INVESTIGATION WORK PLAN
EXHIBIT B

Former Sylvania Electric Products Incorporated Facility Cantiague Rock Road Hicksville, New York

GTE Operations Support Incorporated

March 1998 (revised May 1998)

O'BRIEN & GERE
ENGINEERS, INC.

A-7

New York State Department of Environmental Conservation
Building 40 - SUNY, Stony Brook, New York 11790-2356
Division of Environmental Remediation
Telephone: (516) 444-0240
Facsimile: (516) 444-0248

John P. Cahill
Commissioner

Certified Mail/R.R.R.

July 3, 1998

Jeffrey Banikowski
O'Brien & Gere Engineers, Inc.
5000 Brittonfield Parkway
PO Box 4873
Syracuse, N.Y. 13221

Re: Final Voluntary Investigation Work Plan, Revised May 1998
Former Sylvania Electric Products Incorporated Facility, Hicksville

Dear Mr. Banikowski:

According to our discussions on 6/29/98, I have revised the attachment to be attached and incorporated into the work plan entitled, "Investigation Work Plan, Exhibit B, Revised May 1998" for the Former Sylvania Electric Products Incorporated Facility in Hicksville. The revised May 1998 work plan, as modified by the 7/2/98 attachment, will be attached to the voluntary investigation agreement and will be approved concurrent with the Department's execution of the agreement.

Please distribute a copy of the final work plan with a copy of the 7/2/98 attachment to the rest of the people on the distribution list who have not yet received the revised work plan. Please provide me with my second copy of the revisions which will be used for the forthcoming public repository in the Stony Brook office.

Please provide details on the one soil vapor sample which will also be sent to an off-site laboratory for analysis.

If the 7/2/98 attachment does not address your concerns, please notify me immediately.

Sincerely,

Robert R. Stewart

Robert R. Stewart
Environmental Engineer I

Attachment

cc: R. Becherer
R. Rusinko
W. Varcasio
A. Ludwig, GTE
D. York, GTE

July 2, 1998

Revised Attachment to the Investigation Work Plan, Exhibit B, Revised May 1998

A. FSP, Page D-26, Borings to Investigate Former Leaching Pools

The work plan identifies borings 11, 12, and 30 to 38 as borings being utilized to investigate former leaching pools. I would like to note that the following borings are probably adjacent to former leaching pools:

Boring #5 - This location is being investigated "to evaluate the general area where radiation readings were 1.5 times background." However, NYSDEC's metal detector identified a possible leaching pool cover beneath the asphalt by boring #5. This may be the leaching pool shown on the 1960 site map, Figure #2, which is located west of the southern end of recharge basin #3.

Boring #50 - According to NYSDEC 4/10/98 comment B, this boring will be used to investigate the former sanitary system in front of Building #4. This boring should therefore be through or adjacent to a former leaching pool.

A TAL metals (including cyanide) sample should be collected for both of these borings at the depth assessed to be the bottom of these former leaching pools.

B. FSP, Page D-26, Recharge Basin Sample Locations

The recharge basin borings are identified as borings 1 to 3, 23 to 28, 41, and 42. The sample collected at the bottom of these structures should also be analyzed for PCBs. There are a total of 11 samples. However, under Table 6-1 of the FSP on page 32, it is stated that up to 10 samples will be analyzed for PCBs. All recharge basin sediment samples must be analyzed for PCBs.

C. FSP, Geoprobe Groundwater Samples

The FSP is unclear about the collection of the geoprobe groundwater samples. A limit of up to 5 geoprobe groundwater samples is set. The four proposed geoprobe groundwater samples as shown on Figure 4 must be collected at these locations unless the Department agrees to relocate these samples based on field observations or field screening. Additionally, as we discussed by telephone, if General Instrument well W-7 cannot be sampled due to access problems, a geoprobe groundwater sample will be collected near the location of soil boring #49. This groundwater sample is necessary to determine the groundwater quality downgradient of the former sanitary system for Building #4.

D. Soil Vapor Survey

As agreed previously, one of the soil vapor samples collected on the first day of sampling

will also be sent to an off-site laboratory for analysis. The sample will be analyzed using a quick turnaround. This will help evaluate the performance of the field GC.

E. Citizen Participation, Page 4

The Department agrees to take the lead on the citizen participation activities during the Voluntary Investigation Agreement. However, five additional copies of all **final** documents produced under the Voluntary Investigation Agreement will be needed. The Department will send one copy of each document to the following people:

1. Mark C. Roberts
   U.S. Nuclear Regulatory Commission
   Region I
   475 Allendale Road
   King of Prussia, PA 19406

2. John Molloy, consultant for the Hicksville Water District
   H2M Group
   575 Broad Hollow Road
   Melville, NY 11747

3. Thomas Casey, consultant for the Westbury Water District
   Henderson & Casey
   344 Madison Street
   Westbury, NY 11590

4. Joseph Elm, Executive Vice President or his representative
   Magazine Distributors, Inc.
   P.O. Box 9058
   100 Cantiague Rock Road
   Hicksville, NY 11802-9058

5. A local repository near the site to be established by the Department.

The Department understands that the volunteer will be providing one copy of all final documents for the Voluntary Investigation Agreement as part of your access agreements to the following people:

1. Timothy Kelly
   Nassau County Department of Public Works
   170 Cantiague Rock Road
   Hicksville, NY 11801

July 2, 1998

2. Barry Ballen, President or his representative
   Gilbert Displays, Inc.
   140 Cantiague Rock Road
   Hicksville, NY 11801

3. Jeffrey Goldstein, Chief Financial Officer
   Air Techniques, Inc.
   70 Cantiague Rock Road
   Hicksville, NY 11801

4. John Kiernan, Commissioner
   Department of Recreation and Parks
   Eisenhower Park
   East Meadow, NY 11554

5. Kenneth Krause
   Harbor Distributing
   120 Bethpage Road
   Hicksville, NY 11801

Please note that the Department will be sending a letter to Mr. Ballen, Mr. Elm, and Mr. Goldstein after the agreement has been executed by the Department and the final work plan has been received by them, but prior to the start of the investigation. In these letters, the Department will summarize the proposed voluntary investigation and recommend that these representatives inform their employees about it.

5816.009

INVESTIGATION WORK PLAN EXHIBIT B

Former Sylvania Electric Products Incorporated Facility Cantiague Rock Road Hicksville, New York

GTE Operations Support Incorporated

Swiatoslav W. Kaczmar, Ph.D., CIH
Vice President

March 1998 (revised May 1998)

O'BRIEN & GERE ENGINEERS, INC.

5000 Brittonfield Parkway
Syracuse, NY 13221

Contents

1. Introduction 1
1.1. Project objectives 3
1.2. Project approach 4

2. Project scoping, site history, and background information 7
2.1. Project scoping 7
2.2. Site history and description 10
2.3. Historical manufacturing and disposal practices 12
2.4. Current site and area usage 15
2.5. Regional setting and hydrogeology 17
2.5.1. Regional setting 17
2.5.2. Regional hydrogeology 18
2.5.3. Site hydrogeology 18
2.6. Climate/meteorology 19
2.7. Ground water impacts and soil radionuclides 20
2.7.1. Ground water impacts 20
2.7.2. Soil radionuclides 20

3. Conceptual site model 25

4. Field investigation 27
4.1. Task 1: Project planning 27
4.2. Task 2: Ground penetrating radar (GPR) survey 28
4.3. Task 3: Radiation survey 28
4.4. Task 4: Mobilization 28
4.5. Task 5: Survey 29
4.6. Task 6: Surface and subsurface soil investigation 30
4.7. Task 7: Ground water investigation 30
4.8. Task 8: Restoration of surfaces 31
4.9. Task 9: Site history report 31

5. Data validation and interpretation 33

6. Human health assessment 35

7. Report preparation 37

8. Project organization 39

9. Schedule 43

References 45

List of Tables

2-1 Locations of process residual disposal (circa 1959)
2-2 Soil radionuclide activity

List of Figures

1-1 General site map
2-1 Historical (former) site map
2-2 Current site map
2-3 Land use
3-1 Conceptual site model
8-1 Project organization
9-1 Project schedule

List of Appendices

A Geology and hydrogeology
B Regional ground water quality information
C Health and safety plan
D Field sampling plan
E Quality assurance project plan
F Key project individual resumes

List of Exhibits

A Interim Technical Memorandum - Ground Penetrating Radar Survey and Exterior Radiation Survey Results, March 1998
B Historical information

1. Introduction

This document presents the investigative work plan for the former Sylvania Electric Products Incorporated (Sylvania) facility (the site), located at Cantiague Rock Rd. in Hicksville, NY (Figure 1-1). This plan was prepared by O'Brien & Gere Engineers, Inc. on behalf of GTE Operations Support Incorporated (GTEOSI), in cooperation with the New York State Department of Environmental Conservation (NYSDEC). An earlier version of this work plan was issued to NYSDEC as well as other regulatory agencies in April 1997. This Work Plan incorporates agreed to revisions made in response to NYSDEC comments presented in correspondence to O'Brien & Gere Engineers dated June 6, 1997 and May 14, 1998 as well as in several related follow-up phone conversations.

The work plan also includes revisions based upon the completion of a ground penetration radar survey and an exterior radiation survey, proposed tasks presented in the April 1997 plan. In cooperation with NYSDEC, GTEOSI elected to complete the surveys in order to expedite the project schedule. The surveys were conducted under NYSDEC oversight. Results of the surveys are presented in an Interim Technical Memorandum (ITM), entitled *Ground Penetration Radar Survey and Exterior Radiation Survey Results* dated March 1998, included in this document as Exhibit A. Details of the surveys are briefly discussed in Chapter 4.

The purpose of this plan is to outline those activities necessary to perform a comprehensive investigation of the site with respect to the presence of process residuals, including uranium and thorium, reported to have been utilized by GTEOSI's (as successor in interest) predecessor companies. Uranium and thorium were recently identified by the NYSDEC and Nuclear Regulatory Commission (NRC) in exposed surface soils at the northeastern portion of the site at levels above background. In addition to uranium and thorium, the investigative activities described herein also focus on tetrachloroethylene (PCE), a chlorinated solvent. PCE was reportedly used on-site during the time frame that GTEOSI's predecessor companies owned and operated manufacturing facilities at the site. PCE has been found in ground water obtained from on-site monitoring wells.

This plan has been prepared by GTEOSI on a voluntary basis, in a proactive spirit of cooperation with involved regulatory agencies. Upon acceptance by NYSDEC, this plan will be considered Exhibit B of the VCP agreement between GTEOSI and NYSDEC.

This plan is divided into the following chapters.

1. Introduction - introduces the reviewer to the site.

2. Project scoping, site history, and background information - describes data gathering activities regarding the site history and other pertinent site-related information.

3. Conceptual site model - conceptually describes human health exposure pathways that will be examined when assessing potential human health risks that may be posed by residuals related to former site usage by GTEOSI's predecessor companies.

4. Field investigation - summarizes those activities that will be performed to investigate the site. Detailed field investigation procedures are included in the project Field Sampling Plan (Appendix D).

5. Data validation and interpretation - briefly introduces the reader to activities that will be taken to support the validity of collected data, referencing the Quality Assurance Project Plan (Appendix E).

6. Human health assessment - summarizes the manner in which the human health assessment will be addressed.

7. Report preparation - describes reporting efforts.

8. Project organization - presents lines of communication and key individuals that will be involved in the voluntary cleanup action.

9. Schedule - outlines the schedule for implementation of the Work Plan.

1.1. Project objectives

The following project objectives have been established for the investigation:

- evaluate the nature and extent of residual radionuclides in surface soils on-site as well as those within the adjacent golf course driving range owned by Nassau County.
- investigate the presence of residual radionuclides and PCE in accessible subsurface areas relative to their potential to act as sources to ground water (e.g. recharge basins and leaching pools). In the event that contamination is found that is not related to former site usage by GTEOSI's predecessor companies, such as gasoline, it will be reported to NYSDEC and its impact evaluated with respect to site conditions and fate and transport mechanisms.
- evaluate the extent that process residuals, if any, in ground water may be migrating to off-site areas.
- develop sufficient data that, when combined with existing data, the need for removal or remedial actions which are protective of human health and the environment can be evaluated.
- evaluate the potential for worker exposures inside existing on-site buildings

In addition to meeting the goals and intent of NY State's Voluntary Cleanup Program, the investigation has been designed to achieve these objectives in a manner consistent with the National Contingency Plan (40 CFR Part 300) and in recognition of regulatory guidance that has been developed to assess environmental conditions associated with sites of this type. This regulatory guidance includes, but is not limited to, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (United States Environmental Protection Agency, Interim Final, 1988), applicable portions of 6 NYCRR Parts 370 to 376 and 6 NYCRR parts 380 and 381.

1.2. Project approach

The investigative approach for the project considers possible source areas as well as unknown sources that may be associated with previous site usage. It is based on the preliminary acquisition of representative samples, and hydrogeologic information, as well as other information available from upgradient and downgradient sites. These sites bracket the former Sylvania facility and are either listed by NYSDEC as inactive hazardous waste sites or are otherwise regulated by NYSDEC under its petroleum spills program.

The investigation consists of non-invasive and invasive activities. The non-invasive activities include a ground penetrating radar survey and radiation survey which have been completed and are discussed in Exhibit A. Based on the results of the non-invasive investigations, the location of invasive activities required to investigate the site are presented in this work plan. Activities will be scheduled to address soils in potential "hot spot" type areas first followed by the investigation of unknown sources. Soils behind Gilbert Displays at the northwest corner of the site that contain uranium and thorium are an example of a "hot-spot" type area. Others examples include cesspools and recharge basins that may have been used in former manufacturing processes.

The selected approach assumes that access to the properties currently comprising the site as well as the adjacent golf course driving range can be gained in a timely fashion. If access difficulties are encountered, the investigative approach and schedule to implement work plan activities may require modification. In addition and as discussed with NYSDEC, NYSDEC will take the lead in performing public participation activities. Specifically, the NYSDEC will:

- prepare a project fact sheet
- prepare a mailing list for distribution of the fact sheet
- establish and maintain a repository for project reports.

Public participation activities that will be performed by GTEOSI include:

- reviewing the fact sheet prior to its distribution and providing comments to NYSDEC for their consideration
- providing technical support to NYSDEC in the event that NYSDEC finds it necessary to schedule a public meeting

- distributing a copy of the final work plan to current property owners.

Consistent with the VCP agreement between GTEOSI and NYSDEC, investigative activities may be directed to off-site, downgradient areas as appropriate based on the results of the work described herein. A plan to address any additional work will be developed as soon as it becomes apparent that a plan of this type is necessary. The Scope of Work will be negotiated with NYSDEC at that time.

I:\DIV82\PROJECT\09\DWG\001.DWG ACB

LEGEND

SITE BOUNDARY

C01

NOTE: ADAPTED FROM SYLVAN ASCENT INC. CO/MAPS.

IN CHARGE OF			
DESIGNED BY	CHECKED BY		
DRAWN BY			

500 0 500 1000

1"=1000'

NO.	DATE	REVISION	INIT.

O'BRIEN & GERE

FORMER SYLVANIA
ELECTRIC PRODUCTS INCORPORATED FACILITY
HICKSVILLE, NEW YORK

SITE LOCATION MAP

FILE NO. 5816.009.001

DATE Nov. 1997

1-1

11/97

2. Project scoping, site history, and background information

This chapter presents a summary of scoping activities related to the site investigation. It outlines the history of the site as developed from those scoping activities, and provides an overview of the site geology and other site related background information. A comprehensive site history report will be developed at a later date (refer to Section 4.2).

2.1. Project scoping

To date, scoping has focused primarily on data gathering activities from a variety of sources, including a site visit performed by GTEOSI and O'Brien & Gere personnel, a meeting held on 1/14/97 with NYSDEC to discuss the site investigation, follow-up meetings with NYSDEC on 3/12/97 and 8/14/97 to review the Conceptual Work Plan, a meeting with NYSDEC and current property owners on 10/14/97 to discuss VCP site investigative requirements, and phone conversations with regulatory personnel. A summary description of the scoping activities is presented below. The reader is referred to Figure 2-1 for the location of historical properties discussed as part of the summary.

- site visit - A site visit was performed on 1/9/97 to review site topography, the location of existing monitoring wells, surrounding properties, and current site usage and possible exposure pathways.

- background documentation - Background documentation concerning the site has been obtained from a variety of sources. Information targeted as part of this effort has not only included information regarding the site, but also information regarding upgradient and downgradient properties that could reasonably be expected to influence work plan activities. The process and work efforts conducted during the acquisition of pertinent background information are described in the following paragraphs.

  Site information was originally provided to NYSDEC personnel by the NRC and subsequently to GTEOSI by NYSDEC. This information was

maintained by the NRC in their capacity as licensing agency for special nuclear materials previously used at the site. The information was provided to GTEOSI sometime prior to the 1/9/97 site visit. The NRC information substantiated the use of special nuclear materials at the site, past uses of PCE, and provided a historical perspective on facility manufacturing processes. It also contained information on three monitoring wells at the property currently owned and occupied by Gilbert Displays, Inc. located at 140 Cantiague Rock Rd. In large part, this information forms the basis of the site history and corporate genealogy presented in the following subsection.

Follow-up conversations with NRC personnel revealed that not all file information had been provided to NYSDEC. As a result, O'Brien & Gere, on behalf of GTEOSI, performed a file search of NRC records on 2/6/97. The file search revealed that the most pertinent information regarding the site had already been provided to NYSDEC. The reviewer noted, however, that comparison of the files to a file log of previously provided data was extremely time-consuming and could not be completed in full detail. A continued search of NRC files may, therefore, be warranted at a future date.

In addition to the NRC file search, pertinent General Instrument (downgradient property) files maintained by NYSDEC Region 1 were reviewed and copied pursuant to a Freedom of Information letter (FOIL) request.

General Semiconductor (hereinafter "General Instruments") is located at 600 West John Street, Hicksville, NY. General Instruments is situated immediately downgradient from the former Sylvania site. It is a state listed Class 2 Inactive Hazardous Waste site and has recently undergone a Remedial Investigation/Feasibility Study (RI/FS). Consequently, there are numerous monitoring wells on the property providing geologic and hydrogeologic information beneficial to investigation of the former Sylvania facility.

Nassau County Department of Public Works files (NCDPW) were also reviewed and copied under a FOIL request. The NCDPW is currently under investigation for two petroleum spills which took place in 1979 and 1986. The NCDPW is situated immediately upgradient of the former Sylvania facility. Remediation of ground water at that location,

consisting of a pump and treat system, is on-going. Approximately 50 monitoring wells have been placed on the property, providing important geologic and hydrogeologic information regarding the site in an upgradient direction.

Several file reports regarding a ground water investigation at the Air Techniques, Inc. property were provided to O'Brien & Gere for review by GTEOSI. These monitoring wells are situated in a downgradient direction on a portion of the property which is part of the site. The monitoring wells were installed in order to examine the presence of PCE in ground water upgradient and downgradient of the Air Techniques facility.

A FOIL request has been filed with the Nassau County Department of Health (NCDH) to review records regarding several public well fields in the vicinity of the site. These records will be reviewed, pending arrangements with NCDH personnel. The purpose of the FOIL request was to obtain documentation concerning well depths, aquifer depths, and other pertinent geologic information for use in the design of the conceptual site model. Through information obtained elsewhere, such as NYSDEC Region 1, and phone conversations with NCDH, information has been obtained regarding the well fields from which to proceed with implementation of the work plan. Should NCDH information regarding the public wells obtained at a later date differ from that presented, it will be appended to the work plan.

Information was also obtained from Environmental Data Resources, Inc., a for profit firm that researches and supplies records from a variety of governmental database listings (e.g. National Priority List, Resource Conservation and Recovery Act, State listed hazardous waste sites). This information has been included and is discussed as part of GTEOSI's Voluntary Cleanup program application.

A meeting to discuss the site was held with NYSDEC representatives on 1/14/97 prior to preparation of the work plan. During the meeting, NYSDEC provided information on past soil sampling events, a summary of historical events related to investigation of the Air Techniques facility, and their perspective on applicable investigative methodologies in support of work plan development. A follow-up meeting was held with NYSDEC on 3/12/97, subsequent to submission of the draft Conceptual Work Plan dated 2/21/97. At this meeting, NYSDEC provided comments regarding the proposed investigative tasks.

A meeting was held with representatives of NYSDEC Region 1 on 8/14/97 at NYSDEC's Terrytown offices. The purpose of the meeting was to discuss the April 1997 work plan. On the basis of this meeting, a follow-up meeting was held on 10/14/97 which was attended by current property owners, as well as representatives of NYSDEC and GTEOSI. The 10/14/97 meeting was held at NYSDEC's offices in Stony Brook, NY. The 8/14/97 and 10/14/97 meetings resulted in changes to the work plan which are also incorporated herein together with those previously discussed with NYSDEC.

Other scoping activities have included the acquisition of aerial photographs from the NCDPW and tax maps from the Tax Assessors Office in Mineola, NY.

Information gathered during the above scoping activities is referenced, as appropriate, throughout the remainder of this work plan.

2.2. Site history and description

The following narrative regarding the history of the site is a summary of GTEOSI's (1996) response to an inquiry made by NYSDEC on 6/3/96. A more detailed summary of past ownership and uses of the property obtained via a title search by GTEOSI is presented in voluntary Cleanup Program application Sections IIIA and IIIB. Additional information concerning the site will be presented in a site history report, designated as Task 9 (Section 4.9), which will be prepared concurrently with implementation of the work plan.

The former Sylvania facility is located in west-central Long Island, approximately one mile west of Hicksville, NY. Historically, the site consisted of lots 79 and 80 of Block 499, Section 11 (Figure 2-1). According to GTEOSI, the corporate genealogy relevant to GTEOSI's involvement with historical site uses is as follows:

- 3/57 - the Sylvania-Corning Nuclear Corporation (Sylcor) was incorporated, owned in equal shares by Sylvania and Corning Glass Works (Corning)

- 3/5/59 - Sylvania, in existence since 1942, merged with General Telephone Corporation to form General Telephone & Electronics Corporation (now GTEOSI Corporation) with Sylvania becoming a wholly owned subsidiary

- 4/60 - Sylvania bought out Corning's interests in Sylcor. Ownership of the subject facility was transferred to Sylvania and Sylcor was dissolved and liquidated into Sylvania 12/31/60

- 12/23/70 - Sylvania changed its name to GT&E Sylvania Incorporated (GT&E Sylvania)

- 1/1/71 - GT&E Sylvania Incorporated changed its name to GTE Sylvania

- 1/9/80 - GTE Sylvania became GTE Products Corporation

- 1/29/93 - the sale by a wholly-owned subsidiary of GTE Corporation of all of the stock of GTE Products Corporation to a wholly-owned subsidiary of Siemans AG, was completed.

- 7/11/96 - letter from GTEOSI indicating responsibility for the subject site

The names of the former facility were determined by GTEOSI as follows:

- Sylvania Atomic Energy Division Facility - circa 1952-1957

- Sylvania -Corning Nuclear Corporation Facility - circa 1957-1960

- Sylvania Sylcor Division Facility - circa 1960-1967

- Sylvania Parts Division Facility (Lot 79 only) - circa 1967-1978 Sylvania Chemical/Metallurgical Division, High Temperature Composites Laboratory Lot 79 only - circa 1970

Figure 2-1 shows the locations of buildings formerly used for manufacturing at the site. Buildings #1 and #2 on Lot 80 already existed when Sylvania first occupied the property in 1952. Sylvania acquired the remainder of Lot 79 in 1957, and constructed building #4 circa 1957 - 1958 for the purpose of manufacturing atomic fuel elements for reactors used in research and electric power generation. Records indicate that Sylvania operated under license #SNM-82 issued from the Atomic Energy

Commission (AEC; Nuclear Regulatory Commission). Sylvania was required to obtain a license to acquire enriched uranium (uranium enriched with isotope uranium-235) for fuel rod fabrication (NRC 1996). The facility was used to manufacture nuclear fuel elements for the AEC, as well as high temperature coatings and composite alloys for space and aircraft industries. Records also indicate that Sylvania operated research pilot and metallurgical laboratories on Lots 79 and 80. Records circa 1960 speak of expansion of a beryllium laboratory (location unknown) and of beryllium research and processing during the 1960s.

With the sale of Sylvania Nuclear Division's equipment, tooling, and license assets to National Lead Industries in 1966, the production of nuclear fuel elements and components at the facility ceased. According to NRC (1996), the AEC removed the site in 1967 from licensing requirements, due to cessation of nuclear products production activities. Non-nuclear production activities at Lot 79 ceased completely during 1972, with the sale of the parcel to Dewiant Corporation.

Between 5/66 and 4/69, six buildings, along with foundations, were removed at Lot 79. The foundations of three of these buildings may have been disposed of somewhere on the Sylvania property. A contractor, one Fallacara, partially filled in at least one recharge basin, and installed a parking lot along the lot line of Lots 79 and 80. Also during 1967, Building # 4 on Lot 79 was reportedly decontaminated. According to GTEOSI (1996, Exhibit B), all Sylvania property on Cantiague Road excluding those recharge basins not filled were certified for use as "other than a radiation installation" by the NYS Department of Labor, Division of Industrial Hygiene. Of the original on-site buildings, only a portion of one remains-that forming a portion of the Air Techniques facility.

2.3. Historical manufacturing and disposal practices

The primary historical manufacturing processes and disposal practices associated with those processes described in this section are based on information summarized in Exhibit B and the NRC (1996).

Processes performed during the period when nuclear fuel elements were manufactured included:

- Melting of enriched uranium-molybdenum and enriched uranium-aluminum in graphite and ceramic crucibles in vacuum furnaces
- Sintering of uranium oxide-powdered stainless steel in hydrogen atmosphere sintering furnaces
- Rolling of uranium-stainless steel billets in hydrogen atmosphere rolling furnaces
- Iso-static pressing of uranium pellets-aluminum tubing involving argon gas
- Chemical cleaning of all products involving hot and cold acid, caustics, solvents, water and anodizing solutions in cleaning tanks, hoods, and degreasers.

Disposal activities associated with these processes are referenced in comments contained in a recent License Evaluation Report on the former Sylvania facility prepared by NRC. The evaluation was made as part of NRC's routine activities regarding previously closed licenses using NRC file records (Mark Roberts, NRC, personal communication, 2/97).

The evaluation states that liquid wastes were generated from the coolant used for the fabrication equipment and from chemical cleaning baths. With respect to the equipment coolant, the evaluation states that in 1958, Sylvania indicated that the coolant was dried and the resulting sludge burned to salvage the uranium. An AEC compliance inspection on June 10, 1958 indicated that liquid wastes (apparently from the chemical cleaning baths) were monitored, and discharged to the septic system if less than 0.5 grams of uranium per liter. Typical values discharged were 0.025 grams uranium per liter and clothing washes (0.125 grams per liter). The licensee also collected the liquids in drums for later disposal.

In a 1952 letter to the NCDH, Sylvania indicated that cooling water for equipment using nitric acid would be emptied directly into a leaching pool since the cooling water would at no time be open to the process and could not pick up any contamination.

In August 1960, 2 kilograms of U-235 in solution was sent to Davidson Chemical Company in Erwin, Tennessee (NRC 1994). In 1961, 2 grams of U-235 in solution was sent to Spencer Chemical Company, Pittsburgh, Kansas. Sometime between 1963 and 1965, the licensee also began to discharge effluent to four sumps located on the site. The four sumps were

pumped to a dry well also located on the site. The licensee sampled the sumps for contamination. In an AEC compliance inspection report dated August 3, 1965, the average sample was 1E-7 to 8E-7 µCi/cc. One of the sumps was smeared in 1979 and was found to be contain less than the minimum detectable level of 1 picoCurie/g of U-238 and 0.15 picoCi/g of Th-232. However, the concentration of uranium in soil samples taken from the sumps in 1967 were reported to be 3000 to 25000 times greater than naturally occurring uranium concentrations.

According to GTEOSI (1996, Exhibit B) and NRC (1994), residuals were disposed in four on-site recharge basins, leaching pools, or cesspools (circa 1959). The process residuals disposed in these areas are listed in the following table. The reviewer is referred to Figure 2-1 for the locations of the disposal areas which, as explained later, have been identified for investigation.

Table 2-1. ***Locations of Process Residual Disposal (circa 1959)***

Process Residual	Recharge Basin # 1	Recharge Basin #2	Building # 1 Cesspool	Recharge Basin # 3	Leaching Pool	Recharge Basin # 4
Molybdenum Disulfide	x	x				
Trisodium Phosphate	x					
Aluminum	x			x		x
Uranium	x	x	x	x		x
Nickel	x	x	x	x		
Copper		x				
Carbon/Silicon		x				
Iron				x		x
Silver						x
Hydrofluoric acid	x					x
Hydrochloric acid	x	x				x
Nitric acid	x	x			x	x
Sulphuric acid	x					x

Table 2-1. *Locations of Process Residual Disposal (circa 1959)*

Process Residual	Recharge Basin # 1	Recharge Basin #2	Building # 1 Cesspool	Recharge Basin # 3	Leaching Pool	Recharge Basin # 4
Caustics	x			x		x
Potassium chromate						x
Sodium sulphite						x

2.4. Current site and area usage

Currently, the land formerly occupied by Sylvania is identified as northern Lots 99 and 100 (Parcel N) and southern Lot 94 (Parcel S) (see Figure 2-2). Gilbert Displays Incorporated at 140 Cantiague Rock Road and Magazine Distributors Incorporated at 100 Cantiague Road, are situated on Lots 100 and 99, respectively. Air Techniques, Inc., located at 70 Cantiague Road, occupies Lot 94. Refer to Figure 2-3 for a land use map.

Based on site reports, as well as a site visit by O'Brien & Gere and GTEOSI personnel, land use on-site and directly to the north, west and south is commercial/industrial. The 9.5 acre site, which is largely fenced, is bounded by the Nassau County Park (Cantiague Park) to the east, Cantiague Rock Road to the west, General Instruments Corporation facilities to the south, and the NCDPW to the north. Approximately 40 percent of the site is paved, 55 percent occupied by buildings and 5 percent vegetated. Site topography is level, with ground water flow reportedly to the south. A brief description of upgradient, downgradient, and on-site facilities is presented below. A more detailed description of the geology and physical characteristics of the site and vicinity, as relevant to the investigation, are presented in Section 2.5 and in Appendix A.

NCDPW - The NCDPW Road and Bridge Maintenance Garage is located directly north and hydraulically upgradient of the site. The facility is used to store and maintain trucks and construction equipment. There were two reported petroleum spills at the NCDPW facility which may have impacted ground water in a downgradient direction: one in 1979 and the other in 1986. Reportedly, several tens of thousands of gallons of product were released (EEA 1991, Tim Kelly NCDPW personal communication, 2/97). According to Mr. Kelly, the 1979 spill file (spill #79077) has been closed

while the 1986 spill file (spill #8605893) remains open. Aspects of the petroleum releases and upgradient ground water conditions relevant to the site investigation are presented in Appendix B.

Gilbert Displays, located at the northern portion of the site (see Figure 2-2) and immediately south of the NCDPW, is a 54,500 ft^2 one story office and industrial building reported to have been constructed in 1968. Gilbert Displays produces, as the name implies, displays for commercial clients. The area around the building consists of a paved parking lot located along the eastern, western, and southern borders of the building (EEA 1991). A description of a site investigation regarding ground water quality near Gilbert Displays is presented in Appendix B.

Magazine Distributors is centrally located on the site and consists of a commercial building similar to Gilbert Displays. This facility is also bounded by parking lots on all sides. Reportedly, there are two underground petroleum tanks at this location, and one above ground tank used to store solvents (Robert Stewart, NYSDEC Region 1, personal communication, 3/97). Information regarding environmental investigations and activities at Magazine Distributors was limited.

The Air Techniques Inc. facility, located on the southern portion of the site, consists of a one story brick building of approximately 210,000 ft^2. The remainder of the site is paved and is used for parking and storage. This property (Lot 94) was purchased by Air Techniques in 1979, and was expanded to the east after an adjacent lot (lot 105) was purchased from Nassau County (ERM 1997). Exclusive of the expansion, the Air Techniques building is the only building remaining from the site which is the subject of this investigation (historically building #4 shown on Figure 2-2). This parcel has been the subject of an on-going ground water investigation since 1995 by GTEOSI (ERM 1996). A summary of this investigation is presented in Appendix B.

General Instruments is located downgradient and directly adjacent to the site. As noted earlier, General Instruments is a Class 2 State listed inactive hazardous waste site and is currently the focus of an RI/FS due to several leaks associated with underground waste solvent tanks. The 11.5 acre parcel is almost entirely covered by buildings and pavement. The building is currently vacant and for sale (NYSDEC 1/97). In 1/97, a preliminary remedial action plan for the site was issued by NYSDEC to address on-site

soil contamination. Ground water contamination is to be addressed separately from the soils. A summary of the remedial investigation for this area is also presented in Appendix B.

2.5. Regional setting and hydrogeology

The following discussion of physical characteristics is taken from published materials and data gathered as part of investigations at the downgradient General Instrument Corporation site, Hicksville, New York (Stearns & Wheler 1992), as well as other studies. Appendix A presents a more detailed summary of regional geology, hydrogeology and ground water characteristics in the vicinity of the site.

The site is primarily paved and occupied by buildings (> 90 % of total surface area), and has little topographic relief. No significant surface water bodies were located on-site or in the near vicinity.

2.5.1. Regional setting

Regionally, the site area is found on a glacial outwash plain. Topography becomes more varied northward in the vicinity of the Ronkonkoma and Harbor Hill moraines and associated ground moraine areas. Few surface water bodies are found within the near vicinity of the site. The area surrounding the site is largely urbanized; industrial and commercial areas border the site to the north, west, and south. In turn, these areas are bordered by residential areas. Cantiague Park (Nassau County Park), a recreational area, lies immediately east of the site.

The unconsolidated geologic deposits of Long Island are approximately 1,100 feet thick in the vicinity of the site. The deposits are thinnest in the northwestern part of Nassau County and thicken southward. The unconsolidated deposits in Nassau County have been investigated by Isbister (1966) and Smolensky and Feldman (1988). These and other investigations have divided the deposits into seven surficial geologic units: two members of the Raritan Formation, the Magothy Formation, two distinct units of the Port Washington Deposit, the Port Washington clay unit, and the Upper Pleistocene deposits. Regional geology of western Long Island, as well as, bedrock geology is presented in Appendix A.

Regionally, surface water in Nassau County region consists of a few small streams, ponds, and marshes. Surface water collection is mainly controlled

by precipitation rates, infiltration and runoff rates, and by perched water tables. Numerous perched ponds, marshes, and effluent streams occur north of the Ronkonkoma moraine (Isbister 1966).

Headwaters of the streams on Long Island tend to originate in the highlands of the Ronkonkoma and Harbor Hill moraines. To the north, sediments tend to be impermeable tills that support perched water tables and effluent streams. To the south of the highlands, outwash plain deposits are usually very permeable and will not support a perched water table. Streams to the south of the Ronkonkoma moraine tend to be influent, and more often than not, they disappear completely. Direct runoff from urban areas (pavement, rooftops) is rerouted by storm drainage systems to numerous recharge basins, which ultimately replenish the water table.

2.5.2. Regional hydrogeology

The regional hydrogeology involves two types of aquifers, the unconsolidated deposit aquifer and the bedrock aquifer. Four major unconsolidated aquifers underlie Nassau County. From deepest to most shallow the aquifers are the Lloyd Aquifer, Port Washington Aquifer, Magothy Aquifer, and the upper glacial aquifer.

The Lloyd Aquifer is a confined aquifer which overlies bedrock and underlies the Raritan confining unit, is 300 ft thick, and is present 900 ft below land surface (bls). The Port Washington Aquifer overlies bedrock in northern Nassua County. The Magothy Aquifer is located 85 ft bls, is 650 ft thick and serves as the principle source of fresh water on Long Island. The upper glacial aquifer is located 10 ft bls and is 75 ft thick.

The regional ground water flow on Long Island is separated by a ground water divide that trends east to west along the north central portion of Long Island. Ground water north of the divide discharges to Long Island Sound and ground water south of the divide discharges into Great South Bay (Kilburn, 1979).

A more detailed description of these aquifers is presented in Appendix A.

2.5.3. Site hydrogeology

Investigations adjacent to the site have focused on the upper glacial aquifer and the Magothy Aquifer. Test borings and well borings were completed at the adjacent General Instrument Corporation (Stearns & Wheler 1992)

site. The test borings indicated that the site is underlain by relatively simple stratigraphy consisting of gravelly sands overlying silty fine sands. A fairly uniform gravelly sand extends from the surface to 60 or 70 feet bls. In addition, according to John Conover (former NYSDEC Project Manager), there is a confining layer at 150 feet in depth below the General Instruments site.

The depth to ground water is 60 ft bls and ground water flow direction is to the south. The in-situ hydraulic conductivity (K) of the aquifer material located 60 to 70 ft bls (shallow wells) and 120 ft to 130 ft bls (deep wells) was evaluated by slug testing (Stearns & Wheeler 1992). The hydraulic conductivity values calculated for aquifer material adjacent to shallow wells varied from 2.4×10^{-3} cm/sec to 4.8×10^{-2} cm/sec, with a geometric mean of 1.01×10^{-2} cm/sec. The hydraulic conductivity values calculated from the deep wells varied from 4.10×10^{-4} cm/sec (1.27×10^{-5} ft/sec) to 1.23×10^{-2} cm/sec (4.04×10^{-4} ft/sec).

Values for ground water flow rates in the vicinity of the site are based on calculations by Stearns & Wheler (1992). The ground water flow rates were calculated using a hydraulic gradient estimate of 0.001 feet per foot. The ground water flow rate for the shallow wells ranged from 8.3 ft/year to 165.55 feet/year. The ground water flow rate for the deep wells ranged from 1.3 ft/year to 41.4 feet/year. Based on results presented in Stearns & Wheler (1992), there is no appreciable vertical component of flow.

2.6. Climate/meteorology

Climate is important to this investigation because of Long Island's dependence on precipitation as its sole source of recharge to ground water. The Long Island climate is controlled primarily by the prevailing westerly winds, causing most weather systems to approach from the continental United States. Temperature extremes tend to be subdued by the proximity of the Atlantic Ocean (Isbister 1966).

Average temperature and precipitation data were taken from Mineola Station Division, Mineola, New York. The average daily temperatures ranged from a low of 39.8°F in February to a high of 75°F in July. Total monthly precipitation was at a low of .73 inches in February of 1990 and a high of 8.79 inches in May of 1990 (NOAA climatological data, New York, 1990). On average, Mineola Station receives 43.87 inches of rain per year, approximately half of which is recharged to the subsurface via natural

infiltration, recharge basins, and cesspools. The remainder of the precipitation is removed by either direct runoff or evapotranspiration (Peterson 1987).

2.7. Ground water impacts and soil radionuclides

2.7.1. Ground water impacts

Ground water contamination has been documented at the downgradient General Instruments site and upgradient NCDPW site. Chlorinated solvents have also been historically detected in public water supply wells upgradient of the site, and the property immediately downgradient of Air Techniques (General Instruments) has been subject to a ground water remediation program (ERM-NE 1997). Appendix B provides a summary of site specific and regional ground water conditions.

2.7.2. Soil radionuclides

As mentioned in the opening remarks to this plan, the investigation will focus on uranium and thorium in soils in addition to PCE. The following section briefly summarizes past studies of radionuclide activity for site soils.

The most recent soil data as well as historical data are presented in Table 2-2. Recent soil data were obtained from NYSDEC during the 1/14/97 meeting referenced earlier. As discussed during the meeting, soil samples were collected from the driving range behind the Gilbert Display properties as well as samples collected from the rear of Gilbert Displays.

In addition to the NYSDEC data, further historical information on radionuclide levels in surface soils was available in two NRC memos regarding surveys, dated 11/19/96 and 8/20/96, respectively. Four soil samples were collected in the survey dated 11/19/96, while the survey dated 8/20/96 included three soil samples, one ground water sample, and a radiological investigation of background exposure rates.

Data on soil radioactivity levels were also available in a Department of Energy memo regarding a radiological survey dated 5/21/79, conducted by a Radiological Assistance Program (RAP) team. Two soil samples were collected in this survey, and a radiological survey of gamma exposure rates was performed.

Table 2-2. ***Soil radionuclide data***

Source of Information	Description of Survey Samples	Radionuclide	Activity Range
Preliminary data received from DEC during meeting on 1/14/97. Date of Investigation not specified. (Note: this portion of the table may change pending the release of the final NYSDEC report regarding this issue)	1. Driving Range Soils: Surface soil samples taken from the driving range side of fence. Sample depths range between 0-14". Alpha measurements were reported for five surface soil samples.	Th 228	0.9 - 8 pCi/g
		Th 232	1.2 - 8 pCi/g
		U 238	11 - 70 pCi/g
		U 234	11 - 63 pCi/g
		Th 230	0.6 - 3.1 pCi/g
		U 235	0.7 - 5.5 pCi/g
	2. Gilbert Display Soils: Surface soil samples collected from near fence at the rear of Gilbert Display property. Sample depths range between 0-24". Alpha measurements were reported for two core samples (compacted) and one surface soil sample.	Th 228	1.6±1.4 - 169±133 pCi/g
		Th 232	1.6±1.3 - 169±33 pCi/g
		U 238	52±13 - 1044±199 pCi/g
		U 234	52±13 - 982±188 pCi/g
		Th 230	1.4±1.4 - 22±6 pCi/g
		U 235	2±2 - 53±16 pCi/g
	3. Background soil data - Surface background data collected from driving range soils.	Th 228	0.8 pCi/g
		Th 232	0.7 pCi/g
		U 238	1.3 pCi/g
		U 234	1.3 pCi/g
		Th 230	1.1 pCi/g
		U 235	0.1 pCi/g

Table 2-2. ***Soil radionuclide data***

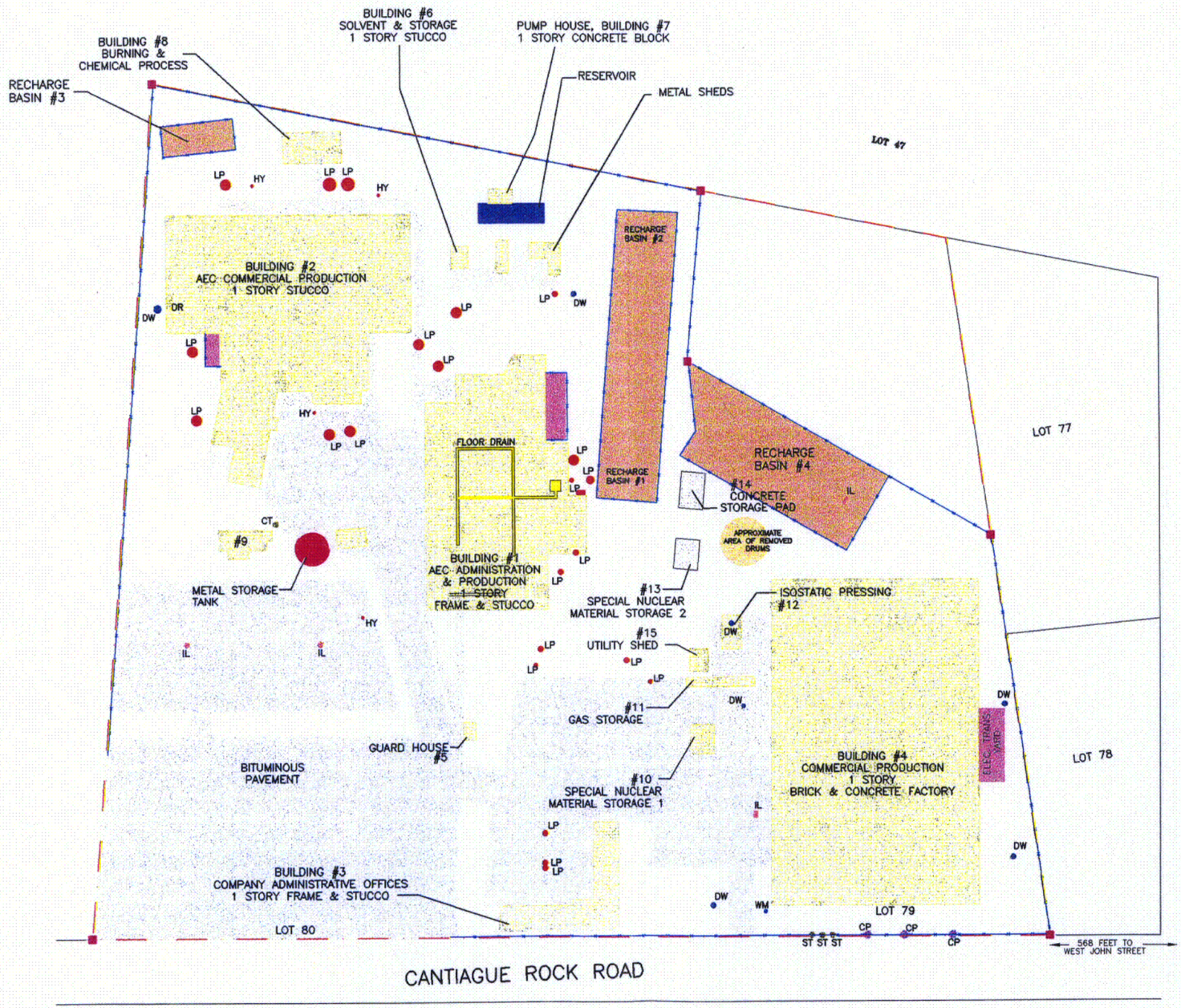
Source of Information	Description of Survey Samples	Radionuclide	Activity Range
NRC Memo regarding data from samples collected as part of a survey of public area adjacent to the site. Four soil samples were collected in the survey, which was conducted on 11/19/96. Analysis was performed using gamma spectroscopy, and the U-238 activity was inferred from its daughter protoactinium-234m.	Sample A: Collected approximately one foot from the east side of the fence separating the golf driving range from the properties on Cantiague Rock Road and 15 feet south of the property boundary between Magazine Distributors and Gilbert Displays.	U 238	6.8 ± 0.6 pCi/g
		Ra 226	1.6 ± 0.5 pCi/g
		U 235	0.42 ± 0.03 pCi/g
	Sample B: Collected approximately one foot from the east side of the fence separating the golf driving range from the properties on Cantiague Rock Road and 15 feet north of the property boundary between Magazine Distributors and Gilbert Displays.	U 238	11.1 ± 1.0 pCi/g
		Ra 226	1.7 ± 0.7 pCi/g
		U 235	0.54 ± 0.04 pCi/g
	Sample C: Collected approximately one foot from the east side of the fence separating the golf driving range from the properties on Cantigue Rock Road approximately one foot from the fence on the golf driving range and 105 feet north of the property boundary between Magazine Distributors and Gilbert Displays	U 238	3.5 ± 0.7 pCi/g
		Ra 226	1.0 ± 0.4 pCi/g
		U 235	0.16 ± 0.03 pCi/g
	Sample D (Background): Collected on the east side of the golf driving range, approximately 200 meters due east of the location of the samples A, B and C.	U 238	0.9 ± 0.4 pCi/g
		Ra 226	0.2 ± 0.3 pCi/g
		U 235	0.06 ± 0.02 pCi/g

Table 2-2. ***Soil radionuclide data***

Source of Information	Description of Survey Samples	Radionuclide	Activity Range
US NRC Memo reporting the results of a safety inspection of the former Sylvania site. The inspection was conducted on 8/20/96. Inspection activities included the analysis of soil samples collected at the site. Inspection report included, in addition, results of analysis of soil and groundwater samples collected and analyzed by representatives of NYSDEC. The additional soil sample was collected on 8/27/96 from the area with elevated gamma exposure, and a groundwater sample was collected on 9/5/96.	Radiological survey of exterior areas included measurements of background exposure rates. The background exposure rate along the western edge of the property was 9 to 11 µR/hour at one meter above the ground surface. Exposure rate measurements along the eastern border of the Gilbert Displays area showed elevated levels. The values measured at approximately one meter from the ground surface ranged from 15 to 110 µR/hour. The highest value was measured at a distance of approximately one meter from the fence bordering the golf driving range and six meters from the border of the Magazine Distributors fence. The maximum direct measurement on the ground surface was 500 µR/hour. The measured exposure rate on the Magazine Distributors' property ranged from 5 to 13 µR/hour. The highest readings were obtained in the north east corner of the property, next to the common fence with gilbert Displays. Measurements on the Air Techniques were within measured background levels.		
	Sample #1 : Obtained approximately one meter south of Sample #2.	U 238	641 ± 11 pCi/g
		U 235	27.7 ± 0.5 pCi/g
		Th 232	46.6 ± 0.4 pCi/g
	Sample #2 : Obtained at the point of the highest measured exposure rate.	U 238	2613 ± 16 pCi/g
		U 235	118.6 ± 0.6 pCi/g
		Th 232	17.4 ± 0.1 pCi/g
	Sample # 3 : Collected in the area of elevated gamma exposure rates.	U 238	230 ± 17 pCi/g
	Sample # 4: Groundwater sample collected from a monitoring well on the Air Techniques site near the boundary with the Magazine Distributors property.	Gross alpha activity	115 ± 12 pCi/liter
		Gross beta activity	22 ± 3 pCi/liter
Dept. of Energy Memo regarding a radiological survey report conducted on 5/21/79 by a Radiological Assistance Program (RAP) team. Soil, vegetation and water samples were collected. Gamma and alpha radiation surveys were made.	General gamma exposure rates were barely detectable above background. The maximum gamma exposure rate detected at ground level was 0.3 to 0.35 mR/hr. No surface alpha activity was observed. Radioactivity levels in the vegetation and water samples were below the respective method detection limits.		
	Soil Sample 1: Yale Property (SE corner)	U 238	1362 pCi/g
		Th 232	17.4 pCi/g
	Soil Sample 2: Ball field and parking lot fence	U 238	38 pCi/g
		Th 232	1 pCi/g

Table 2-2. ***Soil radionuclide data***

Source of Information	Description of Survey Samples	Radionuclide	Activity Range
Data on water samples abstracted and tabulated from correspondence dated circa 1959-1960. Water samples listed in this table were collected between 6/59 and 6/60 from drain #1 and the four sumps. No further information was available on the sampling methods or the respective levels of uranium isotopes.	Drain # 1	Uranium	2.360 - 14.58 mg/L
	Basin (Sump) #1	Uranium	0.32 - 28.5 mg/L
	Basin (Sump) #2	Uranium	1.05 - 13.4 mg/L
	Basin (Sump) #3	Uranium	0.76 - 34 mg/L
	Basin (Sump) #4	Uranium	0.06 - 4.16 mg/L
Water samples collected on 5/0/96, 5/10/96, 5/11/96, 9/5/96. No further information was available on the water samples listed in this table	SH196-0509-A656W2 (05/11/96)	Gross Alpha	109.74 ± 13.77 pCi/L
		Gross Beta	55.38 ± 4.92 pCi/L
	SH196-0509-A656W3 (05/11/96)	Gross Alpha	1.52 ± 1.98 pCi/L
		Gross Beta	7.13 ± 2.38 pCi/L
	SH196-0509-A656W4 (05/11/96)	Gross Alpha	4.81 ± 2.45 pCi/L
		Gross Beta	5.91 ± 2.21 pCi/L
	SH196-0509-A656W5 (05/11/96)	Gross Alpha	0.66 ± 1.36 pCi/L
		Gross Beta	7.22 ± 2.31 pCi/L
	SH196-0509-A656W2 (05/10/96)	Radium 226	0.99 ± 0.43 pCi/L
	SH196-0509-A656W2 (9/5/96)	Gross Alpha	107.31 ± 11.50 pCi/L
		Gross Beta	22.32 ± 3.50 pCi/L



LEGEND

- FENCE
- SITE BOUNDARY
- MONUMENT

HISTORIC STRUCTURES

- PAVEMENT
- BUILDINGS
- CONCRETE
- RECHARGE BASINS
- RESERVOIR
- STORAGE TANK
- ELECT. TRANS. YARD
- DRUM STORAGE

HISTORIC SUBSURFACE STRUCTURES

- LEACHING POOL (LP)
- DRY WELL (DW)
- DRAIN (DR)
- INLET (IL)
- CISTERN (CT)
- SEPTIC TANKS (ST)
- CESSPOOL (CP)
- WATER METER PIT (WM)
- HYDRANT (HY)

C02

NOTE: ADAPTED FROM
H.Q.HOLTZMACHER
PROF. ENGINEER & L.S. LICENSE
HICKSVILLE, NEW YORK.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER, TO ALTER THIS DOCUMENT.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED IN THE TITLE BLOCK. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE TITLE BLOCK TO DETERMINE THE ACTUAL SCALE OF THIS DRAWING.

IN CHARGE OF _____
DESIGNED BY _____ CHECKED BY _____
DRAWN BY _____

50 0 50 100
1" = 100'

NO.	DATE	REVISION	INIT.

O'BRIEN & GERE

FORMER SYLVANIA
ELECTRIC PRODUCTS INCORPORATED FACILITY
HICKSVILLE, NEW YORK

1960 FORMER
SITE MAP

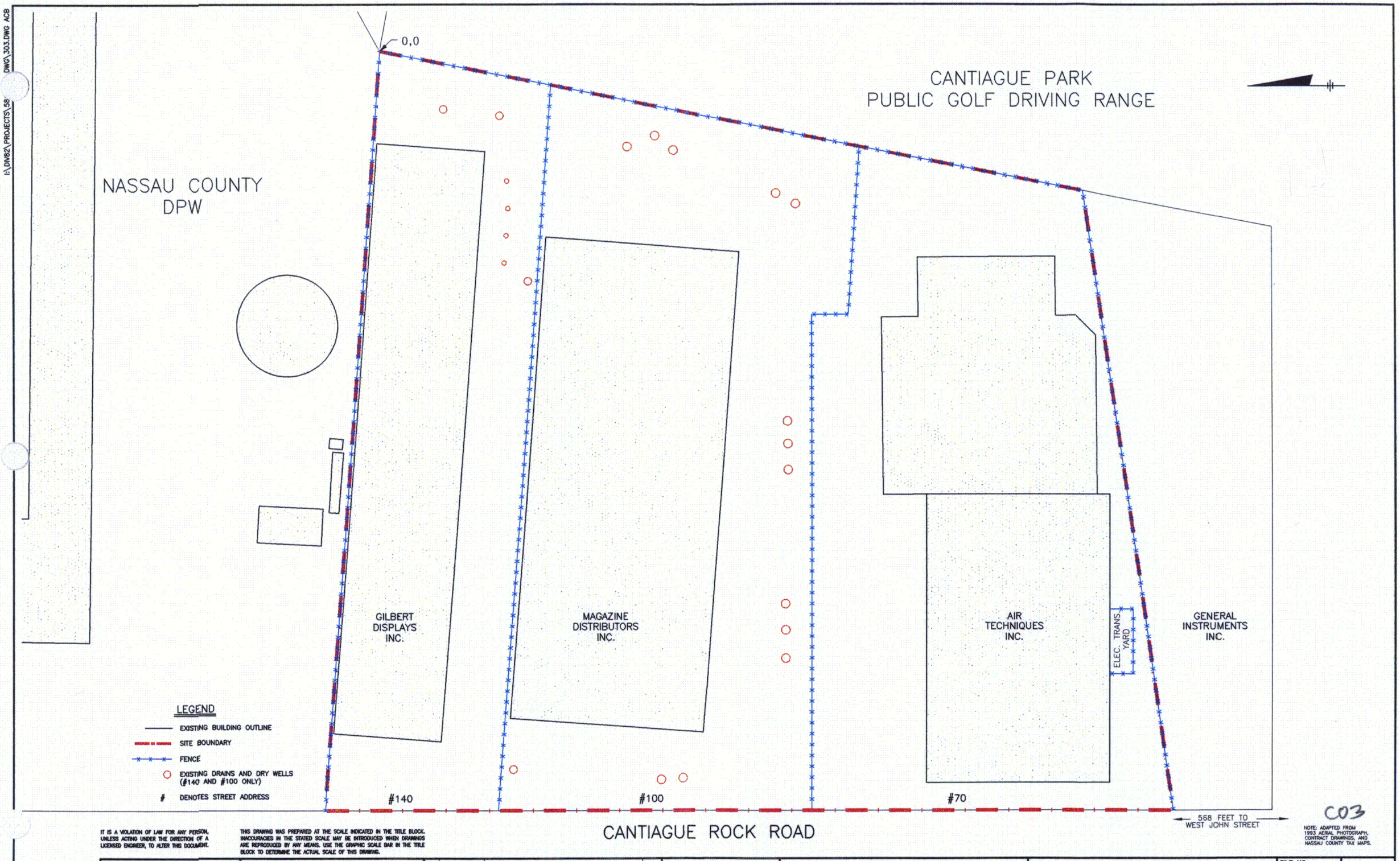
FILE NO. 5816.009.002
DATE Nov. 1997

2-1

11/97

I:\DWG2\PROJECTS\09\DWG\002.DWG ACB

I:\DWGS\PROJECTS\5816\DWG\303.DWG ACB



C03

NOTE: ADAPTED FROM 1993 AERIAL PHOTOGRAPH, CONTRACT DRAWINGS, AND NASSAU COUNTY TAX MAPS.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER, TO ALTER THIS DOCUMENT.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED IN THE TITLE BLOCK. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE TITLE BLOCK TO DETERMINE THE ACTUAL SCALE OF THIS DRAWING.

IN CHARGE OF _____

DESIGNED BY _____ CHECKED BY _____

DRAWN BY _____

40 0 40 80

1" = 80'

NO.	DATE	REVISION	INIT.

O'BRIEN & GERE

FORMER SYLVANIA
ELECTRIC PRODUCTS INCORPORATED FACILITY
HICKSVILLE, NEW YORK

CURRENT
SITE MAP

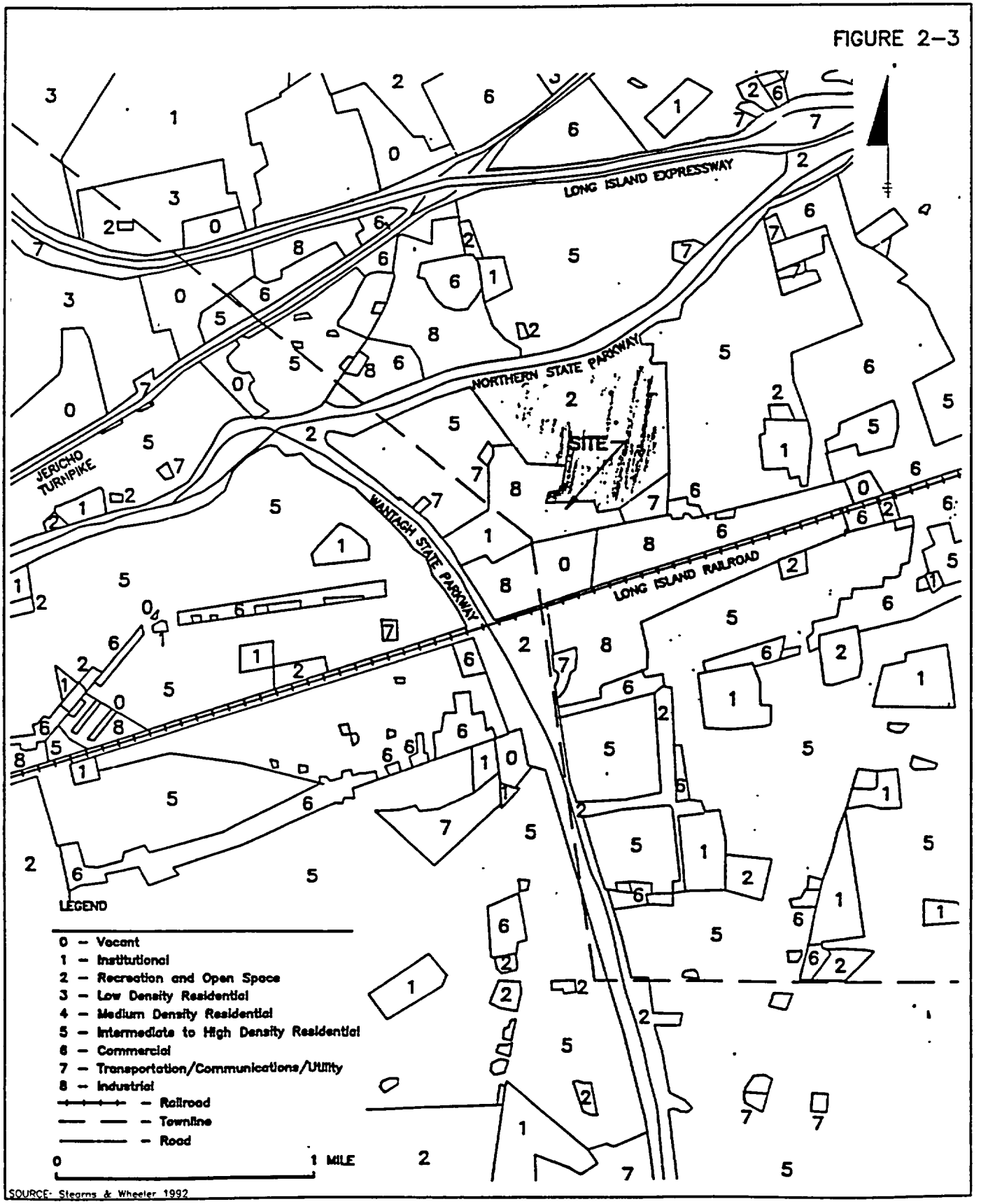
FILE NO. 5816.009.303

DATE March 1998

2-2

/98

FIGURE 2-3



SOURCE: Stearns & Wheeler 1992

FORMER SYLVANIA ELECTRIC PRODUCTS FACILITY HICKSVILLE, N.Y.

FILE NO. 5816.008-024

LAND USE

O'BRIEN & GERE ENGINEERS, INC.

I:\DIV82\PROJECTS\5816\0085\DWG\024.DWG

DATE: 02/19/9.

3. Conceptual site model

This Conceptual Site Model was developed, based on a review of available site information and a site visit. The Conceptual Site Model takes into account potential compounds of concern, sources, migration pathways, as well as potential human exposures and relates these concepts to site investigatory activities. For this reason the Conceptual Site Model is an important part of the Work Plan. It serves to justify and support the overall investigation. However, because it is conceptual, the site model is considered iterative and may be modified to reflect investigative results and changing site conditions. The Conceptual Site Model is illustrated on Figure 3-1 and is summarized below.

Based on evaluation of background information, the primary sources of detected radionuclides and chlorinated organics may be the former recharge basins #1 to 4, former leaching pools and on-site drywells. Currently, there is limited information regarding the use and historical location of both the drywells and leaching pools. It is reported that historically (circa 1952-1967), uranium, thorium, and PCE may have been disposed to the recharge basins. Under current use, elevated radionuclide activity was detected at the northeastern property line near non-paved, vegetated areas.

Potential receptors include adults and adolescents visiting the adjacent Nassau County Park and park workers. To date, a private well search has not been performed, but is anticipated as part of Work Plan activities. Exposures to site related compounds of concern are possible if domestic use of ground water is occurring in the near vicinity. It is unknown (but appears unlikely) whether or not site ground water is hydraulically connected to downgradient public well fields. Therefore, it is unknown if site-related radionuclides are impacting ground water used for domestic purposes.

In terms of radionuclides and as discussed with NYSDEC, exposures and clean-up levels for soils will be modeled in consideration of the following:

- vegetables for human consumption are not grown on-site or in the near site vicinity, nor is this pathway plausible in the future

- apartments or residential structures may be placed on Cantiague Park at sometime in the future
- there is the possibility of direct contact for construction workers in the event subsurface soils are accessed for construction purposes
- ground water may be used as a source of potable water from downgradient public water supplies.

The voluntary cleanup investigation has been designed to investigate exterior subsurface conditions in the vicinity and immediately downgradient of the existing on-site buildings. Based on the findings of this portion of the investigation, the need for, and extent of, an interior building investigation will be assessed.

Figure 3-1
Former Sylvania Electric Products Incorporated Facility
Hicksville, NY
Conceptual Site Model
Commercial / Industrial Future/Current Land Use

Source	Contaminants of Potential Concern	Transport Mechanism	Exposure Pathway	Pathway Status	Receptor	Exposure Route	Qualitative/ Quantitative	Comments
Historical Sources			Contact w/surface soil	Complete	Adults, Adolescent	Er, Il, Ir Dc	Quantitative	Adults and adolescents (recreational land use) at Nassau County Park may be exposed to radionuclide activity near exposed soils and vegetation at northeastern property line.
Former Recharge Basins # 1 - 4 (Soils/Leachate/Overflow)	Uranium and Thorium Radionuclides/PCE	Potential Overflow to Soils	Contact w/sub-surface soils	Complete	Construction Worker	Er, Il, Ir, Dc	Quantitative	Workers may be exposed to COPCs in soils during excavations or construction. Exposures could be controlled through implementation of a HASP.
		Leaching	Building Foundations	Incomplete	Facility Workers	none	Qualitative	It is highly unlikely that facility workers would be exposed externally to radionuclide activity potentially present under building foundations.
Current Sources			Volatilization of ground water VOCs to indoor air	Incomplete	Facility Workers	none	Qualitative	Volatile organic residues were detected at considerable depth (aquifer > 60 feet below grade) and therefore are unlikely to migrate through soil gas to indoor air.
Upgradient and On-site Sub-Surface Residues	Tetrachloroethene, Trichloroethene, Petroleum constituents	Ground Water	Ground water - Non potable use (ie. industrial use)	Incomplete	Facility Workers	none	Qualitative	Facilities utilize municipal water. It is unlikely that municipa well fields are impacted by site COPCs.
			Ground water - Domestic Use (ie. drinking water, showering)	Incomplete	Adult, Child	none	Qualitative	Municipal water is utilized by the public in the vicinity of th site. It is unlikely that municipal well fields are impacted by site COPCs.
			Ambient Air Dust (outdoor)	Incomplete	Adults, Adolescent	none	Qualitative	It is unlikely that adults and adolescents (recreational use) would be exposed to radionuclide activity from soil derived dust, since exposed areas are vegetated near northeaster property line fence. Dust generation would be negligible.

Il - Incidental Ingestion Dc - Dermal Contact
Er - External exposure to radionuclide activity
Ir - Internal exposure to radionuclide activity
Inh - Inhalation

Note: Conceptual model is based on a preliminary review of historical and current information. It may, in an iterative manner, be revised.

i:/div82/projects/5816.009/rpts/wrkpln/Fig3-1

4. Field investigation

Review of available information and the January 14, and March 12, 1997, meetings with NYSDEC personnel suggest that the investigation of on and off-site areas will be necessary to: identify areas of process residuals, such as the locations of the former recharge basins, that may be acting as sources to ground water, evaluate areas where radiation levels in soils above background have been detected, and assess the building interiors to confirm the absence of worker exposure to radioactive materials.

Field activities will be performed in a staged progression, with one task determining the need for and extent of the succeeding task. Where possible, tasks which are not interrelated in this manner will be performed concurrently. In addition, and to avoid the need to investigate an area more than once, the investigation will address PCE, uranium, and thorium (previously identified on site) as well as other organics and inorganics typically investigated at sites of this type simultaneously. Only those potential source areas outside of the on-site buildings will be investigated using invasive techniques.

The proposed site characterization activities are briefly presented in the task descriptions within this Chapter. Specific field sampling procedures to be used during the implementation of site investigation activities are included in the Field Sampling Plan (FSP) presented in Appendix D. In addition, quality assurance/quality control (QA/QC) procedures are presented in the Quality Assurance Project Plan (QAPP) presented in Appendix E.

4.1. Task 1: Project planning

Project planning is anticipated to be an on-going task. Future planning activities will include: acquisition of access agreements, finalization of the Voluntary Cleanup Program agreement with NYSDEC, and subcontracting.

4.2. Task 2: Ground penetrating radar (GPR) survey

A GPR survey was completed in December 1997 utilizing a portable subsurface interface radar, model SIR-2, manufactured by Geophysical Survey Systems, Inc. of North Salem NH. The system configuration for this investigation was composed of a single channel 500 MHZ antennae, a portable SIR-2 recording system, and a connecting 23 conductor communication cable. The GPR survey was used to evaluate and confirm the presence of subsurface structures such as the recharge basins. Results of the survey are presented in the *Interim Technical Memorandum, Ground Penetration Radar Survey and Exterior Radiation Survey Results* dated March 1998 (Exhibit A).

The profiles developed during the GPR survey were used, together with the exterior radiation survey (Task 3), to assist in the selection of surface soil sampling and boring locations (Task 6).

4.3. Task 3: Radiation survey

Building exterior and off site areas

A radiation survey was completed along the exterior of existing buildings and the adjacent off site area in the Cantiague Park golf driving range. The radiation survey was conducted in order to define, to the extent practicable, the lateral extent of above-background gamma emitting radioactive materials that may indicate the presence of process residuals, particularly uranium and thorium progeny. Results of the survey are presented in the Interim Technical Memorandum, Ground Penetration Radar Survey and Exterior Radiation Survey Results dated March 1998 (Exhibit A).

4.4. Task 4: Mobilization

Site preparation activities will be initiated approximately 3 weeks prior to the initiation of field activities. During this period, it is anticipated that two GTEOSI representatives will: 1) coordinate the mobilization and preparation of support facilities and equipment; 2) identify and mark

sampling locations, and 3) contact local utility companies to identify and mark underground utility lines. NYSDEC and current property owners will be notified in writing one week prior to the commencement of each field activity, unless field conditions dictate otherwise. In this case, NYSDEC as well as current property owners will be informed as soon possible the activity is scheduled, but before it is implemented.

Vegetative clearing along the fence line at the northern and eastern fence line of the site was completed in November 1997. Clearing was required prior to the implementation of the exterior radiation survey and ground penetrating radar survey. As noted earlier, however, in the event that access to NCDPW and General Instruments wells cannot be achieved in a timely fashion without undue difficulty, these wells will be dropped from the sampling program.

4.5. Task 5: Survey

In order to accurately examine potential source areas, a site survey will be conducted to relocate these areas using the 1960 survey prepared by Holzmacher, et al. Of particular interest are the locations of such structures as former recharge basins, leaching pools, and the solvent storage building.In addition, to the extent possible, the location of existing leaching pools, sanitary pools, storm drains, monitoring wells including the NCDPW and General Instruments wells, and underground storage tanks will be included in the survey. In the event that access to NCDPW and General Instruments wells cannot be achieved in a timely fashion without undue difficulty, however, these wells will be dropped from the sampling program.

The survey will also include the common fence separating Gilbert Displays, MDI, and Air Techniques from the Cantiague Golf Course Driving range. The exterior radiation survey and ground penetration radar survey used the fence line as a baseline. The fence pole located at the northeast corner of the Gilbert Displays' property was selected as the 0,0 point for measurement purposes. The distance of each fence pole was measured away from the 0,0 pole providing the coordinate system from which the GPR (as well as the radiation) survey grid lines were established. In total, 66 fence poles were used. Fence pole 17 marked the boundary between Gilbert Displays and MDI and, fence pole 46 the boundary between MDI and Air Techniques. The survey will be performed by a surveyor licensed in the State of New York.

4.6. Task 6: Surface and subsurface soil investigation

Continuous soil cores will be collected from potential source areas identified during performance of Tasks 2 and 3, and those areas such as a portion of the golf course driving range behind Gilbert Displays where the exterior radiation survey identified readings of above background radiation. The cores will be obtained using direct push methodologies such as a truck mounted Geoprobe®.

The cores will be screened for radioactivity and volatile organic compounds (VOCs). A soil vapor sample will be collected as a preliminary screening for the presence of VOCs at those soil borings which are located at the former location of historic structures. Specific procedures and methodologies are presented in the FSP. In addition, proposed soil boring locations based on the results of the GPR survey and exterior radiation survey are presented in the FSP.

Use of a conventional drill rig or other means of sampling will be evaluated in consultation with NYSDEC in the event that building rubble or other obstructions prevent the use direct push methodologies. If a conventional drill rig is used, drill cuttings of the rubble will be screened in the field with laboratory verification of a representative number of cuttings to evaluate the appropriate method of their disposal.

4.7. Task 7: Ground water investigation

One round of ground water sampling will be conducted at the site to corroborate previous sampling results and update site ground water quality conditions. Ground water samples will be collected from five monitoring wells located on the former facility property and four monitoring wells upgradient of the facility on the DPW property and two downgradient on the General Instruments site. In addition, up to five ground water samples will be collected with the Geoprobe® system to evaluate ground water quality conditions in areas not monitored by the existing monitoring well network. As noted earlier, however, in the event NCDPW and General

Instrument wells cannot be surveyed without overdue difficulty, they will be dropped from the sampling program.

4.8. Task 8: Restoration of surfaces

Asphalt, soils, and other surfaces disturbed as a result of invasive site activities will be restored as agreed between GTEOSI and individual property owners.

4.9. Task 9: Site history report

A site history report will be prepared that summarizes the background research completed for the site. Specifically, the report will include a summary of : completion of the NRC file search; acquisition of design drawings of the current on-site buildings; acquisition of plans describing Nassau County DPW pump and treat system; interviews of former facility employees and companies involved in the construction of the additions at the rear of the Air Techniques and Gilbert Displays buildings, and information detailing the processes formerly used on-site, what materials were used in performing the process; areas where wastes may have been generated, containment areas, and areas used for laboratory experimentation. In addition, the site history report will summarize the results of a literature search regarding background metals concentrations in the site vicinity. The site history report will be presented with the final report

5. Data validation and interpretation

Data will be validated according to NYS Analytical Services protocols in accordance with the quality assurance project plan (QAPP) provided as Appendix E to the work plan.

Analytical reporting requirements are presented as Attachment A of the QAPP. The proposed reporting requirements have been developed in recognition of NYS Analytical Services protocols and data validation requirements to verify the accuracy and precision of data acquired during the collection and analysis of environmental samples.

6. Human health assessment

Exposures to Radiouclides

The results of the radiological survey, soil investigation, and ground water investigation programs will be used to evaluate the potential risk to human health based on the exposure pathways described in the conceptual site model. That portion of the human health assessment dealing with radionuclides will be administered by a qualified health physicists.

Ground water data may be modeled using an applicable modeling program such as the USGS USEPA ATD123 (three-dimensional ground water transport model) to evaluate the potential for process residuals related to site usage by GTEOSI's predecessor companies to migrate to drinking water wells downgradient of the site. RESRAD, a US Department of Energy microcomputer program designed to derive site-specific soil cleanup guidelines for radionuclides, will be used to assist in evaluating the exposure levels for identified receptors, relative to the NYSDEC guidance exposure limit of 10 millirems/year above background.

Exposures to Organics

Conventional USEPA risk assessment methods, as presented in *Risk Assessment Guidance for Superfund (USEPA 1989)* will be used to evaluate potential exposures to chlorinated solvents (e.g. conceptual PCE) and petroleum constituents (benzene, toluene). As seen in the site model (Figure 3-1), exposure pathways for ground water, soil, and indoor air organics are believed to be incomplete. Therefore, on a preliminary basis, it is not anticipated that exposures to organics will be quantified at the site. Potential exposures to off-site ground water receptors will be evaluated, if there is sufficient evidence to conclude that site-related compounds of potential concern (COPCs) may impact domestic water supplies.

7. Report preparation

Three types of reports are currently anticipated:

1. Interim Technical Memorandum
2. Monthly progress reports, and;
3. Final investigation summary report.

The Interim Technical Memorandum (ITM) was completed in March 1998 and is included as Exhibit A. The ITM presented the methods and results of the GPR survey and the exterior radiation survey which were conducted in November/December 1997.

Monthly progress reports will be include requirements outlined in Section II of the Voluntary Cleanup Agreement.

The final investigation summary report will be submitted to the NYSDEC and other involved regulatory agencies presenting the results and conclusions of the investigation. The final report will structured in a manner consistent with a typical RI-type report to substantiate the quality and thoroughness of the investigation. The report will include the following types of information:

- updated site description
- site maps
- field investigation results
- chemical analyses
- health and environmental risk assessment
- conclusions of the investigation
- remedial objectives
- data validation
- certification of performance.

8. Project organization

Key project individuals and lines of communication are shown in the organization chart. The resumes of key individuals are provided as Appendix F. Resumes for the quality assurance officer, soil vapor survey personnel, and data validator were previously provided to NYSDEC and approved by NYSDEC on 5/11/98.

GTEOSI

O'Brien & Gere will report to Alvin Ludwig, GTEOSI Vice President, Controller, throughout the investigation and act at his direction. It is presumed that Mr. Ludwig will perform the following:

- obtain access agreements from current Site owners
- provide comments on draft reports and approve final project reports
- act as the primary interface with NYSDEC
- negotiate and secure the Voluntary Cleanup Program Agreement
- approve changes to the scope of work and schedule
- administer the overall project on behalf of GTEOSI

O'Brien & Gere will support Mr. Ludwig in the performance of the above activities at his discretion. It is assumed that Ms. Jean Agostinelli, GTEOSI, will assist Mr. Ludwig. In turn, O'Brien & Gere will report to Ms. Agostinelli in Mr. Ludwig's absence and at his direction.

Project Officer

Swiatoslav W. Kaczmar, Ph.D., CIH, will act as Project Officer on behalf of O'Brien & Gere. As Project Officer, it is Dr. Kaczmar's responsibility to review, approve, and sign any reports issued by O'Brien & Gere, certify that work was performed in accordance with the work plan, allocate staff

and other resources to the project, and review and administer subcontracts. Dr. Kaczmar will also act as the Director of Health and Safety.

Project Manager

Jeffrey E. Banikowski, CPG, LSP, will act as Project Manager. As Project Manager, Mr. Banikowski will have responsibility for the implementation and completion of each of the tasks identified in the work plan. Mr. Banikowski will manage the technical and administrative aspects of the project, function as the firm's principal client contact, and interface with regulatory agencies at GTEOSI's direction. The data management, data validation, and geographic information system support team will also report directly to Mr. Banikowski throughout the project. Within O'Brien & Gere, Mr. Banikowski will report to Dr. Kaczmar.

Field Operations Supervisor

The Field Operations Supervisor will be responsible for day to day field operations. Mr. Tim Eddy, P.H., acting in this capacity, will oversee soil coring operations, sample collections, mobilization and demobilization activities, and overall in-field coordination with subcontractors, regulatory agencies, and property owners.

Mr. Eddy is a trained health physics technician (Navy Nuclear Power School) and a certified professional hydrogeologist (certificate #96-HG-1134). Mr. Eddy will be able to perform multiple on-site functions in his role as Field Operations Supervisor. Mr. Eddy joined O'Brien & Gere in 1989.

*Radiation Safety Officer/Industrial Hygienist/*Risk Assessor

Thomas Lavoy, CHP, will act as project Radiation Safety Officer. Mr. Lavoy's responsibilities include: oversight of radiation health and safety, review and interpretation of sample analyses related to radionuclides, preparation of that portion of the human health risk assessment that addresses nuclides, operation of the Department of Energy's RESRAD program (Version 5.0), and representing GTEOSI in matters of radiation and health physics. Mr. Lavoy will report to the Project Manager. If necessary, Mr. David Wilson, CIH, will be available to assist Mr. Lavoy in the performance of his duties relative to an indoor radiation survey.

Mr. Aamer Raza, an experienced risk assessor, will be responsible for preparation of that portion of the risk assessment dealing with chemical risk.

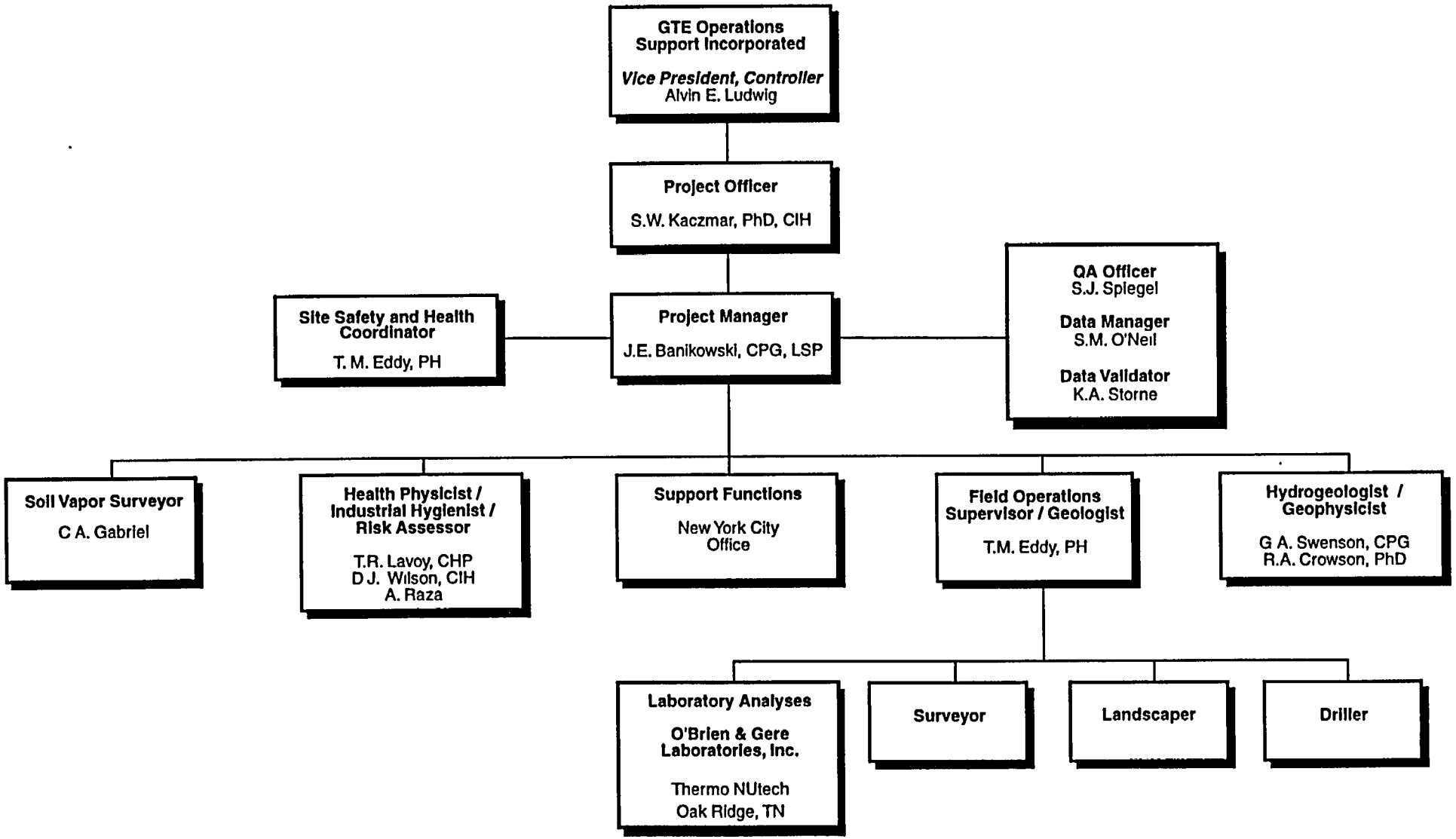
Site Safety and Health Coordinator (SSHC)

A SSHC will be assigned to the project on a full-time basis in large part because of required air monitoring and Site control activities presented in the Health and Safety Plan (Appendix C). The SSHC will report to the Project Manager and, in matters of health physics, both the Radiation Safety Officer and Project Manager. The SSHC will conduct daily health and safety briefings with Site workers, when appropriate to review health and safety procedures prior to each day's work activities. The SSHC will also review decontamination protocols, perform air monitoring, and maintain health and safety records. Because non-invasive activities may not require full-time health and safety services, the SSHC will also be assigned to assist the Field Operations Supervisor.

Figure 8-1

PROJECT ORGANIZATION CHART

Voluntary Cleanup Program
Former Sylvania Electric Products Incorporated Facility
GTE Operations Support Incorporated



A228TE fh5/clm/110497

9. Schedule

An aggressive schedule reflecting GTEOSI's desire to address environmental issues associated with site involvement by GTEOSI's predecessor companies is presented as Figure 9-1 . The schedule assumes access to the site and adjacent golf course driving range can be achieved in a timely fashion. The schedule further assumes that a regulatory vehicle such as a Voluntary Cleanup Agreement will be finalized between GTEOSI and NYSDEC in the near future. The schedule has been developed in the belief that it is in the best interests of both GTEOSI and New York State to investigate the site to the extent of GTEOSI's involvement as expeditiously as possible. For this reason, GTEOSI offers this schedule for regulatory examination and, barring any unforeseen circumstances that would cause delay, commits to its implementation.

References

Eder Associates (1996) Product Recovery System. Nassau County Department of Public Works.

EEA, Inc. (1991) Environmental Investigation of 140 Cantiague Road (currently Gilbert Displays)

Eckhardt, D.A.V., W.J. Flipse, Jr., E.T. Oaksford, 1989. Relation Between Land Use and Ground water Quality in the Upper Glacial Aquifer in Nassau and Suffolk Counties, Long Island, New York, U.S. Geological Survey, Water Resources Investigations Report 86-4142.

ERM-NE (1987) Subsurface Investigation. Air Techniques

ERM, Northeast (1997) Summary Report of Ground Water Monitoring Program- Air Techniques Facility

ES&E (1996). NCDPW Garage. Site Investigation

Freeze, R.A. and Cherry, J.A. (1979) Groundwater.

GTEOSI (1996) Data Supplied by GTEOSI Operations Support Inc. Former Sylvania Site, Hicksville, NY.

GTEOSI (1996) Letter of Response From GTEOSI to the NYSDEC Region 1 Request for Information Letter, Regarding the Former Sylvania Site, Hicksville, NY.

Ibister, J. (1966) Geology and Hydrology of Northeastern Nassau County, Long Island, New York. Geologic Survey Water - Supply Paper 1825.

Kilburn, C., (1979). Hydrogeology of the Town of North Hempstead, Nassau, Long Island, New York, Long Island Water Resources Bulletin 12.

NRC (1994) Review of Nuclear Element Production License by the Nuclear Regulatory Commission.

NRC (1996) Inspection Report Number 070-00097/96-001. Gilbert Displays, Inc. (former Sylvania Facility)

NRC (1997) Survey of Public Area Adjacent to the Former Sylvania, Inc. Facility, Hicksville, NY. Letter from NRC to the NYSDEC Region I.

NYSDEC (1997) Division of Environmental Remediation. Proposed Remedial Action Plan, Operable Unit No.1 - Soils, Hicksville, New York, January 1997.

NYSDEC (1997) Handout at Meeting with O'BRIEN & GERE and GTEOSI. Topic: Preliminary Radionuclide Data for Soils at the Former Sylvania Site, Hicksville, NY.

NYSDEC PRAP (1997). General Instrument Corporation. Hicksville, NY.

NYCDOH (1991) Site Information.

NYSDEC O'Brien & Gere Engineers, Inc (1998), Interim Technical Memorandum, Exterior Radiation Survey and Ground Penetrating Radar Survey Results, Former Sylvania Electric Products Facility, Hicksville, NY.

Peterson, D.S. (1987). Recharge rates in Nassau and Suffolk Counties, New York, U.S. Geological Survey, Water Resources Investigations Report 86-4181.

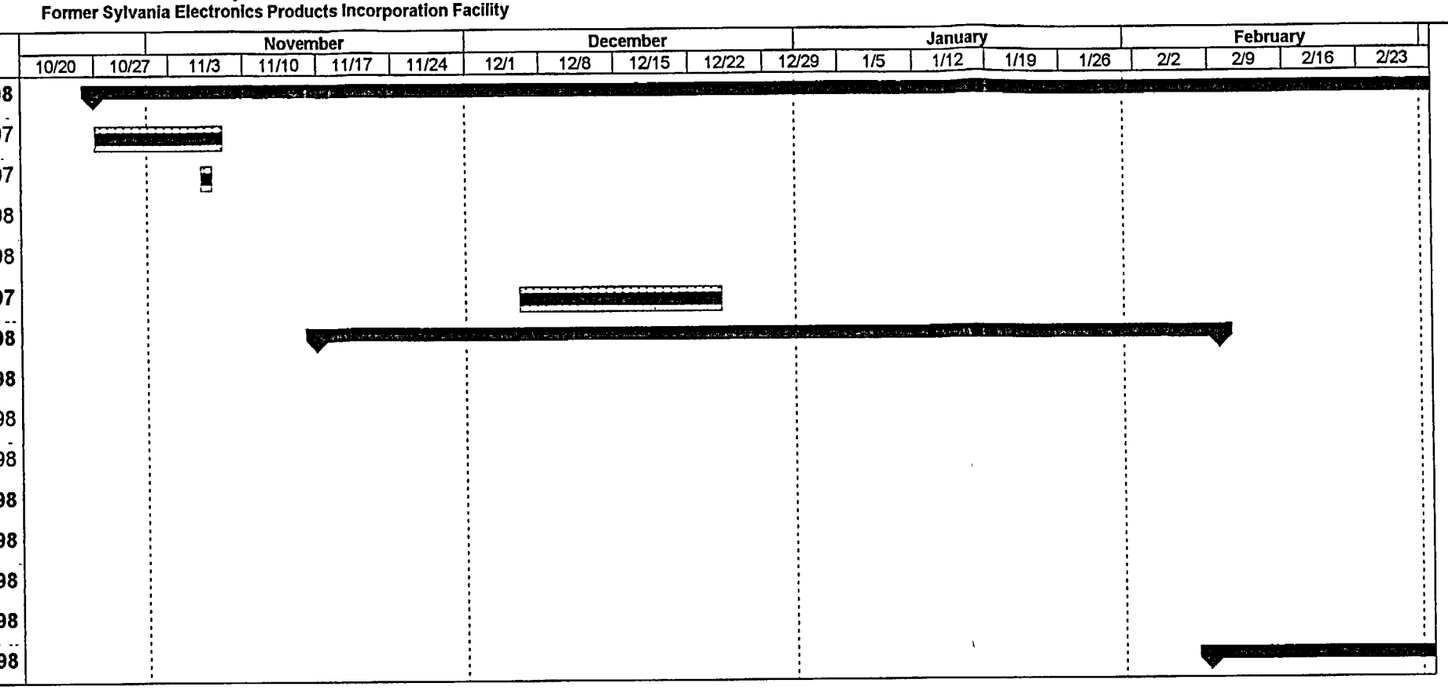
Smolensky, D.A and S.M. Feldman. (1988) Geohydrology of the Bethpage - Hicksville - Levitown Area, Long Island, New York, Water Resources Investigations Report 88-4135.

Stearns and Wheler (1992), Remedial Investigation, General Instrument Corporation, Hicksville, New York, January 1992.

US DOE (1979) Department of Energy Report. Letter to the NRC Regarding Radionuclide Data for the Former Sylvania Site in Hicksville, NY.

Figure 9-1
Project Schedule
Former Sylvania Electronics Products Incorporation Facility

ID	Task Name	Duration	Start	Finish
1	**1.0 Project Planning**	**168d**	**10/27/97**	**6/15/98**
2	1.1 Completion of the environmental assessment form	2w	10/27/97	11/7/97
3	1.2 Site Visit	1d	11/6/97	11/6/97
4	1.3 Finalization of Application and Work Plan	14.2w	3/9/98	6/15/98
5	1.4 NYSDEC Approval of Application and Work Plan	1d	6/15/98	6/15/98
6	**2.0 Ground Penetrating Radar Survey**	**3w**	**12/6/97**	**12/24/97**
7	**3.0 Radiation Survey**	**63d**	**11/17/97**	**2/9/98**
10	**4.0 Mobilization**	**20d**	**6/16/98**	**7/13/98**
11	4.1 Execute property access agreements	4w	6/16/98	7/13/98
12	4.2 Subcontracting	2w	6/16/98	6/29/98
13	**5.0 Survey**	**2w**	**7/14/98**	**7/27/98**
14	**6.0 Surface and Subsurface Soil Investigation**	**30d**	**7/28/98**	**9/7/98**
17	**7.0 Ground Water Investigation**	**30d**	**6/16/98**	**7/27/98**
20	**8.0 Restoration of Surfaces**	**2w**	**9/8/98**	**9/21/98**
	9.0 Report preparation activities	**219d**	**2/9/98**	**12/10/98**



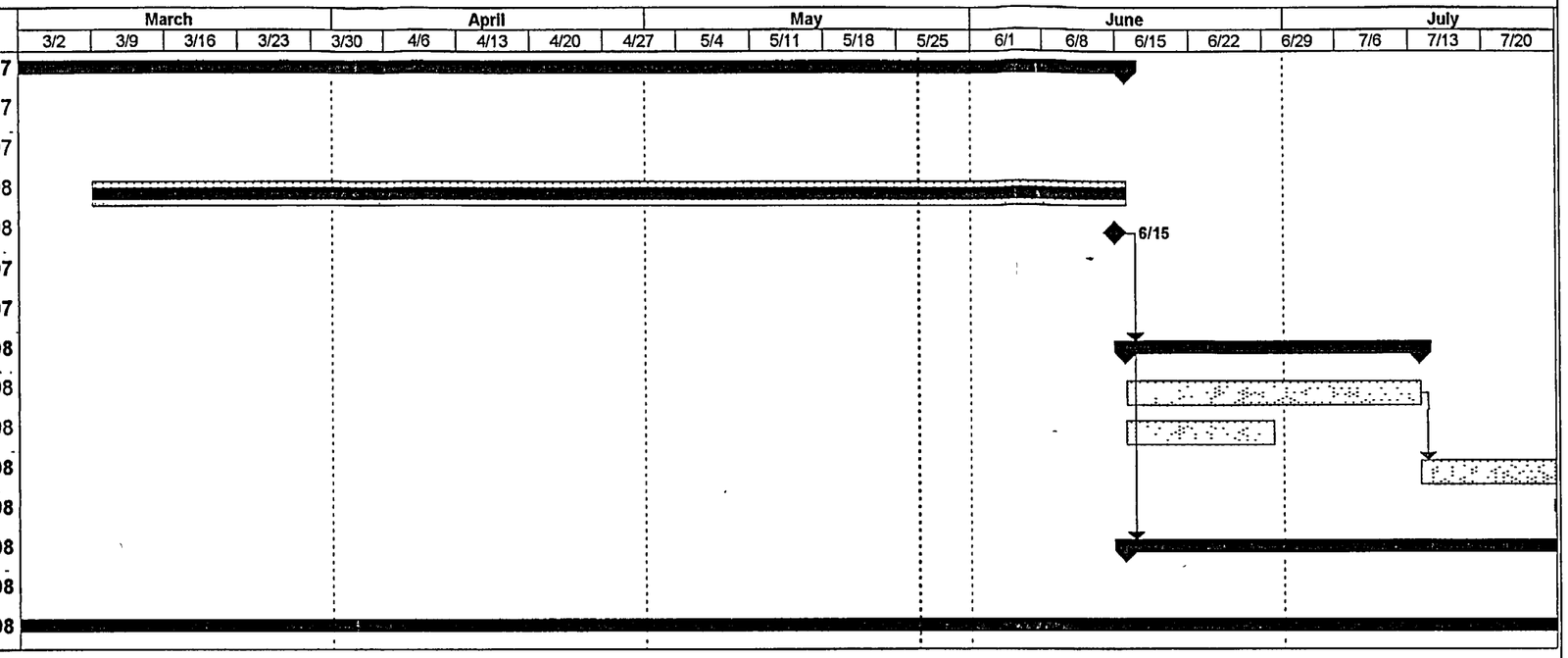
Pr Former Sylvania Products, Inc
D /13/98 Revised 5/27/98

Task | Milestone | Rolled Up Task | Rolled Up Progress
Progress | Summary | Rolled Up Milestone

I.\DIV82\PROJECTS\5816009\4_NOTES\GTE4.MPP 5/27/98

Figure 9-1
Project Schedule
Former Sylvania Electronics Products Incorporation Facility

ID	Task Name	Duration	Start
1	**1.0 Project Planning**	**168d**	**10/27/97**
2	1.1 Completion of the environmental assessment form	2w	10/27/97
3	1.2 Site Visit	1d	11/6/97
4	1.3 Finalization of Application and Work Plan	14.2w	3/9/98
5	1.4 NYSDEC Approval of Application and Work Plan	1d	6/15/98
6	**2.0 Ground Penetrating Radar Survey**	**3w**	**12/6/97**
7	**3.0 Radiation Survey**	**63d**	**11/17/97**
10	**4.0 Mobilization**	**20d**	**6/16/98**
11	4.1 Execute property access agreements	4w	6/16/98
12	4.2 Subcontracting	2w	6/16/98
13	**5.0 Survey**	**2w**	**7/14/98**
14	**6.0 Surface and Subsurface Soil Investigation**	**30d**	**7/28/98**
17	**7.0 Ground Water Investigation**	**30d**	**6/16/98**
20	**8.0 Restoration of Surfaces**	**2w**	**9/8/98**
21	**9.0 Report preparation activities**	**219d**	**2/9/98**



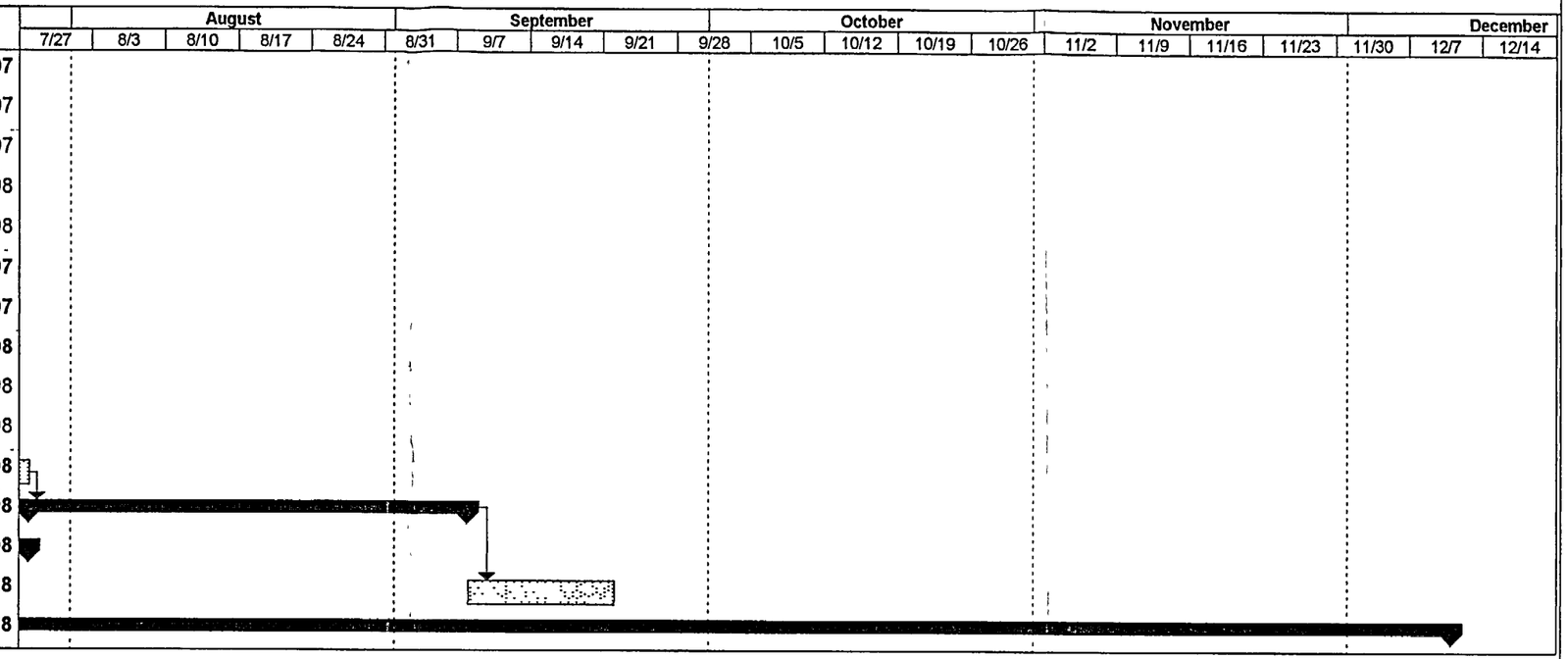
Project: Former Sylvania Products, Inc
Date: 3/13/98 Revised 5/27/98

Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Milestone | Rolled Up Progress

I:\DIV82\PROJECTS\5816009\4_NOTES\GTE4 MPP 5/27/98

Figure 9-1
Project Schedule
Former Sylvania Electronics Products Incorporation Facility

	Task Name	Duration	Start
1	**1.0 Project Planning**	**168d**	**10/27/97**
2	1.1 Completion of the environmental assessment form	2w	10/27/97
3	1.2 Site Visit	1d	11/6/97
4	1.3 Finalization of Application and Work Plan	14.2w	3/9/98
5	1.4 NYSDEC Approval of Application and Work Plan	1d	6/15/98
6	**2.0 Ground Penetrating Radar Survey**	**3w**	**12/6/97**
7	**3.0 Radiation Survey**	**63d**	**11/17/97**
10	**4.0 Mobilization**	**20d**	**6/16/98**
11	4.1 Execute property access agreements	4w	6/16/98
12	4.2 Subcontracting	2w	6/16/98
13	**5.0 Survey**	**2w**	**7/14/98**
14	**6.0 Surface and Subsurface Soil Investigation**	**30d**	**7/28/98**
17	**7.0 Ground Water Investigation**	**30d**	**6/16/98**
20	**8.0 Restoration of Surfaces**	**2w**	**9/8/98**
21	**9.0 Report preparation activities**	**219d**	**2/9/98**



Project: Former Sylvania Products, Inc
Date: 3/13/98 Revised 5/27/98

Task | Milestone | Rolled Up Task | Rolled Up Progress
Progress | Summary | Rolled Up Milestone

I:\DIV82\PROJECTS\5816009\4_NOTES\GTE4 MPP 5/27/98

APPENDIX A

Geology and Hydrogeology
Former Sylvania Electric Products Incorporated Facility
Hicksville, New York

Geology and Hydrogeology

Regional Geology

The regional geologic setting in the Nassau County area consists of unconsolidated geologic deposits overlying bedrock (Kilburn 1979). The unconsolidated deposits consists of residual or weathered bedrock, and sand, silt, clay, and gravel of alluvial or glacial origin. The unconsolidated deposits are subdivided into stratigraphic or geologic units based on like characteristics, such as grain size distribution, sorting, porosity, composition of grains, and any other unique characteristics. Boundaries between unconsolidated geologic units are often marked by unconformities. An unconformity is an interruption in the continuity of a depositional sequence that represents a period in the geologic past of non-deposition or erosion. Geologic units on opposite sides of an unconformity are often physically very different.

Bedrock Geology

The bedrock underlying Long Island is Precambrian to lower Paleozoic in age (700 million years to 500 million years before present). The bedrock geology predominately consists of schist and gneiss with igneous intrusions. A schist is a strongly foliated crystalline rock of metamorphic origin. The bedrock is known to have some fractures; however, the fractures are not considered significant within the regional hydrogeology because of relatively low fracture permeability in comparison to the unconsolidated deposits. A highly weathered zone of approximately 50 feet exists at the top of the bedrock. This zone contains various colored clays and sandy clay mixed with partly decayed rock and mineral fragments. The bedrock surface slopes at approximately 62 ft/mile toward the southeast, and ranges from 160 feet below sea level at the north shore of Nassau County, to approximately 900 feet below sea level in the vicinity of the site (Kilburn 1979).

Regional Hydrogeology

Four major aquifers exist within the unconsolidated deposits which underlie Nassau County. The aquifers are the Lloyd aquifer, the Magothy aquifer, the Port Washington aquifer, and the upper glacial aquifer. Across section and ground water flow map of regional aquifers is shown in Figure A-1 (Smolensky and Deldman 1988).

Lloyd Aquifer

The Lloyd Aquifer rests unconformably on bedrock. The bedrock is relatively impermeable and can be considered the base of the hydrogeologic system (Smolensky and Deldman 1988). The Lloyd Aquifer lies about 900 ft below land surface and is estimated to be 300 ft thick. The Lloyd Aquifer is confined as it underlies a clay unit, the Raritan confining unit. The aquifer reportedly has low to moderate permeability and an average horizontal conductivity of 40 ft/day.

Port Washington Aquifer

The Port Washington Aquifer rests unconformably upon bedrock in northern Nassau County and abuts late Cretaceous age (100 million years ago to 65 million years before present) hydrogeologic units to the south (Stearns & Wheler, 1992).

Magothy Aquifer

The Magothy Aquifer is the principal source of fresh water on Long Island. The aquifer is approximately 600 ft thick and lies about 85 ft bls. Due to high concentrations of clays in the upper portions of the Magothy Aquifer, groundwater is more efficiently withdrawn near the base of the aquifer. As a result, most public water supply wells are screened in the lower Magothy Aquifer. A map indicating the surface elevation of the Magothy aquifer is shown in Figure A-2. The Magothy Aquifer is considered moderately permeable to highly permeable, and has an average hydraulic conductivity of 50 ft/day (Smolensky and Feldman 1988).

Upper Glacial Aquifer

The upper glacial aquifer is the uppermost hydrogeologic unit on Long Island and forms the present day land surface. The thickness is approximately 85 ft with the upper 10 ft consisting or fill and recent deposits. .The upper glacial aquifer is nearly continuous across Long Island. Therefore, almost all recharge must infiltrate through the upper glacial aquifer to reach the lower aquifers. Almost all recharge originates from the precipitation that Long Island receives. Nearly half of the 44 inches per year average precipitation infiltrates through the upper glacial aquifer to recharge groundwater. The upper glacial aquifer is higher permeable and has a hydraulic conductivity that ranges from 130 feet/day in north-central Long Island, to 270 feet/day and higher in the southern part of Long Island (Eckhardt, Flipse, and Oaksford 1989).

The four aquifers are hydraulically interconnected to varying degrees. The connection of adjacent hydrogeologic units is controlled by their water-bearing properties and by the groundwater flow dynamics. Groundwater flows from areas of high pressure or hydraulic head to areas of low pressure or hydraulic aquifer is separated from the Magothy Aquifer by the Raritan confining unit. The Raritan confining unit has a very low hydraulic conductivity, yet it does not completely prevent the migration of groundwater between the Lloyd and Magothy aquifers (Kilburn 1979). It is possible that the Lloyd Aquifer is hydrogeologically connected with the adjacent Port Washington Aquifer (Smolensky and Feldman 1988). The Port Washington Aquifer is believed to be in close hydraulic communication with the adjacent Lloyd and Magothy aquifers. The Port Washington Aquifer also forms part of the valley fill deposits in the channels cut by Pleistocene rivers. The valley fill deposits can act as groundwater flow paths that increase the hydraulic connection between aquifers (Kilburn 1979).

The regional groundwater flow on Long Island is separated by a groundwater divide which trends east/west along the north-central portion of Long Island. All groundwater north of the divide discharges into Long Island Sound, and all groundwater south of the divide discharges into Great South Bay (Kilburn 1979).

ATTACHMENT A

Soil boring log

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING
Client: GTE Operations Support Inc Former Sylvania Electric Products Incorporated Facility, Proj. Loc: Hicksville, NY File No.: 5618	Drill Method: Sampler: Hammer: Fall:	Page 1 of 1 Location: Start Date: End Date:
Boring Company: Foreman: Drill Rig: OBG Geologist:		Screen = Riser Steel // \ Grout Sand Pack Bentonite

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing PID (ppm)	

Notes:

ATTACHMENT B

Soil gas sampling protocol

Contents

B.1. Target parameters 1
B.2. Working linear range 1
B.3. Detection limits 1
B.4. Sample matrix 2
B.5. Principle, scope and application 2
B.6. Interferences and coeffective actions 2
B.7. Safety precautions 3
B.8. Sample size, collection, preservation, and handling 3
B.9. Apparatus and materials 5
B.10. Routine preventative maintenance 5
B.11. Reagents and calibration standards 6
B.12. Calibration procedures 6
B.13. Sample preparation 7
B.14. Analytical measurements 7
B.15. Data treatment 10
B.16. Data deliverables 11
B.17. Quality control requirements 12
B.18. References 13
B.19. Method validation data 13

This SOP provides general guidance for the performance of soil vapor survey's using portable gas chromatographic analysis. Procedures listed herein may be altered based on the professional opinion of the field team leader, in conjunction with the client, and regulatory agency.

B.1. Target parameters

Target parameters are selected on a case by case basis. Compounds which can be readily detected include those in a USEPA Method 8260 scan.

B.2. Working linear range

A Photovac 10S70 portable gas chromatograph (GC) equipped with a CPSIL-5 capillary column, isothermal column oven and 10.6 eV photoionization detector will be used to complete the analysis of samples and standards. The working linear range, based on past studies, of the Photovac for parameters commonly measured is 0.010 to 1,000 parts per million by volume (ppm/v).

B.3. Detection limits

Detection limits for the commonly measured analytes is 0.010 to 0.025 ppm/v.

The detection limit for each target parameter will be calculated by placing the conservative minimum area which can be integrated by the GC, in this case 50 millivolt seconds (mvs), into the linear regression equation developed for each.

B.4. Sample matrix

Soil vapor.

B.5. Principle, scope and application

Principle: Soil vapor sampling is a screening technique used to locate and semi-quantitatively identify the concentration and chemical composition of subsurface volatile organic compounds (VOCs). VOCs present in soil or ground water tend to volatilize into the vapor phase and migrate within the vadose zone. A soil vapor sample is therefore a measure of the volatile vapors present in the soil pore space of the zone (depth) being sampled. Soil vapor samples are not designed to provide a direct measure of a given volatile component in soil or ground water, rather they provide a basis for evaluating the relative concentration of VOCs present in the vadose zone in a given area of study.

Scope and application: Soil vapor surveys are performed to delineate the spatial distribution and tentatively identify the chemical composition of VOCs in the shallow vadose zone (3 to 12 feet).

B.6. Interferences and coeffective actions

Some common interferences encountered in the collection of soil vapor samples include moisture and insufficient soil porosity. To avoid interferences associated with moisture in a sample, soil vapor samples will be collected from a depth of at least 2 feet above the capillary fringe. In areas where shallow ground water conditions are encountered (< 2 feet), no sample will be collected. To measure the soil porosity, a vacuum gauge may be placed in-line during sample collection. This method will only be used if resistance is noted during retrieval of the samples. If a vacuum reading of greater than 15 mm Hg is obtained at any location a second sample point should be installed and sampled.

A common interference associated with analysis of soil vapor samples is coelution of sample peaks. To minimize problems associated with

coelution of sample peaks, instrument setup parameters are chosen which will provide good separation for indicator chemicals. For this application, a carrier flow rate of 10 cc/min and column oven temperature of 40 degrees Celsius have been selected. The chosen flow rate and oven temperature have, in the past, shown to provide good separation for the target parameters selected.

B.7. Safety precautions

Level D protective equipment is generally worn during collection of soil vapor samples. If site conditions warrant, personal protective equipment should be upgraded in accordance with the site Health and Safety Plan. The electric impact hammer used to install the sample probes will not be operated in steady rains to avoid electrocution.

B.8. Sample size, collection, preservation, and handling

Sample size: A One liter of vapor sample will be collected in a tedlar bag from each location using a vacuum box and manual pump. Further detail is provided in the following section.

Sample collection: Soil vapor samples are collected in the following step-wise manner.

a. A length of 3/16 inch OD teflon tubing is seeded into the threaded end of a 3 inch slotted aluminum shield point.

b. The teflon tubing/shield point assembly is fed through a hollow hardened steel sampling probe (3 feet by 3/4 inch).

c. The probe is driven to the desired depth of sampling using a hand held, electric impact hammer (Bosch Model #11209), powered by a portable generator (2500 to 3500 watt).

d. The hardened steel probe is retracted 3 to 6 inches, using a manual jack, to expose the vapor intake slots of the shield point.

e. A six to eight inch length of tygon tubing (0.12 inch ID) is placed onto the end of the teflon tubing extending out from the sampling probe. The tygon tubing is then fed through a pinching shut off valve.

f. A vacuum box containing a 1 liter tedlar bag is connected to the tygon tubing and approximately 25 volumes of vapor are purged from the system to minimize ambient air contributions to sample results. The purging is completed by pumping vapor into a 1 liter tedlar bag dedicated to purging and closing off flow to the tubing using a tubing shutoff valve. The purge vapor is then released to the atmosphere. For this application, approximately 500 ml of vapor will be purged from the sample train prior to collection of a sample. The length of teflon tubing will be approximately 6 feet, with and inside diameter of 1/8 inch, resulting in a dead space volume of approximately 15 ml.

g. After the purging is completed, a new sample bag, dedicated for the individual sample is attached to the vacuum box and filled with vapor sample.

h. The sample bag is transported by the field technician to the on-site GC laboratory for direct injection into the GC.

i. A 100 μl gastight syringe is used to extract an aliquot of sample from the tedlar bag. The plunger of the 100 μl syringe is drawn back to fill the syringe and the vapor sample injected directly into the GC for analysis.

j. Prior to collection of a subsequent sample, the hardened steel probe is removed from the ground and decontaminated. Decontamination consists of washing the probes with a soapy water solution and rinsing with distilled water. Decontamination fluids will be containerized for future disposal or treatment.

Sample preservation: After collection, the tedlar bags are placed in a cooler to minimize photodegradation.

B.9. Apparatus and materials

A Photovac 10S70 portable GC equipped with a CPSIL-5 CB capillary column, isothermal column oven and 10.6 eV photoionization detector (PID) will be used to complete the analyses. The column and pre-column are constructed of 530 micron wide-bore fused silica capillary with lengths of 10 and 1 meter, respectively. The isothermal column oven is capable of operating in the range of 30 to 50 degrees Celsius. The PID is capable of efficiently ionizing compounds with ionization potentials less than or equal to 10.6 eV. Partial ionization of compounds with ionization potentials greater than 10.6 eV will occur, but sensitivity to these compounds will be poor. The GC setup parameters are as typically follows:

a. carrier gas flow rate = 10 cc/min
b. column oven temperature = 40 degrees Celsius
c. backflush time = 90 seconds
d. analysis time = 600 seconds
e. minimum area = 50 mvs
f. chart speed = 0.5 cm/min

The GC is interfaced with a CompuAdd 320nx laptop computer. The interface allows the GC to be operated through the computer keyboard and all chromatograms and accompanying data to be automatically downloaded to disk, providing a backup copy of all data. The remaining equipment and materials utilized to complete a soil vapor survey are summarized on the attached equipment checklist.

B.10. Routine preventative maintenance

The GC is maintained in the following manner:

a. The GC is sent to the manufacturer quarterly for a "tune up".

b. In between jobs, the GC is plugged in to maintain the charge of the internal battery and the carrier gas reservoir is filled at all times to maintain a flow of gas through the column.

c. Prior to mobilization to the site for field work, a four point calibration will be completed for each indicator chemical to evaluate instrument performance and establish retention time windows for each calibrant.

d. The UV lamp of the GC is removed, cleaned and retuned prior to initiation of each job. The lamp is cleaned by wiping the lense using a soft cloth or Kim wipe dampened with methanol. The lamp is tuned by removing the lamp housing cover and adjusting the lamp tune knob until the lamp shines brightest. The instrument is then turned off, the cover replaced and the instrument turned back on.

e. The GC column is flushed out prior to initiation of each job. The flushing is completed by filling the carrier gas reservoir, turning up the carrier flow rate to approximately 40 cc/min and allowing the instrument to run overnight. During the column flushing the column oven is set to 50 degrees Celsius to aid in driving off any residual VOCS.

B.11. Reagents and calibration standards

Standards are prepared in 1 liter tedlar bags. An aliquot of a 5000 μg/ml standard in methanol, obtained from Supelco, is injected into a tedlar bag and allowed to come to equilibrium in the vapor phase. A 100 μl gastight syringe is used to extract an aliquot of gaseous standard from the tedlar bag for injection into the GC. No shelf life has been established for standards prepared by this method, therefore standards prepared in this manner are prepared each day.

B.12. Calibration procedures

The GC calibration consists of two components, 1) initial calibration and 2) continuing calibration.

Initial calibration: Prior to initiation of field activities a four point calibration will be completed for each target analyte. Included will be a zero level standard or method blank and three concentration levels of each indicator chemical. Typical concentrations used for the initial calibration are 0, 0.1, 0.2 and 0.5 ppm. The quality control criteria for initial calibration is an R-squared value of $\geq$ 0.95.

Continuing calibration: A mid-level (mid-point) calibration will be performed at the start of each day and every ten environmental samples to account for changes in instrument response throughout the study period. If a mid-level standard exhibits a relative percent difference (RPD) of ≥ 30%, an initial calibration will be performed.

B.13. Sample preparation

No sample preparation is required.

B.14. Analytical measurements

General: A Photovac 10S70 portable GC will be used to complete the analysis of samples and standards. The output from the Photovac is a series of peaks on a chromatogram. An injected sample first passes through a 1 meter pre-column. Compounds which have not cleared the pre-column within 90 seconds, are backflushed from the system. The remaining portion of the sample passes through the analytical column and is separated based on molecular size, structure and polarity. When each component of a sample reaches the 10.6 eV light source, they are ionized. This ionization causes a increased voltage to be measured by the detector, which causes a deflection in the plotter pen. The amount by which the pen deflects is proportional to the number of ionized particles hitting the detector, and the concentration of a given component in the sample. Peaks observed in a sample run are identified based on retention time comparison to standards. Sample peaks which are consistent with standards, on the basis of retention time, are quantified using the corresponding calibration equation. Sample peaks which are not consistent with standards are grouped and labeled "Other VOCS".

Instrument setup: The following steps are taken to setup the instrument at the start of the analysis period.

a. The carrier gas regulator is connected to the gas cylinder using a large crescent wrench.

b. The quick connect end of the regulator is attached to the fill port located in the upper right corner of the GC.

c. The valve of the cylinder is opened by turning counter clockwise and the internal cylinder of the GC is filled with 1700 psi of ultra high purity nitrogen or ultra pure air (99.999%).

d. The bleeder valve of the regulator is then rotated 90 degrees to release the gas within the fill line and the quick connect is disconnected. A full internal cylinder allows for operation of the GC for approximately twelve hours at a flow rate of 10 cc/min.

e. The power cord of the GC is plugged into an AC outlet supplying 100 amps. In cases where AC power is not available, the GC is powered by a portable generator of 1500 watts or greater.

f. The GC is turned on by depressing the <*ON*> key on the GC control panel.

g. The laptop computer is then interfaced with the GC using a serial communications cord. The cord is attached to the 10 prong female serial port of the computer and to the five prong serial port of the GC, located in the lower left corner of the GC control panel.

h. The computer is turned on and PC Dandi software is loaded from the hard drive.

i. The <Phone> key of the GC, located in the upper left corner of the GC control panel, is depressed and the arrow keys of the GC are toggled until the "systems Operation" mode is displayed.

j. The <arrow> keys are again used to toggle until "local and remote" are displayed. The < enter > key on the GC control panel is then depressed and the GC is linked to the computer. When the link is established a message appears on the computer and GC displays which reads "remote link established".

k. When a message appears that reads "ready enter command" the GC is ready for operation.

l. The AC adapter for the isothermal column oven is plugged into the GC control panel and plugged into an AC or generator. The GC is allowed to come up to temperature for a period of approximately 15 minutes.

m. The computer keyboard is then used to operate the GC. The PC Dandi menu is toggled through using the < insert > and < delete > keys of the computer.

n. The <delete> key is depressed twice to enter the PC Dandi menu heading "DISK". The down arrow key of the computer is then used to toggle to the "autosave" selection. The <enter> key is depressed once so the screen reads "autosave ON". This allows each chromatogram to be automatically saved to disk.

o. The <delete> key is then used to toggle to the "COMMAND" heading of the PC Dandi menu. The down arrow key is used to toggle to various functions within the "COMMAND" heading. After toggling to the selection of choice, the < enter> key is depressed and a default value appears. To select the value desired, the <arrow> keys are used and to save the selected value the <enter> key is depressed. Commands which must be set prior to completing any analyses include: 1) "Gain" 100; 2) "Use" to set the date and time to appear on chromatograms; 3) "Chart Speed" 0.5 cm/sec; 4) "Sensitivity", slope up = 16, slope down= 16, power at 4 minutes = 6; 5) "Minimum Area" = 50 mvs; 6) "Cycle", cycle time = 0, analysis time = 600 seconds; 7) "Event", event 1 - on at = 8 seconds, off at = 10 seconds, event 3 - on at = 0 seconds, off at = 90 seconds. Event 1 sets the time for the internal pump to turn on and off in relation to initiation of an analysis. The pump is used as a timing mechanism for injection. Event 3 sets the time period during which the instrument will operate in backflush mode. To list all instrument setup parameters, use the arrow keys to toggle to "List" within the "Command" heading and depress the <enter>

Chromatogram organization: Upon completion of an analysis, a hard copy of the chromatogram and associated data is produced by the GC pen plotter. The following steps are taken to archive each chromatogram.

a. The chromatogram is cut from the paper roll using scissors and taped onto a chromatogram report sheet.

b. The information on the chromatogram report sheet is filled out. Information on each chromatogram report sheet includes sheet number, client or site name, sample name, sample depth, date, collection time, instrument gain, sample injection volume, analyst, instrument detector, instrument column, carrier gas, carrier gas flow rate an backflush time. A space is also provided where comments can be written about a sample as necessary.

B.15. Data treatment

Chromatogram data are first input to a worksheet file. A linear regression is performed on calibration data for each standard to develop an equation relating peak area to concentration. The equation used to calculate the calibration equation for each standard follows.

X = peak area, Y = Standard concentration

Y' = a + bx, where Y'= sample concentration, a = Y intercept, b =slope, x = X - Mean X

a = mean Y = 1/n EY

b = ExY/Ex2

Based on review of continuing calibration data, retention time windows are established for each standard. If retention times vary considerably from one day to the next then separate retention time windows are established for each day. A program is written to quantify the data and produce a tabulation of the results. Working detection limits for each standard are calculated by placing the minimum detectable area into each calibration equation. TCE and TCA standard concentrations are calculated using the ideal gas equation. If 1 μl of a 5000 μg/ml TCE standard is injected into a 1 liter glass sampling bulb, the standard concentration would be calculated in the following manner.

a. 1 μl x 5000 μg/ml x 1 ml/ 1 000 μl = 5 μg TCE

b. 5 μg/l liter (1) x 1000 m^3 x 1 mg/1000 μg = 5 mg/ m^3

c. 5 mg/ m^3 x 24.45/131.4 g/mol = 0.93 ppm/v

The number 24.45 is generated using the ideal gas equation pv = nRT. The division of 24.45 by 131.4, the molecular weight of TCE, converts the units from Mg/M3 to ppm/v.

Also included in the data reduction program is background subtraction prior to quantification. Syringe blanks are obtained from the collection

syringes after analysis of each sample, to evaluate the contribution of the collection syringe on sample results. Any detections observed in the syringe blank is subtracted, on a compound by compound basis, from the subsequent sample collected with the same syringe.

B.16. Data deliverables

The following data deliverables should be included as part of the report summarizing the sampling effort.

a. **Case narrative:** A brief description of the sampling and analysis program will be provided. It will include a discussion of problems encountered during the program and the corrective actions taken to correct them.

b. **Calibration summary:** A summary of initial and continuing calibration data will be provided. Included will be the retention times and peak areas for each standard and the calibration equation developed using the calibration data.

c. **Analysis summary:** A sheet will be provided which lists all analyses completed during the survey in ascending order.

d. **Quality assurance summary:** A summary of quality assurance measures taken during the sampling program will be prepared. Included will be GC blanks, syringe blanks, equipment blanks, and duplicates.

e. **Raw data:** Raw data will be included with the other deliverables. Included will be a copy of the raw chromatograms.

f. **Instrument logbook:** A copy of the instrument logbook will be included with other deliverables. Included in the logbook will be instrument serial number, date of purchase, date brought on line, maintenance and repair history (over the period of the project), analyst, parameters measured, instrument settings, and comments on the analyses of each day.

B.17. Quality control requirements

a. **GC blanks:** The GC blank run at the start of each day will establish instrument baseline conditions, should not contain any detectable concentrations of VOCS. The only acceptable peaks are those resulting from the chromatogram "shouldering" which often occurs during the first 90 seconds of an analytical run.

b. **Syringe blanks:** Syringe blanks are analyzed after each standard and sample run where detectable levels of VOCs are observed, to return instrument response to near background. Syringe blanks tend to exhibit greater response when compared to a GC blank because of the change in pressure resulting from sample injection. Syringe blanks will be pulled from the collection syringes and will be run successively until instrument response returns to near baseline. If any low levels of VOCs are observed in a syringe blank, they will simply be subtracted from sample results prior to quantification.

c. **Initial calibration:** After a four point calibration is performed for each standard, a linear regression will be performed to establish a calibration equation for each. The R-squared value for each standard must be greater than or equal to 0.95.

d. **Continuing calibration:** The response and retention time for continuing calibration standards must have a RPD of ≤ 30% of the values established in the initial calibration. If continuing calibration standards fall outside of 30%, an initial calibration will be performed.

e. **Duplicates:** Duplicate samples will be analyzed at a frequency of 1 per 10 environmental samples. The response and retention time for each peak in duplicate analysis must fall within 30% of the first sample. If the duplicate falls outside of these limits, it will be discounted as a QA sample.

f. **Equipment blanks:** Equipment blanks shall not contain a concentration of greater than 0.1 ppm for any VOC with a retention time greater than 40 seconds. The range of 0 to 40 seconds has been discounted due to the presence of peaks in this range resulting from injection and sample moisture.

g. **Laboratory confirmation samples:** Laboratory confirmation samples are analyzed at a frequency of 1 per 10 environmental samples, at the discretion of the project manager and QA/QC officer. Analyses should be performed by a NYSDOH ELAP certified laboratory.

B.18. References

Not applicable.

B.19. Method validation data

Upon completion of sampling, the field log is reviewed for format and transcription errors. The case narrative will also include a brief summary of quality assurance/ quality control outliers. Outliers will be identified by comparison to the criteria set forth in part 17 of this document.

ATTACHMENT C

Ground water sampling protocol

Contents

C.1. General 1
C.2. Technical basis 1
C.3. Method 2
C.3.1. Equipment needed 2
C.3.2. Collection of descriptive data 3
C.3.3. Sampling procedures 4
C.3.4. Procedure after taking sample 5

C.1. General

This protocol provides methods and procedures for the collection of representative ground water samples using a low flow purging with a pump. The protocol is designed to reduce variability and to encourage continuity in sample collection activities among samplers who collect ground water samples for O'Brien & Gere. The objectives of this protocol are the following:

- To enable personnel to collect representative samples of ground water with minimum turbidity for laboratory analysis.
- To assess the horizontal and vertical distribution of constituents of concern in a water-bearing unit.

C.2. Technical basis

The sampler must follow correct procedures to collect samples that accurately represent the ground water. It is the responsibility of the sampler to see that the sample is neither altered nor contaminated by the sampling and handling procedures.

The ground water in the casing of the well and near the well is probably not representative because of the influence of the well itself. The well is purged to remove the water altered by the well and to draw ground water that is more typical for that well point.

Moreover, the hydrogeological environment in the subsurface is different from that at the surface. The water's temperature, gas content, reduction-oxidation potential, and other physical, biological, and chemical conditions usually vary between the subsurface and the surface. When the sampler follows appropriate procedures, the sample will typify subsurface ground water conditions.

Sampling systems can alter the physical, chemical, and biological conditions of the ground water. Equipment that constricts the flow of the water can change the pH of a sample simply because it changes the partial pressure of the sample's dissolved gases. Equipment that introduce

dissolved oxygen in a sample can alter organic and inorganic constituents. Turbulence and reduction of pressure can change the contents of dissolved oxygen, carbon dioxide, and volatile organic compounds.

The sampling equipment should not affect the sample. The sampling system used depends on several factors including the type and size of the well, the pumping level, the type of contaminant, the analytical procedures, and the presence or absence of permanent pumping fixtures.

C.3. Method

This section presents procedures for the collection of representative samples from wells using the low flow purging technique. The procedures, divided into four subsections, are provided below.

- Equipment needed
- Collection of descriptive data
- Sampling procedure
- Procedure after taking sample

C.3.1. Equipment needed

- Adjustable rate, positive displacement pumps (for example, centrifugal or bladder pumps constructed of stainless steel or Teflon).
- Tubing - Polyethylene, polypropolyne, PVC, or Tygon tubing may be used for sample collection.
- Water level measuring device, 0.01 foot accuracy (electronic preferred for tracking water level drawdown during all pumping operations).
- Flow measurement supplies (for example, graduated cylinder and stop watch).
- Power source (generator, nitrogen tank, etc.).

- In-line indicator parameter monitoring instrument - pH, specific conductance, and temperature, eH and turbidity meter.
- Decontamination supplies.
- Logbook(s).
- Interface probe, if needed.
- Sample bottles.
- Sample preservation supplies (as required by the analytical methods).
- Sample tags or labels.
- Well construction data, location map, field data from last sampling event.
- Field sampling plan.

C.3.2. Collection of descriptive data

Before collecting a sample with a pump, data will be compiled about the well and the ground water in the well. Before collecting the sample, measure the water level to ascertain the volume of ground water to be removed from the well. The water level measurements will also be used for other hydrogeological evaluations. Where appropriate, measure the thickness of NAPL encountered. Follow these steps to measure the water level:

- Survey the site to locate wells.
- Check that the water level measuring equipment is operating correctly.
- Don a new pair of disposable gloves.
- As feasible, begin measuring water levels at wells with the least amount of contamination and proceed to those that are more contaminated.
- Record in the field book changes observed in each well such as erosion or cracks in protective concrete pad or the integrity of the well.

- Don a new pair of disposable gloves.
- Slit the center of a plastic sheet and slip the sheet over the well. This creates a clean surface on which the sampling equipment can be positioned.
- Decontaminate meters, tools, and sampling equipment before placing them on the plastic sheet in accordance with Appendix E.
- Screen the well headspace for VOCs at the rim of the well with a PID instrument and record the reading in the field logbook.

C.3.3. Sampling procedures

- Prepare the submersible pump for operation. The pump discharge tubing should be new or dedicated teflon or teflon coated polyethylene. Connect the tubing to the in-line water quality indicator parameter meter.
- Slowly and carefully lower the sampling pump and associated equipment into the well. The objective is to minimize mixing of the stagnant water above the screened interval with the water within the interval and avid re-suspension of fines within the well. Position the pump intake in the center of the screened interval.
- Commence well purging by low flow pumping from the well. the flow rate shall not exceed 0.5 liters/min. Record purge rate on the Ground Water Field Sampling Log.
- During purging, monitor and record pH, specific conductivity, temperature, oxidation-reduction potential (redox), and turbidity approximately every three minutes from the in-line monitor and turbidity meter.
- Well sampling can commence after equilibration of water quality parameters. Equilibration is defined as three consecutive readings within 10% of each other. Record total volume of water purged and purging time on the Ground Water Field Sampling Log for future reference.
- Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to avoid pumping the well dry and/or allow

stabilization of indicator parameters. If recharge rate of the well is very low and the well is purged dry, then sampling should commence as soon as the well has recharged to a sufficient level to collect the appropriate volume of samples. Sample collection using bailing techniques may be used in this situation. However, turbidity levels shall be maintained as low as possible.

- Remove the sampling bottles from their transport containers, and prepare the bottles for receiving samples. Inspect all labels to insure proper sample identification. 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 labeled purgeable priority pollutant first.

- After the last sample has been collected, record the date and time.

- Begin the Chain of Custody documentation.

C.3.4. Procedure after taking sample

After taking a sample, follow these practices to complete the documentation and leave the well intact and secure:

- Pack the sample. The type of analysis for which a sample is collected determines the type of container, preservative, holding time, and filtering requirement. Samples are transferred directly from the sampler to the container. The container should hold any necessary preservative and should be correctly labeled before the sample is transferred to it.

  Next, log the sample. Put the samples in a cooler to keep them at 4°C. Ship samples within twenty-four hours or within their allowable holding time, whichever is shorter. Include adequate packing and coolant with the samples so that the samples arrive unimpaired.

- Begin the chain-of-custody.

- Remove the pump and tubing from the well and disconnect the pump from the tubing. The tubing may either be dedicated to the well for future sampling events (by hanging the tubing in the well) or be properly discarded.

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

- Put the gloves and plastic sheet in a plastic bag for disposal.

- Decontaminate the equipment. Sampling equipment will be decontaminated prior to use and following sampling of each well. Pumps will not be removed between purging and sampling operations. The pump and tubing (including support cable and electrical wires which are in contact with the sample) will be decontaminated by the procedures listed below.

  - The decontaminating solutions can either be pumped from buckets through the pump or the pump can be disassembled and flushed with the decontaminating solutions. It is recommended that detergent and methanol used in the decontamination process be used sparingly and water flushing steps be extended to ensure that any sediment trapped in the pump is flushed out. The outside of the pump and the electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

    - Flush the equipment/pump with potable water.

    - Flush with non-phosphate detergent solution (five gallons).

    - Flush with tap water to remove all of the detergent solution.

    - Flush with distilled/deionized water.

    - Flush with methanol.

    - Flush with distilled/deionized water.

O'Brien & Gere Engineers, Inc. — Low Flow Ground Water Sampling Log

Date _____ Personnel _____ Weather _____

Site Name _____ Evacuation Method _____ Well # _____

ite Location _____ Sampling Method _____ Project # _____

Well Information:

Depth of Well * _____ ft.

Depth to Water * _____ ft.

Length of Water Column _____ ft.

* Measurements taken from

- [ ] Top of Well Casing
- [ ] Top of Protective Casing
- [ ] (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).

Water sample:

Time collected: _____

Total volume of purged water removed: _____

Physical appearance at start

Color _____

Odor _____

Sheen/Free Product _____

Physical appearance at sampling

Color _____

Odor _____

Sheen/Free Product _____

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

Notes:

APPENDIX B

Regional Ground Water Quality Information Former Sylvania Electric Products Incorporated Facility Hicksville, New York

Regional Groundwater Quality Information

The following information is contained in a previous report (Stearns & Wheler 1992). The accuracy of the reported data is under review and may be updated or modified as additional information becomes available.

This section describes the regional and local groundwater quality based on samples taken from water supply wells and monitoring wells by state and local agencies (Stearns & Wheler 1992).

Regional Groundwater Quality

The regional ground water quality of Nassau County was studied by the Nassau County Department of Health and Dvirka and Bartilucci Consulting Engineers in June 1986. Five study areas were delineated to help determine the most significant groundwater contamination by organic compounds. The five areas were New Hyde Park, Garden City Park, New Cassel Industrial Area, West Hicksville, and North Hicksville (Stearns & Wheler 1992).

A total of 871 wells were used in the investigation. Three hundred twenty-six (326) of the study wells penetrated the Upper Glacial aquifer, 490 the Magothy aquifer, and 55 the Lloyd aquifer. As noted in the study, the majority (348 out of 434) of public water supply wells utilize the Magothy aquifer.

The Upper Glacial aquifer being the shallowest aquifer and proximal to any potential sources of contamination was the most contaminated. Of the wells tested, 36 percent contained volatile organic levels greater than 10 ppb. Fourteen percent of the Upper Glacial aquifer wells reported volatile organic levels greater than 50 ppb. Fifteen percent of the wells that penetrated the Magothy aquifer contained volatile organic levels greater than 10 ppb. The Lloyd aquifer is the deepest and farthest from any potential sources of contamination. Only 2 percent of the wells tested showed volatile organic levels greater than 10 ppb, while 98 percent contained levels less than 10 percent. None of the wells penetrating the Lloyd aquifer contained volatile organic levels greater than 50 ppb (NCDH 1986).

This regional outlook is a generalization and is somewhat dated. The quality of ground water was not found to be uniform, but varied laterally based on the subsurface environment and land use.

Local Groundwater Quality

Within a one-mile radius of the site, there are reportedly public water supply wells, Nassau County Department of Health (NCDH) monitoring wells, and Nassau County Department of Public Works (NCDPW) monitoring wells. Three of the five public supply wells are approximately three-quarters of a mile north, or upgradient of the Sylvania Electric Products facility (the site). The other wells are located approximately three-quarters mile west, or cross-gradient from the site. Wells lie in one geographic area,

yet they span four separate water districts; these were identified as the Hicksville, Jericho, Westbury, and Bowling Green Water Districts.

Public Wells Ground Water Quality

Two of the five public water supply wells are located in the Hicksville Water District; they are Wells N-3878 and N-3953. The wells are situated in the northwest corner of Cantiague Park and are slightly more than one-half mile northeast and upgradient from the site. Both wells are presently drawing water from the Magothy aquifer. Well N-3878 is screened from 255 to 278 feet below sea level, while Well N-3953 is screened from 17 to 267 feet below sea level (Kilburn 1982). Sampling events conducted between June 1989 and August 1990 revealed elevated levels of 1,1-dichloroethane, 1,1,1-trichloroethane, and tetrachloroethene in Well N-3953. With the exception of tetrachloroethene, none of the contaminants exceeded the New York State drinking water standards. In June 1989, tetrachloroethene was found to exceed the maximum contaminant level (MCL) for New York State drinking water as described in Chapter 1, Part 5, of Public Health Law, with a concentration of 5.3 ppb (NCDH 1991). Detectable levels of contamination were not identified in Well N-3878.

One public supply well within the one-mile radius of the site is within the Jericho Water District (N-7030). It is located approximately three-quarters of a mile north of the site on Cantiague Rock Road and is upgradient from other wells within the one-mile radius. Well N-7030 is screened in the Magothy aquifer from 332 to 372 feet below sea level (Kilburn 1982). In January 1989, the well was found to contain 12 ppb tetrachloroethene (which exceeds the MCL for public water supply wells) and was taken off line during that same month. One or two years prior to its abandonment, Well N-7030 was not used to supply public water (NCDH 1991).

The Westbury Water District contains four public water supply wells within a one-mile radius of the site. Each of the four wells are grouped together approximately one-half mile southwest and downgradient of the site, in the New Cassel Industrial area. Prior to 1977, wells, N-2201 and N-2236 were destroyed and abandoned. While active, both wells withdrew water from the Magothy aquifer for potable purposes (Kilburn 1982). In November of 1988, a third well (N-6819) was abandoned, leaving Well N-5655 the only active Westbury public water supply well within one mile of the site. Well N-6819 was screened from 85 to 135 feet below sea level in the Magothy aquifer and was used for public supply (Kilburn 1982). Well N-5655 is screened from 75 to 125 feet below sea level and was used to obtain water from the Magothy aquifer (Kilburn 1982). Contamination first appeared in Well N-5655 in February of 1990. Compounds contributing to the contamination included 1,1-dichloroethene, 1,1,1-trichloroethane, bromodichloromethane, chlorodibromomethane, and bromoform. Although elevated levels of these compounds were discovered, none of the levels exceeded MCLs for public drinking water supplies.

Two public water supply wells for the Bowling Green Water District are located just outside the one-mile radius and are located south-southwest and downgradient from the site. Both wells, N-8956 and N-8957,

draw water from the Magothy aquifer. Well N-8956 is screened from 355 to 415 feet below sea level and Well N-8957 is screened from 409 to 469 feet below sea level (Kilburn 1982). The principal contaminants in Well N-8956 are trichloroethene and tetrachloroethene. However, in 1989, elevated levels of chloroform, bromoform, bromodichloromethane, and chlrordibromomethane were also detected. None of the levels of contaminants found in Well N-8956 exceeded the MCL. Elevated levels of trichloroethene and 1,2,3-trichloropropane were discovered in Well N-8957. However, the contaminants in Well N-8957 did not exceed the MCL for public water supplies (NCDH 1991).

Non-Public Water Supply Wells Ground Water Quality

One industrial well is located less than one-quarter of a mile southwest and downgradient from the site. Industrial Well 9341 is owned by PRD Electronics and draws water from the Magothy aquifer. The screened interval begins at 231 feet below ground surface (NCDOH 1991). The principal contaminants found during a 1985 sampling event included cis and trans-1,2-dichloroethylene, trichloroethene, 1,1-dichloroethane, ethylbenzene, xylene (o,m,p), and dichlorobenzene (o,m,p). These compounds exceeded the New York State ambient water quality standards and guidance values with concentrations ranging from 57 ppb (ethylbenzene) to 1600 ppb (trichloroethene). Cis and trans-1,2-dichloroethylene at 440 ppb, tetrachloroethene at 260 ppb, and dichlorobenzene at 130 ppb. The total volatile organic compounds found in Well 9341 was 2691 ppb (NCDH 1986).

The six monitoring wells installed in West Hicksville for the investigation of contaminated aquifer segments are dispersed between the Long Island Railroad and Old County Road, and extend from Charlotte Street east for approximately three-quarters of a mile. The six observation wells are between 60 and 72 feet deep. Analytical results that are presented here were obtained from three sampling events that occurred over a one-year period (October 1984 to December 1985). Analytical data from wells WH-1 and WH-4 report almost non-detectable amounts of VOCs. Over the course of one year, 4 to 16 ppb of 1,1,1-trichloroethane was reported in well WH-2. Compounds reported from WH-3 include 1,1,1-trichloroethane, 1,1,2-trichlorotrifluoroethane, trichloroethene, and tetrachloroethene. Concentrations of these compounds, with the exception of tetrachloroethene, increased by an order of magnitude with each successive sampling event. By December 1985, the concentration of 1,1,2-trichlorotrifluoroethane had reached 520 ppb, 1,1,1-trichloroethane, trichloroethene, and tetrachloroethene. Concentrations above the detection limit also exceeded the New York State ground water standards. The highest concentrations reported included 620 ppb tetrachloroethene in well WH-5 and 170 ppb 1,1,1-trichloroethane in well WH-6 (NCDH 1986).

In addition to the above wells, the NCDPW reportedly has forty-seven monitoring wells situated immediately upgradient of the site that were installed to investigate two prior petroleum spills. These wells are located within the Hicksville Water District. Well N-1195 is located on the west side of Cantiague Rock Road, north and upgradient from the site. The screen extends from 57.05 to 31.95 feet above sea level in the Upper Glacial aquifer.

Sampling events associated with NCDPW wells which occurred between April 1987 and October 1990 are reported here to document a portion of the history of ground water contamination associated with wells on the NCDPW property.

The 1987 and 1990 sampling events reported total volatile organics to be below the detection limit. In 1988 and 1989, total volatile organic concentrations were 5.00 ppb and 2.10 ppb, respectively. On the east side of Cantiague Rock Road and within the Cantiague Park are two monitoring wells, N-11457 and N-11458. Well N-11457 is screened from 687.1 feet to 707.1 feet below sea level in the Lloyd aquifer and is used for observation. A sampling event on November 1, 1990 reported elevated levels of chloroform and biomodichloromethane at concentrations of 2.7 ppb and 1.1 ppb, respectively. A subsequent sampling event on December 7, 1990 reported all volatile organics to be below the detection limit of the instrument. None of the concentration levels reported exceeded the New York State groundwater standards or guidance values. Well N-11458 is screened from 446.9 feet to 466.9 feet below sea level in the Magothy aquifer. Results from a sampling event on October 16, 1989 indicated 0.7 ppb methylene chloride and no other compounds above the detection limit. A second sampling event on November 14, 1990 reported 6.3 ppb dibromochloromethane and all other compounds below the detection limit. All reported values were below New York State groundwater standards and guidance values. The fourth monitoring well that is within one mile of the Site (N-9917) is located one-half mile southeast of the Site on the south side of Old County Road. Well N-9917 is also set within the Upper Glacial aquifer and screened from 53.84 to 48.64 feet above sea level. The sampling events reported took place between January 1985 and June 1990. Total volatile organics reported for 1989 and 1990 were below detection limit. In January of 1985, trans-1,2,-dichloroethylene, trichloroethene, and tetrachloroethene were reported in concentrations of 0.10 ppb, 1.0 ppb, and 1.50 ppb, respectively. During March of 1985, tetrachloroethene (1.3 ppb) was the only compound reported over the detection limit. A June 1988 sampling event reported 3.30 ppb benzene and no other volatile organics over the detection limit. Benzene was the only compound found in both wells to exceed ambient water quality standards and guidance values (NCDPW 1991).

Other Possible Sources of Local Groundwater Contamination

There are a variety of possible sources of contaminants detected in local public water supply wells, industrial water supply wells, and monitoring wells in the vicinity of the site. For example, there are nine known Class 2 and 2a inactive hazardous waste sites within a one-mile radius of the site. Most of the waste sites are between the former Sylvania Electric Products facility and downgradient public water supply wells with the exception of Hicksville public water supply Wells N-3878 and N-3953, and Jericho Water District public water supply Well N-7030.

The Westbury public water supply wells (N-5655 and N-6819) are downgradient of five inactive hazardous waste sites: Mattiace Petrochemicals, Anchor/Lith Kem-ko, AGO Associates, Air Techniques, Inc., and GIC. Mattiace Petrochemical is not considered a source of TCE, PCE, or 1,2,3-trichloropropane, the three contaminants found in the wells. The other sites are possible sources, however. According to MCDOH,

monitoring wells located between these four sites and the Westbury public water supply wells (N-2201, N-2236, N-5655, and N-6819) indicate little or no contamination, implying that the source of contamination is to the south of water supply wells and within the New Cassel Industrial Area (NCIA). Two compounds, 1,1-dichloroethane and 1,1,1-trichloroethane, found in N-5655 are cited by the NCDOH (1986) as primary contaminants of the NCIA.

Elevated levels of trichloroethene and tetrachloroethene have been detected in Bowling Green Water Supply District public water supply Wells N-8956 and N-8957. The inactive hazardous waste sites listed as potential contaminant sources for N-5655 are also potential contaminant sources for N-8956 and N-8957. Industrial Well 9341 is located southwest and downgradient from Air Techniques, GIC, Mattiace Petrochemicals, and Anchor/Lith Kem-lo. Elevated levels of trans-1,2-dichloroethylene are recognized at GIC and Air Techniques. Concentrations of 1,1-dichloroethylene have been shown to exist at Anchor/Lith Kem-ko and GIC. Based on information found in previous reports, bromoform was not detected to any of the Class 2 sites upgradient to Well 9341. The area of influence of pumping wells is not known, and therefore, the potential impacts of downgradient as well as upgradient sources is not known.

APPENDIX C

Health and Safety Plan
Former Sylvania Electric Products Incorporated Facility
Hicksville, New York

HEALTH AND SAFETY PLAN

Former Sylvania Electric Products Incorporated Facility Cantiague Rock Road Hicksville, New York

GTE Operations Support Incorporated

March 1998 (revised May 1998)

Contents

1. Introduction 1
1.1. General 1
1.2. Site background 1
1.3. Implementation of the HASP 2
1.4. Project organization 3

2. Hazard analysis 7
2.1. Potential exposures 7
2.1.1. Exposure pathways 7
2.2. Tasks 8
2.3. Mobilization/demobilization (non-intrusive) 9
2.3.1. Potential health hazards and compounds of concern 9
2.3.2. Controls 9
2.4. Utility markout (non-intrusive) 9
2.4.1. Potential health hazards compounds of concern 9
2.4.2. Controls 9
2.5. Building radiation and volatile organics survey (non-intrusive) 9
2.5.1. Potential health hazards and compounds of concern 9
2.5.2. Controls 10
2.6. External radiation survey (non-intrusive) 10
2.6.1. Potential health hazards and compounds of concern 10
2.6.2. Controls 10
2.7. Geophysical studies (non-intrusive) 10
2.7.1 Potential health hazards and compounds or concern 10
2.7.2 Controls 10
2.8 Direct push subsurface soil sampling 11
2.8.1. Potential health hazards and compounds of concern 11
2.8.2. Controls 11
2.9. Manual soil sampling (intrusive) 12
2.9.1 Potential health hazards and compounds of concern 12
2.9.2 Controls 12
2.10. Soils containment 12
2.10.1 Potential health hazards and compounds of concern 12
2.10.2 Controls 12

2.11. Site restoration 13
2.11.1 Potential health hazards and compounds of concern .. 13
2.11.2 Controls 13
2.12. Decontamination activities 13
2.12.1 Potential health hazards and compounds of concern .. 13
2.12.2 Controls 13

3. Personnel training 15
3.1. Site workers 15
3.2. Management and supervisors 15
3.3. Emergency response personnel 15
3.4. Site-specific training 16
3.5. Training certification 16

4. Personnel protection 17
4.1. Protective equipment introduction 17
4.2. Protective equipment description 18
4.3. Protective equipment failure 19
4.4. Dust suppression 19

5. Medical monitoring 21
5.1. Medical surveillance program 21
5.2. Respirator certification 21
5.3. Heat/cold stress 22
5.3.1. Monitoring 22
5.3.2. Cold stress work/rest schedules 22

6. Air monitoring 25
6.1. Field instrumentation and calibration 25
6.1.1. Photoionization detector (PID) 25
6.1.2. Radiation monitor (lapel filters) 26
6.1.3. Real-time aerosol monitor (RAM) 26
6.2. Air sampling 26
6.2.1. PID monitoring 27
6.2.2. Radiation monitoring 27
6.3. Quality control - field sampling 28
6.4. Action levels 28
6.4.1. Organic vapors 28
6.4.2. Radiation levels 29
6.4.3. Particulates 29

7. Community air monitoring plan (ground intrusive activities) 31
7.1. Vapor emission response plan 31
7.2. Major vapor emission 32
7.3. Major vapor emission response plan 32
7.4. Air monitoring plan for radionuclides 33

8. Site control 35
8.1. Site security 35
8.2. Site control 35
8.2.1. Exclusion zone 35
8.2.2. Buffer zone 36
8.2.3. Support zone 36
8.2.4. Zone map 36
8.3. Site access procedures 37
8.3.1. Zone map 37
8.4. Site communications 37
8.5. Housekeeping 37
8.6. Confined space entry 37
8.7. Fall protection 38
8.8. Safety and toolbox meetings 39
8.8.1. Safety meetings 39
8.8.2. Toolbox meetings 39
8.9. Drum handling guidelines 39
8.10. General worker safety rules 40
8.11. Health and safety log 42
8.12. Site communications 43
8.12.1. Communication procedures 43
8.12.2. Nonverbal communication 44
8.12.3. Lines of communication 44
8.13. Sanitary facilities 44

9. Decontamination 45
9.1. Personnel decontamination procedures 45
9.2. Monitoring equipment decontamination procedures 46
9.3. Decontamination supplies 47
9.4. Collection and disposition of contaminated materials 47
9.5. Site refuse 48

10. Emergency response 49
10.1. Notification of site emergencies 49
10.2. Responsibilities 50

10.3. Accidents and injuries 51
10.4. Safe refuge 51
10.5. Fire fighting procedures 52
10.6. Emergency equipment 52
10.7. Emergency site communications 52
10.8. Security and control 52

11. Special precautions and procedures 53
11.1. Heavy machinery/equipment 53
11.2. Additional safety practices 53
11.3. Daily log contents 55

12. Format for HASP addenda 57

List of Tables

1-1 Project personnel
2-1 Summary of potential health effects
2-2 Radionuclide data
10-1 Emergency telephone numbers

List of Figures

10-1 Map to hospital location

List of Attachments

A Technical and Administrative Guidance Memorandum 4031

1. Introduction

1.1. General

This Health and Safety Plan (HASP) has been developed to provide general procedures to be followed by engineering, construction and oversight personnel while performing work at the former Sylvania Electric Products Incorporated facility in Hicksville, New York (the site).

This HASP describes the minimum responsibilities, training requirements, protective equipment, and standard operating procedures to be used to address potential health and safety hazards while in investigation and construction areas. This plan specifies procedures and equipment to be used during work activities and emergency response to minimize exposures of personnel to hazardous materials. The selection of protective equipment is in accordance with 29 CFR 1910.32.

Although this HASP can be made available to interested persons for informational purposes, GTE Operations Support Incorporated (GTEOSI) does not assume responsibility for the interpretations or activities of any persons or entities other than employees and contractors of GTEOSI.

1.2. Site background

The former Sylvania facility is located at 70-140 Cantiague Rock Road, Hicksville, New York. In Section 11, Block 499, lots 94, 99, and 100 of the Nassau County Land and Tax Maps. GTEOSI's predecessor companies in interest operated processing units at this facility from approximately 1952 until 1966. GTEOSI's predecessor's fabricated fuel element plates for various customers. The fabrication process included melting, shearing, punching, pressing, welding, heating, brazing, machining, powder blending, sintering, and chemical cleaning and milling.

1.3. Implementation of the HASP

The requirements and guidelines presented in this HASP are based on information contained in a variety of site historical reports referenced in the Work Plan. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR Part 1910 and 29 CFR Part 1926. This HASP will be available for inspection and review by site workers and regulatory personnel while work activities are underway. Site workers are required to read this HASP before beginning work on site and to comply with it when conducting the site investigation activities listed in the Work Plan. Site workers will notify the GTEOSI representative or the Site Safety and Health Coordinator (SSHC) of matters of health and safety. The SSHC is responsible for informing the Project Manager and Radiation Safety Officer of monitoring activities, monitoring compliance with the provisions of this HASP, and for modifying this HASP to the extent necessary if site conditions change.

Non-intrusive activities: Non-intrusive activities within the Contractor's scope of work are those that do not have the potential to jeopardize the health and safety of site workers, the public, or the environment with respect to site related chemical compounds. Hazardous waste operations training per 29CFR1926.65 is not required. However, all other applicable health and safety regulations, GTEOSI requirements, and HASP requirements must be followed.

Intrusive activities: Intrusive activities within the Contractor's scope of work are those which have the potential to cause health and safety concerns to site workers, the public, or the environment. These activities and any non-intrusive activities conducted in an Exclusion Zone require training per 29CFR1926.65.

This HASP is specifically intended for the Contractor's personnel, subcontractors, and visitors who will be conducting activities within the defined scope of work in specified areas of the site. For the purposes of this HASP, the Contractor is defined as either the construction firm or as the engineering firm who will perform work on-site under contract to GTEOSI. The Contractor will inform site personnel, subcontractors, and

visitors of potential safety and health hazards and the contents of this HASP. The above persons are responsible for complying with regulations, GTEOSI policies, and this HASP applicable to the work that they are performing. This HASP may be provided to interested parties for informational purposes, however, the HASP is specifically intended for the conduct of activities within the scope of work of the Contractor.

This HASP has been developed concurrent to development of the conceptual Work Plan. It is, therefore, anticipated that this HASP may require modification to reflect the scope of work presented in the New York State Department of Environmental Conservation (NYSDEC) approved Work Plan that is to be developed at a later date.

Future actions that may be conducted at this site and unexpected conditions that may be encountered may necessitate the modification of the requirements of this HASP. The SSHC will recommend modifications to this HASP, and the Contractor's Project Manager and the Director for Safety and Health will have responsibility for approving them. Modifications to this HASP shall be outlined on the *Revision Summary* page.

1.4. Project organization

All personnel involved in the activities at the site implicitly have a part in implementing the HASP. Among them, the contractor's Project Officer, Project Manager, Director for Safety and Health, SSHC, and Site Supervisor have specifically designated responsibilities. Their names and telephone numbers are listed in Table 1-1.

Key project personnel and their responsibilities are discussed below.

Project officer: The project officer is responsible for the overall administration and technical execution of the project. The project officer is further responsible for the acquisition and delegation of resources necessary for project completion and HASP implementation.

Project manager: The project manager reports to the Project Officer and is directly responsible for the technical progress and financial control of the project.

Director for safety and health: The Director for Safety and Health (DSH) will be responsible for implementation of this HASP. Procedural changes and modifications to this HASP must be approved by the DSH.

Site supervisor/foreman: are responsible for coordinating the project requirements in the field. The Site Supervisor/Foreman oversees daily activities of the project and are, therefore, responsible for implementing health and safety requirements and following safety procedures in the field. The Site Supervisor/Foreman are also responsible for conducting periodic safety inspections independent of the SSHC and CSC and correcting observed deficiencies on this site. The Site Supervisor/ Foreman will contact the local emergency response organizations to notify concerned affiliates of the hazards associated with this project.

Site safety and health coordinator: The SSHC for site workers reports to the Project Manager, coordinates his activities with the DSH and establishes operating standards and coordinates overall project safety and health activities for the site. The SSHC reviews project plans and revisions to plans to determine that safety and health procedures are maintained throughout the investigation. The SSHC audits the effectiveness of the HASP on a continuing basis and suggests changes, if necessary, to the Project Manager. In maters of health physics, the SSHC will consult with the Radiation Safety Officer.

Radiation safety officer (RSO): The RSO will report directly to the Project Manager and will be available to answer questions regarding health physics issues. Any unusual conditions encountered during invasive field activities will require radiological monitoring coordinated by the site RSO.

Table 1-1. ***Project personnel***

Name and title	Telephone
Swiatoslav Kaczmar, Project Officer	315-437-6100
Jeffrey Banikowski, Project Manager	315-437-6100
Swiatoslav Kaczmar, Director for Safety and Health	315-437-6100
Timothy Eddy, Site Supervisor/Site Safety and Health Coordinator	315-437-6100
Tom LaVoy, Radiation Safety Officer	315-437-6100

Specifically, the SSHC is responsible for the following actions:

- Providing a complete copy of the HASP at the site before the start of activities
- Familiarizing workers with the HASP
- Conducting on-site health and safety training and briefing sessions
- Documenting the availability, use, and maintenance of personal protective and other safety or health equipment
- Maintaining safety awareness among site workers and communicating safety and health matters to them
- Reviewing field activities for performance in a manner consistent with contractor policy and this HASP
- Monitoring health and safety conditions during field activities
- Coordinating with emergency response personnel and medical support facilities
- Notifying the Project Manager of the need to initiate corrective actions in the event of an emergency, an accident, identification of a potentially unsafe condition, encountering a health or safety problem, or identification of an exception to this HASP
- Recommending improvements in safety and health measures to the Project Manager
- Conducting safety and health performance and system audits
- Selection and inspection of PPE
- Ensuring that the daily Health and Safety Log is available for review when requested by an GTEOSI Representative
- Forwarding all accident/emergency reports to the GTEOSI Representative within 24 hours.

The SSHC has the authority to recommend that the Project Manager take the following actions:

- Suspend field activities or otherwise limit exposures if the health or safety of any site worker appears to be endangered
- Notify site workers to alter work practices that the SSHC deems to not protect them
- Suspend a site worker from field activities for violating the requirements of this HASP

Site Supervisor: The Site Supervisor will be assigned on a task specific basis and will be responsible to the Project Manager for overall site coordination.

2. Hazard analysis

2.1. Potential exposures

The SSHC is responsible for administering the Contractor's Hazard Communication Program. This Hazard Communication Program will document that site workers are informed about the hazards associated with chemicals used on the job and the location of the material safety data sheets (MSDS) for materials brought on-site. The OSHA HAZWOPER standards (29 CFR 1910.120 and 1926.65) require that site personnel, subcontractors, and visitors must be informed of hazards associated with the site. Health hazard information for site chemical hazards is summarized below and in Table 2.1 of this HASP. Table 2.2 lists the highest concentrations of various compounds which have been detected in soil and water, respectively, at the site.

Note: The MSDS forms for hazardous materials brought on site will be filed in the Contractor's trailer.

2.1.1. Exposure pathways

Possible exposure pathways are inhalation of the chemical compounds or radioisotopes listed in Table 2.1 released from soils; inhalation of dusts, accidental ingestion of chemical compounds or radioisotopes; and skin contact/absorption with soils.

Based upon anticipated site activities and prudent safety and hygiene practices during site work, ingestion of site chemical compounds or radioisotopes is unlikely. Hazardous skin contact or absorption by the various compounds or radioisotopes is also unlikely because of the low concentrations that are anticipated and the fact that personal protective equipment (PPE) will be used when necessary. The primary route of exposure is inhalation of organic vapors and dusts containing the chemical compounds or radioisotopes listed in Table 2.1. However, inhalation of airborne residuals approaching the OSHA PELs is unlikely because of

natural ventilation of the work area, safe work practices, PPE, and / or air monitoring. Some compounds may cause noticeable odors during excavation. Confined spaces, such as inside tanks and deep excavations (>5 ft), represent special exposure considerations because of the reduced natural ventilation and restricted means of egress. Special procedures will be used to prevent injury and overexposure in confined spaces.

2.2. Tasks

Tasks to be conducted may include:

- Survey of former structures (non-intrusive)
- Mobilization/demobilization (non-intrusive)
- Utility markout (non-intrusive)
- Building radiation and volatile organic survey (non-intrusive)
- External radiation survey (non-intrusive)
- Geophysical studies (non-intrusive)
- Soil sampling with a Geoprobe® (intrusive)
- Manual soil sampling (intrusive)
- Soils containment (intrusive)
- Site restoration (non-intrusive)
- Decontamination activities (intrusive)

Detailed descriptions of these tasks are presented in the Work Plan. Site activities will be conducted in accordance with the procedures described in the Work Plan. Both the potential health and safety hazards and the hazard control procedures for each task are discussed below. If additional work tasks are identified after this HASP has been implemented which are not adequately addressed by this HASP, a task specific addendum to this HASP will be prepared to appropriately address the health and safety issues associated with the new work task before the initiation of the task in question. Section 11 provides a format for the task specific addenda.

2.3. Mobilization/demobilization (non-intrusive)

2.3.1. Potential health hazards and compounds of concern

There is minimal potential for contact with site-related compounds during completion of the survey of former structures. Site workers may be exposed to physical hazards related to moving equipment.

2.3.2. Controls

Level D PPE will be used to minimize the potential for head, foot, and eye injuries related to equipment movement.

2.4. Utility markout (non-intrusive)

2.4.1. Potential health hazards compounds of concern

There is minimal potential for contact with site-related compounds during mobilization and demobilization activities. Site workers may be exposed to physical hazards related to moving equipment.

2.4.2. Controls

Level D PPE will be used to minimize the potential for head, foot, and eye injuries related to equipment movement.

2.5. Building radiation and volatile organics survey (non-intrusive)

2.5.1. Potential health hazards and compounds of concern

There is limited potential for exposure to physical hazards, volatile organics or radioisotope emissions while performing this task.

2.5.2. Controls

Level D PPE will be worn.

2.6. External radiation survey (non-intrusive)

2.6.1. Potential health hazards and compounds of concern

There is minimal potential for exposure to volatile organics or radioisotopes. Short-term contact to soils containing measurable quantities of radioisotopes is possible.

2.6.2. Controls

Level D PPE will be worn, short-duration work shifts will be utilized in areas of exposed soils and radioactivity monitoring will be performed.

2.7. Geophysical studies (non-intrusive)

2.7.1 Potential health hazards and compounds or concern

There is minimal potential for exposure to volatile organics or radioisotopes. Short-term contact to soils containing measurable quantities of radioisotopes is possible.

2.7.2 Controls

Level D PPE will be worn, short-duration work shifts will be utilized and radioactivity monitoring will be performed.

2.8 Direct push subsurface soil sampling

2.8.1. Potential health hazards and compounds of concern

Hazards generally associated with drilling operations include noise levels exceeding the OSHA PEL of 90 dBA that are both a hazard and a hindrance to communication, carbon monoxide from the truck housing the Geoprobe® unit and overhead electrical and telephone wires which can be hazardous when in close proximity to the Geoprobe® unit. Moving parts on the Geoprobe® may catch clothing. Moving the truck mounted unit over uneven terrain may cause the vehicle to roll over or get stuck.

During the separation of the cores and the process of description, the possibility exists for soils to contact workers, and volatile organic and radioisotope emissions into the workers' breathing zones.

2.8.2. Controls

Initially Level D equipment is to be worn. Coveralls are to be worn during drilling and when there is a need to handle or work with potentially contaminated soil or liquid. Personnel must wear hard hats when working near operating heavy machinery.

Site workers will remain upwind of the vehicle exhausts unless required by sampling work. If visible dust is generated while obtaining soil samples, dust suppression methods appropriate to the site will be implemented. Air in the workers' breathing zone will be sampled for VOCs during excavation using a PID, and dust levels will be qualitatively monitored by visual observation. Workers will also wear lapel filters for the analysis of alpha radiation by a proportional counter and scaler able to discriminate between alpha and beta radiation. Subsequent monitoring and respirator wear will be in accordance with Section 6.4 of this HASP.

Equipment will be decontaminated in accordance with the guidelines in the Quality Assurance Program Plan (QAPP) and in Section 9 of this HASP.

It should be noted that dust generation using a Geoprobe® unit is highly unlikely. The unit uses a direct-push methodology without the use of drilling to remove soils or to make a path for the soil removal tools. No cuttings are produced and surface disturbance is minimized.

2.9. Manual soil sampling (intrusive)

2.9.1 Potential health hazards and compounds of concern

Soil sampling will be performed in multiple areas of the Site. There is potential for encountering volatile organics and radioisotopes during sampling activities.

2.9.2 Controls

Level D PPE will be worn. Coveralls are to be worn when there is a need to handle or work with potentially contaminated soil or liquid.

To minimize exposure to volatile organics and radioisotopes during soil sampling, air in the worker's breathing zones will be monitored using a PID and care will be taken to avoid dust generation. Subsequent monitoring and respirator wear will be in accordance with Section 6.4 of this HASP.

2.10. Soils containment

2.10.1 Potential health hazards and compounds of concern

Soil removal may be performed in multiple areas of the site as a remedial measure. There is potential for encountering VOCs and radioisotopes during this activity. In addition, equipment used to excavate, transport, and contain soils can pose physical hazards to site workers. Due to the invasive nature of soil handling required for removal, there is potential for exposure to impacted soils.

2.10.2 Controls

Initially Level D equipment is to be worn. Coveralls are to be worn when soil probes are installed and when there is a need to handle or work with potentially impacted soil or liquid. Personnel must wear hard hats when working near operating heavy machinery. Air in the workers' breathing zone will be sampled for VOCs during excavation using a PID and

radioactivity using a suitable radiation detection instrument. Dust monitoring will also be conducted visually and in accordance with NYSDEC Technical and Administrative Guidance Memorandum 4031, Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites (1989). Subsequent monitoring and respirator wear will be in accordance with Section 6.4 of this HASP.

2.11. Site restoration

2.11.1 Potential health hazards and compounds of concern

If performed, there is minimal potential for contact with site contaminants during site restoration activities. Site workers may be exposed to hazards related to moving equipment.

2.11.2 Controls

Level D PPE will be used to minimize the potential for head, foot, and eye injuries related to equipment movement.

2.12. Decontamination activities

2.12.1 Potential health hazards and compounds of concern

There is potential for exposure to site contaminants during site restoration. In addition, site workers may be exposed to hazards related to moving equipment, as well as slip and fall hazards due to wet surfaces.

2.12.2 Controls

Modified level D PPE will be used to minimize the potential for head, foot, and eye injuries related to equipment movement, as well as non-descript Tyvek coveralls to protect site workers from splashing of materials and wash solutions. Dosimeters will be worn at all times.

Table 2-1. ***Summary of Potential Health Effects***

Chemical	Location	PEL[1]	IDLH	Characteristics	Routes of Exposure	Symptoms of Exposure and Health Effects
Volatile Organic Compound (VOCs)	Soil, ground water	Varies, from 1 ppm TWA for vinyl chloride to 200 ppm TWA[2] for toluene	Varies: from 1000 ppm for TCE to 4000 ppm for 1,1-dichloroethane	Soil / dust, colorless vapor released from contaminated soil or water that may have a strong, irritating, or otherwise characteristic odor.	Inhalation Contact Ingestion	Irritation to the eyes, nose, and throat; dizziness; dermatitis. Many VOCs can cause liver and / or kidney damage.
Nuisance Dust	Debris, soil, ground water	15 mg/m³	Not Applicable	Airborne dust kicked up during sludge transportation or tailings area excavation activities. Excessive airborne dust will probably be observed at concentrations approaching the OSHA PEL.	Inhalation	Eye, nose, and throat irritation at concentrations approaching the OSHA PEL. If soil are highly alkaline or acidic, there is an increased potential for irritation at lower concentrations.
Metals	Soil, sediment, ground water	Varies, 0.002 mg/m³ beryllium to 10 mg/m³ iron	Varies, 100 mg/m³ lead to 250 mg/m³ for chromium	Soil / dust	Inhalation Ingestion (minimal potential for exposure)	Target organ effects to liver, kidneys, CNS, and reproductive system
Total Petroleum Hydrocarbons (TPHs) *light liquids (i e , solvents)*	Debris, soil, ground water	Varies, 1 ppm TWA and 5 ppm STEL for benzene to 100 ppm TWA for xylene	Varies 500 ppm for benzene to 900 ppm for xylene	Colorless liquid to light-yellow liquid. Strong oxidizers, many fluorides and perchlorates, nitric acid, aromatic odor. *Class IB Flammable Liquid (benzene)*	Inhalation, Absorption, Ingestion, Contact	Irritation of the eyes, nose, respiratory system, giddiness, headache, nausea, staggered gait; fatigue, anorexia, lassitude; demerits; suspected occupational carcinogen.
Total Petroleum Hydrocarbons (TPHs) *heavy liquids (i e.,lubricants)*	Debris, soil, ground water	Varies, 5 mg/m³ TWA and 10 mg/m³ STEL for oil mist to 2000 mg/m³ TWA and 1800 mg/m³ Ceiling for naphtha	Varies, 2500 mg/m³ for oil mist to 4521 mg/m³ LEL for naphtha.	Colorless liquid to light-yellow liquid. Strong oxidizers, many fluorides and perchlorates, nitric acid, burned lubricating-like odor. *Class IIIB Combustible Liquid*	Inhalation, Absorption, Ingestion, Contact	Irritation of the eyes, nose, respiratory system
Polycyclic aromatic hydrocarbons (PAH)	Soil, ground water			Soil / dust, colorless vapor released from soil or water that may have a strong, irritating, or otherwise characteristic odor.		

Table 2-1. *Summary of Potential Health Effects*

Chemical	Location	PEL[1]	IDLH	Characteristics	Routes of Exposure	Symptoms of Exposure and Health Effects
Uranium/Thorium	Soils, ground water			Soil/dust, no odor or other distinguishing characteristics.	Inhalation, Contact	General health impairment

[1] An appeals court decision forced OSHA to revert the PELs published in 1989 to the PELs published in 1971. The PELs listed here reflect the 1971 PELs with 1989 PELs listed in parentheses All values are 8-hour time-weighted averages (TWAs) unless otherwise indicated Definitions **PEL**: Permissible Exposure Limit, the concentration an employee may be exposed to for an 8-hour work day for a 40 hour work week for which nearly all employees may be repeatedly exposed without adverse health effects, **STEL** - Short-Term Exposure Limit as a 15 minute average, **Ceiling** - maximum concentration, **mg / m³** = milligrams per cubic meter of air; **f / cc** = fibers per cubic centimeter of air; IDLH IMMEDIATELY Dangerous to Life and Health, contaminant concentration which present the possibility for severe health consequences if exposed to the IDLH concentration without the appropriate personal protective equipment (PPE), **LEL** = Lower Explosive Limit.

[2] Number 2 fuel oil and diesel fuel are materials which were stored in underground storage tanks There are no occupational exposure limits for Number 2 fuel oil (diesel fuel) However, there are occupational exposure limits for gasoline, a related petroleum product Since gasoline is more volatile, this is a conservative assumption

[3] Substance for which the Threshold Limit value (TLV) is higher than the OSHA PEL and / or the National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL)

Table 2-2. ***Radionuclide data***

Source of Information	Description of Survey Samples	Radionuclide	Activity Range
Preliminary data received from DEC during meeting on 1/14/97. Date of Investigation not specified. (Note: this portion of the table may change pending the release of the final NYSDEC report regarding this issue)	1. Driving Range Soils: Surface soil samples taken from the driving range side of fence. Sample depths range between 0-14". Alpha measurements were reported for five surface soil samples.	Th 228	0.9 - 8 pCi/g
		Th 232	1.2 - 8 pCi/g
		U 238	11 - 70 pCi/g
		U 234	11 - 63 pCi/g
		Th 230	0.6 - 3.1 pCi/g
		U 235	0.7 - 5.5 pCi/g
	2. Gilbert Display Soils: Surface soil samples collected from near fence at the rear of Gilbert Display property. Sample depths range between 0-24". Alpha measurements were reported for two core samples (compacted) and one surface soil sample.	Th 228	1.6±1.4 - 169±133 pCi/g
		Th 232	1.6±1.3 - 169±33 pCi/g
		U 238	52±13 - 1044±199 pCi/g
		U 234	52±13 - 982±188 pCi/g
		Th 230	1.4±1.4 - 22±6 pCi/g
		U 235	2±2 - 53±16 pCi/g
	3. Background soil data - Surface background data collected from driving range soils.	Th 228	0.8 pCi/g
		Th 232	0.7 pCi/g
		U 238	1.3 pCi/g
		U 234	1.3 pCi/g
		Th 230	1.1 pCi/g
		U 235	0.1 pCi/g

Table 2-2. ***Radionuclide data***

Source of Information	Description of Survey Samples	Radionuclide	Activity Range
NRC Memo regarding data from samples collected as part of a survey of public area adjacent to the site. Four soil samples were collected in the survey, which was conducted on 11/19/96. Analysis was performed using gamma spectroscopy, and the U-238 activity was inferred from its daughter protoactinium-234m.	Sample A: Collected approximately one foot from the east side of the fence separating the golf driving range from the properties on Cantiague Rock Road and 15 feet south of the property boundary between Magazine Distributors and Gilbert Displays.	U 238	6.8 ± 0.6 pCi/g
		Ra 226	1.6 ± 0.5 pCi/g
		U 235	0.42 ± 0.03 pCi/g
	Sample B: Collected approximately one foot from the east side of the fence separating the golf driving range from the properties on Cantiague Rock Road and 15 feet north of the property boundary between Magazine Distributors and Gilbert Displays.	U 238	11.1 ± 1.0 pCi/g
		Ra 226	1.7 ± 0.7 pCi/g
		U 235	0.54 ± 0.04 pCi/g
	Sample C: Collected approximately one foot from the east side of the fence separating the golf driving range from the properties on Cantigue Rock Road approximately one foot from the fence on the golf driving range and 105 feet north of the property boundary between Magazine Distributors and Gilbert Displays	U 238	3.5 ± 0.7 pCi/g
		Ra 226	1.0 ± 0.4 pCi/g
		U 235	0.16 ± 0.03 pCi/g
	Sample D (Background): Collected on the east side of the golf driving range, approximately 200 meters due east of the location of the samples A, B and C.	U 238	0.9 ± 0.4 pCi/g
		Ra 226	0.2 ± 0.3 pCi/g
		U 235	0.06 ± 0.02 pCi/g

Table 2-2. ***Radionuclide data***

Source of Information	Description of Survey Samples	Radionuclide	Activity Range
US NRC Memo reporting the results of a safety inspection of the former Sylvania site. The inspection was conducted on 8/20/96. Inspection activities included the analysis of soil samples collected at the site. Inspection report included, in addition, results of analysis of soil and groundwater samples collected and analyzed by representatives of NYSDEC. The additional soil sample was collected on 8/27/96 from the area with elevated gamma exposure, and a groundwater sample was collected on 9/5/96.	Radiological survey of exterior areas included measurements of background exposure rates. The background exposure rate along the western edge of the property was 9 to 11 μR/hour at one meter above the ground surface. Exposure rate measurements along the eastern border of the Gilbert Displays area showed elevated levels. The values measured at approximately one meter from the ground surface ranged from 15 to 110 μR/hour. The highest value was measured at a distance of approximately one meter from the fence bordering the golf driving range. and six meters from the border of the Magazine Distributors fence. The maximum direct measurement on the ground surface was 500 μR/hour. The measured exposure rate on the Magazine Distributors' property ranged from 5 to 13 μR/hour. The highest readings were obtained in the north east corner of the property, next to the common fence with gilbert Displays. Measurements on the Air Techniques were within measured background levels.		
	Sample #1 : Obtained approximately one meter south of Sample #2.	U 238	641 ± 11 pCi/g
		U 235	27.7 ± 0.5 pCi/g
		Th 232	46.6 ± 0.4 pCi/g
	Sample #2 : Obtained at the point of the highest measured exposure rate.	U 238	2613 ± 16 pCi/g
		U 235	118.6 ± 0.6 pCi/g
		Th 232	17.4 ± 0.1 pCi/g
	Sample # 3 : Collected in the area of elevated gamma exposure rates.	U 238	230 ± 17 pCi/g
	Sample # 4: Groundwater sample collected from a monitoring well on the Air Techniques site near the boundary with the Magazine Distributors property.	Gross alpha activity	115 ± 12 pCi/liter
		Gross beta activity	22 ± 3 pCi/liter
Dept. of Energy Memo regarding a radiological survey report conducted on 5/21/79 by a Radiological Assistance Program (RAP) team. Soil, vegetation and water samples were collected. Gamma and alpha radiation surveys were made.	General gamma exposure rates were barely detectable above background. The maximum gamma exposure rate detected at ground level was 0.3 to 0.35 mR/hr. No surface alpha activity was observed. Radioactivity levels in the vegetation and water samples were below the respective method detection limits.		
	Soil Sample 1: Yale Property (SE corner)	U 238	1362 pCi/g
		Th 232	17.4 pCi/g
	Soil Sample 2: Ball field and parking lot fence	U 238	38 pCi/g
		Th 232	1 pCi/g

Table 2-2. ***Radionuclide data***

Source of Information	Description of Survey Samples	Radionuclide	Activity Range
Data on water samples abstracted and tabulated from correspondence dated circa 1959-1960. Water samples listed in this tablewere collected between 6/59 and 6/60 from drain #1 and the four sumps. No further information was available on the sampling methods or the respective levels of uranium isotopes.	Drain # 1	Uranium	2.360 - 14.58 mg/L
	Basin (Sump) #1	Uranium	0.32 - 28.5 mg/L
	Basin (Sump) #2	Uranium	1.05 - 13.4 mg/L
	Basin (Sump) #3	Uranium	0.76 - 34 mg/L
	Basin (Sump) #4	Uranium	0.06 - 4.16 mg/L
Water samples collected on 5/0/96, 5/10/96, 5/11/96, 9/5/96. No further information was available on the water samples listed in this table	SH196-0509-A656W2 (05/11/96)	Gross Alpha	109.74 ± 13.77 pCi/L
		Gross Beta	55.38 ± 4.92 pCi/L
	SH196-0509-A656W3 (05/11/96)	Gross Alpha	1.52 ± 1.98 pCi/L
		Gross Beta	7.13 ± 2.38 pCi/L
	SH196-0509-A656W4 (05/11/96)	Gross Alpha	4.81 ± 2.45 pCi/L
		Gross Beta	5.91 ± 2.21 pCi/L
	SH196-0509-A656W5 (05/11/96)	Gross Alpha	0.66 ± 1.36 pCi/L
		Gross Beta	7.22 ± 2.31 pCi/L
	SH196-0509-A656W2 (05/10/96)	Radium 226	0.99 ± 0.43 pCi/L
	SH196-0509-A656W2 (9/5/96)	Gross Alpha	107.31 ± 11.50 pCi/L
		Gross Beta	22.32 ± 3.50 pCi/L

3. Personnel training

3.1. Site workers

Site workers performing the invasive activities outlined in this HASP must have completed a training course of at least 40 hours meeting the requirements of 29 CFR 1910.120(e) for safety and health at hazardous waste operations. If the course was completed more than 12 months before the date of site work, completion of an approved, 8 hour refresher course on health and safety at hazardous waste operations is required.

3.2. Management and supervisors

In addition to the requirements described in Section 3.1 for site workers, field supervisors must have completed an off-site training course of at least 8-hr meeting the requirements of 29 CFR 1910.120(e) on supervisor responsibilities for safety and health at hazardous waste operations.

3.3. Emergency response personnel

Site workers who respond to emergency situations involving health and safety hazards must be trained in how to respond to such emergencies in accordance with the provisions of 29 CFR 1910.120(l). Skills such as cardiopulmonary resuscitation (CPR), mouth-to-mouth rescue breathing, and basic first aid skills may be necessary.

3.4. Site-specific training

Site-specific training will be provided to each site worker and reviewed before assignment. Site workers will be briefed daily by the Site Supervisor or by the SSHC as to the potential hazards that may be encountered during that day. Topics will include:

- Availability of this HASP
- Recognition and control of general site hazards and specific hazards (including heat and cold hazards) in the work areas
- Selection, use, testing, and care of the body, eye, hand, foot and respiratory protective equipment being worn and the limitations of each
- Decontamination procedures for site workers, their personal protective equipment, and other equipment used on-site
- Emergency notification procedures (including hand signals) and evacuation routes to be followed
- Emergency response procedures and requirements
- Procedures for obtaining emergency assistance and medical attention

3.5. Training certification

A record of employee training completion will be maintained on site by the SSHC for each site worker who is trained. This record will include the dates of the completion of worker training, supervisor training, refresher training, emergency response training, and site-specific training for site workers.

4. Personnel protection

4.1. Protective equipment introduction

The basic level of personal protective equipment (PPE) to be used during activities at the site is OSHA Level D. PPE may be upgraded based on air monitoring results or at the discretion of the Project Manager and based on the SSHC's recommendations. A downgrade of PPE must be approved by the SSHC and the Project Manager.

If the SSHC determines that field measurements or observations indicate that a potential exposure is greater than the protection afforded by the equipment or procedures specified in this or other sections of this HASP, the work will be stopped, and site workers will be removed from the site until the exposure has been reduced or the level of protection has been increased.

Site respirator users must be trained and medically approved to use respiratory protection. Respirators issued are approved for protection against dust and organic vapors by NIOSH. Respirators are issued for the exclusive use of one worker and will be cleaned and disinfected after each use by the worker. Respirator users must check the fit of the respirator before each day's use to see that it seals properly. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator. No facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory PPE. Cartridges and filters for air-purifying respirators in use will be changed daily at a minimum. The user will inspect the integrity of air-purifying respirators daily.

4.2. Protective equipment description

The level of personal protective equipment that may be used on-site is categorized as Level C or D, based upon the degree of protection required. The following is a brief description of the two levels that may be used on this site.

Level C. The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met. The following constitute Level C equipment:

- NIOSH approved full-face or half-face, air purifying respirators with organic vapor cartridges, radionuclide and high efficiency dust (HEPA) filters
- Chemical-resistant clothing (overalls, chemical-splash suit, disposable chemical-resistant overalls)
- Coveralls (optional)
- Gloves, outer, chemical-resistant
- Gloves, inner, chemical-resistant
- Boots, outer, chemical-resistant, with steel toe and shank
- Optional chemical resistant boot covers
- Hard hat
- Face shield when not wearing a full face respirator.

Level D. A work uniform providing no respiratory protection, used only for prevention of skin contamination. The following constitute Level D equipment:

- Coveralls or other skin protective clothing (long sleeve shirts and long pants)
- Gloves
- Boots or shoes, chemical-resistant, steel toe and shank
- Optional chemical resistant boot covers
- Safety glasses or chemical splash goggles
- Hard hat
- Escape mask (optional)
- Face shield when not wearing other eye protection.
- Pocket self reading dosimeter

4.3. Protective equipment failure

If an individual experiences a failure or other alteration of PPE that may affect its protective ability, that person is to leave the work area immediately. The Project Manager or the SSHC must be notified and, after reviewing the situation, are to determine the effect of the failure on the continuation of on-going operations. If the Project Manager or the SSHC determine that the failure affects the safety of workers, the work site, or the surrounding environment, workers are to be evacuated until corrective actions have been taken. The SSHC will not allow re-entry until the equipment has been repaired or replaced and the cause of the failure has been identified.

4.4. Dust suppression

The SSHC shall implement one or more of the following dust control measures if dusty conditions are observed:

- Wetting excavation area, building surfaces and/or debris
- Spraying water on buckets when excavating and dumping contaminated soil or debris
- Hauling materials in properly tapered or watertight container
- Modifying work practices, such as reducing the size and/or number of demolition activities
- Restricting vehicle speeds to 10 mph
- Applying water to haul roads.

5. Medical monitoring

5.1. Medical surveillance program

The contractor will have implemented a medical monitoring program in accordance with 29 CFR 1910.120. The contractor's program will be designed to monitor and reduce health risks to employees potentially exposed to hazardous materials and to provide baseline medical data for each employee involved in work activities. It is also designed to determine the employee's ability to wear personal protective equipment such as chemical resistant clothing and respirators.

Medical examinations are administered on a post-employment and annual basis and as warranted by symptoms of exposure or specialized activities. The examining physician is required to make a report to GTEOSI of any medical condition that would increase the employee's risk when wearing a respirator or other PPE. The contractor will maintain site personnel medical records as required by 29 CFR 1910.120 and by 29 CFR 1910.20, as applicable.

Employees performing the activities listed in the Work Plan of this document have or will receive medical tests as regulated by 29 CFR 1910.120. Where medical requirements of 29 CFR 1910.120 overlap those of 29 CFR 1910.134, the more stringent of the two will be enforced.

5.2. Respirator certification

Employees who wear or may wear respiratory protection have been provided respirators as required by 29 CFR 1910.134. This standard requires that an individual's ability to wear respiratory protection be medically certified before performing designated duties.

5.3. Heat/cold stress

The timing and location of this project may be such that heat / cold stress could pose a threat to the health and safety of site personnel. Work / rest regimens will be employed as deemed necessary by the SSHC so that site workers do not suffer adverse effects from heat / cold stress. Special clothing and an appropriate diet and fluid intake will be recommended to all on-site personnel to further reduce these temperature-related hazards. Site workers should stop work, notify the SSHC when they observe symptoms of heat / cold stress in themselves or co-workers.

5.3.1. Monitoring

Heat stress monitoring of personnel wearing protective clothing should be considered when the ambient temperature is 70°F or above. To monitor the worker, one of the following methods should be employed:

- Heart rate should be measured by the radial pulse for a 30 second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following cycle by one-third.

- Oral temperature should be measured at the end of the work period (before drinking). If oral temperature exceeds 99.6°F, shorten the next work cycle by one-third without changing the rest period. If the oral temperature still exceeds 99.6°F at the beginning of the next rest period, shorten the next work cycle by one-third. Do not permit a worker to wear a semi-permeable or impermeable garment when his / her oral temperature exceeds 100.6°F.

5.3.2. Cold stress work/rest schedules

Work/rest schedules must be altered to minimize the potential for cold stress. Cold stress is defined as a decrease in core body temperature to 96.8°F and/or cold injury to body extremities. Decreases in core body temperature are associated with reduced mental alertness, reduction in

rational decision making, or loss of consciousness in severe cases. Symptoms of cold stress include pain in extremities (i.e. hands and feet) and severe shivering. If workers experience these symptoms, then stop work and implement the following controls

- Workers must don adequate dry insulating clothing; and
- Adjust the work/rest schedule to increase the amount of rest/ rewarming time.
- Toolbox safety meetings discussing symptoms of cold stress, clothing requirements, and work breaks must be held when the wind chill temperature (see Appendix A) drops below 0 °F and EACH DAY the wind chill temperature is below 25°F.

Note: Wind chill temperatures are a combination of actual air temperature and wind speed as shown in Appendix A. Wind chill temperatures ≤25°F below zero are extremely dangerous. Workers must protect any exposed skin, especially the face, ears, and fingers.

6. Air monitoring

Organic vapors and radioactivity above background may be present in the investigation areas where invasive activities take place. Real time monitoring of organic vapor and radioactivity will be conducted on-site by, or under the supervision of, the SSHC. The SSHC will evaluate whether the personal protective measures employed during field activities are appropriate and will modify the protective measures accordingly. Field personnel will record readings in a notebook at the site. The SSHC will be responsible for maintaining monitoring instruments throughout the investigation.

6.1. Field instrumentation and calibration

On-site air monitoring at the site will include the use of photoionization detectors (PID) and radiation detection instrumentation. The instruction manuals for this equipment, including maintenance and calibration details, will be on site.

6.1.1. Photoionization detector (PID)

Hazard monitored. Many organic and some inorganic gases and vapors.

Application. Detects the presence and total concentration of many organic and some inorganic gases and vapors.

Detection method. Ionizes molecules using UV radiation, produces a current that is proportional to the number of ions present.

General care and maintenance. Recharge daily or replace the battery. Regularly clean the lamp window. Regularly clean and maintain the instrument and its accessories. Turn the function switch to "stand-by" and allow the instrument to "warm up" for 5 min. Calibrate once a day using an isobutylene gas standard according to the

manufacturer's instructions. Repeat the procedure to validate calibration.

Typical operating time. 10 hr, 5 hr with strip chart recorder.

6.1.2. Radiation monitor (lapel filters)
Hazard monitored. Alpha radiation.

Application. Detects the presence and activity levels of alpha radiation associated with uranium and thorium.

Detection method. A lapel filter apparatus will be worn by workers engaged in soil probing activities. Alpha particles on the filter react with a detector which is proportional to the activity present.

General care and maintenance. Keep clean. Calibrate prior to field activities.

6.1.3. Real-time aerosol monitor (RAM)
Hazard monitored. Particulate emissions.

Application. Detects the presence of particulates necessary to meet the requirements of TAGM 4031 (Attachment 1).

Detection method. The RAM-1 uses a pulsed semiconductor light emitting diode which generates a narrow band emission. The scattered radiation is detected by means of a silicon photo-voltaic-type diode with integral low noise preamplifier.

General care and maintenance. Keep clean, follow manufacturer's instructions for calibration procedures.

6.2. Air sampling

The air in the work area will be monitored with a portable PID and radiation survey instrumentation to determine the presence and concentration of organic vapors and radiation after removing wellhead covers and during soil collection and sampling activities associated with

use of the Geoprobe®. Individual monitoring, if necessary, will be performed in the breathing zone and, if workers are wearing respiratory protective equipment, outside near the face piece. The sampling strategies described below may be modified if work tasks or operations change. Monitoring instruments will be checked for appropriate response, in accordance with the manufacturer's instructions, before use each sampling day.

6.2.1. PID monitoring

The air will be monitored with a portable PID equipped with a 10.2 electron volt detector to determine the presence and concentration of VOCs. Samples will be collected continuously and recorded at approximately 15-minute intervals. The PID will be checked for positive and accurate response to a predetermined concentration of isobutylene in accordance with the manufacturer's instructions before use each sampling day.

Before the start of work, the PID will be used to determine the concentration of VOCs upwind of the work site. When VOC levels exceed the action level, the PID will be used to measure the VOC level downwind of the work area.

6.2.2. Radiation monitoring

Air in the breathing zone will be monitored using a filter cassette, the filter of which will be analyzed using a Ludlum 43-10 alpha detector and Ludlum model 2929 scaler (or equivalent).

The filter apparatus will be attached to the lapel of individuals actively engaged in soil sampling and identifying sample cores. Filters will be analyzed at the end of each day of work or at a frequency established by the SSHC in consultation with the RSO.

To evaluate accumulated dose, these individuals will also be required to wear thermoluminescent dosimeters (TLDs). TLDs will be sent to a qualified laboratory for analysis (e.g. Landauer®, Inc.) at the end of drilling activities or at the end of each month of work.

To evaluate daily measurable exposures, these individuals will also be required to wear a pocket self reading dosimeter.

6.3. Quality control - field sampling

The SSHC, or someone under the direct supervision of the SSHC, will record the results of the air sampling for health and safety purposes in bound log books and on appropriate data sheets. These books and sheets will be used to document the collection of samples and data so that an individual data set can be traced to its point of origin, the sampler, and the sampling equipment used. Sampling will be performed according to the manufacturer's instructions.

6.4. Action levels

Action levels are used to determine when activities should stop, to determine when site evacuation is necessary, to select emergency response levels, and to change PPE levels. Action levels were developed, based on actual sample analysis and regulatory exposure limits published by OSHA.

6.4.1. Organic vapors

A PID will be used to determine the presence of organic vapors. Work will cease at any time that the reading on the PID exceeds 2.7 ppm of organic vapors. If the level is measured at a wellhead or other sampling location, additional sampling in the worker's breathing zones will be initiated at that time. If the level in the worker's breathing zone is less than 2.7 ppm, work may resume with continuous alternate breathing zone and wellhead monitoring. Breathing zone monitoring may cease when the wellhead level is less than 1.0 ppm.

Level C protection (air purifying respirators and chemical resistant clothing) will be donned by the site workers when the VOC concentration in the respective breathing zone exceeds 2.7 ppm as indicated on the PID. Once the respirators are on, work may resume with continuous monitoring alternating between the breathing zone and the wellhead. Respirators may be removed when the breathing zone level is less than 1.3 ppm. Breathing zone monitoring may cease when the work area level is less than 1.3 ppm.

If the measured VOC concentration is greater than or equal to 135 ppm, the workers will leave that work area. Actions, such as increasing ventilation, will be implemented to promote dispersion of the vapors. Workers wearing respirators may return when the level is less than 100 ppm. The action levels for air purifying respirators then apply.

The organic vapor level will be measured upwind and 50 feet downwind of the site, at approximately 60 minute intervals, whenever air purifying respirators are being worn. If the downwind concentration exceeds the upwind concentration by more than 2.7 ppm, work on the site will stop until the downwind concentration is less than 2.7 ppm greater than the upwind concentration.

6.4.2. Radiation levels

Radiation levels for uranium or thorium at or in excess of their respective derived air concentration (DAC) will require the use of respirators and institution of a urinalysis program at the recommendation of the RSO.

Respirator use can be discontinued pending review of newly acquired data by the RSO and when radiation levels return to a level below the DAC.

6.4.3. Particulates

Upon visual observation of air-borne particulate matter or at levels exceeding the primary standards which are associated with on-site activities, a water spray will be applied as a control measure. The primary standards and guidance for particulate matter less than 10 microns in diameter is referenced in TAGM 4031 (Attachment 1). The primary standards are 150 µg/cubic meter over a 24-hour averaging time and 50 µg/cubic meter over an annual averaging time.

7. Community air monitoring plan (ground intrusive activities)

Real-time air monitoring, for volatile compounds and particulate levels at the perimeter of the work area will be conducted as follows:

- Volatile organic compounds will be monitored at the downwind perimeter of the work area on a continuous basis. If total organic vapor levels exceed 5 ppm above background, work activities will be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for NYSDEC and NYSDOH personnel to review.

- Particulates will be continuously monitored upwind and downwind with temporary particulate monitoring stations. If the downwind particulate level is 150 $\mu g/m^3$ greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for NYSDEC and NYSDOH personnel to review.

7.1. Vapor emission response plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Site Safety & Health Officer

will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified.

7.2. Major vapor emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality will be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 foot zone).

If efforts to abate the emission source are unsuccessful and if the following levels persist for more than 30 minutes in the 20 foot zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

- if organic vapor levels are approaching 5 ppm above background.

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area.

7.3. Major vapor emission response plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the Health and Safety Plan of this Work Plan will go into effect.

2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30 minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety & Health Officer.

7.4. Air monitoring plan for radionuclides

Continuous air monitoring for uranium and thorium will be conducted at the perimeter of the work area whenever intrusive work is in progress. This monitoring will assess if off-site airborne radioactivity releases are less than 10% of the environmental limits of NYSDEC part 380. It will also identify that workers are not exposed to more than 10% of the occupational limits for radionuclides as listed in the New York Department of Labor Code Rule 38.

A continuous air monitor (CAM) will be started prior to any work activities. The intake will be located at the edge of the work area. The alarm point for the monitor will be selected in the field based on background and suitable exposure rate in consultation with NYSDEC (e.g. 20% of the derived air concentration). Background will be established from the previous days equilibrium count rate. It takes several hours for the air monitor to reach the peak background count rate due to collection of radon daughter products present in the air.

A new filter paper shall be placed in the CAM at the beginning of each work day. The unit will be source checked each day to verify operation of the detector and alarm circuits. The air flow will also be checked at the start of each work day. During normal work activities the CAM will be checked approximately once an hour for flow rate and count rate.

If the alarm should activate, work activity in the immediate area shall cease. The count rate of the CAM will be verified to see that this is actually an increase in airborne radioactivity. If this appears to be an actual airborne release of radioactive materials, lapel samples will be collected and assayed for radioactivity.

A gas flow proportional counter or other lab type instrument will be used to assay the filters from lapel samplers for alpha radioactivity. The lab

instrument will also be used to assay the air filter from the CAM. It is preferable to wait 12 to 24 hours before counting an air sample. This will allow adequate time for the radon daughters to decay and minimize interference from this source. The lab instrument will be calibrated with an NIST traceable uranium or thorium source in a disc geometry. The activity is electroplated onto the surface of the disc to simulate the geometry of the air sample. The calibration will determine the efficiency to be used when calculating the activity of the air sample. The activity measured will be divided by the volume of the air sample to give the radioactivity in microcuries per milliliter. The limits for thorium are the most restrictive and as such will be used until a nuclide specific assay is available.

When a nuclide specific analysis is required, air samples will be sent to an off-site laboratory. This will be done when an air sample exceeds 10% of any applicable thorium based limit.

Blank air samples will be taken periodically upwind of intrusive work activity. These blanks can be counted to give an accurate estimate as to the background levels of radon daughters collected on particulate air samples.

8. Site control

8.1. Site security

Site security will be monitored and controlled by the Project Manager, the Site Supervisor, and the SSHC. Their duties will include limiting access to the work area to authorized personnel, overseeing project equipment and materials, and overseeing work activities. The procedures specified below will be followed to control access to each work site to prevent persons who may be unaware of site conditions from exposure to hazards. Work area control procedures may be modified as required by site conditions.

8.2. Site control

Two categories of work zones will be established at each sampling and drilling point: an exclusion zone immediately around the work area and a buffer zone. Control procedures to limit exposure to work hazards, short of formal zones, will be established during radiation surveying and at other times when Level D protective clothing is appropriate.

8.2.1. Exclusion zone

The exclusion zone is where sampling and construction are conducted. The SSHC will identify this zone. It must be centered on the work activities. This zone will be designated with flags attached to portable stakes or cones installed before beginning the field work. Based on the discretion of the SSHC, and in coordination with GTEOSI and current property owners, a larger portion of the site may be designated as the exclusion zone.

The zone may be enlarged to contain the necessary ancillary equipment and personnel for the work to be done.

8.2.2. Buffer zone

The buffer zone contains personnel and equipment decontamination stations. The buffer zone will generally be located upwind of the work activities. It will only be large enough to contain equipment and personnel necessary to keep potentially contaminated media and materials in the immediate work area. This area will be designated with yellow flags attached to portable stakes or cones.

8.2.3. Support zone

The remainder of the site is defined as the support zone. The support zone contains support facilities, extra equipment, transport vehicles, and additional personnel and equipment necessary to manage and perform work activities.

8.2.4. Zone map

Site workers leaving an exclusion zone will be decontaminated in a buffer zone to an extent reflecting possible contamination exposure before entering the support zone. The Site Supervisor and the SSHC will establish decontamination locations for each site. A map depicting the exclusion zone, buffer zone, and support zone will be prepared and posted in the support zone. The layout of the zones, the procedures to be followed for zone control, and the signs used to indicate the zones will be reviewed during the daily safety briefings before beginning the day's work.

Site workers leaving an exclusion zone will be decontaminated in a buffer zone before entering the support zone. The Site Supervisor and the SSHC will establish decontamination locations for each site. Because of the number of locations at which sampling will be conducted and the repetitive nature of the work, a map depicting the exclusion and decontamination zones will not be posted. The layout of the zones, the procedures to be followed for decontamination and zone control, and the signs used to indicate the zones will be reviewed during the daily briefings before beginning each day's work.

8.3. Site access procedures

8.3.1. Zone map

The Site Supervisor and the SSHC will establish access procedures for each site. Access will be monitored by the SSHC, who will maintain a log-in sheet for site workers and guests. The log-in sheet will include, at a minimum, personnel on the site, their arrival and departure times and their destination on the site.

8.4. Site communications

Cellular telephones will be assigned to the Site Supervisor and SSHC. These will be used during on-site activities to facilitate communications for emergency response and other purposes and to serve as the primary off-site communication network. If available, a cellular telephone will provide back-up for the facility phones.

8.5. Housekeeping

The site shall be maintained in a clean and orderly condition at all times. Construction areas shall be free of waste materials, debris, and rubbish to the extent that is feasible. Materials and equipment shall not obstruct traffic or emergency response activities. Waste materials, debris, and rubbish shall periodically be removed from the site and properly disposed off-site as required by site conditions and activities.

8.6. Confined space entry

The Contractor's Confined Space Entry procedure must be followed and a ***Hot Work & Confined-Space Entry Permit*** must be completed prior to entry. FULLY completed confined space entry permits must be sent to the Contractor ASH when the permits expire or are canceled.

All persons entering manholes, tanks or similar confined spaces must have a body harness and lifeline attached. When vertical entry/exit is required greater than five (5) feet, a tripod and man-winch must be setup prior to entry. The standby person must be familiar with its operation. Off-site rescue services (i.e., fire department) must also be available and notified of the entry. Standby persons shall not enter confined spaces to conduct rescue or first aid activities. If the potential for a hazardous atmosphere has been eliminated, then rescue or first aid personnel do not require an SCBA for entry.

8.7. Fall protection

OSHA-approved methods of fall protection are required under the following conditions:

- An employee is working **six feet** or more above the ground;
- An employee is working in a manlift higher than six feet above the ground;
- An employee is involved in assembly/disassembly of scaffolds, work platforms or temporary surfaces;
- An employee is working over dangerous equipment/conditions; and
- An employee is working within **six feet** of an unprotected edge of a floor/ wall opening or roof.

The SSHC must discuss deviations from this requirement and other Contractor's *Fall Protection* program requirements with the Contractor's ASH.

8.8. Safety and toolbox meetings

8.8.1. Safety meetings

At a minimum, informal safety meetings must be held daily for site workers and subcontractors. Task-specific safety meetings for non-routine or high hazard tasks should also be conducted with site workers assigned to those tasks. The following will be covered:

- The day's work activities and/or task-specific work activities are to be reviewed and any safety considerations identified are to be discussed; and

- The previous day's work activities are to be reviewed and any health or safety considerations or deficiencies are to be discussed.

8.8.2. Toolbox meetings

Toolbox meeting will be conducted at a minimum, once per week. Weekly topics will cover a multitude of Health and Safety related information and be documented in the following manner:

- All attendees are to sign in on a *Safety/Toolbox Meeting* form;
- The form is to be complected by all employees; and
- A copy of the *Safety/Toolbox Meeting* form will be filed on-site for the duration of the project.

Safety/Toolbox Meetings may be conducted by subcontractors if equivalent documentation guidelines are met, however a copy of each meetings document must be kept on-site for the duration of the project by the Contractor's SSHC.

8.9. Drum handling guidelines

Note: Drums are not anticipated at this site. In the unlikely event that they are encountered, the SSHC must STOP work, notify a GTEOSI representative and the Contractor's ASH. At a minimum, the following drum handling guidelines must be followed AFTER making the above notifications and modifying this HASP (if required).

- Extreme care will be exercised in opening drums or other sealed containers in which the contents may be harmful to sampling personnel. When practical, a drum will not be moved or opened unless the drum appears to be structurally sound.

- Drums will be opened in such a manner that excess interior pressure, as evidenced by bulging or swelling, has been safely relieved. If pressure cannot be relieved from a remote location, appropriate shielding will be placed between sampling personnel and the drums to reduce the risks of injury.

- All drums that cannot be moved without rupture, leakage or spillage will be emptied into a DOT approved 85 gallon salvage drum using a portable hand pump (for liquid wastes) or a hand shovel (for solids and sludges).

- Drums shall be moved by grappler, non-metallic slings, within a backhoe bucket or front-end loader, or by other means that will minimize damage to containers and release of contents.

- Additional overpack units, in addition to those required to overpack the drums, should be provided on site adjacent to the staging area and each active excavation area.

8.10. General worker safety rules

Workers follow the established safety practices for their respective tasks. The need to exercise caution in the performance of work is made more acute due to weather conditions and restrictions in mobility, peripheral vision, and communication caused by the personal protective equipment. To enhance site safety, the following general worker safety procedures have been established:

- Smoking in work areas is prohibited.

- Eating, drinking, chewing gum, chewing tobacco and application of cosmetics in work areas is prohibited, except in specifically designated areas.

- In any unknown situation, always assume the worst conditions and plan accordingly.
- Employ the "buddy" system when appropriate. Be alert.
- Minimize contact with contaminated materials. Avoid breathing chemical odors. Stay upwind of the containment source if possible. Do not expose skin to water, chemicals, or soil. If one becomes dirty or wet with contaminated fluids, clean up immediately using plenty of water. Plan work areas and decontamination zones, and develop safety procedures to minimize exposure to contaminants.
- Hands must be washed before eating, drinking, and before using toilets.
- Avoid heat, cold, and other work stresses related to wearing the protective gear. Work breaks should be planned to prevent stress-related accidents or fatigue.
- Maintain monitoring systems. Conditions can change quickly if subsurface areas of contamination are penetrated.
- Withdraw from a hazardous situation to reassess procedures and consult with the SSHC.
- Showers will be required when deemed necessary by the SSHC.
- Project personnel should check for any personal habit which may allow contaminated soil or water onto or into the body. No jewelry except medical alert ID's may be worn. Watches should be carried in a pocket. This requirement may be modified at the discretion of the SSHC.
- Be aware that chemical contaminants may mimic or enhance symptoms of other illnesses or intoxication. Consumption of alcohol and working when ill are prohibited.
- Maintain PPE. Check it daily to ensure that it is clean and in good working order.
- Follow the procedures set forth in this HASP. Notify the SSHC if there is a need to change the health and safety procedures.

8.11. Health and safety log

The SSHC shall maintain a DAILY health and safety log to document daily safety inspections and other safety-related information. The daily log must include the following information when applicable:

- Date and areas Inspected (be specific);
- Equipment utilized and work tasks being performed;
- Personal protective equipment and devices used;
- Violations of this HASP;
- Instances of job related injuries / illnesses (document per this HASP);
- Corrective measures put in place to resolve safety deficiencies;
- Monitoring performed;
- SSHC signature and date and military time of Log entry.
- Daily weather conditions;
- Summary of air monitoring performed that week (including results of perimeter monitoring sample analysis completed that week).

All reports, logs, *Safety/Toolbox Meeting* forms, air monitoring records, and similar safety-related information shall be kept in the Contractor's support area for the duration project.

Note: The SSHC's Health and Safety Log should be handwritten in a bound notebook. It does not have to be a separate notebook and may be included within the supervisor's daily work/activity log or equivalent. The notebook should be available for review by GTEOSI and other authorized personnel.

8.12. Site communications

Two sets of communication systems will be established prior to initiating site activities: 1: internal communications among personnel on-site and 2: external communication between on-site and off-site personnel. Internal communication protocol is designed to alert team members to emergencies; pass along safety information; time remaining until next rest period; changes in the work to be accomplished; and maintenance of site control. An external communication system between on-site and off-site personnel is necessary to coordinate emergency response, report to management, and maintain contact with essential off-site personnel.

On-site internal communications will be conducted through verbal communications and/or hand-held two-way FM radios. Nonverbal communications will be used when background noise impede verbal communications. Nonverbal communications will utilize standard hand and air-horn signals, as illustrated below:

8.12.1. Communication procedures

- A channel will be designated as the radio frequency for personnel communications via hand-held two-way FM radios.
- Personnel in the Exclusion Zone should remain in constant radio and /or verbal communication or within sight of the Site Supervisor/Foreman or designated personnel. Any failure of radio communication requires an evaluation of whether personnel should leave the Exclusion Zone.
- Three short blasts on the air horn is the emergency signal to indicate all personnel should leave the Exclusion Zone and proceed to an on-site place of safe refuge (i.e., the Support Zone).
- A 10 second blast with an air horn will indicate the initiation of a site evacuation. All site personnel shall evacuate the site and proceed to an off-site place of safe refuge.
- External communications (when feasible) during site activities will be accomplished by use of telephone established in the Support Zone.

8.12.2. Nonverbal communication

The following standard hand signals will be used in case of failure of radio communications:

Signal	Meaning
Hand gripping throat	Out of air, can't breathe
Grip partner's wrist or both hands around wrist	Leave area immediately
Hands of top of head	Need assistance
Thumbs up	OK, I am all right, I understand
Thumbs down	No, negative

8.12.3. Lines of communication

In general, all health and safety concerns will be first addressed by the SSHC. The SSHC will then pass on all pertinent information to the Site Supervisor/ Foreman, Project Supervisor, Project Manager, RSO and DSH respectively. The GTEOSI Contact will be notified as necessary.

8.13. Sanitary facilities

Provisions will be made for sanitary facilities for use by all site personnel. These provisions will consist of those facilities in existing buildings on site. In the case that no sanitary facilities can be made available in previously existing buildings, portable facilities will be provided.

9. Decontamination

9.1. Personnel decontamination procedures

The SSHC will be responsible for supervising the proper use and decontamination of PPE used in Level C work. The SSHC will also establish and monitor the decontamination line. The contractor's hazardous waste training manual will be available on site to provide detailed personnel and equipment decontamination procedures.

Decontamination involves scrubbing with a soap and water solution followed by rinses with potable water. Decontamination will take place on a decontamination pad. Dirt, oil, grease, or other foreign materials that are visible will be removed from surfaces. Scrubbing with a brush may be required to remove materials that adhere to the surfaces. Splash protection garments will be washed with soap and potable water before removal. Garments will be air dried before storage or disposal. Waste waters from personnel decontamination will be disposed of with the waste waters from equipment decontamination. Respirators will be sanitized as well as decontaminated each day before re-use. The manufacturer's instructions will be followed to sanitize the respirator masks.

The following decontamination protocol, or one providing the same level of decontamination, will be followed:

Station 1 - equipment drop Provide a table covered with a plastic drop cloth. Deposit equipment used on-site including tools, sampling devices and containers, monitoring instruments, radios and clipboards on the table.

Station 2 - outer garment, boots, and gloves wash and rinse Establish a wash station for gloves, boots, and the protective suit (when worn). Scrub outer boots, outer gloves, and protective suit with detergent and water. Rinse with potable water.

Station 3a - outer boot and glove removal Provide seating for use during the removal and collection of outer boots. Remove outer boots. Deposit them in a container with a plastic liner. If the boots are to be reused after cleaning, place them in a secure location near the work site. Provide a location for removal, collection, and disposal of outer gloves. Remove the outer gloves. Deposit them in a container for disposal. During hot weather a cool down station with chairs, fans, and replenishing beverages may be set up in this area.

Station 3b - filter or cartridge exchange This station will be established only if respirators are worn. The worker's respirator cartridges and filters can be exchanged, new outer gloves and outer boots donned, and joints taped at this station. From here the worker can return to work duties in the exclusion zone.

Station 4 - outer garment removal This station will only be provided if a protective outer garment is worn. Provide a bench to sit on during the removal of the protective garment. If the garment is disposable, deposit it in a container with a plastic liner; otherwise, hang it up to air dry.

Station 5 - respirator removal This station will be established only if respirators are worn. Remove the respirator. Avoid touching the face with gloved fingers. Deposit the respirator on a plastic sheet.

Station 6 - inner glove removal Remove and dispose of inner gloves. Deposit them in a container with a plastic liner. If the gloves are to reused, place them in a secure location near the work site, preferably in a plastic container.

Station 7 - field wash Provide a place for a field wash. Wash hands and face thoroughly. Shower if body contamination is suspected.

9.2. Monitoring equipment decontamination procedures

Sampling equipment used for health monitoring purposes will be cleaned of visible contamination and debris before initial use on site, between uses, and after final use. Monitoring equipment that contacts contaminated

media will be decontaminated after each use by a low phosphate detergent brushing followed by a clean water rinse. After decontamination, monitoring equipment will be stored separately from personal protective equipment. Decontaminated or clean equipment not in use will be covered with plastic and stored in a designated storage area in the support zone.

9.3. Decontamination supplies

The following supplies will be available on site for the decontamination of personnel and equipment:

- Plastic drop cloths
- Appropriate containers to collect non-reusable protective clothing
- Plastic wash tubs
- Soft bristled long-handle brushes
- Appropriate containers to collect wash and rinse water
- Hand spray units for decontamination
- Soap, water, alcohol wipes, and towels to wash hands, faces, and respirators
- Washable tables and benches or chairs.

Water usage will be minimized to the extent practicable by using disposable PPE. For disposal purposes, representative wipe samples from PPE to be disposed will be taken and analyzed using a Ludlum Model 43-10 detector and Ludlum Model 2929 scaler or equivalent.

9.4. Collection and disposition of contaminated materials

Cuttings and field decontamination wastes are to be collected, drummed, and disposed of in accordance with the procedures in the Field Sampling Plan. Investigation derived waste will be managed as described in the Field Sampling Plan.

9.5. Site refuse

Site refuse will be contained in appropriate areas or facilities. Trash and scrap metals from the project will be properly disposed.

10. Emergency response

10.1. Notification of site emergencies

In an emergency, site personnel will signal distress either verbally or with three blasts from a horn (vehicle horn, air horn) maintained by the SSHC. The SSHC, Site Supervisor, or the Project Manager will immediately be notified of the nature and extent of the emergency.

Table 10-1 contains emergency telephone numbers. This table and directions to the hospital will be kept with the telephone and updated as needed by the SSHC. A portable on-site telephone will be used to notify off-site personnel of emergencies. The operating condition of this telephone will be determined daily before initiation of activities.

Table 10-1. ***Emergency telephone numbers***

Location	Telephone
Fire Department	(516) 931-0026
Police Department	(516) 573-6200
Ambulance	(516) 542-0123
GTEOSI Point of Contact (Al Ludwig)	(203) 965-2250
Chemical Emergency Advice	1-800-424-9300
Nassau County Medical Center	(516) 542-0233
National Spill Response Center	1-800-424-8802
NYSDEC Spill Hot Line	1-800-457-7362

Figure 10-1 contains a map showing the location and the route to the Nassau County Medical Center. Directions to the Nassau County Medical Center from the site are:

- Take Cantiague Rock Road ½ block to Prospect Avenue; take a right hand turn 4 blocks to Bond Street; make a left hand turn and proceed 5 block to Old Country Road; make a left hand turn and proceed 1 block to Carman Avenue; make a right hand turn and proceed 10 block to the Hospital entrance on the left side of the street.

10.2. Responsibilities

The SSHC is responsible for responding to, or coordinating the response of off-site personnel to, emergencies. In the event of an emergency, the SSHC will direct notification and response, and will assist the Site Supervisor in arranging follow-up actions. Upon notification of an exposure incident, the SSHC will call the hospital, fire, and police emergency response personnel for recommended medical diagnosis, treatment if necessary, and transportation to the hospital.

Before the start of investigation activities at the site, the SSHC will:

- Notify emergency contacts, and health care facilities of the potentially hazardous activities on-site as a result of the activities listed in the Work Plan.
- Confirm that the following safety equipment is available: eyewash, first aid supplies, air horn, and fire extinguishers
- Have a working knowledge of the contractor's safety equipment.
- Confirm that a map detailing the most direct route to Nassau County Medical Center (Figure 10-1) is prominently posted with the emergency telephone numbers (Table 10-1).
- Confirm that employees who will respond to emergencies have been appropriately trained.

Before work may resume following an emergency, used emergency equipment must be recharged, refilled, or replaced and government agencies must be notified as required.

The SSHC, the Site Supervisor, and possibly the Project Manager, are responsible for investigating the incident as soon as possible. The Project Manager will review the incident investigation report to determine whether and to what extent exposure actually occurred, the cause of exposure, and the means to prevent similar incidents. The resulting report must be signed and dated by the Project Manager, SSHC, and the Site Supervisor.

10.3. Accidents and injuries

In the event of an accident or injury, workers will immediately implement emergency isolation measures to assist those who have been injured or exposed and to protect others from hazards. Upon notification of an exposure incident, the SSHC will contact emergency response personnel who can provide medical diagnosis and treatment. If necessary, immediate medical care will be provided by personnel trained in first aid procedures. Other on-site medical or first aid response to an injury or illness will be provided only by personnel competent in such matters.

10.4. Safe refuge

Before commencing site activities, an area will be identified by the SSHC as the place of refuge for site workers. In case of an emergency, personnel in the exclusion zone should evacuate the work area both for their own safety and to prevent hampering of rescue efforts. Following an evacuation, the SSHC will account for site personnel, based on information in the Site Log. If evacuation from this area is necessary, project and personal vehicles will be used to transport site workers to a place of refuge designated by the GTEOSI project contact.

10.5. Fire fighting procedures

A fire extinguisher meeting the requirements of 29 CFR Part 1910 Subpart L, as a minimum, will be available in the support zone during on-site activities. This is intended for use by a trained operator to control small fires. When a fire cannot be controlled with the extinguisher or a trained operator is not available, the exclusion zone will be evacuated, and the fire department will be contacted immediately. The SSHC or the Site Supervisor will determine when to contact the fire department.

10.6. Emergency equipment

The following equipment, selected based on potential site hazards, will be maintained in the support zone for safety and emergency response purposes:

- Fire extinguisher
- First aid kit
- Eye wash bottles

10.7. Emergency site communications

Hand and verbal signals will be used at the site. Portable on-site telephones will be available during site activities for emergency response communications.

10.8. Security and control

Work zone security and control during emergencies, accidents, and incidents will be monitored by the SSHC or the Site Supervisor. The duties of the SSHC or the Site Supervisor include limiting access to the work zones to authorized personnel and overseeing emergency response activities.

11. Special precautions and procedures

The activities performed at the site may expose personnel to both chemical, radiological, and physical hazards. The hazards associated with specific site activities are discussed in Section 2. The potential for exposure to hazardous situations will be significantly reduced through the use of air monitoring, PPE, hazard awareness, training, and administrative and engineering controls. Other general hazards that may be present.

11.1. Heavy machinery/equipment

Site workers performing site activities may use or work near operating heavy equipment and machinery. Respiratory protection and protective eyewear may be worn during portions of work activities. Since this protective equipment reduces peripheral vision of the wearer, site workers should exercise extreme caution in the vicinity of operating equipment and machinery to avoid physical injury to themselves or others.

11.2. Additional safety practices

The following are important safety precautions that will be enforced during the completion of the activities listed in Section 2:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases that probability of hand-to-mouth transfer and ingestion of material is prohibited in the exclusion zone and buffer zones.

- Hands and face must be thoroughly washed when leaving the support zone and before eating or drinking.

- Contact with potentially contaminated surfaces should be avoided whenever possible. Workers should minimize walking through

puddles, mud, or other discolored surfaces; kneeling on ground; and leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground.

- Medicine and alcohol can mask or potentiate the effects of exposure to certain compounds. Consumption of alcoholic beverages is not permitted during investigative activities. Prescribed drugs must only be used at the direction of a physician familiar with the person's work activities.

- Site workers and equipment in the work areas will be minimized consistent with effective site operations.

- Unsafe or inoperable equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.

- Activities in the exclusion zone will be conducted using the "Buddy System." The Buddy is another worker fully dressed in the appropriate personal protective equipment who can perform the following activities:

  - Provide partner with assistance
  - Observe partner for sign of chemical or heat exposure
  - Periodically check the integrity of partner's PPE
  - Notify others if emergency help is needed.

- The HASP will be reviewed frequently for its applicability to the current and upcoming operations and activities.

- Drums with contents that have not been identified will be reported to the site supervisor. Site workers will not handle, move or otherwise disturb drums of unidentified content or condition until an addendum to this HASP has been prepared to address associated health and safety concerns.

11.3. Daily log contents

The Project Manager and the SSHC will establish a system appropriate to the site investigation areas that will record, at a minimum, the following information:

- Site workers and other personnel conducting the site activities. their arrival and departure times, and their destination at the investigation areas
- Incidents and unusual activities that occur on the site such as. but not limited to, accidents, breaches of security, injuries, equipment failures and weather related problems
- Changes to the Work Plan and the HASP
- Daily information such as:
  - Work accomplished and the current site status
  - Air monitoring results

12. Format for HASP addenda

Addenda will be added to this document as numbered addenda, with the following subsections. For example, the first addendum will be labeled Addendum 1, and will have subsections as described below.

Scope of work: This section will be used to describe the task specific scope of work. Describe exactly what work will be performed. For example, four samples will be collected using a long reach backhoe.

Health and safety personnel: This section will be used to describe who will be responsible for HASP duties, and to specify changes in HSM responsibilities from those specified in the main text of the HASP.

Field personnel: This section will be used to specify who will be performing field work.

Initial site entry: This section will be used to specify the initial levels of personal protective equipment to be used for the activities specified in the scope of work of the addendum.

Site hazards: This section will be used to specify site hazards, chemical, physical, biological, or flammable in nature, which are not listed in the main text of the HASP. Include information derived from laboratory analyses which have been conducted related to the scope of work described in the scope of work of the addendum.

Site control: This section will be used to specify Exclusion Zones, Contamination Reduction Zones, Support Zones which will be used during work at the site.

Work practices and PPE: This section will be used to specify additional work practices not specified in Section 2.2. of the HASP. Also, specify the PPE which will be used during the activities specified in the scope of work of the addendum.

Monitoring: This section will be used to specify what monitoring equipment and action levels will be used during work specified in the scope of work of the addendum.

Other: This section will be used to specify changes or additions to other portions of the HASP.

FIGURE 10-1

FORMER SYLVANIA
ELECTRIC PRODUCTS INCORPORATED
FACILITY
HICKSVILLE, NEW YORK

HOSPITAL ROUTE
MAP

Nov. 1997
5816.009-006

O'BRIEN & GERE
ENGINEERS INC

I:\DWGZ\PROJECTS\5816009\008.DWG ACB

11/97

ATTACHMENT A

Technical and Administrative Guidance Memorandum 4031

HWR-89-4031
October 27, 1989

New York State Department of Environmental Conservation

MEMORANDUM

TO: Regional Hazardous Waste Remediation Engrs., Bur. Directors & Section Chiefs
FROM: Michael J. O'Toole, Jr., Director, Division of Hazardous Waste Remediation
SUBJECT: DIVISION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM--FUGITIVE DUST SUPPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES
DATE: OCT 2 7 1989

1. Introduction

Fugitive dust suppression, particulate monitoring, and subsequent action levels for such must be used and applied consistently during remedial activities at hazardous waste sites. This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2. Background

Fugitive dust is particulate matter--a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles, liquid droplets or solids, over a wide range of sizes--which becomes airborne and contributes to air quality as a nuisance and threat to human health and the environment.

On July 1, 1987, the United States Environmental Protection Agency (USEPA) revised the ambient air quality standard for particulates so as to reflect direct impact on human health by setting the standard for particulate matter less than ten microns in diameter (PM_{10}); this involves fugitive dust whether contaminated or not. Based upon an examination of air quality composition, respiratory tract deposition, and health effects, PM_{10} is considered conservative for the primary standard--that requisite to protect public health with an adequate margin of safety. The primary standards are 150 ug/m^3 over a 24-hour averaging time and 50 ug/m^3 over an annual averaging time. Both of these standards are to be averaged arithmetically.

There exists real-time monitoring equipment available to measure PM_{10} and capable of integrating over a period of six seconds to ten hours. Combined with an adequate fugitive dust suppression program, such equipment will aid in preventing the off-site migration of contaminated soil. It will also protect both on-site personnel from exposure to high levels of dust and the public around the site from any exposure to any dust. While specifically intended for the protection of on-site personnel as well as the public, this program is not meant to replace long-term monitoring which may be required given the contaminants inherent to the site and its air quality.

3. Guidance

A program for suppressing fugitive dust and monitoring particulate matter at hazardous waste sites can be developed without placing an undue burden on remedial activities while still being protective of health and environment. Since the responsibility for implementing this program ultimately will fall on the party performing the work, these procedures must be incorporated into appropriate work plans. The following fugitive dust suppression and particulate monitoring program will be employed at hazardous waste sites during construction and other activities which warrant its use:

(1) Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

(2) Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Such activities shall also include the excavation, grading, or placement of clean fill, and control measures therefore should be considered.

(3) Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM_{10}) with the following minimum performance standards:

Object to be measured: Dusts, Mists, Aerosols
Size range: <0.1 to 10 microns
Sensitivity: 0.001 mg/m^3
Range: 0.001 to 10 mg/m^3
Overall Accuracy: $\pm$10% as compared to gravimetric analysis of stearic acid or reference dust

Operating Conditions:
Temperature: 0 to 40°C
Humidity: 10 to 99% Relative Humidity

Power: Battery operated with a minimum capacity of eight hours continuous operation

Automatic alarms are suggested.

Particulate levels will be monitored immediately downwind <u>at</u> the working site and integrated over a period not to exceed 15 minutes. Consequently, instrumentation shall require necessary averaging hardware to accomplish this task; the P-5 Digital Dust Indicator as manufactured by MDA Scientific, Inc. or similar is appropriate.

(4) In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the entity operating the equipment to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

(5) The action level will be established at 150 ug/m^3 over the integrated period not to exceed 15 minutes. While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m^3, the upwind background level must be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 ug/m^3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see Paragraph 7). Should the action level of 150 ug/m^3 be exceeded, the Division of Air Resources must be notified in writing within five working days; the notification shall include a description of the control measures implemented to prevent further exceedences.

(6) It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM_{10} at or above the action level. Since this situation has the potential to migrate contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

(7) The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

1. Applying water on haul roads.
2. Wetting equipment and excavation faces.
3. Spraying water on buckets during excavation and dumping.
4. Hauling materials in properly tarped or watertight containers.
5. Restricting vehicle speeds to 10 mph.
6. Covering excavated areas and material after excavation activity ceases.
7. Reducing the excavation size and/or number of excavations.

Experience has shown that utilizing the above-mentioned dust suppression techniques, within reason as not to create excess water which would result in unacceptable wet conditions, the chance of exceeding the 150 ug/m^3 action level at hazardous waste site remediations is remote. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

(8) If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (that is, below 150 ug/m^3 and no visible dust), work must be suspended until appropriate corrective measures are approved to remedy the situation. Also, the evaluation of weather conditions will be necessary for proper fugitive dust control--when extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended.

There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require appropriate toxics monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

cc: E. Sullivan
D. Markell
A. DeBarbieri
C. Goddard
R. Tramontano
E. McCandless
A. Fossa
J. Kelleher
J. Colquhoun
M. Keenan
D. Ritter
Regional Directors
Regional Engineers
RSHWE
Reg. Citizen Participation Specs.

Responsiveness Summary
TAGM: Fugitive Dust Suppression and Particulate Monitoring at Inactive Hazardous Waste Sites

The following comments (1. through 12.) have been incorporated into the TAGM:

1. Comment: TAGM covers only dust from hazardous waste; however, dust from non-hazardous construction activity at a site can cause a very troublesome nuisance dust condition that can lead to a considerable public concern and annoyance.

2. Comment: Since solidification and treatment at sites can involve using materials such as kiln dust, lime, etc. that have a high dusting potential, a statement stating the need for special measures for these materials should be considered.

3. Comment: TAGM does not state that when extreme wind conditions make dust control ineffective, as a last resort remedial actions may have to be suspended. In general, evaluation of weather conditions will be necessary for proper dust control.

4. Comment: Piles of excavated material should be covered as well as excluded areas.

5. Comment: A technique for dust suppression should be added for reducing the excavation size and/or the number of excavations.

6. Comment: To insure the validity of the dust measurements performed in accordance with this TAGM, there must be an appropriate QA/QC program.

7. Comment: The TAGM should provide for notification should the action level be exceeded.

8. Comment: For explanatory purposes, it may be useful to explain the significance of the ten micron standard in relation to health effects.

9. Comment: Since the responsibility for implementing this will ultimately fall to the PRP or contractor, the TAGM should state that these procedures must be incorporated into appropriate work plans.

10. Comment: The phrase "increasing the level of protection" should read "increasing the level of personal protection for on-site personnel" for clarity.

11. Comment: Suppression techniques should include atomizing sprays as an effective fugitive dust control method.

12. Comment: Define "fugitive dust."

The following comments (13. through 24.) as noted have been modified for use in the TAGM or rejected as being inappropriate or beyond the scope of the TAGM:

13. Comment: It would be helpful to add a section labeled "Purpose" to outline the specific reasons for monitoring and dust suppression.

Response: The third paragraph of "Background" has been revised to describe the purpose.

14. Comment: The use of calcium chloride as a dust suppressant has been specifically prohibited for this use in the Construction Grants program due to possible adverse environmental effects, and recommendation for its use should be evaluated further.

Response: Calcium chloride has been replaced with water.

15. Comment: The reference to a specific monitoring instrument should be deleted and minimum performance standards be substituted.

16. Comment: The real-time monitors used for monitoring particulates should be equipped with automatic alarms and the necessary averaging hardware.

Response (to 15. and 16.): Minimum performance standards have been adopted. A specific instrument has been kept since it is used by the Division of Air Resources, not as an endorsement but as an example and qualified as such by including "or similar." Automatic alarms are suggested, but not required since they are not minimum standards for performance.

17. Comment: The need for the use of watertight containers is unclear. Although watertight roll-offs may prohibit fine particles from passing through the seals, properly tarped standard dump trucks and roll-offs should provide adequate dust control.

Response: Properly tarping has been added.

18. Comment: In the final paragraph it is suggested that it may be appropriate to modify the particulate standard in consideration of the toxicity of the dust generating material. The PM_{10} standard was developed without regard to the chemical characteristics of the particulate material and it should be used accordingly by the Division.

Response: While particulate monitoring and standards should be virtually independent of the toxicity levels, there may be situations involving toxic dusts that warrant more stringent monitoring and action levels than those conservative levels provided for in this TAGM. If toxic air emissions are a concern, appropriate toxics monitoring and action levels should be in place and this suggestion in the TAGM should remain. However, the details of such are beyond the scope of this TAGM.

19. Comment: TAGM does not address what level of protection should be used for varying concentrations or toxicity of fugitive dust in the work zone.

Response: While increasing the level of personnel protection is addressed as a corrective action to be taken if action level are exceeded, the issue of specific levels of personnel protection is not appropriate for this TAGM.

20. Comment: Since semi-volatiles in vapor phase may not register during the dust or volatile organics monitoring, it is essential that these monitorings by themselves are not construed as providing complete safeguards.

Response: The issue addressed by the TAGM is the possible need for more stringent action levels for dust and particulates--vapors are a whole different issue beyond the scope of the TAGM.

21. Comment: It is not clear if TAGM specifies the long-term collection and analysis of fugitive dust to ascertain whether toxic chemicals are present in any significant level.

Response: Collection and analysis of fugitive dust are not within the scope of this TAGM.

22. Comment: TAGM does not specify what actions should be taken when the concentration and/or toxicity of fugitive dust may require lower action levels (i.e. health risk assessment).

Response: The intent of the TAGM is to provide a real-time measure of air quality due to fugitive dust during remedial activities at inactive hazardous waste sites, and health risk assessment from the toxicity of the dust is beyond the scope of this TAGM.

23. Comment: The particulate monitoring could also be utilized to evaluate the exposure of the general public to dusts created by the remedial activities. Sampling should be conducted downwind at an off-site receptor such as a residence or school.

Response: By monitoring on-site both down- and upwind with discrete and conservative action levels along with employing a feasible dust suppression program, the public will be protected from any potential impact of the dust.

24. Comment: The TAGM could also address a screening analysis to determine if a particular contaminant is a possible concern in dust fallout.

Response: While there may be instances where screening analysis is necessary, methodologies for such are more appropriately outlined in the Division of Air Resources Air Guide-1, Guidelines for the Control of Hazardous Air Contaminants.