract number DACA87-02-D-0005, for performing a supplemental remedial investigation (RI) at the Radiological Waste Burial Sites (SEAD-12) that is located at Seneca Army Depot Activity (SEDA) in Romulus, New York. Additional field activities are required in order to achieve the following objectives:

- Delineate the volatile organic compound (VOC) contamination in groundwater in the vicinity of Building 813 and 814;
- Determine levels of natural attenuation parameters in the groundwater to better evaluate potential remedies for the area outside of Building 813 and 814; and,
- Collect additional information on radiological parameters in soils from background and the EM-5 area in response to issues raised by NYSDEC.

The work proposed in this report will be performed as part of the United States Army Corps of Engineers (USACOE) remedial response activities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). It will follow the requirements of the New York State Department of Environmental Conservation (NYSDEC), the United States Environmental Protection Agency, Region II (EPA), and the Federal Facilities Agreement (FFA).

A site plan of SEAD-12 is presented in **Figure 1**. The soil gas survey results, groundwater, surface water, and ditch soil chemistry, and the geophysical results obtained in the primary RI are presented in **Section 2.0** of this report. **Section 3.0** presents the task plan for the supplemental RI; this includes the installation and sampling of additional temporary and permanent monitoring wells, surveying the new temporary and permanent monitoring well locations, collecting surface water samples, and collecting additional soil samples. **Section 4.0** outlines the data quality objectives (DQOs) to be used in obtaining and evaluating the supplemental data to be collected. The schedule and staffing for the Supplemental RI are presented in **Section 5.0** and **Section 6.0**, respectively.

## **2.0 PREVIOUS RI RESULTS**

The Revised Final RI Report at the Radiological Waste Burial Sites (SEAD-12; Parsons, 2002b) presents the results of several different investigations designed to characterize the nature and extent of risks posed by the conditions at SEAD-12. Based on the results of the RI, the Draft Feasibility Study (FS) Report for the Radioactive Waste Burial Sites (SEAD-12; Parsons, 2002a) was prepared. As indicated in the RI and FS report, there are two issues within SEAD-12 that require additional investigation: the VOC contamination in the vicinity of Building 813 and 814, where former painting operations took place, and the concentrations of radionuclides in the soil at the EM-5 area. The Class III area will no longer be investigated as part of this supplemental investigation, as described below. The following summarizes the results of several of the previous investigations related to the two issues to be addressed in the Supplemental RI.

### **2.1 VOC Concentrations Proximate to Buildings 813 and 814**

#### **Building Descriptions**

Buildings 813 and 814 were primarily used for painting operations that took place in SEAD-12. The buildings were originally constructed in the 1950s, and additions were made to both over time. Building 813 originally contained a number of small offices and equipment rooms along with one large, open room. This room contained the paint booth, which was a completely self-contained, pre-fabricated room that was replaced at least once during the period the building was used. An addition to this

building was completed in the late 1980s and included a new sand blasting room. This addition covered what was once an open area between Building 813 and Building 814.

Building 814 originally contained one furnace room and a large, open room. The building was lengthened in the late 1960s, at which point an office was constructed in the southeast corner of the building. Two storage rooms were constructed inside the main room of the building and two other rooms were added to the building's exterior between 1970 and 1990, however, the exact timeframe of these modifications is not known. The basic layouts of the buildings are shown in **Figure 2**.

### **Soil Gas Survey Results**

As part of the RI, 39 soil gas survey samples were collected in and around Buildings 813 and 814 to determine if this area had been impacted by VOCs (**Figure 3**). Former painting operations took place within these two buildings. The soil gas samples collected were analyzed for benzene, toluene, and p-xylenes (three of the four components of BTEX) as well as 1,2-dichloroethene (DCE), trichloroethene (TCE), and total VOCs. A number of locations around the buildings were identified as having elevated concentrations of VOCs. The two highest concentrations of total VOCs were detected in soil gas samples SG12-130 and SG12-134 at 10 ppm; these locations are both inside of Building 813, beneath the floor slab of the addition completed in the late 80s. The next highest total VOC concentrations were detected at soil gas samples SG12-137 and SG12-122 at 8.5 ppm; soil gas sample SG12-137 is also located inside Building 813 near the two locations with 10 ppm concentrations, and soil gas sample SG12-122 is approximately 70 feet to the west of Building 813. Five other soil gas sample locations had concentrations of total VOC ranging from 6.0 to 6.5 ppm. The results of the total VOC analysis of the soil gas samples are shown on **Figure 4**.

Analysis of the soil gas samples for individual VOCs typically showed that TCE concentrations were highest. Two of the sample locations contained concentrations of TCE greater than 1,000 ppb. Soil gas sample SG12-147, located immediately adjacent to the east side of Building 814, had a measured concentration of 2,407 ppb TCE; and soil gas sample SG12-121, located at the northeast corner of Building 813, had a measured concentration of 1,708 ppb TCE (**Figure 5**). Elevated BTEX concentrations were also detected in a number of locations, with concentrations exceeding 500 ppb at soil gas points SG12-126 and SG12-137 (**Figure 6**). Of the BTEX components, toluene was typically detected in the highest concentrations. The complete survey results are presented in **Table 1**.

### **Groundwater Chemistry**

In the area of Buildings 813 and 814, four (4) overburden monitoring wells (**Figure 3**) were installed; the locations of these wells were primarily based on the soil gas survey results. Monitoring well location MW12-37 was placed approximately 10 feet from the northeast corner of Building 813 to

further investigate the elevated soil gas TCE concentrations detected in that location. Monitoring well locations MW12-38 and MW12-39 were placed in approximately the same locations as soil gas sample locations SG12-122 and SG12-148, respectively, in order to investigate the elevated total VOC concentrations detected in those locations. Monitoring well location MW12-38 is also in the suspected downgradient direction of the highest TCE detection at soil gas sample location SG12-147. The fourth monitoring well location, MW12-40, was placed approximately 300 feet downgradient of Buildings 813 and 814 to determine the extent of VOC contamination in the area.

The results of the groundwater sampling program during the RI at SEAD-12 indicate that VOCs were present in groundwater at two of these four wells. The samples collected at monitoring well MW12-37, located at the northeast corner of Building 813, contained a concentration of 1,600 µg/L of TCE during both of the two sampling events conducted; the NYSDEC Class GA Standard for groundwater is 5 µg/L. The groundwater samples collected during the second sampling event also showed an estimated DCE concentration of 30 µg/L, which also exceeds the NYSDEC Class GA Standard, which is 5 µg/L. The sample collected during the second event at MW12-40 also showed a TCE concentration of 1.7 µg/L, however, this does not exceed the GA Standard.

#### **Surface Water/Ditch Soil Chemistry**

As part of the RI, surface water and ditch soil samples were collected from three locations within a ditch that runs adjacent to Buildings 813 and 814 on the north, east, and south sides, as indicated in **Figure 3**.

In the surface water samples, only metals were detected; and of the metals detected, only concentrations of iron and aluminum exceeded NYS AWQS Class C Standards. Surface water sample SW12-30 had a concentration of 610 µg/L for iron and an estimated concentration of 633 µg/L for aluminum. The SW12-30 sample also contained a concentration of 1 µg/L of TCE, which is below the Class C Standards.

Each of the three ditch soil samples, which were co-located with the surface water sample locations, contained detectable concentrations of VOCs, semivolatile organic compounds (SVOCs), pesticides/Polychlorinated Biphenyls (PCBs), and metals. None of the VOCs detected in the ditch soil exceeded NYSDEC Human Health Accumulation or Benthic Aquatic Chronic Criteria for sediment. However, each of the ditch soil samples contained concentrations of SVOCs, all of which were Polycyclic Aromatic Hydrocarbons (PAHs), which exceeded the above criteria. The above criteria were exceeded for at least one pesticide or PCB constituent in each of the ditch soil samples. Ditch soil sample locations SD12-30 and SD12-32 exceed the above criteria for various metals.

### **Soil Chemistry**

Both surface and subsurface soil samples were collected in the vicinity of Buildings 813 and 814 during the RI (**Figure 3**). Three surface soil samples, SS12-66, SS12-67, and SS12-68, were collected to the northwest of the Buildings 813 and 814, near monitoring well MW12-40. The subsurface soil samples were collected during the installation of the four monitoring wells, MW12-37, MW12-38, MW12-39, and MW12-40, to the north and west of the Buildings 813 and 814. The results of the analysis of the surface and subsurface soil samples indicate that there were metals that exceeded TAGM values at these locations. However, none of the VOC or SVOC detections in the surface or subsurface soils exceeded their respective TAGM values.

## **2.2 Investigation of Radionuclides at EM-5**

### **Geophysical and Test Pitting Results**

As part of the geophysical investigation of the RI, an EM-31 survey was conducted. Test pits were excavated at a number of locations in SEAD-12 based on results of this survey. Two test pits dug in the location of anomaly EM-5 uncovered debris that was apparently associated with an original farmstead that predated SEDA. Item such as horseshoes, square nails, and broken glass were recovered from the EM-5 test pits. None of the debris recovered appeared to be related to military activities. All soil and debris removed from both test pits were scanned with field instruments, with no elevated areas of VOCs or radioactivity detected.

### **Radionuclide Soil Sampling**

A total of 30 surface soil and subsurface soil samples were collected and analyzed for radionuclides from EM-5, as indicated in **Figure 7**. Using the Wilcoxon Rank Sum statistical analysis, the EM-5 soils were compared to a background data set to determine if there were any radionuclides that exceeded background concentrations. For the radionuclides distinguishable from background at EM-5, both the residential and worker Derived Concentration Guideline Level (DCGL<sub>WS</sub>) were added to the background dataset as described in MARSSIM (NRC, 2000) and in Section 4.1.2.3 of the RI (Parsons, 2002). When compared to the worker DCGLs, Lead-210 exceeded DCGLs; Lead-210 is part of the Radium-226 decay series.

## **2.3 Investigation of Radionuclides in the Class III Area**

### **Geophysical and Test Pitting Results**

As part of the geophysical investigation of the RI, an EM-31 survey was conducted. Eight test pits were excavated in Class III areas to investigate EM anomalies. Three test pits contained debris (brick, glass, steel pipe and wire, plastic sheeting, empty ammo boxes, and iron stakes) interpreted to be military-related. No elevated areas of radioactivity or VOCs were detected during the scanning of soil or debris removed from the test pits.

### **Radionuclide Soil Sampling**

A total of 103 surface and subsurface soil samples were analyzed for radionuclides. Summary statistics comparing the Class III areas radionuclide data in soils to background radionuclide data are presented in **Table 2**. Using the Wilcoxon Rank Sum statistical analysis, the Class III soils were compared to a background data set to determine if there were any radionuclides that exceeded background concentrations. For the eleven radionuclides distinguishable from background at Class III, both the residential and worker DCGL<sub>WS</sub> were added to the background dataset as described in MARSSIM (NRC, 2000) and in Section 4.1.2.3 of the RI (Parsons, 2002b). When compared to residential DCGLs, Bi-214, Pb-210, Pb-211, and Ra-226 exceeded DCGLs. When compared to worker DCGLs, no radionuclides exceeded DCGLs.

## **3.0 TASK PLAN FOR SUPPLEMENTAL RI**

### **3.1 Installation of Temporary Monitoring Wells**

Fifteen temporary monitoring wells will be installed in the vicinity of Buildings 813 and 814 using a drill rig equipped with a small diameter, hollow-stem auger. It is anticipated that these temporary wells will be installed in two phases to ensure that the outer boundaries of any VOC plumes are defined. The nine wells shown in green on **Figure 8**, TW12-1 to TW12-9, will be installed and sampled during Phase I. Four of these Phase I wells will be located to the north and northwest of monitoring well MW12-37 to further delineate the VOC plume that is believed to be extending downgradient of this well. The other five Phase I wells will be installed in areas that exhibited elevated soil gas VOC concentrations in the RI samples. Proposed well TW12-3 will be installed if the location is accessible. The data from the nine phase I temporary wells will be evaluated based on the VOC analytical results as well as the water level measurements and the inferred groundwater direction. The six Phase II temporary well locations will be chosen based on the evaluation of data from the nine Phase I wells. The Phase II wells will be selected from the remaining twelve well locations shown in red on **Figure 8**.

The rationale behind the proposed placement and installation of each temporary well is discussed further in **Table 3**. If the criteria indicated on **Table 3** for a location to be chosen are met for more than six wells, precedence will be given to those locations closest to higher VOC concentrations.

The temporary monitoring wells will be installed according to the procedures outlined in the Field Sampling and Analysis Plan of the *Generic RI/FS Workplan* (Parsons, 1995), with the exception that the temporary wells will not be finished with ballards, casings, or concrete collars. The soil borings in which the monitoring wells will be installed will be advanced to auger refusal, which will represent the depth of the competent bedrock. All drill cuttings removed from the boring during drilling operations will be scanned with a PID. A monitoring well will be installed in the completed soil boring and screened over the entire depth of the overburden aquifer to a maximum screen length of 10 feet. Each of the temporary wells will be constructed of PVC, which will be removed from the ground if the temporary well point is not converted to a permanent well point. The abandoning of any temporary wells will also be accomplished according to the procedures in the Field Sampling and Analysis Plan.

### 3.2 Groundwater Sampling of Temporary Wells

Groundwater samples will be collected at each of the temporary monitoring wells installed during this program. As stated in **Section 3.1**, the sampling of these wells will take place in two phases to ensure that any VOC plumes are accurately defined. Phase I samples will be collected from the first nine temporary wells installed. These samples will be analyzed for VOCs, and the results of this analysis used to position the next six temporary wells. The last six wells will also be sampled and analyzed for VOCs following installation.

All of the temporary well samples will be collected in accordance with procedures specified in the EPA SOP titled *Groundwater Sampling Procedure, Low Flow Pump Purging and Sampling* (EPA, 1998). In general, each well will be purged and sampled using a bladder pump. Samples will only be collected after water quality indicator parameters including turbidity, temperature, specific conductivity, pH, dissolved oxygen content (DO), and oxidation-reduction potential (ORP), have stabilized in the well (i.e. are constant for three consecutive readings).

All groundwater samples collected will be submitted to a laboratory certified in the State of New York for VOC analysis using EPA Method 8260B. Two duplicates, two rinse blanks, and two Matrix Spike/Matrix Spike Duplicates (MS/MSDs) will be collected and submitted to the lab for quality control (QC) purposes, as shown in the **Table 4** of the sampling plan. The results of the analysis of the temporary well samples will be used to determine the locations of 7 permanent wells to be installed on site.

### **3.3 Installation of Permanent Wells**

Seven of the fifteen temporary well locations will be converted and made permanent, based on an evaluation of the temporary well data. Once permanent, the wells will be used to confirm the results of the temporary well VOC survey and to continue to monitor the horizontal and vertical extent of groundwater impacts. As currently planned, six of these overburden wells will be installed downgradient of the suspected source areas investigated by temporary wells. One well will also be installed upgradient of the suspected source area to provide background groundwater chemical concentrations. The elevated soil gas VOC concentrations detected during the RI around Building 814 may not necessarily indicate a significant impact to groundwater in this area; and, as a result, the majority of the wells may be used to investigate the extent of the TCE detection observed in MW12-37.

The temporary monitoring wells will be converted to permanent wells by finishing them with protective casings, ballards, and concrete collars. The casings for the overburden wells will be driven 2-3 feet below ground surface and extend approximately the same distance above the ground surface. All monitoring wells will be developed as per NYSDEC, TAGM #HWR-88-4015. Development will be performed 2 to 7 days after well installation and at least 7 days before well sampling and water elevation activities.

### **3.4 Groundwater Sampling of Permanent Wells**

Groundwater samples will be collected from each of the 11 permanent monitoring wells (4 existing, 7 proposed) in the vicinity of Buildings 813 and 814. Samples will be collected using the low-flow methods briefly described for the temporary wells, and they will be analyzed for Target Compound List (TCL) VOCs +10 tentatively identified compounds (TICs) using one of two methods. If, based on temporary well data results, the permanent well location does not contain VOCs at a detectable level, EPA Method 524.2 will be used for VOC analysis. If VOCs were detected in the well during the temporary well analysis, EPA Method 8260B will be used. For existing wells, the same method determination is made based on the remedial investigation results. Existing well MW12-37 will be analyzed for VOCs using EPA Method 8260B. Existing wells MW12-38, MW12-39, and MW12-40 will be analyzed using EPA Method 524.2. In addition, samples will be analyzed for TCL Pesticides, TCL PCBs, and Target Analyte List (TAL) metals only. Prior to the sampling event, groundwater elevations will be collected at each well and these data used to create a local groundwater contour map.

In order to assess the current potential for natural attenuation and the application of hydrogen reducing compounds (HRC) as an alternative in the FS, permanent well groundwater samples will also be analyzed for the following parameters in the laboratory: nitrate, sulfate, chloride, manganese, methane, ethane, ethene, total organic carbon (TOC), biological oxygen demand (BOD), and chemical oxygen demand (COD). Parameters measured in the field will include oxidation-reduction potential (ORP) measured by Model U-22 Water Quality Monitoring System with flow cell, H<sub>2</sub>S and Fe (II) measured



by colorimetric field methods, and CO<sub>2</sub> and alkalinity measured by field titration. The sampling plan for the permanent wells is shown on **Table 5**.

### **3.5 Land Survey of Temporary and Permanent Well Locations**

A surveyor, licensed by the State of New York, will be contracted to determine the locations of all temporary and permanent monitoring wells installed during this program. Site surveys will be performed in accordance with good land surveying practices and will conform to all pertinent state, federal, and USACOE laws and regulations governing land surveying. The procedures are outlined in Section 3.13.1 of the Field Sampling and Analysis Plan of the *Generic RI/FS Workplan*.

### **3.6 Surface Water Sampling**

Seven (7) surface water/ditch soil samples will be collected from two areas: (1) the drainage ditches northwest of the plume along Service Road No. 1 if it is confirmed that the plume has migrated in this direction and (2) the drainage ditches north, east, and south of Buildings 813 and 814. Samples along Service Road No. 1 will be collected to determine if VOCs are discharging to surface water in this area. Three samples will be collected to the north and east of Building 813/814 to determine if VOCs are discharging to surface water from the building. The positioning of these samples is based on the location of a drainpipe exiting Building 813. Finally, two samples will be collected to the south of the buildings. One of these samples will re-examine SW/SD12-30, which showed a 1 ppb concentration of TCE during the RI; and the other sample will be collected approximately 75 feet upgradient of this location. **Figure 9** shows the proposed locations for the surface water/ditch soil samples.

Surface water samples and ditch soil samples will be collected according to the methods outlined in the Field Sampling and Analysis Plan. The surface water samples will be analyzed for VOCs, and the ditch soil samples will be analyzed for VOCs and TOC.

### **3.7 Additional Sampling at EM-5**

Due to the high levels of Pb-210 detected at EM-5, soil samples will be re-collected at the location of elevated hits at EM-5 detected during the RI at SEAD-12. The results of the analysis of these samples will be used to supplement data collected during the RI, and a report of the findings will be included as an addendum to the RI report. Eight surface soil and two subsurface soil samples will be collected from ten locations. **Figure 10** shows the proposed locations of surface and subsurface soil samples. These locations were selected from existing sample locations based on the highest detections of Pb-210 in the last round of soil sampling. All samples will be analyzed for Ra-226 (the parent of Pb-210) and its daughter products using EML Method HASL 300 (the specific laboratory SOP to be used is included in

**Attachment A).** One rinse blank sample, one duplicate, and an MS/MSD sample will be submitted to the lab for QC purposes.

### **3.8 Additional Analysis in Class III Locations**

No additional sampling is proposed at this time for the Class III Area of SEAD-12. Due to the schedule to transfer the Conservation Area, samples were collected from this area on August 21, 2003 to verify that there were no radionuclides of concern. Split samples were sent to NYSDEC for verification. The Conservation Area was transferred to the Seneca County Industrial Development Agency (SCIDA) in September 2003.

## **4.0 DATA EVALUATION**

### **4.1 Data Quality Objectives**

The Data Quality Objectives (DQOs) are outlined in the *Generic RI/FS Workplan* (Parsons, 1995); however, updates relating to DQOs presented in *Data Quality Objectives Process for Hazardous Waste Site Investigations QA/G-4HW* (EPA, 2000) are reflected in the section below. The RI/FS process requires decisions regarding future site remedial actions, including whether or not any actions are required. The RI serves as the mechanism for collecting and assessing data that will be used in the decision making process. During this portion of the overall process, data are collected and assembled to:

- characterize site conditions;
- determine the nature of the waste(s) or contaminant(s) present;
- assess the risk posed to human health and the environment by the identified waste(s) or contaminant(s); and
- perform testing to evaluate the potential performance and cost of treatment technologies that are being considered for use.

The FS provides the mechanism within which the alternative remedial actions are developed and scoped, assessed and evaluated. Ultimately, the output of the combined RI/FS process is a recommended alternative for remedial actions needed at the site that is based on the data that is developed during the RI/FS. Consequently, the collected data must be of sufficient quantity and quality to support defensible decision making.

The EPA's Quality Assurance Management Staff (QAMS) developed the Data Quality Objectives (DQO) Process (EPA, 1996) as a systematic planning tool for developing data collection designs that

support defensible decision making in a resource-effective manner. Proper application and use of the EPA's recommended DQO Process can improve the effectiveness, efficiency and defensibility of data collection efforts used in the development and recommendation of potential remedial actions.

The DQO Process is an iterative process that consists of seven steps, as illustrated in **Figure 11**. The output from each step influences the choices that may be made later in the Process, and may lead to reconsideration of prior decisions due to the development or discovery of new data that does not support prior decisions. The first six steps focus on the development and specification of decision performance criteria or the data quality objectives (DQOs) that will be used to develop the data collection design. Key components of each of these steps are highlighted below:

- State the Problem – Concisely describe the problem to be studied. Review existing information and data to serve as the basis of the problem definition.
- Identify the Decision – Identify what questions the investigation/study will attempt to resolve, and the actions that may result.
- Identify the Inputs to the Decision – What information/data needs to be obtained and collected to resolve the problem identified?
- Define the Study Boundaries – Specify the time periods and spatial area to which the decisions will apply. Determine where and when data should be collected.
- Develop a Decision Rule – Define the statistical parameter of interest, specify the action level, and integrate the previous DQO inputs into a single statement that describes the logical basis for choosing among the alternatives.
- Specify Tolerable Limits on Decision Errors – Define decision error rates based on the consideration of making an incorrect decision.

The last step of the DQO Process is the development and specification of the data collection design based on the DQOs. During this step, all of the data and information developed and collected during the prior steps of the process are evaluated and used to generate alternative data collection designs that could be applied to resolving the identified problem. Once the alternative data collection strategies are identified, the most resource-effective design that meets all the DQOs may be selected and implemented. According to EPA guidance QA/G-4HW, for the supplemental work for SEAD-12, a non-probabilistic sampling (judgmental sampling) design is developed since the Army has experience at the site from the original RI field investigation (EPA, 2000). However, when non-probabilistic sampling approaches are used, quantitative statements about data quality are limited only to the measurement error component of total study error and the results cannot be extrapolated to the entire site unless the data are being used to support explicit scientific models. This supplemental groundwater sampling program was designed with a non-probabilistic approach since the Army has extensive knowledge of the site from the results of the initial RI.

For this specific site, the DQO steps for the groundwater investigation are identified below:

<b>State the problem</b>	Determine the outer boundary of the TCE plume at SEAD-12 and the levels of COCs within the plume.
<b>Identify the decision</b>	Phase I – Determine where the permanent wells should be located; Phase II – Determine the outer boundary of the plume and the levels of COCs within the plume.
<b>Identify the inputs into the decision</b>	RI data, new proposed analytical groundwater data, and field parameters
<b>Define the study boundaries</b>	VOCs in the groundwater from the upper aquifer in the vicinity of Buildings 813 and 814, since TCE concentrations were previously detected in the groundwater in this area. Two rounds of sampling will be collected to account for seasonal groundwater fluctuations.
<b>Develop a decision rule</b>	If levels at the perimeter wells exceed ARARs, then further delineation is required. The maximum detection of a VOC in a perimeter well will be compared to the ARAR.
<b>Specify tolerable limits on decision errors</b>	If the true values in a perimeter well exceed 2 times ARARs, then further delineation is necessary.

For the proposed groundwater investigation, the VOC concentrations detected in the temporary wells will be compared to ARARs. If VOCs are detected in a sample collected at a temporary perimeter well at levels greater than two times the ARARs, then further delineation of the plume in the vicinity of the temporary well will be required. The placement of a permanent well will be based on the location of the temporary well with the ARAR exceedance, as outlined in **Table 2**. If the maximum detections of VOCs are less than their respective ARARs, then the boundary of the plume has been delineated.

Decision Errors are comprised of sampling design error and measurement error. In order to control decision errors introduced in the measurement process during physical sampling collection, sampling collection will be completed under the supervision of a field manager and in compliance with all relevant procedures and guidelines. Low flow sampling techniques will be employed, which allow for groundwater sample collection with low turbidity levels that correlates to better quality data.

Decision errors can be classified as either a false rejection or a false acceptance. A false rejection would occur when the perimeter well concentration is below the ARAR, but the true value is over; a false acceptance is when the perimeter well concentration is above the ARAR, but the true value is not. A false rejection can have negative consequence of greater significance than a false acceptance. The potential decision errors were assessed, and although a statistical analysis of the data will not be conducted due to the non-probabilistic nature of the sampling plan, tolerable error limits were assigned

to both the false rejection case and the false acceptance case. To be conservative, the tolerable error limit associated with the false rejection (two times greater than ARARs) will be selected as the tolerable decision error.

This workplan presents the Army's recommended approach to conducting an investigation that will be used to prepare a Decision Document that will be used to justify the future disposition of the site.

#### **4.2 Data Validation**

Analytical data developed during this remedial investigation will be used to support final decisions relative to the final disposition of SEAD-12. Analyses proposed as part of the investigation of SEAD-12 include directed analysis of VOCs in soil, ditch soil, surface water and groundwater; pesticides/PCBs and metals in groundwater; and TOC analysis in soil and ditch soil. In addition, the following parameters will be collected in groundwater in order to assess the potential for natural attenuation: Nitrate, sulfate, chloride, methane/ethane/ethene, BOD, and COD. Sample analysis for each contaminant class will be performed in accordance with the EPA recommended procedures listed below:

- Volatile organic compounds by EPA SW-846 Method 8260B (low level procedure) for surface water and groundwater, and Method 8260B for ditch soil. VOC analysis may also be performed utilizing EPA Method 524.2 for groundwater;
- Pesticides/Polychlorinated Biphenyls by EPA Method 8081A for groundwater;
- TAL Metals by EPA Method 6010B for groundwater;
- Nitrate (NO<sub>3</sub>), sulfate (SO<sub>4</sub>), and chloride (Cl<sub>2</sub>) by EPA Method 300 for groundwater;
- Methane/ethane/ethene (M/E/E) by EPA Method 8015M for groundwater;
- Total Organic Carbon (TOC) by EPA Method 9060 for groundwater;
- Biologic Oxygen Demand (BOD) by EPA Method 405.1 for groundwater;
- Chemical Oxygen Demand (COD) by EPA Method 410.4 for groundwater;
- Radionuclides by EML HASL 300 in soil (see **Attachment A**); and
- Tritium by EPA Method 906.

In order to meet the requirements of New York State, environmental samples will be collected and analyzed according to EPA and New York State Department of Health (NYSDOH) protocols. Determinations of TOC levels will be completed using the Lloyd Kahn protocol for sediment.

Validation of analytical data resulting from analytical determinations in soil, ditch soil, surface water, and groundwater will be performed in a manner that is generally consistent with procedures defined in the EPA's "National Functional Guidelines for Organic Data Review" (EPA, 1999) and consistent with

EPA Region 2's Standard Operating Procedures. Specific data validation procedures that will be followed include:

- HW-24, Validating Volatile Organic Compounds by SW-846 Method 8260B, Revision 1, June 1999;
- HW-29, Measurement of Purgeable Organic Compounds in Water by Gas Chromatography/Mass Spectrometry (GC/MS): Capillary Column, Acquired Using Method 524.2 (Revision 4.1, 1995), Revision 1, October 2001.
- HW-23B, Validating Pesticides/PCB Compounds by SW-846 Method 8082, Revision 1.0, May 2002 [The most current SOP for validating PCB data is HW-23B. However, until a Regional Data Validation SOP can be prepared for Pesticides (i.e., utilizing analytical method SW-846 8081a), DV SOP HW-23 should be used in conjunction with the QA/QC criteria detailed in SW-846 Method 8081A.]; and
- HW-2, Evaluation of Metals Data for the CLP Program, Revision 11, January 1992.

Radiological analytical data will be validated according to the "Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP)", Draft for Public Comment, August 2001 (EPA 402-B-01-003).

The data package submittal requested from the laboratory for the analytical determinations in soil, ditch soil, surface water, and groundwater will contain all data generated during the analyses, including mass spectral identification charts, mass spectral tuning data, spike recoveries laboratory duplicate results, method blank results, instrument calibration, and holding times documentation. All sample data and laboratory quality control results will be requested for soil and ditch soil analyses completed for TOC and groundwater analysis completed for the natural attenuation parameters (nitrate, sulfate, chloride, methane/ethane/ethene, BOD, and COD).

Commensurate levels of data validation will be performed on the results and the data packages reported for the proposed analyses. A *qualitative* review will be completed for the TOC data and the data on the natural attenuation parameters. A qualitative review includes and analysis of the following items as they are applicable to the Method 9060, Lloyd Kahn, and natural attenuation parameters procedures: data completeness, custody documentation, holding times, laboratory and field QC blanks, instrument calibrations, laboratory control sample recoveries, matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy, laboratory duplicate precision, instrument performance, surrogate recoveries for organic analyses, field duplicate precision, internal standard responses for organic analyses, instrument run logs, and all other laboratory QC samples. As part of the validation process, the percent solid content of ditch soils will also be evaluated in accordance with EPA Region 2's SOPs.

Other analyses will be subjected to full data validation. Full data validation is a *qualitative* and *quantitative* review of those items evaluated during a qualitative assessment in addition to calculating sample and laboratory QC results with the instrument raw data. This level of data quality provides assurance that all sample results reported by the laboratory were transcribed, calculated, and reported correctly. Therefore, this level of data review requires laboratories to submit all environmental sample results, laboratory QC results, and instrument raw data (i.e., a full data package or "CLP-type" data deliverable).

## 5.0 SCHEDULE

The schedule for all tasks included in the project is presented in **Figure 12**.

## 6.0 STAFFING

The project team organization for performing the work described in this Work Plan is presented in **Figure 13**.

If you would like to discuss any aspects of the work outlined above, please contact me at (617) 457-7866.

Sincerely,

**PARSONS**



Jacqueline Travers, P.E.  
Project Manager

Enclosures

cc:	S. Absolom, SEDA	C. Boes, AEC
	T. Enroth, USACE	E. Kashden, Gannett Fleming
	K. Hoddinott, USACHPPM	C. Bethony, NYSDOH
	S. Bradley, USACE, Huntsville	





## REFERENCES

- Environmental Protection Agency (EPA), 1996. Data Quality Objectives (DQO) Process, 1996.
- Environmental Protection Agency (EPA), 1998. Groundwater Sampling Procedure, Low Flow Pump Purging and Sampling, March 20, 1998.
- Environmental Protection Agency (EPA), 1999. National Functional Guidelines for Organic Data Review, October 1999.
- Environmental Protection Agency (EPA), 2000. Data Quality Objectives Process for Hazardous Waste Site Investigations QA/G-4HW, 2000.
- Nuclear Regulatory Commission (NRC), 2000. Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, September, 2000.
- Environmental Protection Agency (EPA), 2001. "Multi-agency Radiological Laboratory Analytical Protocols Manual (MARLAP)", Draft for Public Comment, August 2001.
- Parsons Engineering Science, Inc. 1995. Generic Installation Remedial Investigation/Feasibility Study (RI/FS) Workplan for Seneca Army Depot.
- Parsons, 2002a. Draft Feasibility Study Report for the Radioactive Waste Burial Sites (SEAD-12), May 2002.
- Parsons, 2002b. Revised Final Remedial Investigation at the Radiological Waste Burial Sites (SEAD-12), August 2002.

**Table 1**  
**Soil Gas Survey Results**  
**SEAD-12 Supplemental RI Workplan**  
**Seneca Army Depot Activity**  
**Romulus, New York**

LOC_ID	DICHLOROETHENE (ppbv)	BENZENE (ppbv)	TRICHLOROETHENE (ppbv)	TOLUENE (ppbv)	P-XYLENES (ppbv)	TOTAL VOC (ppmv)
SG12-117	0	0	6	0	0	6
SG12-118	0	0	0	0	0	3
SG12-119	0	132	461	11	0	5
SG12-120	0	0	0	197	0	6
SG12-121	452	3	1708	21	0	7
SG12-122	0	0	0	250	14	9
SG12-123	0	116	0	170	0	4
SG12-124	0	0	0	0	0	5
SG12-125	0	0	0	0	0	3
SG12-126	0	146	0	250	141	6
SG12-127	0	0	0	396	82	4
SG12-128	0	0	0	0	0	4
SG12-129	0	0	1	0	0	2
SG12-130	0	0	6	12	0	10
SG12-131	0	0	0	174	0	5
SG12-132	0	0	55	123	0	5
SG12-133	0	4	0	0	0	2
SG12-134	0	0	89	190	0	10
SG12-135	0	0	97	0	0	3
SG12-136	0	0	54	281	0	4
SG12-137	0	0	146	217	351	9
SG12-138	0	0	138	36	0	2
SG12-139	0	0	414	125	0	5
SG12-140	0	0	206	275	0	4
SG12-141	0	0	191	1	0	4
SG12-142	0	43	0	147	10	4
SG12-143	0	140	0	217	0	6
SG12-144	4	0	39	94	0	4
SG12-145	0	118	0	48	0	5
SG12-146	0	0	0	0	0	4
SG12-147	119	82	2407	22	0	7
SG12-148	0	74	110	171	0	6
SG12-149	0	0	0	0	0	3
SG12-150	0	123	0	212	136	6
SG12-151	0	0	958	32	0	4
SG12-152	0	0	98	0	0	3
SG12-153	0	0	31	0	0	2
SG12-154	0	0	633	1	0	3
SG12-155	0	0	224	144	0	3
SG12-156	0	0	0	0	0	2
SG12-157	0	0	0	10	0	4
SG12-158	0	69	148	2	0	2
SG12-159	0	0	0	0	0	3
SG12-160	0	0	0	149	0	9
SG12-161	0	0	193	2	0	6
SG12-162	0	0	10	206	0	9
SG12-163	0	94	0	12	0	4
SG12-164	0	0	0	0	0	7
SG12-165	0	0	245	180	0	4
SG12-166	0	0	0	0	0	13
SG12-167	0	4	0	13	0	4
SG12-168	0	0	0	93	0	7
SG12-169	0	0	0	320	0	28
SG12-170	0	0	0	0	0	1

**TABLE 2**  
**Comparison of Summary Statistics in**  
**Background Soil to Class 3 Soil for Radionuclides**  
**SEAD-12 Supplemental RI Workplan**  
**Seneca Army Depot Activity**

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)			
Gross Alpha	pCi/g	0	3	NA	3	NA	100%	NA	6.00	NA	13.00	NA	9.00	NA	8.00	NA	3.61	NA	NA	NA
Gross Beta	pCi/g	0	3	NA	3	NA	100%	NA	21.00	NA	27.00	NA	24.00	NA	24.00	NA	3.00	NA	NA	NA
Actinium-228	pCi/g	0	3	NA	3	NA	100%	NA	0.68	NA	0.84	NA	0.77	NA	0.78	NA	0.08	NA	NA	NA
Bismuth-214	pCi/g	35	103	27	99	77%	96%	0.60	0.05	2.60	3.00	1.35	1.69	1.40	1.70	0.47	0.65	YES	YES	NO
Cesium-137	pCi/g	35	100	12	84	34%	84%	0.05	0.05	0.70	1.50	0.32	0.51	0.30	0.40	0.22	0.37	YES	NO	NO
Cobalt-57	pCi/g	35	100	5	34	14%	34%	0.05	0.05	0.10	0.30	0.06	0.08	0.05	0.05	0.02	0.05	NO	NO	NO
Cobalt-60	pCi/g	35	100	6	73	17%	73%	0.05	0.05	0.40	0.70	0.13	0.25	0.10	0.20	0.08	0.17	YES	NO	NO
Lead-210	pCi/g	35	100	5	64	14%	64%	0.60	0.60	21.10	72.30	5.62	9.25	3.43	5.60	5.35	11.60	YES	YES	NO
Lead-211	pCi/g	35	100	4	56	11%	56%	0.40	0.35	10.75	20.10	3.20	5.36	2.15	3.70	3.13	5.02	YES	YES	NO
Lead-214	pCi/g	35	103	33	96	94%	93%	0.60	0.05	2.50	2.90	1.48	1.54	1.45	1.68	0.44	0.68	NO	NO	NO
Plutonium-239	pCi/g	35	100	8	20	23%	20%	0.05	0.05	0.25	0.25	0.13	0.09	0.11	0.10	0.05	0.05	NO	NO	NO
Promethium-147	pCi/g	29	5	10	1	34%	20%	2.10	3.25	17.80	16.50	6.43	6.47	4.15	4.20	4.70	5.62	NO	NO	NO
Radium-223	pCi/g	35	100	1	11	3%	11%	0.10	0.15	0.70	1.50	0.22	0.33	0.20	0.25	0.10	0.28	YES	NO	NO
Radium-226	pCi/g	35	100	27	90	77%	90%	0.60	0.05	2.60	3.00	1.36	1.63	1.40	1.70	0.47	0.73	YES	YES	NO
Radium-228	pCi/g	35	100	34	92	97%	92%	1.00	0.05	3.50	3.60	1.73	1.91	1.65	2.00	0.51	0.76	YES	NO	NO
Thallium-208	pCi/g	0	3	NA	3	NA	100%	NA	0.26	NA	0.41	NA	0.35	NA	0.39	NA	0.08	NA	NA	NA
Thorium-227	pCi/g	29	0	8	NA	28%	NA	0.10	NA	0.55	NA	0.23	NA	0.25	NA	0.11	NA	NA	NA	NA
Thorium-230	pCi/g	35	100	9	52	26%	52%	0.20	0.05	2.70	2.30	0.54	0.73	0.32	0.70	0.53	0.64	NO	NO	NO
Thorium-232	pCi/g	35	100	34	91	97%	91%	0.25	0.05	2.00	1.90	0.98	1.05	0.90	1.20	0.36	0.43	NO	NO	NO
Thorium-234	pCi/g	0	3	NA	3	NA	100%	NA	0.30	NA	0.76	NA	0.48	NA	0.38	NA	0.25	NA	NA	NA
Tritium	pCi/g	35	100	6	56	17%	56%	0.05	0.05	30.23	418.00	1.68	28.13	0.05	0.50	5.81	64.91	YES	NO	NO
Uranium-233/234	pCi/g	35	100	17	77	49%	77%	0.05	0.05	1.90	1.90	0.46	0.74	0.10	0.80	0.46	0.41	YES	NO	NO
Uranium-235	pCi/g	35	100	19	37	54%	37%	0.05	0.05	0.40	0.40	0.11	0.09	0.10	0.05	0.08	0.06	NO	NO	NO
Uranium-238	pCi/g	35	100	27	98	77%	98%	0.05	0.05	1.40	1.80	0.67	0.87	0.75	0.90	0.40	0.28	YES	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.

(1) The collection area includes Class 3, Building 813, Building 818, EM 11, EM-13, EM-37, EM-40, EM-7, EM-8, EM-10, EM-14, and EM-38.

**Table 3**  
**Well Placement Rationale - Existing and Proposed Monitoring Wells**  
**SEAD-12 Supplemental RI Workplan**  
**Seneca Army Depot Activity, Romulus, NY**

Monitoring Well Loc ID	Status	Rationale
<b>Existing Permanent or 1st Phase Temporary Wells</b>		
MW12-37	existing	1,708 ppbv TCE concentration in soil gas sample SG12-121; TCE concentration of 1,600 ug/L during two sampling events in the Remedial Investigation
MW12-38	existing	8.5 ppmv total VOC concentration in soil gas sample SG12-122
MW12-39	existing	6.0 ppmv total VOC concentration in soil gas sample SG12-148
MW12-40	existing	Placed 300' downgradient of Bldg 813 and elevated TCE concentration at SG12-121
TW12-1	proposed	633 ppbv TCE concentration in soil gas sample SG12-154
TW12-2	proposed	5.5 ppmv total VOC and 471 ppbv BTEX concentrations in soil gas sample SG12-150
TW12-3	proposed	2,407 ppbv concentration of TCE in soil gas sample SG12-147. Well will be installed if location is accessible.
TW12-4	proposed	10.0 ppmv total VOC concentration in soil gas samples SG12-130 and SG12-134
TW12-5	proposed	191 ppbv TCE concentration in soil gas sample SG12-141
TW12-6	proposed	Suspected downgradient direction from Bldg 813 and elevated TCE concentration in MW12-40
TW12-7	proposed	Suspected downgradient direction from Bldg 813 and elevated TCE concentration in MW12-40
TW12-8	proposed	Suspected downgradient direction from Bldg 813 and elevated TCE concentration in MW12-40
TW12-9	proposed	Suspected downgradient direction from Bldg 813 and elevated TCE concentration in MW12-40
<b>2nd Phase Temporary Wells - 6 of 12 to be Installed</b>		
TW12-10	proposed	Installation based on detections at TW12-3
TW12-11	proposed	Installation based on detections at TW12-3
TW12-12	proposed	Upgradient background location, which will be permanent.
TW12-13	proposed	Installation based on detections at TW12-6 or TW12-9
TW12-14	proposed	Installation based on detections at TW12-7
TW12-15	proposed	Installation based on detections at TW12-7 or TW12-8
TW12-16	proposed	Installation based on detections at TW12-8
TW12-17	proposed	Installation based on detections at TW12-8 or TW12-9
TW12-18	proposed	Installation based on detections at TW12-9
TW12-19	proposed	Installation based on detections at TW12-5
TW12-20	proposed	Installation based on detections at TW12-3
TW12-21	proposed	Installation based on detections at TW12-1

**Table 4**  
**Temporary Well Sampling Plan**  
**SEAD-12 Supplemental RI**  
**Seneca Army Depot Activity, Romulus, NY**

Loc ID	Sampling Phase	Sample Type						Parameters/ Methods	Total Samples	Field Parameters (see below)
		Sample	Duplicate	Matrix Spike	Matrix Spike Duplicate	Rinse Blank	Trip Blank			
TW12-1	I	1					1	1	2	✓
TW12-2	I	1						1	1	✓
TW12-3	I	1	1	1	1	1	1	1	6	✓
TW12-4	I	1						1	1	✓
TW12-5	I	1					1	1	2	✓
TW12-6	I	1						1	1	✓
TW12-7	I	1						1	1	✓
TW12-8	I	1						1	1	✓
TW12-9	I	1						1	1	✓
TW12-10 - TW12-21	II	6	1	1	1	1	2	6	12	✓
Totals	9 Phase I, 6 Phase II	15	2	2	2	2	5	15	28	

Note: All field parameters to be measured using Horiba U-22 flow through cell

**Field Parameters**

DO - Dissolved Oxygen

ORP - Oxidation/Reduction Potential

Temp - Temperature

H<sub>2</sub>S - Hydrogen Sulfide

Fe<sup>+2</sup> - ferrous iron

CO<sub>2</sub> - Carbon Dioxide

Alk - Alkalinity

VOC - Volatile Organic Compounds (8260B)

Table 5  
Permanent Well Sampling Plan  
SEAD-12 Supplemental RI  
Seneca Army Depot Activity, Romulus, NY

Loc ID	Sample Type						Parameters/Methods										Total	Field Parameters (see below)
	Sample	Duplicate	Matrix Spike	Matrix Spike Duplicate	Rinse Blank	Trip Blank	VOCs 8260B/ 524.2 (1)	Pest/PCB 8081A	Metals 6010B	NO3 Method 300	SO4 Method 300	Chloride Method 300	M/E/E 8015M	TOC 9060	BOD 405.1	COD 410.4	Samples	
MW12-37	✓	✓	✓	✓	✓	✓	6	5	5	5	5	5	5	5	5	5	46	2
MW12-38	✓						1	1	1	1	1	1	1	1	1	1	10	1
MW12-39	✓						1	1	1	1	1	1	1	1	1	1	10	1
MW12-40	✓						1	1	1	1	1	1	1	1	1	1	10	1
PW12-TBD1	✓						1	1	1	1	1	1	1	1	1	1	10	1
PW12-TBD2	✓						1	1	1	1	1	1	1	1	1	1	10	1
PW12-TBD3	✓						1	1	1	1	1	1	1	1	1	1	10	1
PW12-TBD4	✓						1	1	1	1	1	1	1	1	1	1	10	1
PW12-TBD5	✓						1	1	1	1	1	1	1	1	1	1	10	1
PW12-TBD6	✓						1	1	1	1	1	1	1	1	1	1	10	1
PW12-TBD7	✓					✓	2	1	1	1	1	1	1	1	1	1	11	1
Totals							17	15	15	15	15	15	15	15	15	15	147	1

Notes: TBD - Permanent well IDs to be determined based on converted temporary well IDs. For example, if TW12-9 is converted to a permanent well, its permanent ID will be PW12-3.

(1) Analytical method for VOCs (8260B or 524.2) will be selected based on prior analytical results for existing wells or temporary well results for new wells. See text for further clarification.

VOC - Volatile Organic Compounds (8260B or 524.2)

Pest/PCB - Pesticides/Polychlorinated Biphenyls (8081A)

Metals - (6010B)

NO<sub>3</sub> - Nitrate (300)

SO<sub>4</sub> - Sulfate (300)

Cl<sub>2</sub> - Chloride (300)

M/E/E - Methane, Ethane, Ethene (8015M)

TOC - Total Organic Carbon (9060)

BOD - Biologic Oxygen Demand (405.1)

COD - Chemical Oxygen Demand (410.4)

Field Parameters

DO - Dissolved Oxygen

ORP - Oxidation/Reduction Potential

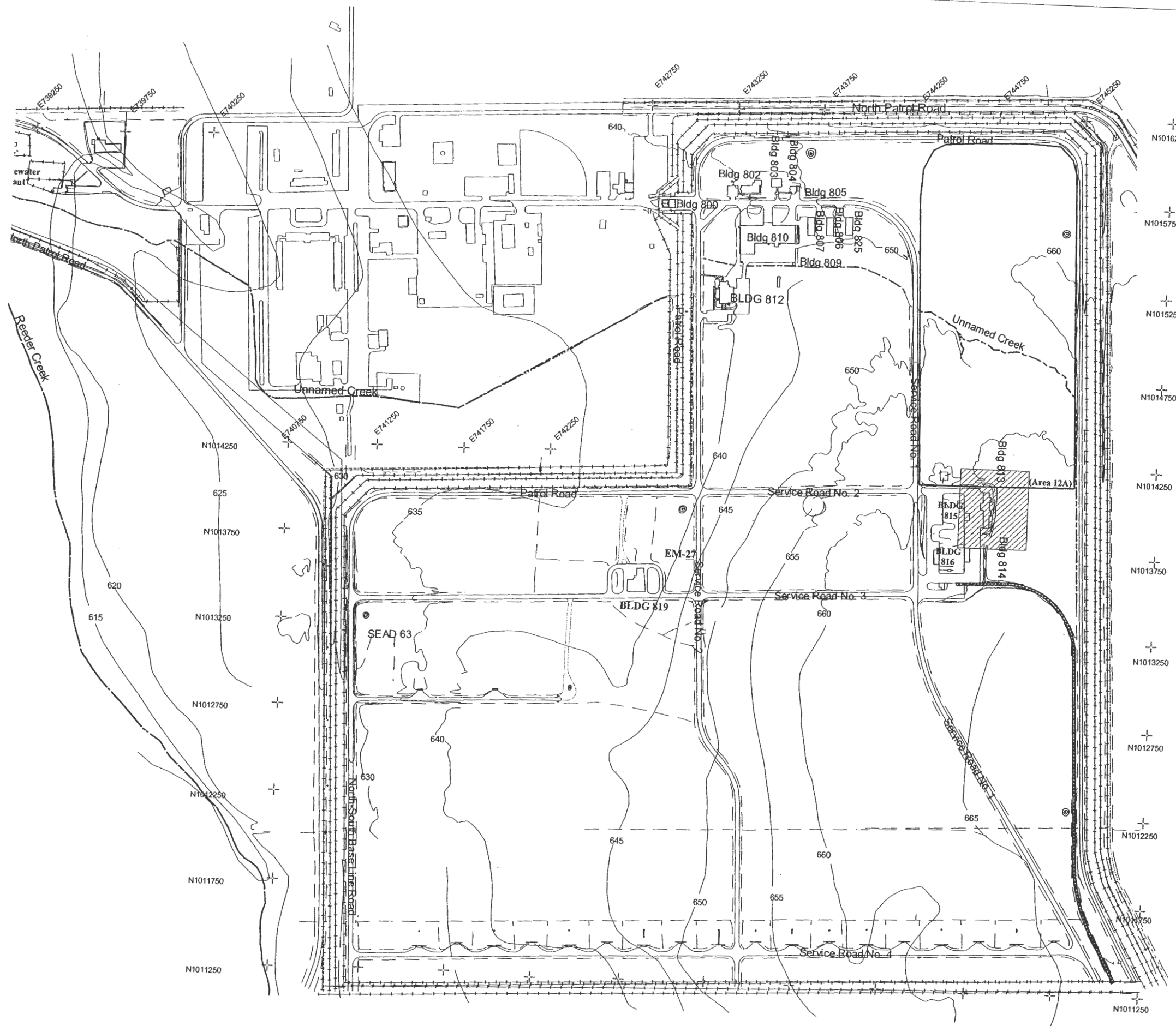
Temp - Temperature

H<sub>2</sub>S - Hydrogen Sulfide

Fe<sup>+2</sup> - ferrous iron

CO<sub>2</sub> - Carbon Dioxide

Alk - Alkalinity



- BUILDINGS
- Supplemental RI Investigation Area
- FENCE
- ROADS
- WATER
- DRAINAGE
- 630 GROUND ELEVATION CONTOURS (5 FOOT INTERVALS)

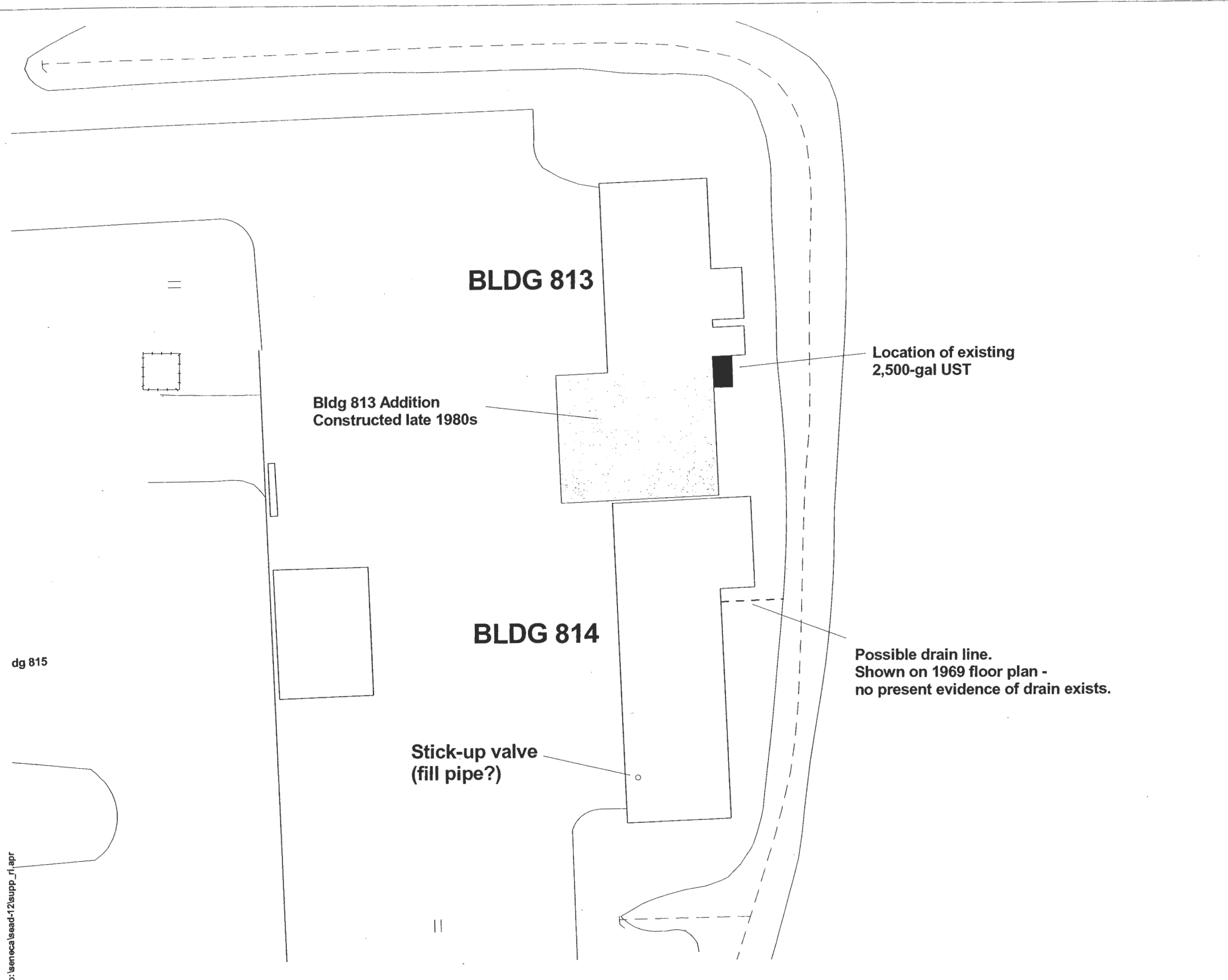
600 0 600 Feet



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Seneca Army Depot Activity  
Supplemental RI  
SEAD-12

FIGURE 1  
SEAD-12 SITE PLAN



LEGEND



20 0 20 40 Feet



**PARSONS**

SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

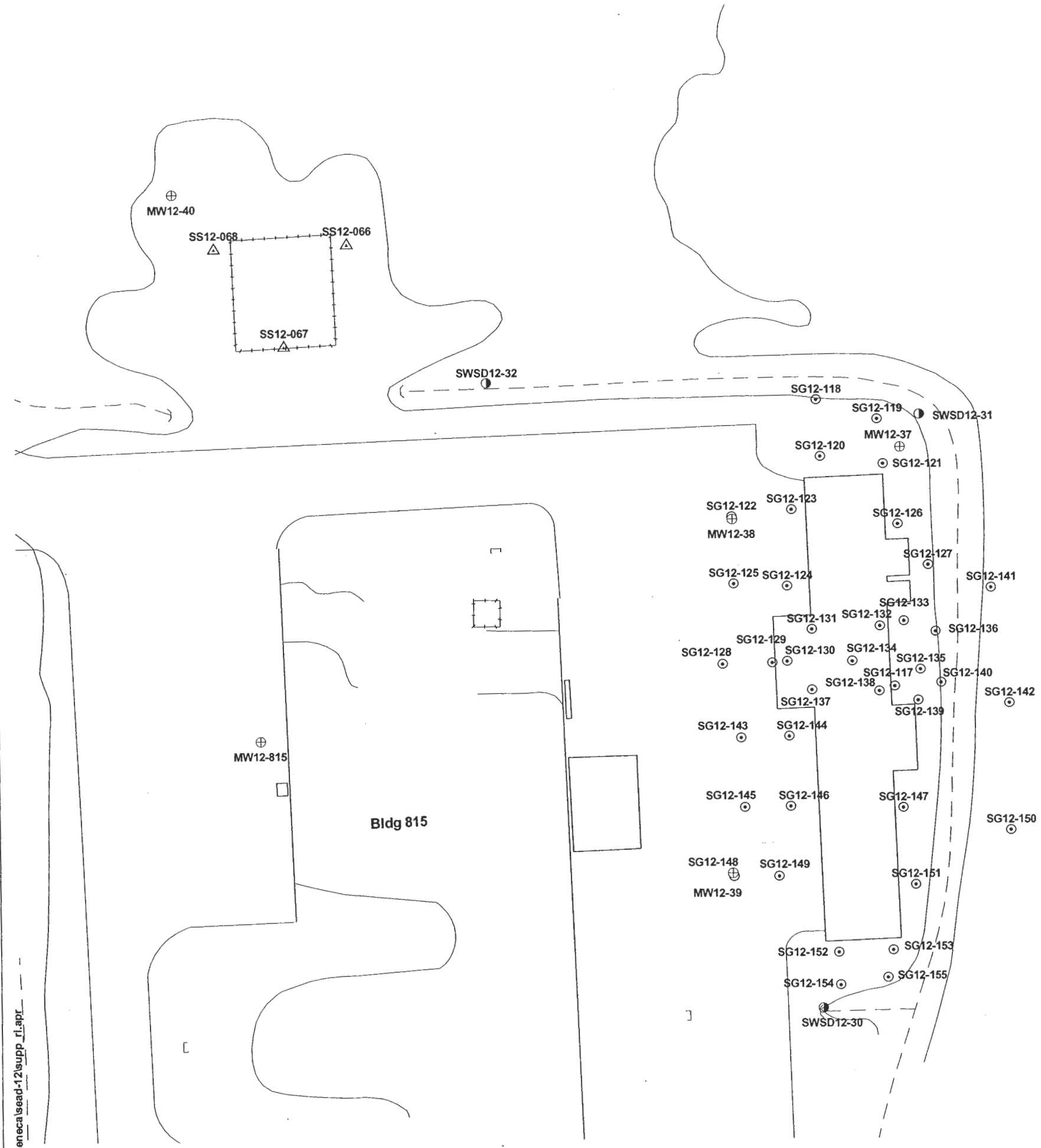
FIGURE 2  
BUILDINGS 813 AND 814

SCALE 1:30

DATE MARCH 2004

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## LEGEND

SG12-128  
⊙ SOIL GAS SAMPLE LOCATION

MW12-37  
⊕ MONITORING WELL LOCATION  
subsurface soil samples  
also collected

SS12-67  
△ SURFACE SOIL SAMPLE  
LOCATION

SW/SD12-30  
● SURFACE WATER/SEDIMENT  
SAMPLE LOCATION



50 0 50 Feet



# PARSONS

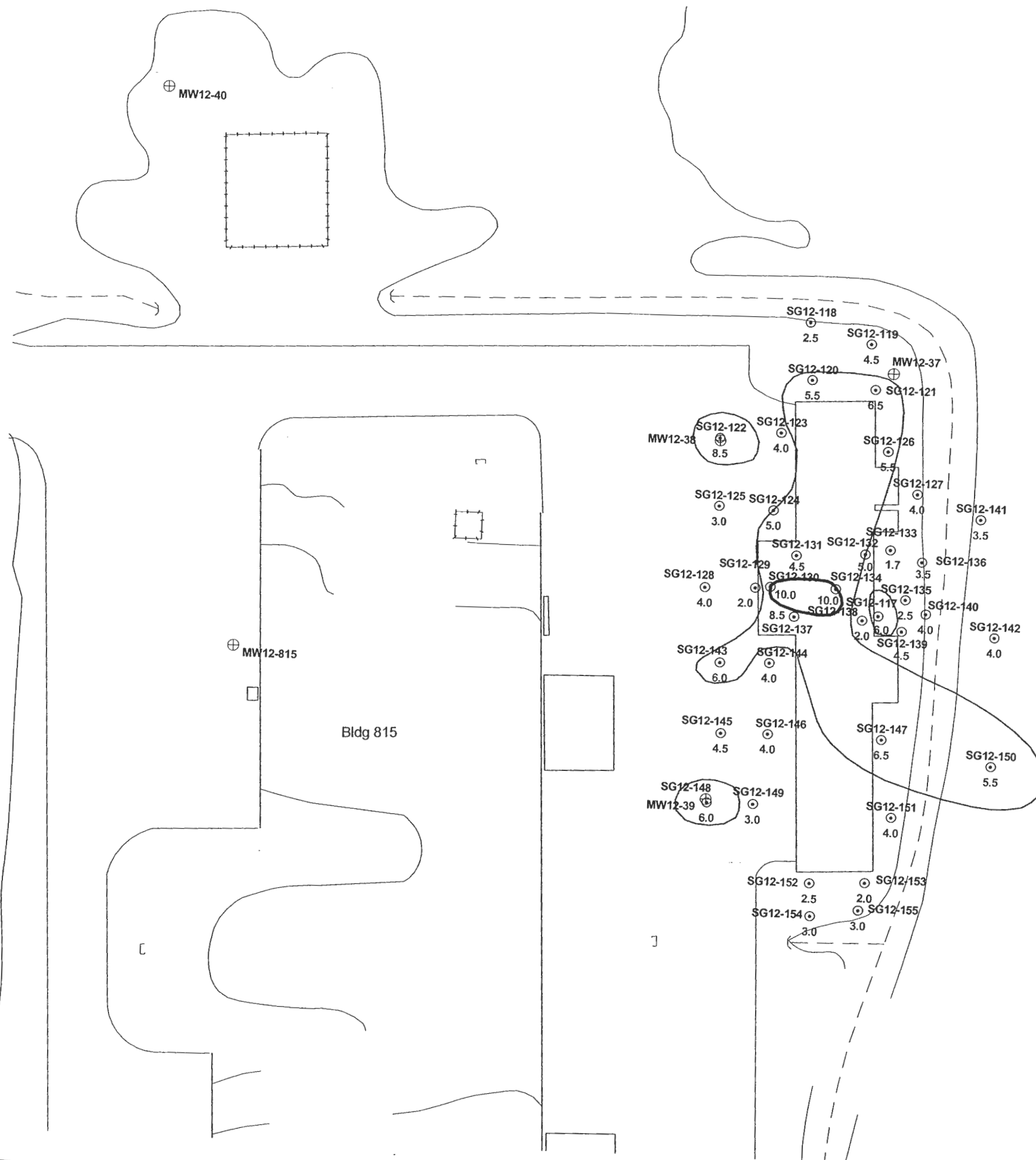
SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

FIGURE 3  
REMEDIAL INVESTIGATION  
SAMPLING LOCATIONS

SCALE 1:50

DATE MARCH 2004

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## LEGEND

SG12-128

- ⊙ SOIL GAS SAMPLE LOCATION
- 4.0 W/ VOC CONCENTRATION (ppm)

MW12-37

- ⊕ MONITORING WELL LOCATION

## SOIL GAS ISOCONCENTRATION CONTOURS

- 5 ppm
- 10 ppm



50 0 50 Feet



# PARSONS

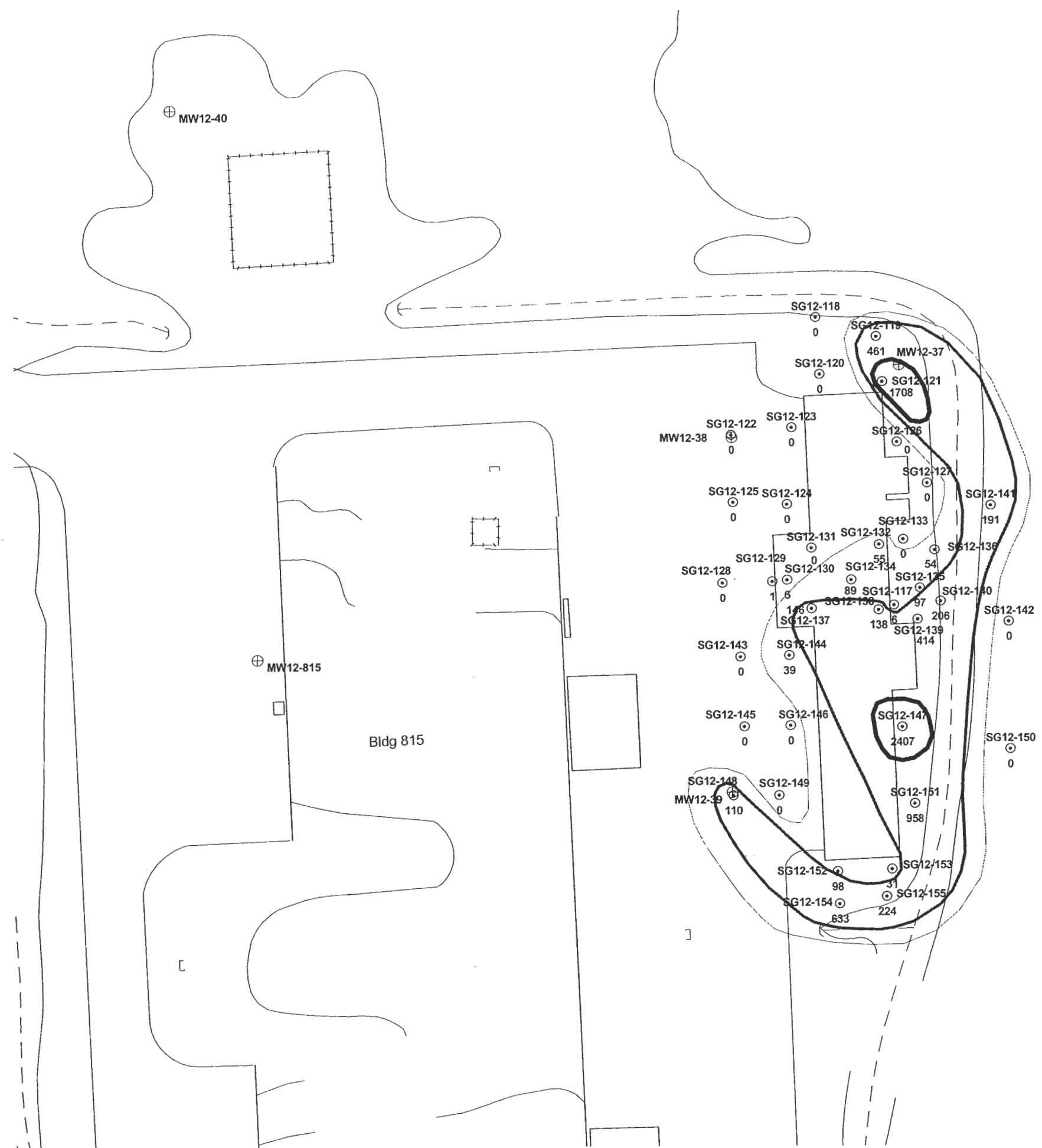
SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

FIGURE 4  
SOIL GAS TOTAL VOC  
CONCENTRATIONS

SCALE 1:50

DATE MARCH 2004

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## LEGEND

SG12-128

- ⊙ SOIL GAS SAMPLE
- 10 LOCATION W/ TCE CONCENTRATION (ppb)

MW12-37

- ⊕ MONITORING WELL LOCATION

## SOIL GAS ISOCONCENTRATION CONTOURS

- 10 ppb
- 100 ppb
- 1000 ppb

N

50 0 50 Feet



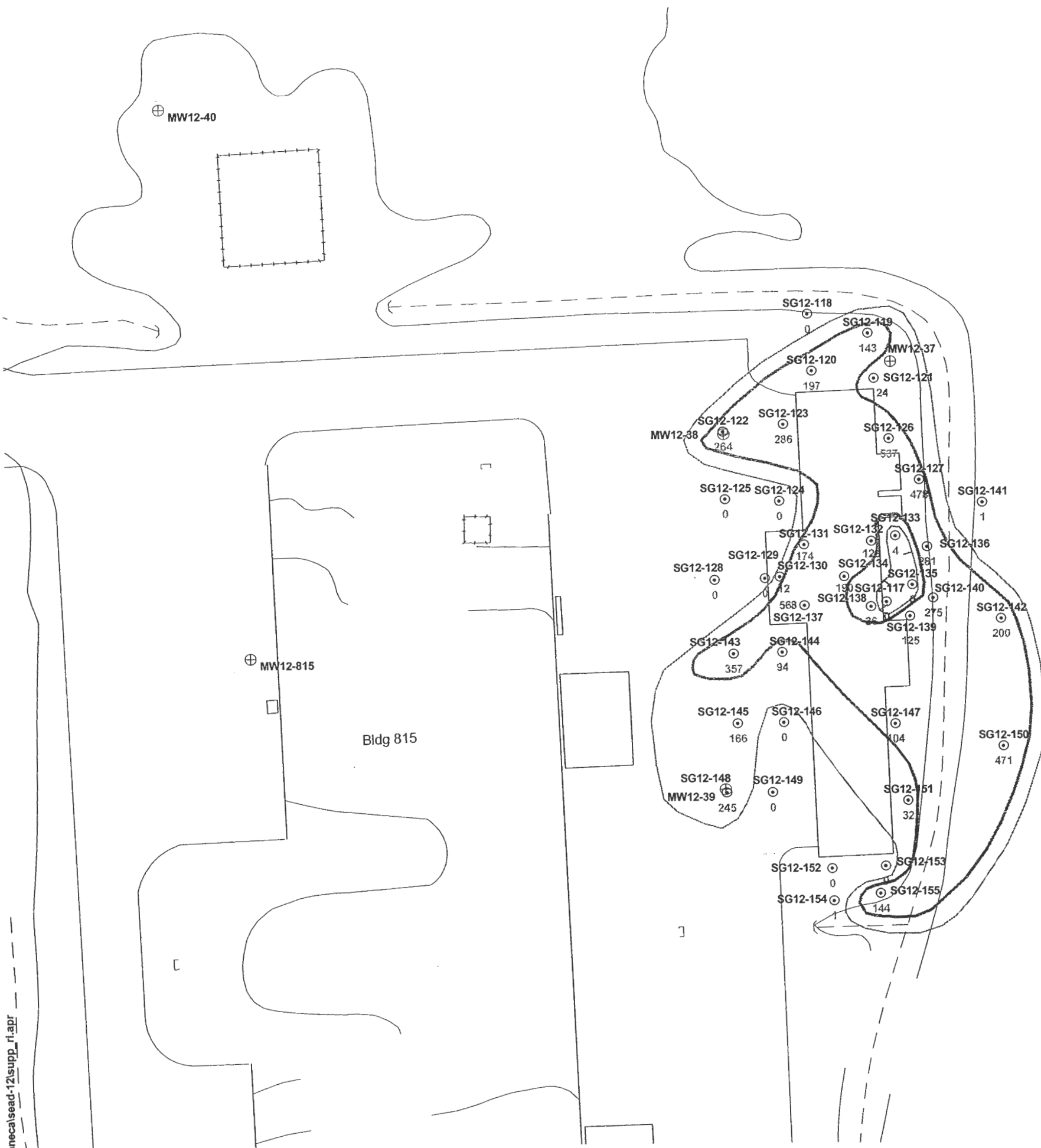
# PARSONS

SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

FIGURE 5  
SOIL GAS TCE  
CONCENTRATIONS

SCALE 1:50

DATE MARCH 2004



LEGEND

- SG12-128  
○ SOIL GAS SAMPLE LOCATION  
256 W/ BTEX CONCENTRATION (ppb)
- MW12-37  
⊕ MONITORING WELL LOCATION

SOIL GAS ISOCONCENTRATION  
CONTOURS

- 10 ppb
- 100 ppb



50 0 50 Feet



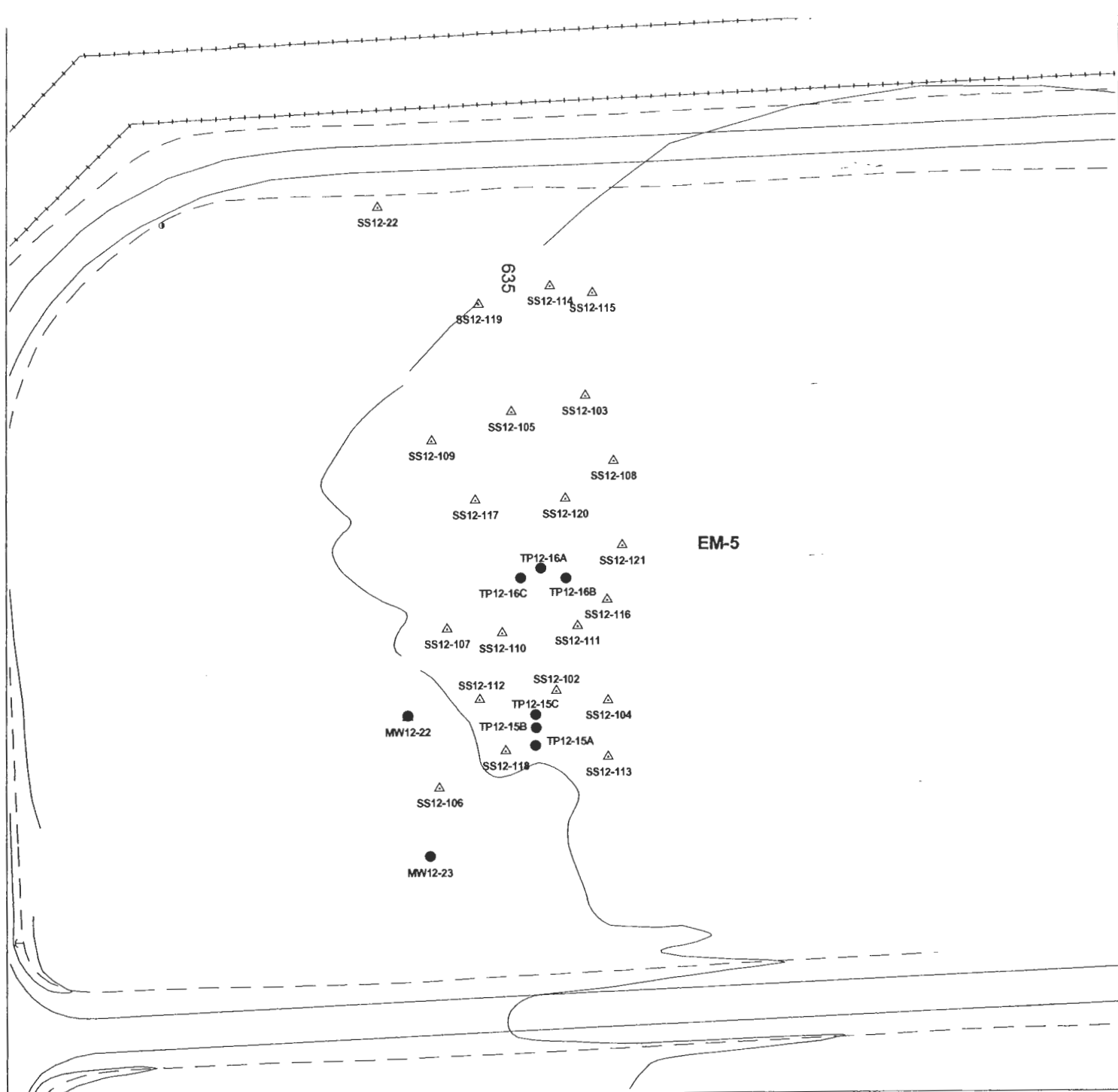
**PARSONS**

SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

FIGURE 6  
SOIL GAS BTEX  
CONCENTRATIONS

SCALE 1:50

DATE MARCH 2004



SS12-128

△ PREVIOUS SURFACE SOIL SAMPLE LOCATION

TP12-15

● PREVIOUS SUBSURFACE SOIL  
SAMPLE LOCATION

80 0 80 Feet



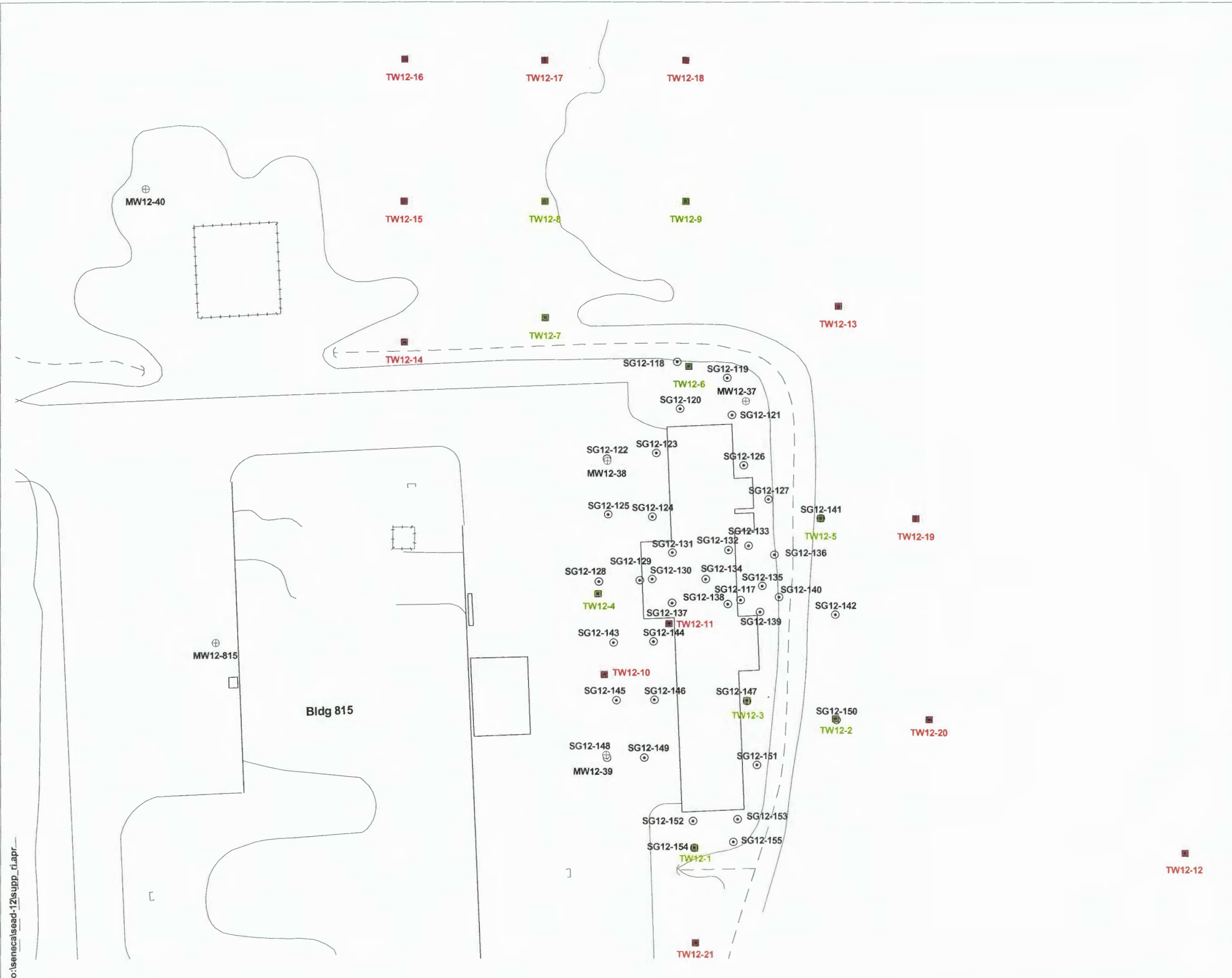
**PARSONS**

SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

FIGURE 7  
PREVIOUS SOIL SAMPLE  
LOCATIONS AT EM-5

SCALE 1:100

DATE MARCH 2004



# LEGEND

- SG12-128  
⊙ SOIL GAS SAMPLE LOCATION
- MW12-37  
⊕ MONITORING WELL LOCATION
- MW12-37  
□ TEMPORARY WELL LOCATION
- Green - 1st phase of borings
- Red - 2nd phase of borings  
6 of 12 to be installed  
based on 1st round  
results



**PARSONS**

SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

**FIGURE 8  
PROPOSED TEMPORARY WELL  
LOCATIONS**

Twice Road No. 1

SW/SD12-73

MW12-40

SWSD12-33

SWSD12-32

SW/SD12-72

MW12-37

SWSD12-31

MW12-38

SW/SD12-71

MW12-815

Bldg 815

MW12-39

SW/SD12-70

SWSD12-30

SW/SD12-69

SW/SD12-68

# LEGEND

SW/SD12-30

○ PREVIOUS SURFACE WATER/  
SEDIMENT SAMPLING LOCATION

SW/SD12-70

● PROPOSED SURFACE WATER/  
SEDIMENT SAMPLING LOCATION



50 0 50 Feet



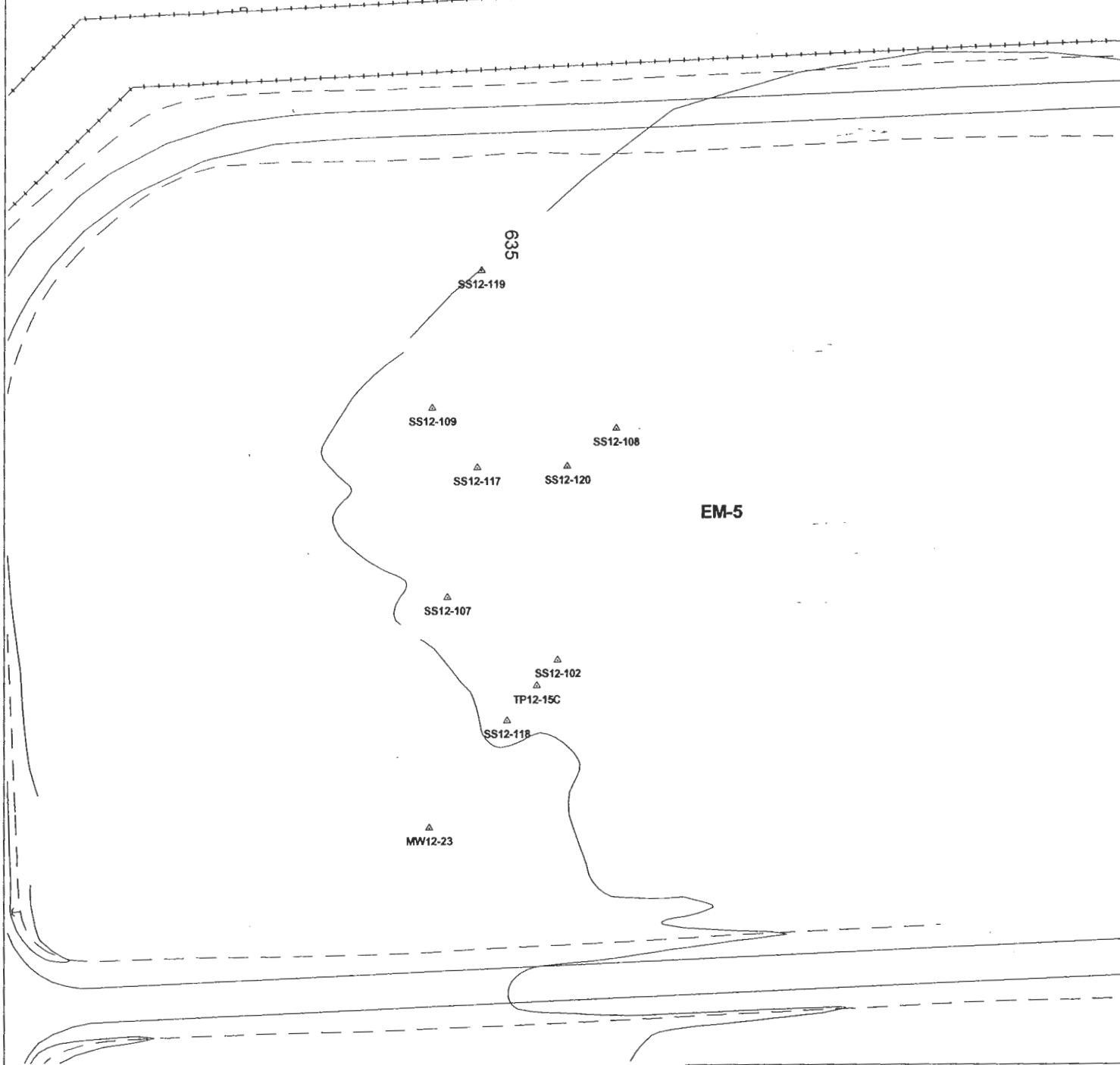
## PARSONS

SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

FIGURE 9  
PROPOSED SURFACE WATER/  
DITCH SOIL SAMPLE LOCATIONS

SCALE 1:50

DATE MARCH 2004



SS12-128

△ PROPOSED SOIL RE-SAMPLE LOCATION

80 0 80 Feet



**PARSONS**

SENECA ARMY DEPOT ACTIVITY  
SUPPLEMENTAL RI  
SEAD 12

FIGURE 10  
PROPOSED SOIL SAMPLE  
LOCATIONS AT EM-5

SCALE 1:100

DATE MARCH 2004





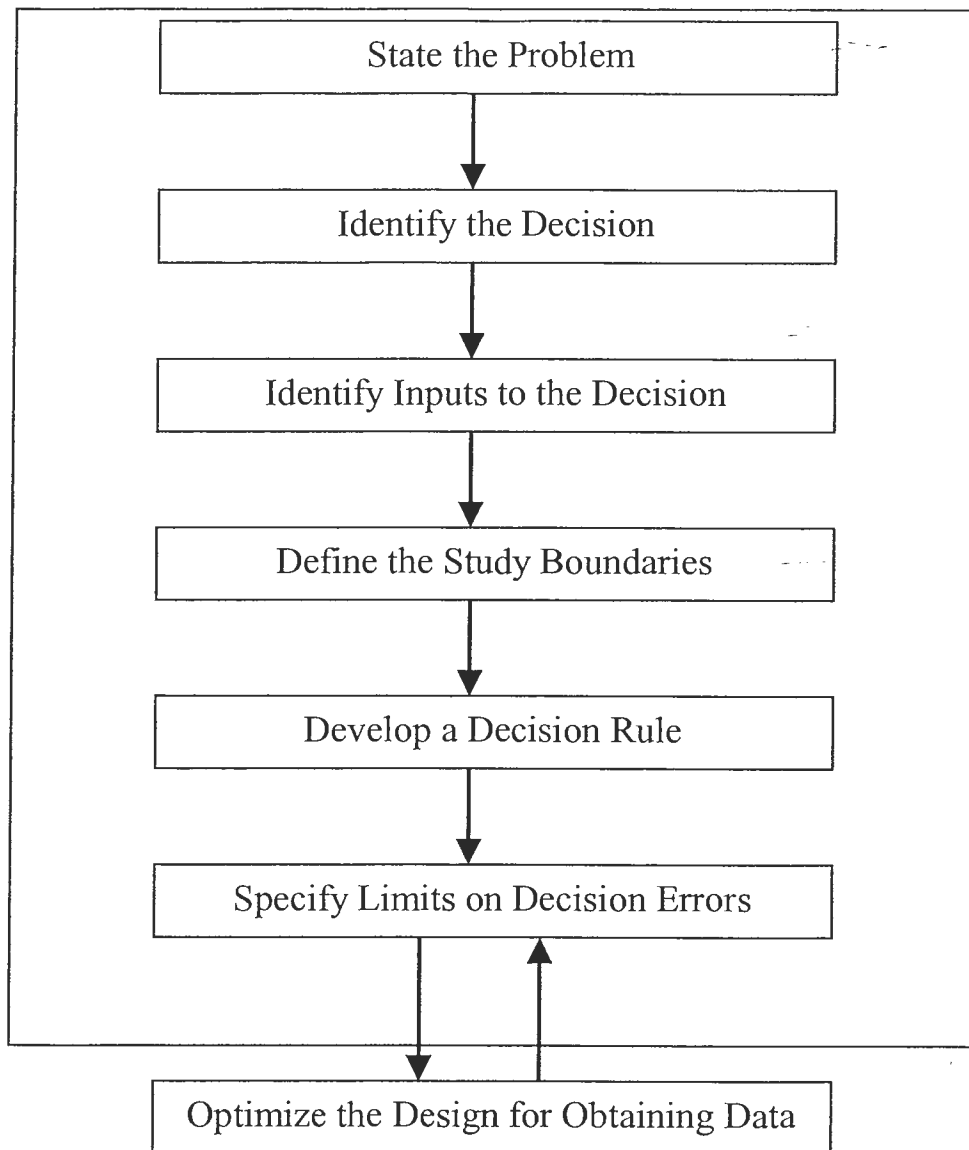
## **ATTACHMENT A**

### **LAB SOPs FOR GAMMA ISOTOPE ANALYSIS**



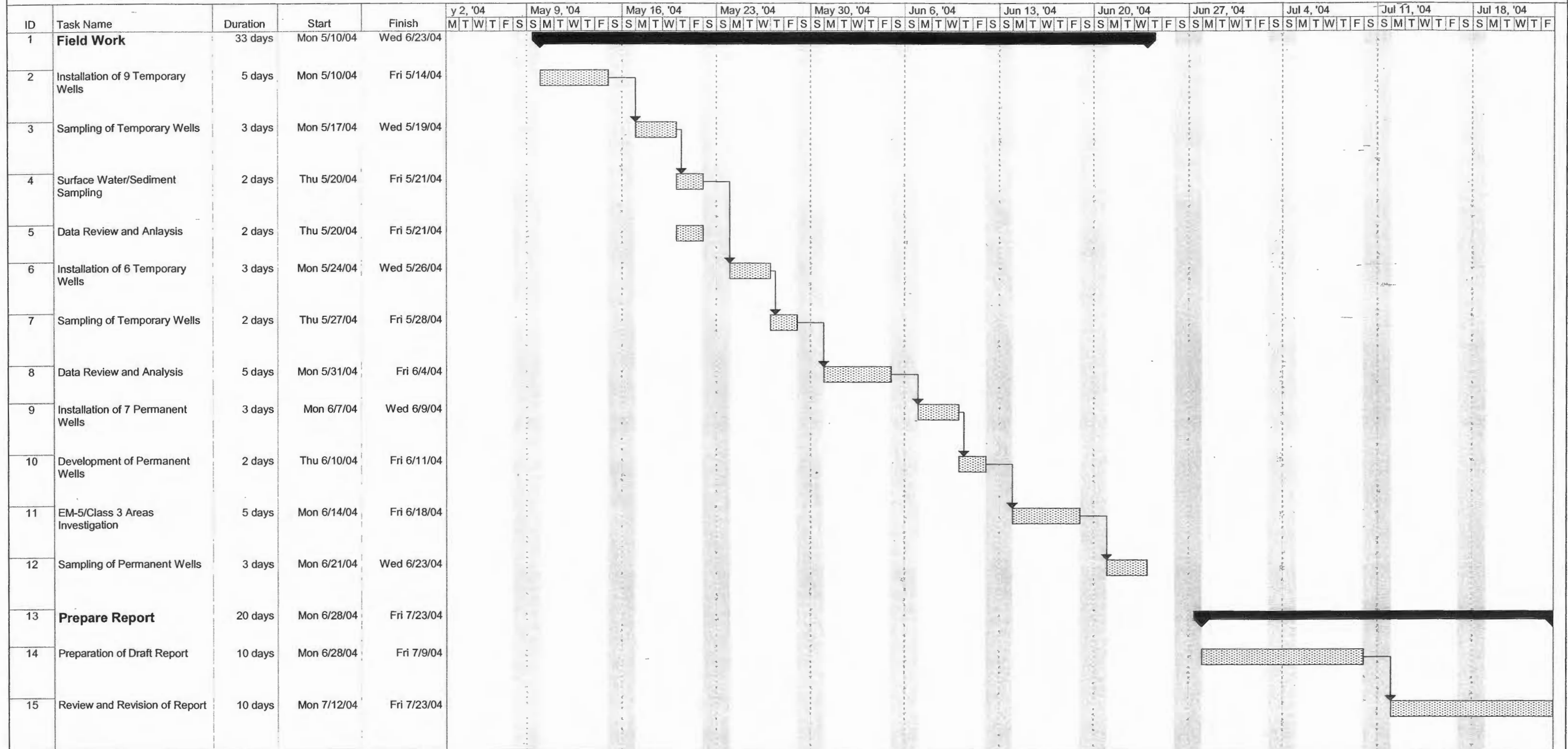
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**Figure 11**  
**EPA Quality Assurance Management Staff's**  
**Data Quality Objectives Process**  
(Guidance for the Data Quality Objectives Process, EPA/600/R-96/055, Sept 1996)

Figure 12  
Project Schedule  
SEAD-12 Supplemental RI  
Seneca Army Depot Activity, Romulus, NY



Project: schedule  
Date: Wed 3/10/04

### Task



### Milestone



## Project Summary



### External Milestone



## Progress



## Summary



## External Tasks



### Deadline





escape interference line can be seen at  $1332-511=821$ , and the double escape interference line at  $1332-1022=310$ .

- 4.4 **Summation Interference:** When high gamma emission rates are seen, sample summation can occur. Prominent in geometries close to detection and in low energy range (i.e., 10,000 cps at 88 KeV, 15,000 cps at 210 KeV), a summation interference can be seen at  $88+88=176$  KeV,  $210+210=420$  KeV,  $210+88=298$  KeV.
- 4.5 **False Positive:** An isotope that has failed one or more of several tests including half-life, abundance, and energy tolerance ( $\pm 2$  KeV)
- 4.6 **Abundance Test:** The test where the software calculates the total possible lines from the library and checks to see how many were actually seen. The cutoff for a positive identification is 75%.
- 4.7 **Energy Tolerance:** The test where the software checks the energy line in the spectrum to see if it is within the energy tolerance setting. (The standard setting is 2 KeV.) If it is within this setting then the line is associated with that nuclide. The energy line can be associated with more than one nuclide.
- 4.8 **Half-Life Test:** The test to determine if the half-life of the isotope is long enough not to have decayed away. The half-life of the sample is the time from sample date to analysis date plus  $1/2$  the count time. A limit of no more than eight half-life is the standard setting.
- 4.9 **Key Line:** The line chosen by the builder of the library to be the prominent line of the isotope. This line is used in the MDA table for purposes of calculating activity, error and MDA. For non-identified isotopes the key line is used as the basis for calculating a region around the key line and then calculating activity error and MDA. Usually this line is the most abundant line on a line that is relatively free from interference.
- 4.10 **Abundance:** The branching ratio or ratio of disintegration of the isotope at a particular energy. For example, Cobalt-60 has an abundance, or branching ratio, of 99% at 1332 KeV.
- 4.11 **Accuracy:** The error of the reported result due to the counting statistics of the instrument used for quantification.
- 4.12 **Back Scatter:** The detection of a count that occurs when an event interacts with counting materials, changes direction, and scatters back to the detector.

## 5.0 METHOD VARIATIONS

Modifications to the procedure are limited to GEL's use of additional isotopes for the daily calibration check and the inclusion of a more stringent calibration and resolution periodicity.

## 6.0 SAFETY PRECAUTIONS AND WARNINGS

- 6.1 Keep hands free from moving parts of canning device and Gamma shields.
- 6.2 Personnel performing this analytical procedure are trained in and follow the safe laboratory practices outlined in the Safety, Health and Chemical Hygiene Plan, GL-LB-N-001.
- 6.3 Personnel handling radioactive materials are trained in and follow the procedures outlined in GL-RAD-S-004 for Radioactive Material Handling.



- 6.4 Personnel handling biological materials are trained in and follow the procedures outlined in GL-RAD-S-010 for Handling Biological Materials.
- 6.5 If there is any question regarding the safety of any laboratory practice, **stop immediately**, and consult qualified senior personnel such as a Group or Team Leader.

## 7.0 INTERFERENCES

- 7.1 Some Gamma isotopes emit gamma lines that may overlap with other isotopes. If the energies of the two isotopes are within 2 KeV, the peaks may not be resolvable and will give a positive bias to the result. This problem is minimized by careful review of the peak search.
- 7.2 Soil samples may vary in density from the standard used for calibration. This may bias the results due to self-absorption of lower energy (<100 K).

## 8.0 APPARATUS, MATERIALS, REAGENTS, EQUIPMENT, AND INSTRUMENTATION

### 8.1 Ancillary Equipment

- 8.1.1 100 cc aluminum cans with lids for soil and miscellaneous samples
- 8.1.2 Gelman Sciences PETRI dish for soil and miscellaneous samples
- 8.1.3 2 L and 500 mL Marinelli beakers for water samples
- 8.1.4 Air displacement pipette. 1 mL
- 8.1.5 Can annealing tool
- 8.1.6 Graduated cylinder

### 8.2 Reagents, Chemicals and Standards

- 8.2.1 NIST traceable mixed gamma standard in 100cc aluminum can
- 8.2.2 NIST traceable 2.0 liter mixed gamma standard in 2 L Marinelli beaker
- 8.2.3 NIST traceable mixed gamma standard in 0.5 L Marinelli
- 8.2.4 NIST traceable mixed gamma standard in snap falcon PETRI dish
- 8.2.5 Standard soil blank
- 8.2.6 NIST traceable aqueous Cs-137 standard
- 8.2.7 Mixed Gamma Standard: Contains Am-241, Co-57, Co-60, Y-88, Sr-113, Pb-210, Cd-109 as a minimum.

### 8.3 Instrumentation

- 8.3.1 High purity germanium detector, with associated electronics and data reduction software
- 8.3.2 Top loader balance

## 9.0 SAMPLE HANDLING AND PRESERVATION

- 9.1 For soil samples, 500g of sample should be collected, preferably in a plastic container to avoid breakage.
- 9.2 For water samples, 2 liters of sample should be collected in a plastic container and preserved to pH2 with Nitric acid.

## 10.0 SAMPLE PREPARATION

### 10.1 Soil sample preparation.

- 10.1.1 Prepare the sample for gamma counting in accordance with SOP GL-RAD-A-021 "Soil sample preparation for the determination of radionuclides".

10.1.2 Fill the appropriate container with sample prepared from step 10.1.1 using the following steps as a guideline:

10.1.2.1 If Ra-226 analysis is required, the sample is placed in a 100cc can for in-growth.

**NOTE:** It is recommended that in-growth be allowed 14 days to quantify Ra-226. Shorter intervals can be used at the request of the client. However, shorter in-growth periods may decrease the accuracy of the data. If there is insufficient mass of sample to fill the 100cc can, contact the team or group leader.

10.1.2.2 All homogenized samples shall be placed in the 100cc can. Determine the net weight of the sample. If the net weight is less than 55 grams or greater than 190 grams, contact the team or group leader to determine the appropriate counting container. Record sample weight and date on sample container.

10.1.2.3 If there is insufficient sample to fill the 100cc can, place sample in the 10cc petri dish, cap and seal. Record sample weight and date on sample container.

10.1.2.4 If there is insufficient sample to fill the 10cc petri dish, perform the following digestion process:

10.1.2.4.1 Weigh out an appropriate aliquot into a labeled teflon beaker. Record this weight on the sample container.

10.1.2.4.2 Add 10 mL of concentrated nitric acid to each sample.

10.1.2.4.3 Place samples on medium heat (~300 °F) and cover each sample with a teflon lid. Reflux all samples for 30 minutes.

10.1.2.4.4 Remove teflon lids and add 5 mL concentrated hydrochloric acid and 10 mL hydrofluoric acid to each sample. Cover samples and reflux for 120 minutes.

10.1.2.4.5 Remove teflon lids and allow samples to evaporate to dryness.

10.1.2.4.6 Add 5 mL of concentrated nitric acid and evaporate to dryness.

10.1.2.4.7 Repeat Step 10.3.6.

10.1.2.4.8 Add 5 mL of concentrated nitric acid to the dry samples. Place the samples back on the hotplate long enough so that the dried sample dissolves into the acid.

10.1.2.4.9 Transfer solution to a 500 mL vessel and dilute to 500 mL. Record original sample mass and diluted volume on sample

## 10.2 Water sample preparation



- 12.3 Refer to "Counting Room Instrument Maintenance and Performance Checks" (GL-RAD-I-010) for instructions concerning instrument maintenance.

### 13.0 ANALYSIS AND INSTRUMENT OPERATION

- 13.1 Prepare the sample as outlined in section 10.0
- 13.2 Place the sample on the detector and count the sample an appropriate amount of time in the gamma shield. See "Gamma Spectroscopy System Operating Procedure" (GL-RAD-I-001) for specific instructions on operating the gamma spectrometers.

### 14.0 EQUIPMENT AND INSTRUMENT MAINTENANCE

- 14.1 Refer to "Gamma Spectroscopy System Operating Procedure" (GL-RAD-I-001) for instructions concerning the Gamma Spectrometer.
- 14.2 Refer to "Counting Room Instrument Maintenance and Performance Checks" (GL-RAD-I-001) for instructions concerning instrument maintenance.

### 15.0 DATA RECORDING, CALCULATION, AND REDUCTION METHODS

#### 15.1 Data Recording

Record the following information on the Gamma Que Sheet: preparation date, analyst's initials, spike isotope, spike code, spike volume, LCS isotope, LCS code, LCS volume, nominal concentration LCS, and nominal concentration MS. For each sample record the detector number, sample mass, sample date and time.

- 15.2 The instrument will report sample pCi/g or pCi/L according to the following equations:

$$\text{Sample pCi/g} = \frac{A * d}{2.22 * E * V * B * \text{CNT} * \text{ABS}}$$

$$\text{Sample pCi/L} = \frac{A * d}{2.22 * E * V * B * \text{CNT}}$$

Where:

A = net peak area (counts)  
 ABS = relative absorption factor  
 B = abundance (gammas/disintegration)  
 E = counting Efficiency (counts/gamma)  
 V = sample volume (grams or liters)  
 ct = sample count time (minutes)  
 $d = \text{decay factor} = d = \frac{1}{e^{-\lambda t}}$

- 15.3 Counting uncertainty is calculated according to the following equation:

$$\text{pCi/unit} = A_c * 1.96 \sqrt{\left(\frac{ef - er}{E}\right)^2 + \left(\frac{pk - er}{pk}\right)^2 + \left(\frac{ab - er}{A}\right)^2 + \left(\frac{sy}{100}\right)^2 + (\text{Decay})}$$

Where:

$A_c$  = Activity from 15.2



- 15.7.2 The activity of a non-target isotope will not be reported unless it is greater than the minimal detectable activity of a method blank with similar volume and count time.
- 15.7.3 The energy tolerance should be between 2 and 3 KeV.
- 15.7.4 The sensitivity setting should be between 0.1 and 3. The default setting is 3.
- 15.7.5 Start channel on peak search should be approximately 50 and end channel should be 4096.
- 15.7.6 The confidence level setting should be 5.
- 15.7.7 These settings should not be changed without approval from a group leader.
- 15.8 The following guidelines are used to accept unidentified lines on the peak search after environmental background subtraction:
  - 15.8.1 The line matches the natural fingerprint of the Uranium-238 or Thorium-232 decay chains (i.e. 63, 75, 93, 239, 295, 352, 511, 609, 1120, etc.).
  - 15.8.2 The line matches as a summation peak from two other lines in the spectrum.
  - 15.8.3 The line has a net area of less than 20.

## 16.0 QUALITY CONTROL REQUIREMENTS

### 16.1 Analyst and Method Verification

Refer to "Analyst and Analytical Methods Validation Procedures" (G-RAD-D-003) for instructions concerning the validation of analysts and analytical methods.

### 16.2 Method Specific Quality Control Requirements

- 16.2.1 A method blank will accompany each batch of 20 or less samples. The reported value should be less than or equal to the CRDL for all target isotopes. Matrix spikes are prepared by spiking a portion of the QC sample with Cs-137 (as a minimum).
- 16.2.2 For water samples only, a matrix spike (MS) should be run with every batch of 20 samples. The recovery of the spike should fall between 75 and 125%. The recovery is calculated as follows:

$$\%REC = \frac{\text{spike(pCi/g)} - \text{sample(pCi/g)}}{\text{spikedamount(pCi/g)}} * 100$$

or:

$$\%REC = \frac{\text{spike(pCi/L)} - \text{sample(pCi/L)}}{\text{spikedamount(pCi/L)}} * 100$$

**NOTE:** Performing a matrix spike on a soil sample would result in direct contamination of the sample, therefore, only water samples require an MS.

- 16.2.3 A sample duplicate should be run with every batch of 20 or less samples. The relative percent difference (RPD) between the sample and the duplicate should be  $\leq 20\%$ . The RPD is calculated as follows.

$$RPD = \frac{\text{high sample (pCi/g)} - \text{low sample (pCi/g)}}{\text{Average (pCi/g)}}$$

or:

$$RPD = \frac{\text{high sample (pCi/L)} - \text{low sample (pCi/L)}}{\text{Average (pCi/L)}}$$

- 16.2.4 A laboratory control spike (LCS) should be run with every batch of 20 samples or less. The recovery of the spike should fall between 75 and 125%. The LCS should contain Cs-137 as a minimum. Some clients may request a mixed gamma standard. For soils, a mixed gamma expired calibration source may be used as an LCS. For liquids and filters, spike a blank sample with Cs-137 as a minimum.

- 16.2.5 The recovery is calculated as follows:

$$LCS = \frac{\text{observed\_pCi/g}}{\text{known\_pCi/g}} * 100$$

or:

$$LCS = \frac{\text{observed\_pCi/L}}{\text{known\_pCi/L}} * 100$$

### 16.3 Actions required if the Quality Control Requirements Are Not Met

If any of the above criteria cannot be satisfied, the analyst should inform the group leader and initiate a non-conformance report as outlined in "Documentation of Nonconformance Reporting and Dispositioning, and Control of Nonconforming Items" (GL-QS-E-004).

## 17.0 DATA REVIEW, APPROVAL, AND TRANSMITTAL

- 17.1 The first level of review is the analyst review. The analyst will perform the following steps of review:

- 17.1.1 Visually check the que sheet, spreadsheet, raw data and data report to make sure the information has been transcribed correctly.

- 17.1.2 Review the raw data to see if there are any hits not on the requested list. If there are, report to the client by adding the information into LIMS.

A true identification or a "hit" is any isotope greater than 10 pCi/L or 5 pCi/g on the identified nuclide list. The error must also be less than 40% of the result and not have interference by another isotope or have a very short half-life.

- 17.1.3 Check to see that the required detection limit (RDL) is met if required.

- 17.1.4 Check hits to see if they are true hits (see 18.1.2.1) and not an interference or a false positive.

Identifications are classified into two categories: false positives (interference), and true identification (hit). The false positives are rejected by checking the abundance test results for the isotope and by checking last results for the half-life. The result is considered

interference and rejected by checking to see if there are any clean lines in sample spectrum for the isotope. If none exist, then the identification is rejected. If the key line has a possible interference and secondary lines do not confirm the activity calculation, the identification is rejected. Isotopes that pass these criteria are accepted as true identifications. The above tests and criteria are standard and will be followed unless directed otherwise by contract, specification or instructions.

17.1.5 Complete the batch checklist.

- 17.2. The second level review is performed by the Data Validator or Report Specialist, who reviews the batch checklist, checks requested and non-requested hits, and reviews the transcription.
- 17.3 After the review process is complete, the data is transmitted from the laboratory personnel to the reporting personnel as outlined in "Data Review and Validation Procedures" (GL-RAD-D-003).

#### 18.0 RECORDS MANAGEMENT

- 18.1 Each analysis that is performed on the instrument is documented in the run log according to "Run Logs" (GL-LB-E-009).
- 18.2 All raw data printouts, calculation spreadsheets and batch checklists are filed with the sample data for archival and review.

#### 19.0 LABORATORY WASTE HANDLING AND WASTE DISPOSAL

- 19.1 All soil sample cans are opened and sample returned to original sample containers after completion of batch.
- 19.2 Radioactive waste is disposed of as outlined in the Laboratory Waste Management Plan (GL-LB-G-001).

#### 20.0 REFERENCES

- 20.1 USEPA. Prescribed Procedures for Measurement of Radioactivity in Drinking Water. Method 901.1, August 1980.
- 20.2 Canberra Nuclear Genie System Spectroscopy, Applications and Display User's Guide. Vol. I and II, May 1991.
- 20.3 EML procedures manual. HASL-300-Ed.25, 1982.



## **Response to Comments from the U.S. Environmental Protection Agency**

**Subject:** Draft Workplan for Supplemental RI for SEAD-12  
Seneca Army Depot Activity  
Romulus, New York

**Comments Dated:** August 7, 2003

**Date of Comment Response:** March 11, 2004

### **General Comments:**

**Comment 1:** The workplan does not include a references section. Provide references for any cited guidance, such as EPA's "National Functional Guidelines for Organic Data Review."

**Response 1:** A list of references has been added, which includes the above referenced guidance document.

**Comment 2:** Section 4- Data Evaluation, is a paraphrase of EPA previous language requesting an update amendment of the Generic RI/FS Workplan (Parsons 1995). Although an attempt to address some of the DQO steps is found within the document (i.e., Tables 3 and 4), no information was included regarding the development of a Decision Rule or Tolerable Limits on Decision Errors. Please clarify if a separate Sampling and Analysis Plan (SAP) will be submitted to address the above-mentioned concerns.

**Response 2:** A separate Sampling and Analysis Plan (SAP) will not be submitted. The text of the workplan has been clarified to include information regarding the development of a Decision Rule and Tolerable Limits on Decision Errors.

"For this specific site, the DQO steps for the groundwater investigation are identified below:

<b>State the problem</b>	Determine the outer boundary of the TCE plume at SEAD-12 and the levels of COCs within the plume.
<b>Identify the decision</b>	Phase I – Determine where the permanent wells should be located; Phase II – Determine the outer boundary of the plume and the levels of COCs within the plume.
<b>Identify the inputs into the decision</b>	RI data, new proposed analytical groundwater data, and field parameters
<b>Define the study boundaries</b>	VOCs in the groundwater from the upper aquifer in the vicinity of Buildings 813 and 814, since TCE concentrations were previously detected in the groundwater in this area. Two rounds of sampling will be collected to account for seasonal groundwater fluctuations.
<b>Develop a decision rule</b>	If levels at the perimeter wells exceed ARARs, then further delineation is required. The maximum detection of a VOC in a perimeter well will be compared to the ARAR.
<b>Specify tolerable limits on decision errors</b>	If the true values in a perimeter well exceed 2 times ARARs, then further delineation is necessary.

For the proposed groundwater investigation, the VOC concentrations detected in the temporary wells will be compared to ARARs. If VOCs are detected in a sample collected at a temporary perimeter well at levels greater than two times the ARARs, then further delineation of the plume in the vicinity of the temporary well will be required. The placement of a permanent well will be based on the location of the temporary well with the ARAR exceedance, as outlined in **Table 3**. If the maximum detections of VOCs are less than their respective ARARs, then the boundary of the plume has been delineated.

Decision Errors are comprised of sampling design error and measurement error. In order to control decision errors introduced in the measurement process during physical sampling collection, sampling collection will be completed under the supervision of a field manager and in compliance with all relevant procedures and guidelines. Low flow sampling techniques will be employed, which allow for groundwater sample collection with low turbidity levels that correlates to better quality data.

Decision errors can be classified as either a false rejection or a false acceptance. A false rejection would occur when the perimeter well concentration is below the ARAR, but the true value is over; a false acceptance is when the perimeter well concentration is above the ARAR, but the true value is not. A false rejection can have negative consequence of greater significance than a false acceptance. The potential decision errors were assessed, and although a statistical analysis of the data will not be conducted due to the non-probabilistic nature of the sampling plan, tolerable error

limits were assigned to both the false rejection case and the false acceptance case. To be conservative, the tolerable error limit associated with the false rejection (two times greater than ARARs) will be selected as the tolerable decision error.”

**Comment 3:** The workplan proposes to install temporary wells in two phases, using the results of the first phase of wells to determine whether up to six additional wells will be installed. Although alluded to in the report, the criteria for this decision is, by reference to Table 3, “based on [presumably, any positive] detection” in particular wells. This criteria is too vague. Furthermore, if more than six wells show positive detection, then “precedence will be given to locations closest to the higher VOC concentrations.” But again, this criterion seems too vague. It would be preferable for the Army to present a plan for the second phase of temporary well installations after a complete review of the first phase of temporary well data including the water level measurements and inferred groundwater direction.

**Response 3:** Once the first phase of sampling is completed, the data will be evaluated, which includes evaluating water level measurements and the inferred groundwater direction, as well as identifying the locations where detections of VOCs in groundwater were reported. After the data from the first round of sampling the temporary wells are evaluated, the locations for the permanent wells will be selected based on the results of the previous sampling round. The text has been clarified.

**Comment 4:** The workplan proposes to install seven permanent monitoring wells based on the results of the temporary well VOC analysis. The stated objectives for the permanent well network, however, do not appear consistent. One objective is to confirm the results of the temporary well survey and to monitor the horizontal and vertical extent of groundwater impacts, which suggests that the permanent wells be located in the plume. But the workplan also indicates that one permanent well will be installed upgradient while the rest will be located downgradient of the suspected source area, which suggests that the permanent wells are intended more as sentinel wells located beyond the extent of the plume. The workplan should be clarified as to the objective of monitoring well network, and a description should be provided of the way that the temporary well results will be used to locate the permanent well.

**Response 4:** The main objectives of installing the permanent wells are to confirm the results of the temporary well survey and to monitor the horizontal and vertical extent of groundwater impacts. To that end, six of the temporary well locations will be made permanent once all the data collected from the installation has been analyzed. The text has been clarified to address the installation. During the supplemental fieldwork, any additional information that can be collected is useful; hence, a seventh well will be installed upgradient of the suspected source in order to gather background data if deemed necessary following the analysis of the temporary well network.

### **Specific Comments**

**Comment 1: Section 1.0, Page 1 of 14:** Specify media of concern for the 1<sup>st</sup> and 3<sup>rd</sup> bullet.

**Response 1:** The media of concern is groundwater. The first bullet has been revised to state “delineate the volatile organic compound (VOC) contamination in groundwater in the vicinity of Building 813 and 814.” The second bullet has been removed, and the revised bullet states “determine levels of natural attenuation parameters in the groundwater to better evaluate potential remedies in the area outside of Building 813 and 814.”

**Comment 2: Section 3.2, Page 7 of 14:** The last paragraph in this section indicates that duplicate samples and rinsate blanks will be collected during groundwater monitoring. Quality Control (QC) samples should also include trip blanks (for VOCs) and Matrix Spike/Matrix Spike Duplicates (MS/MSD). Table 4 does indicate trip blanks and MS/MSDs to be collected at an appropriate frequency. Revise the text accordingly.

**Response 2:** Two duplicates, two rinse blanks, and two Matrix Spike/Matrix Spike Duplicates (MS/MSDs) will be collected and submitted to the lab for quality control (QC) purposes, as shown in Table 4. In addition, five trip blanks will be included with the samples sent to the laboratory for analysis. The text has been revised accordingly.

**Comment 3: Section 3.6, Page 9 of 14:** The first paragraph in this section indicates that surface water sample collection is based on the location of a fuel oil tank adjacent to the building. The last paragraph indicates that surface waters will be analyzed for VOCs only. VOC analysis alone is not adequate to measure the heavier hydrocarbons typically of concern with fuel oil tanks. Surface waters in this area should also be analyzed for SVOCs/PAHs.

**Response 3:** SVOCs were not detected in the surface water or groundwater samples during the RI field program. As a result, SVOCs are not included in the supplemental sampling plan.

**Comment 4: Section 4.2, Page 12 of 14:** The first bullet point in this section indicates that VOC analysis will be performed utilizing EPA SW-846 Method 8260B. But it should be revised to indicate that VOC analysis may also be performed utilizing EPA Method 524.2, as described in previous sections of the workplan.

**Response 4:** The first bullet has been revised to include that VOCs may be analyzed by EPA Method 524.2.

**Comment 5: Section 4.2, Page 13 of 14:** The last paragraph of this page describes the items to be reviewed during data validation. It is recommended that the % solid content of sediments also be reviewed and determined to be acceptable as part of the validation procedure. Extraordinarily low % solid content could artificially elevate contaminate levels in sediment samples.

**Response 5:** The following text has been added, at the end of the above referenced paragraph: "As part of the validation process, the percent solid content of sediments will also be evaluated, in accordance with EPA Region 2's SOPs."

**Comment 6:** Table 6 was missing from the document.

**Response 6:** Table 6 is no longer applicable since supplemental sampling within the Class III area has been deleted from the scope of work.