Betsy Lowe

WORK PLAN

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

MUNICIPAL SANITARY LANDFILL
GLOVERSVILLE, NEW YORK

October 17, 1988

Tentatively Approved by NYSDEC
January 12, 1989

TIGHE & BOND CONSULTING ENGINEERS
ENVIRONMENTAL SPECIALISTS

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLAN
for
MUNICIPAL SANITARY LANDFILL
CITY OF GLOVERSVILLE, NEW YORK

September 2, 1986

Revised August 7, 1987

Revised January 22, 1988

Revised October 17, 1988

Tighe & Bond, Inc.
Consulting Engineers
Easthampton, Massachusetts
413-527-5600

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SECTION 1

INTRODUCTION

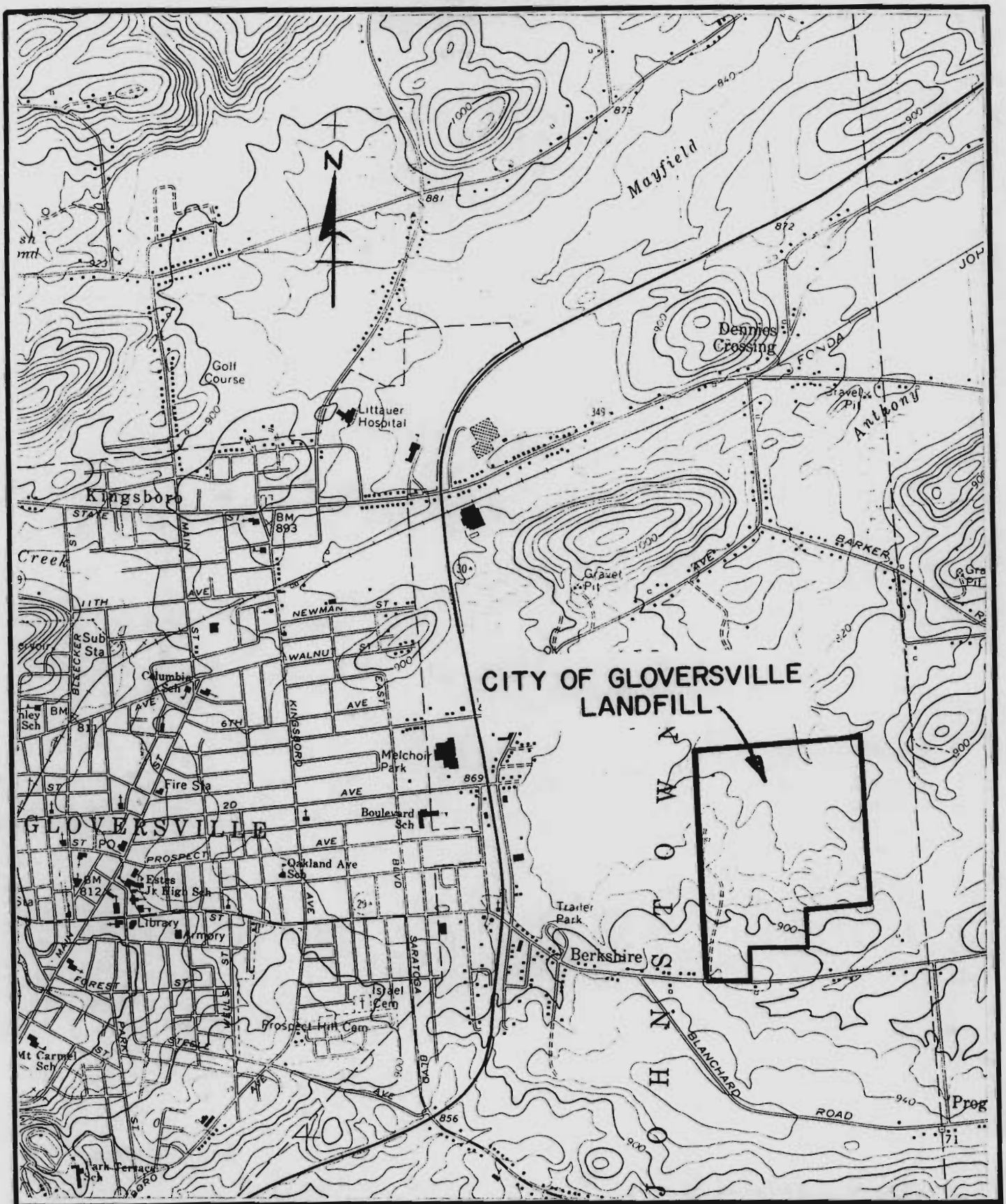
SECTION 1
INTRODUCTION

1.1 General - This work plan sets forth the City of Gloversville's proposal for a remedial investigation and feasibility study of the City of Gloversville municipal sanitary landfill site. The objective of the remedial investigation is to determine whether hazardous substances have been or may be released from the landfill site and, if so, the areal and vertical extent of such release and the environmental impacts thereof. Following the acquisition of data required by this remedial investigation, the City will conduct a feasibility study to evaluate alternative remedial measures which may be applicable to this site.

This study is being proposed by the City of Gloversville in connection with settlement discussions concerning the federal litigation entitled "The State of New York against The City of Gloversville, et al." This work plan was approved by the State of New York in a January 12, 1989 letter from the Department of Law.

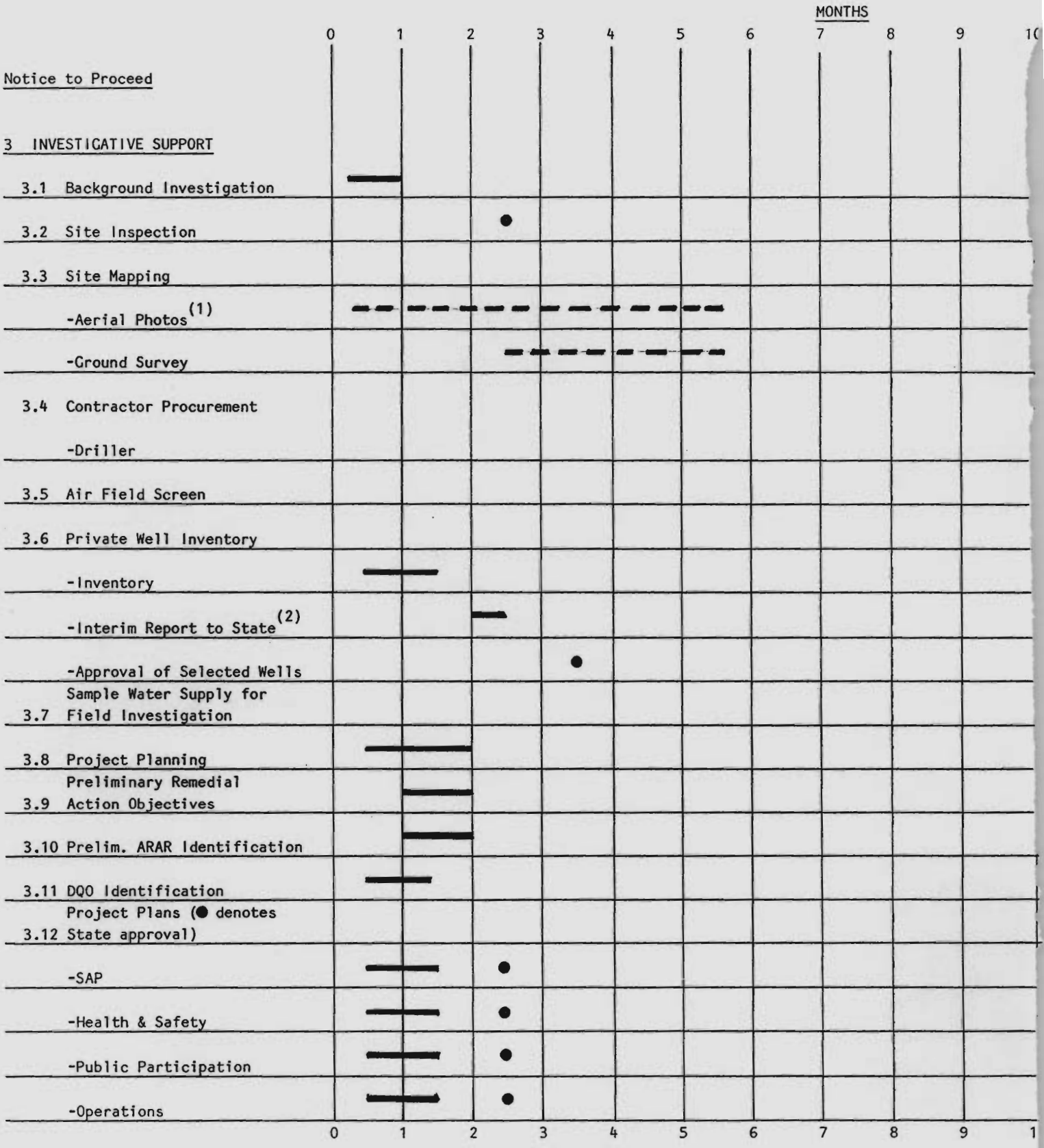
1.2 Site Location - The sanitary landfill site is located in the Town of Johnstown, Fulton County, NY, just outside the Gloversville city limits. The site is near the easterly border of the city limits, northerly of East Fulton Street (Route 29A), and easterly of Route 30A. The approximate location of the site is shown in Figure No. 1.1.

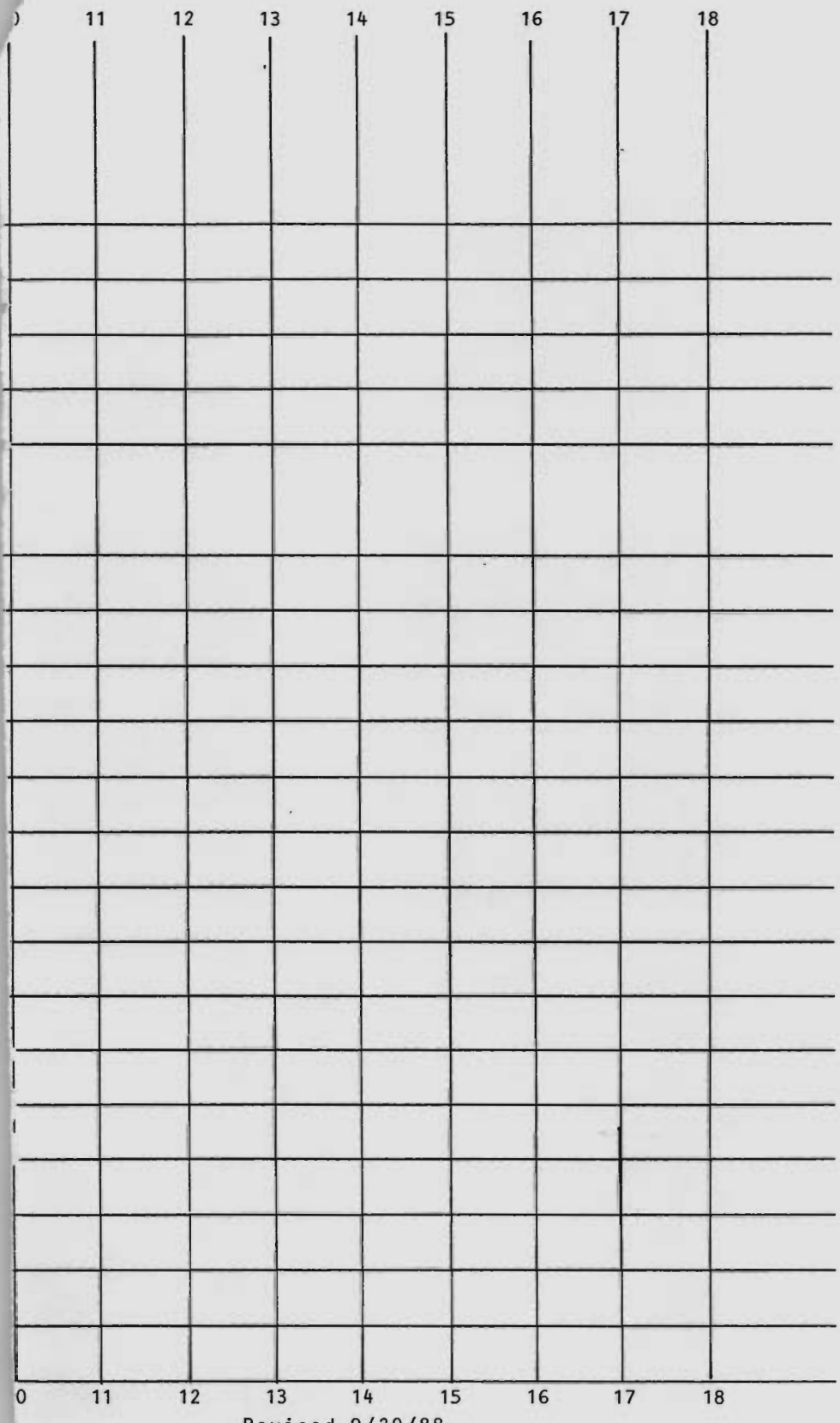
1.3 Remediation Investigation (RI) - As set forth hereafter, the remedial investigation shall include a site investigation, mapping, geophysical surveys, groundwater, air, stream, sediment and residential well sampling and analysis and an assessment to determine whether hazardous substances have been released from the landfill site. The data collected during the remedial investigation shall be used for the feasibility study of remedial alternatives outlined hereafter.



	REMEDIAL INVESTIGATION SANITARY LANDFILL CITY OF GLOVERSVILLE, N.Y. TIGHE & BOND, INC.	FIGURE NO. 1.1 LOCUS PLAN SCALE: 1"=2000' AUG., 1986

Figure 1.2
Estimated Project Schedule





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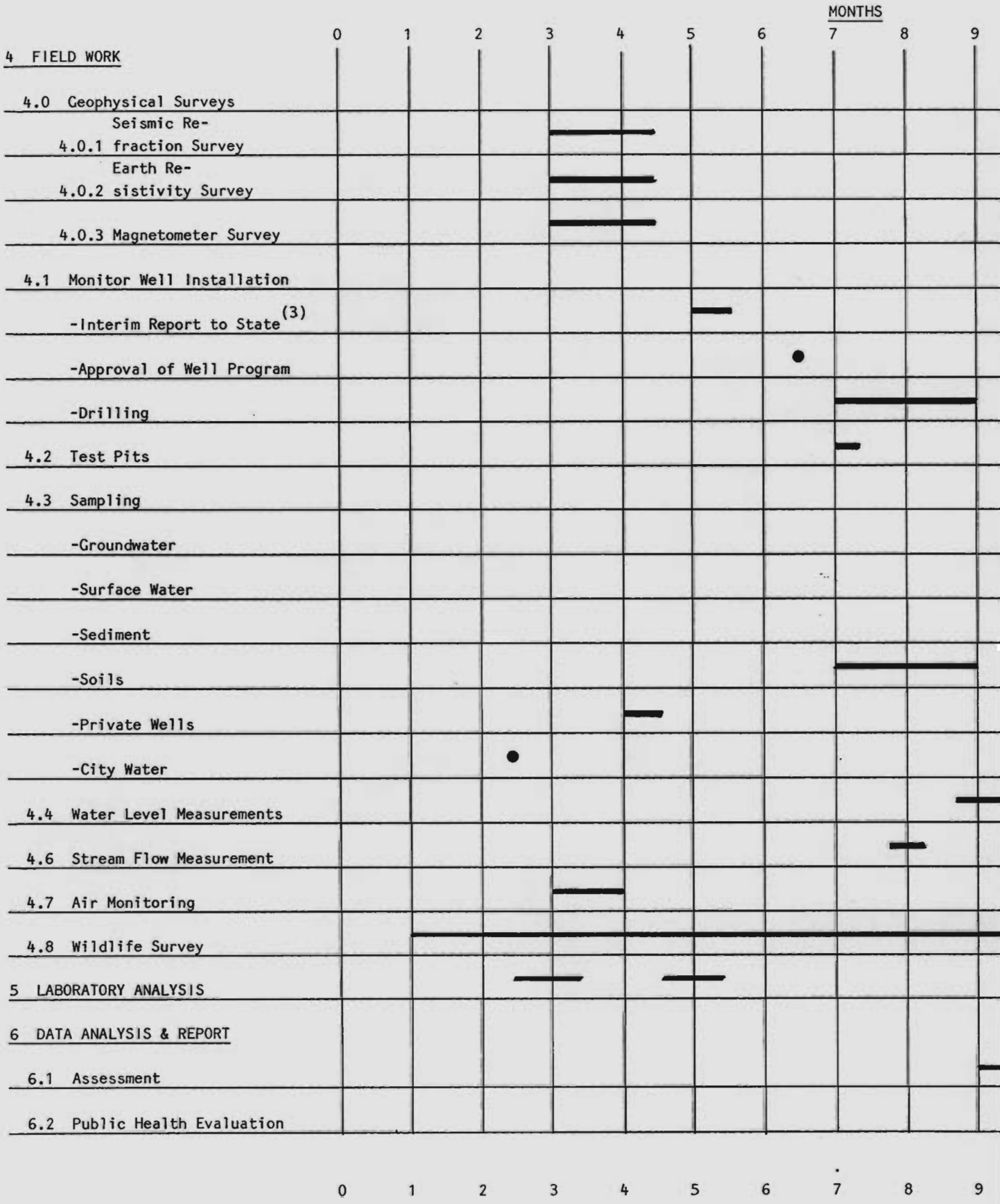
MONTHS
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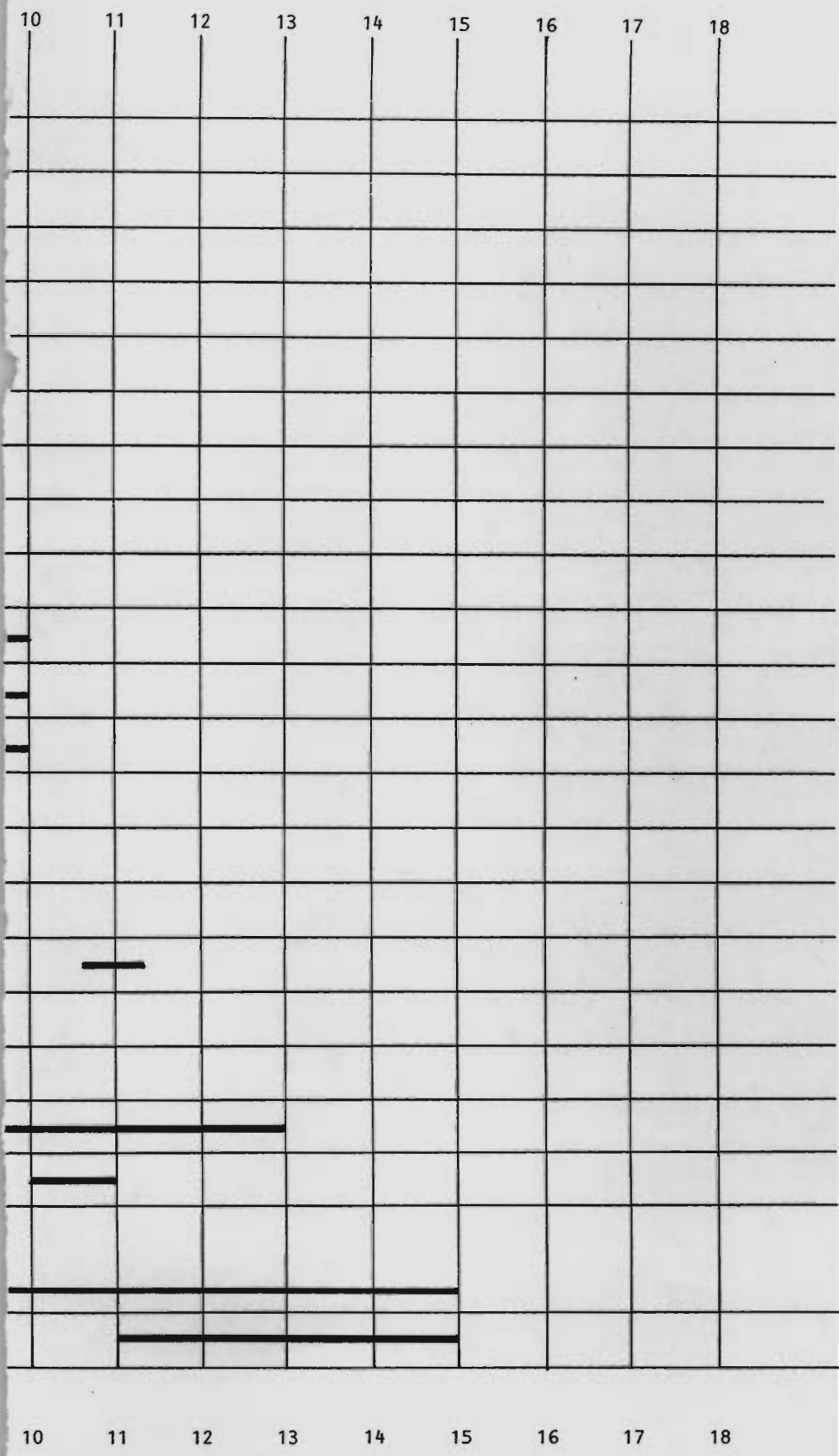

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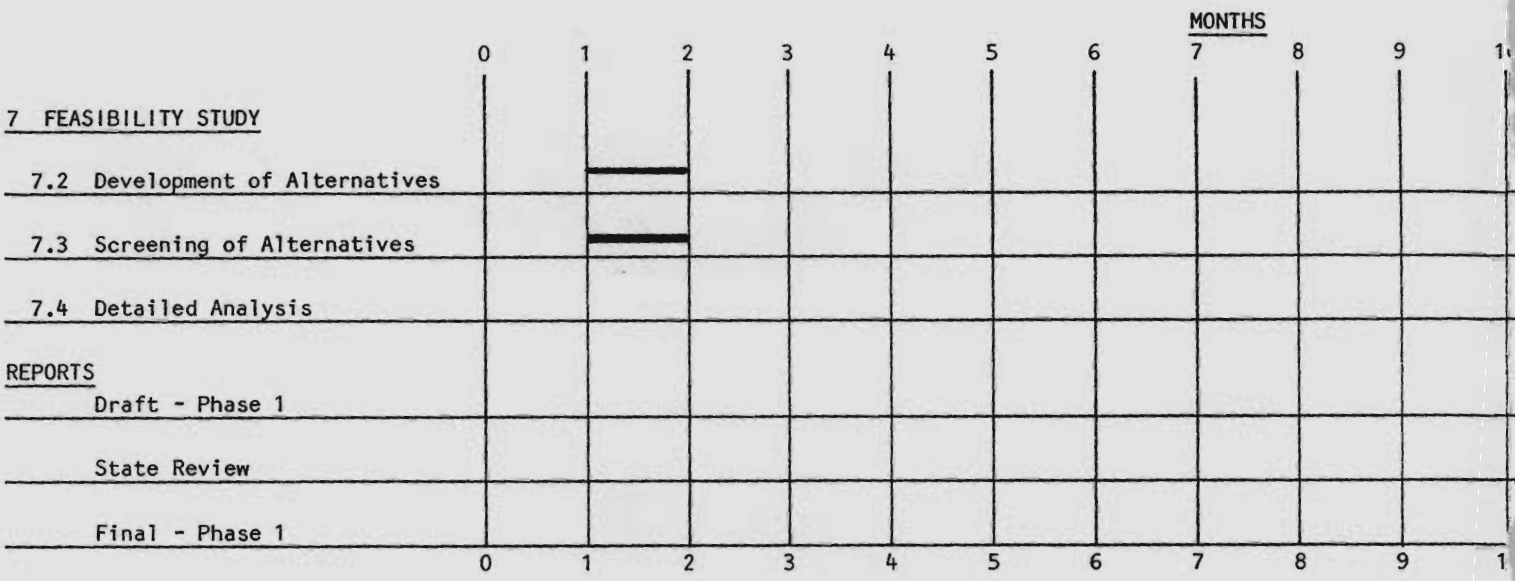
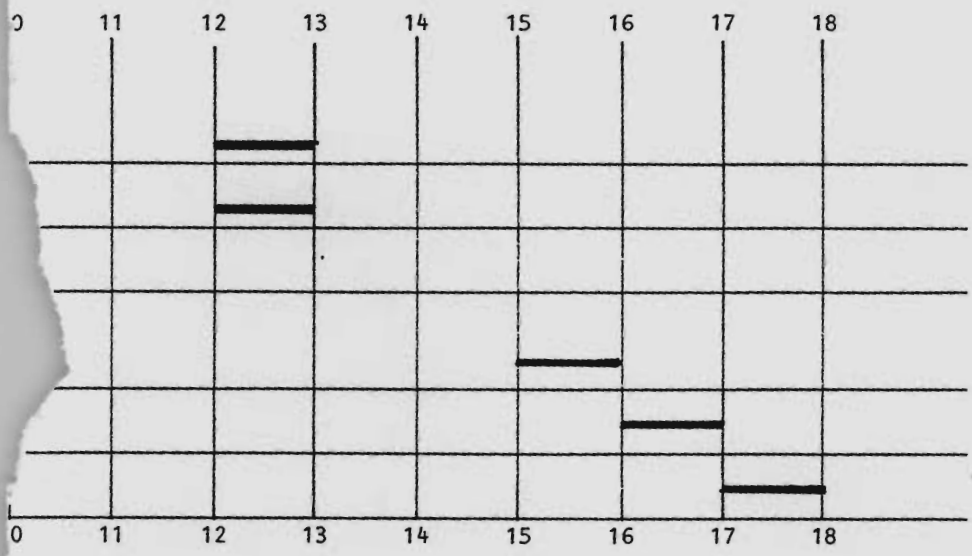


Notes: (1) Schedule for aerial photos depends on season; it must be completed in early spring or late fall.
(2) Schedule may be delayed pending aerial photo and map development.
(3) Aerial mapping required for interim report on monitoring well locations.

EG5/E



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SECTION 2

BACKGROUND

SECTION 2
BACKGROUND

2.1 Site Setting - The Gloversville sanitary landfill is located on glacial deposits overlying Canajoharie Shale. Well logs in the area (Arnow, 1951) indicate that there is a bedrock valley under the landfill, with the elevation of the top of the shale being in the 730 to 750-foot range, and the surrounding areas having bedrock at elevations of over 800 feet above sea level.

The 1980 study conducted by Dunn Geoscience, referenced below, developed several cross sections of the landfill site based on borings for monitoring wells. These cross sections are shown in Figure 2.2. The plan location for these cross sections is shown in Figure 2.1. The groundwater contour map is reproduced in Figure 2.3.

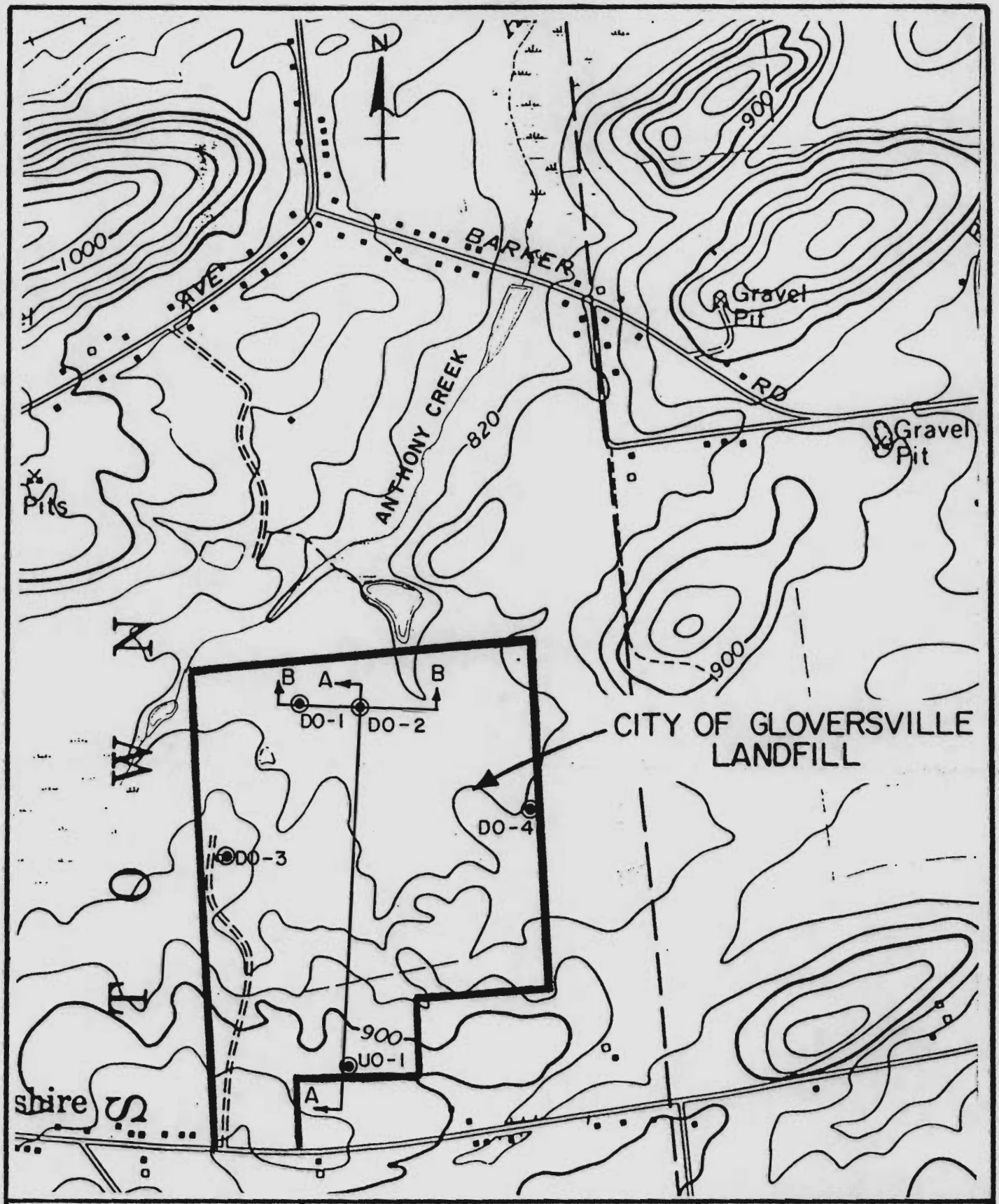
According to the Dunn Report:

> "In general, the geologic cross sections show a thick layer (50 to 100 feet) of kamic sand which wedges out to the north. Overlying the kamic gravels, as shown by the two downgradient wells, is a lacustrine sequence of approximately 25 feet of lacustrine sand over clay."

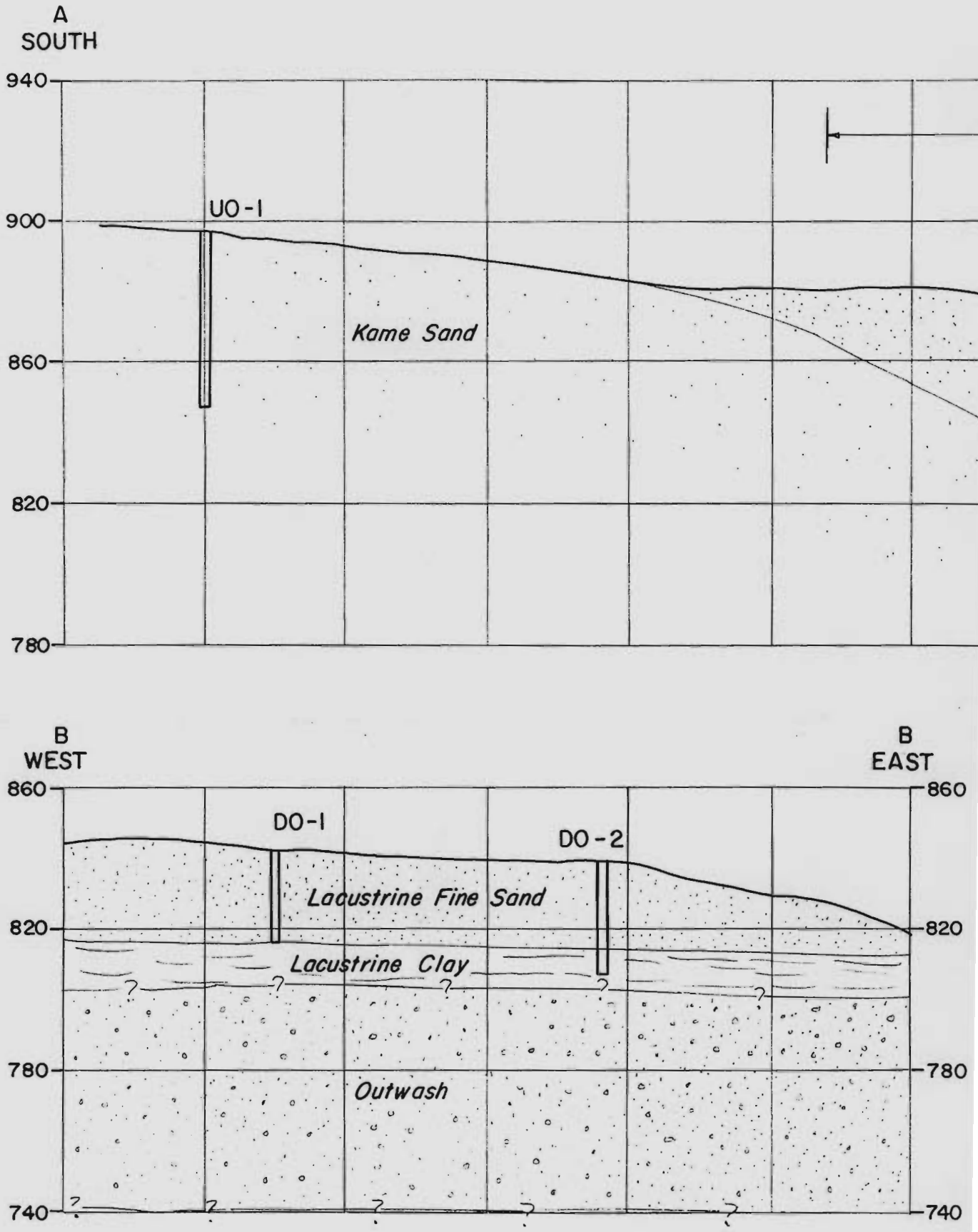
The landfill is located in the drainage basin of the Sacandaga Reservoir, which discharges to the Hudson River.

2.2 Landfill History - The site has in the past and continues to be used for both disposal of municipal and industrial solid waste, although detailed information regarding the use of the site is not readily available. All available information regarding disposal practices at this site will be developed as part of the Remedial Investigation.

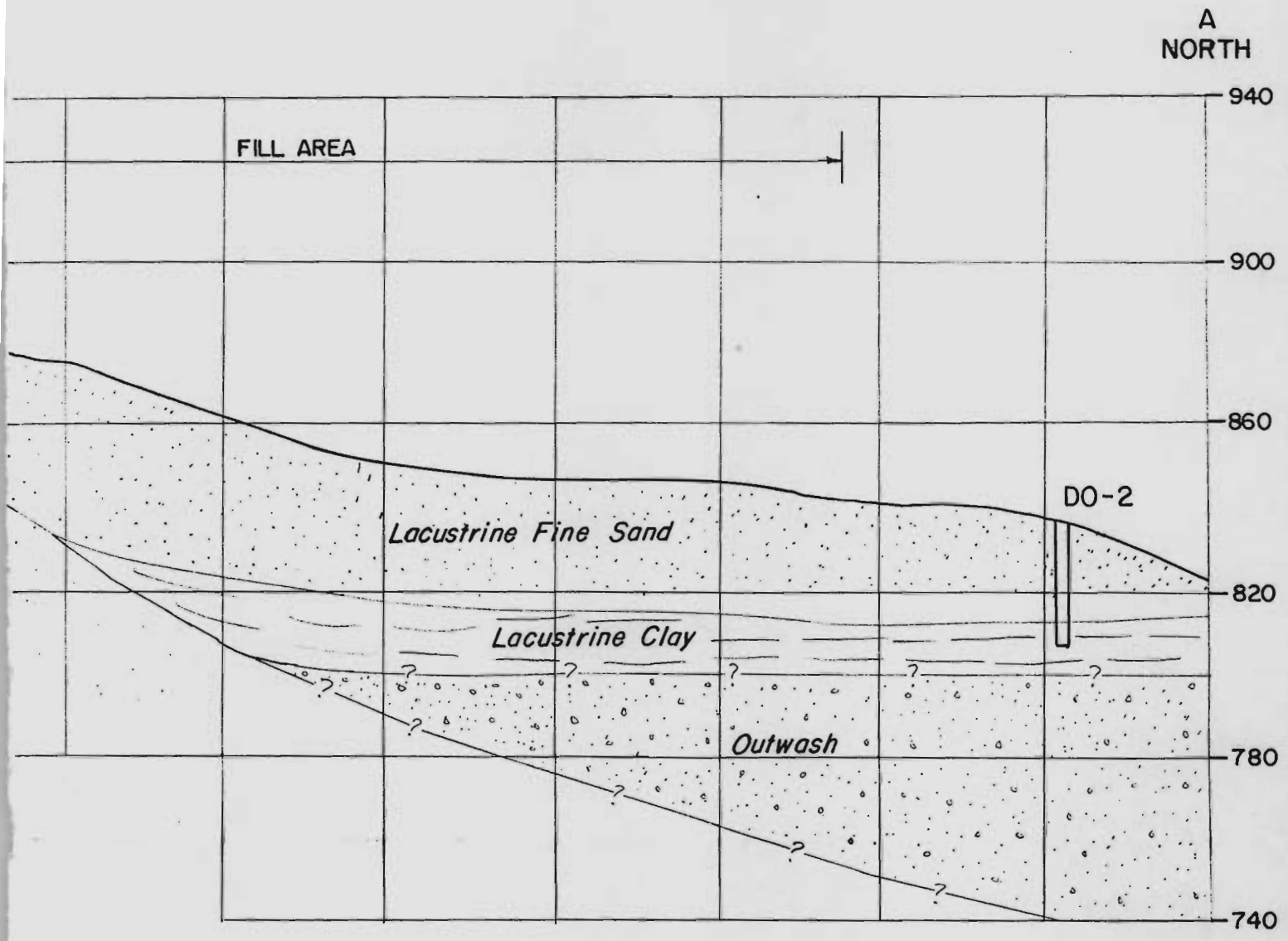
EG4/K



LEGEND	REMEDIAL INVESTIGATION SANITARY LANDFILL CITY OF GLOVERSVILLE, N.Y.	FIGURE NO. 2.1 1980 SITE EVALUATION
UO-1 / DO-1 = EXISTING WELL	TIGHE & BOND, INC.	SCALE: 1"=1000' SEPT., 1986



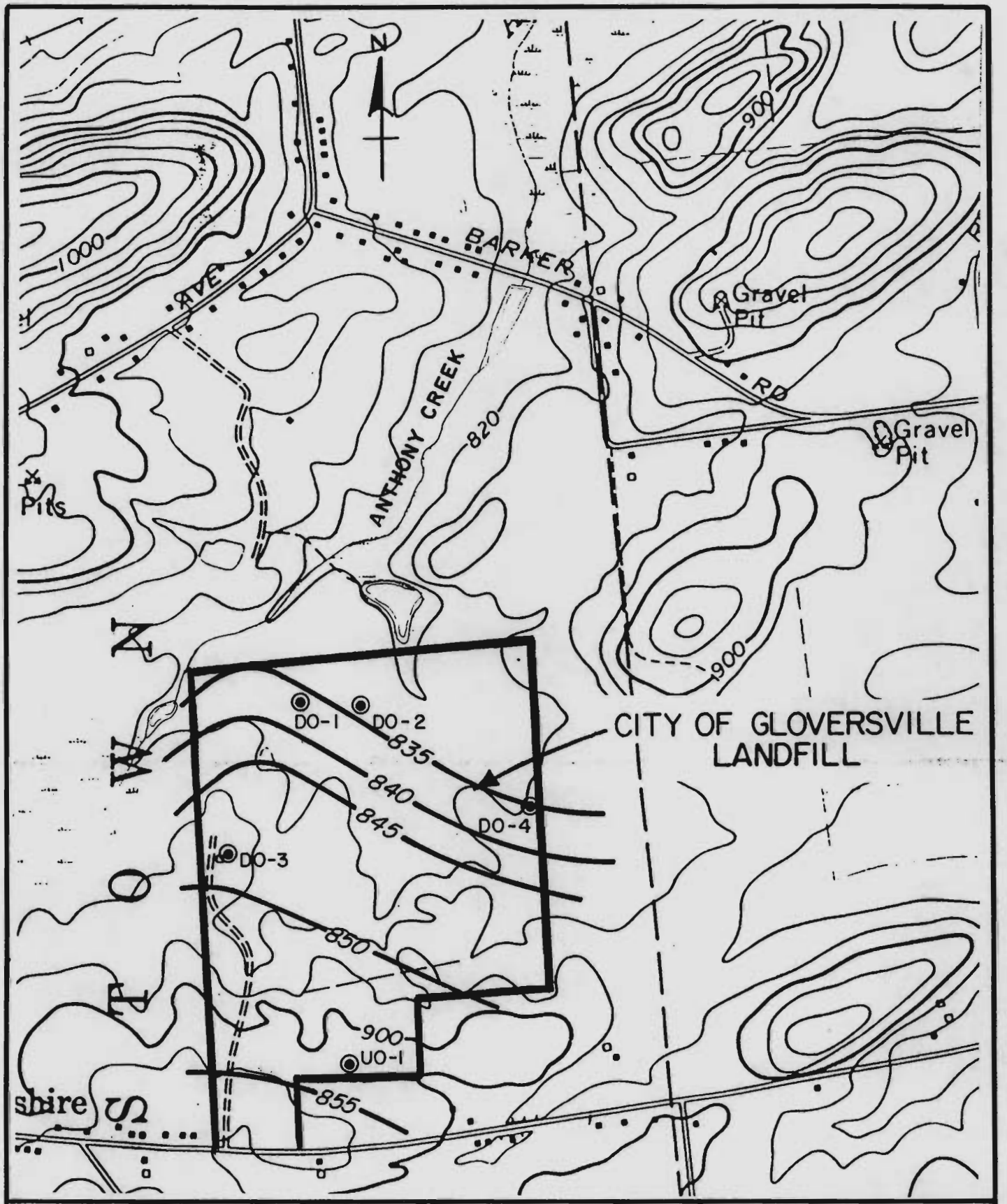
SOURCE: 1980 DUNN GEOSCIENCE REPORT



NOTE:

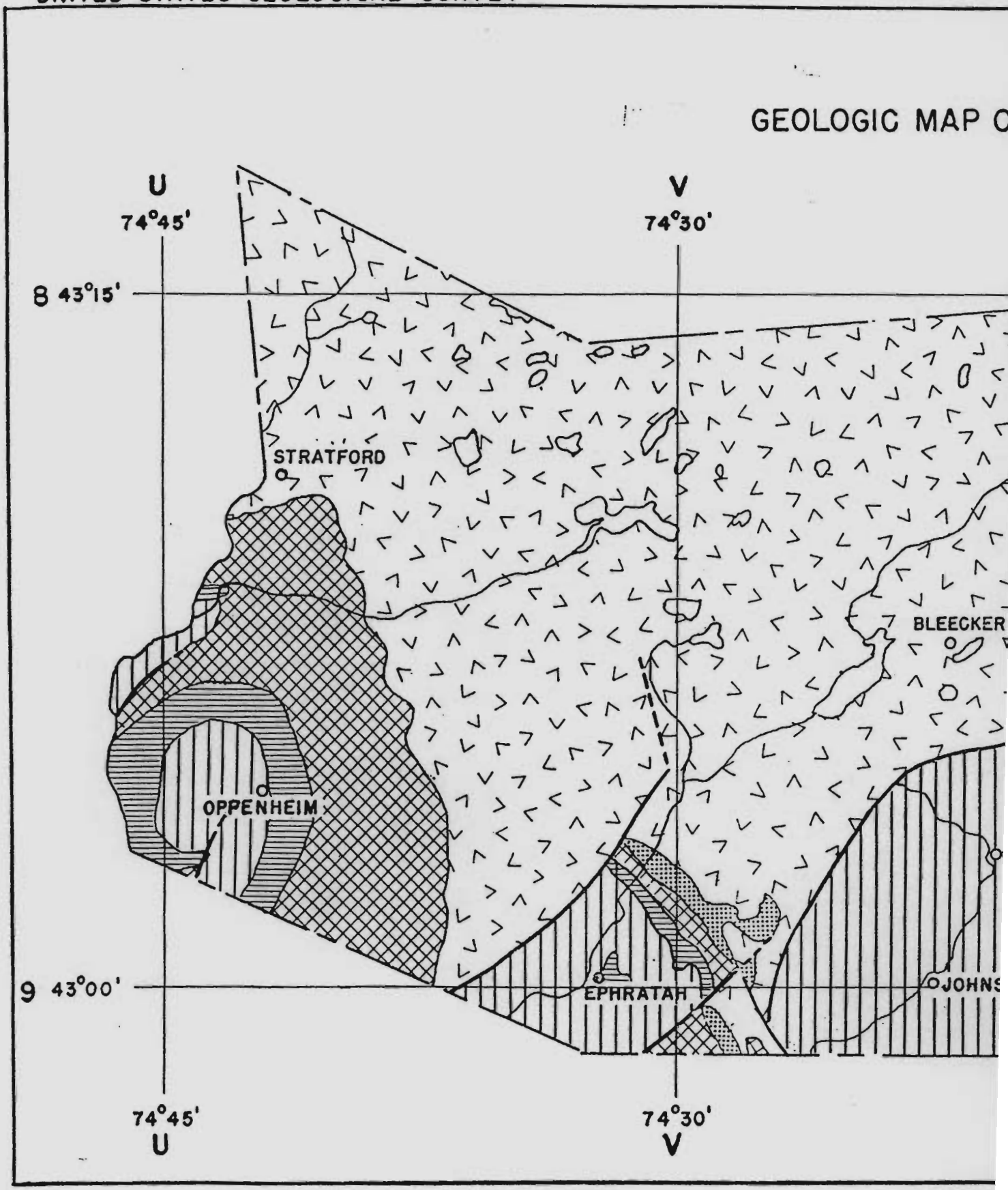
THICKNESS OF LACUSTRINE CLAY AND PRESENCE OF OUTWASH MATERIAL IS BASED ON INTERPRETATION AND IS NOT FIELD VERIFIED.

REVISED DECEMBER 1987	REMEDIAL INVESTIGATION SANITARY LANDFILL CITY OF GLOVERSVILLE, N.Y. TIGHE & BOND, INC.	FIGURE NO. 2.2 SECTIONS SCALE: HORIZ. 1"=200' VERT. 1"=40' SEPT., 1986



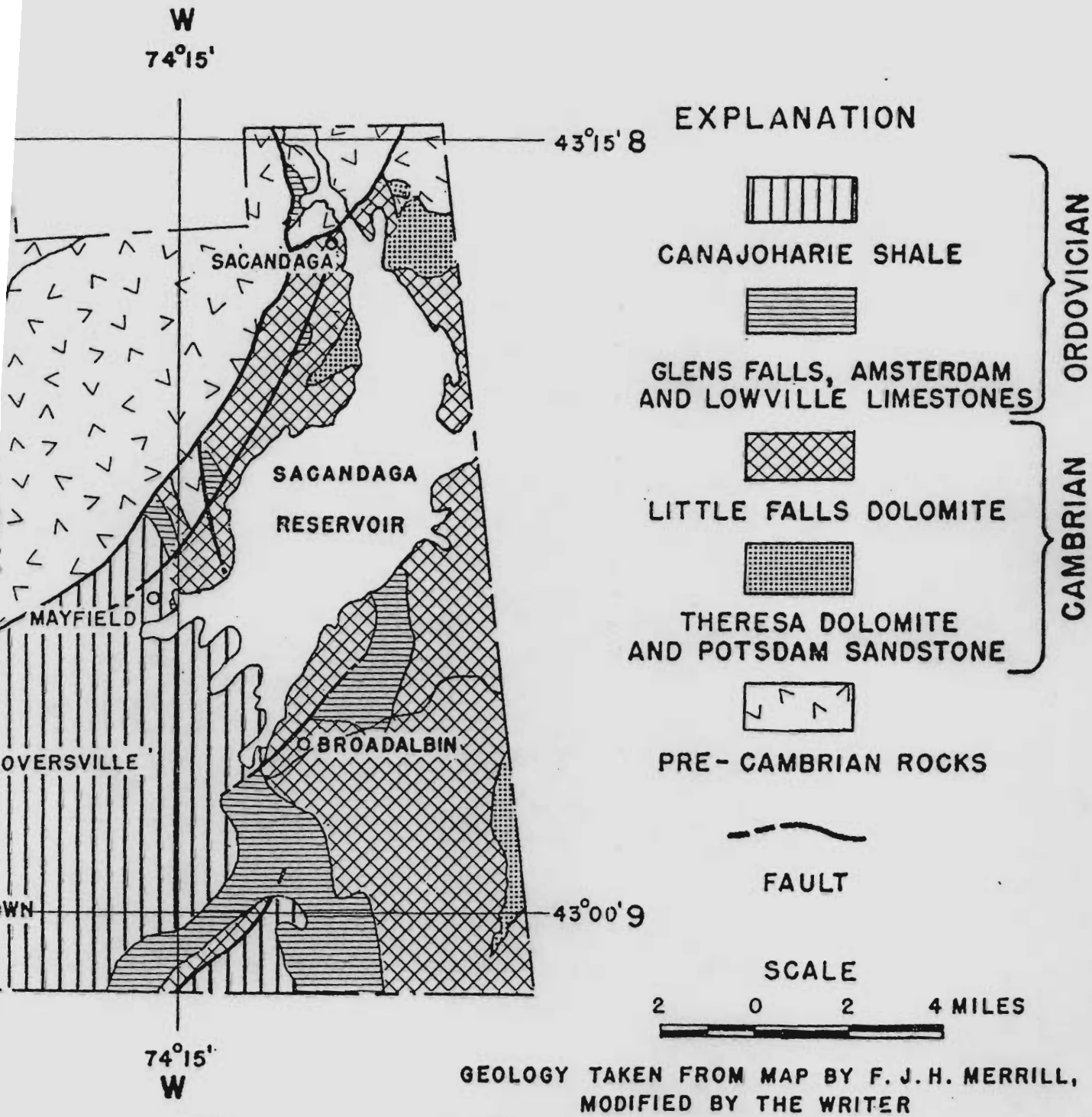
LEGEND	REMEDIAL INVESTIGATION SANITARY LANDFILL CITY OF GLOVERSVILLE, N.Y.	FIGURE NO. 2.3
◉ UO-1 / DO-1 = EXISTING WELL		GROUNDWATER CONTOURS
—850— = GROUNDWATER CONTOURS	TIGHE & BOND, INC.	SCALE: 1"=1000' SEPT., 1986

UNITED STATES GEOLOGICAL SURVEY



NEW YORK WATER POWER AND CONTROL COMMISSION PLATE 2

FULTON COUNTY, NEW YORK



GEOLOGY TAKEN FROM MAP BY F. J. H. MERRILL, MODIFIED BY THE WRITER

FIG. 2.4

SECTION 3

INVESTIGATIVE SUPPORT

SECTION 3
INVESTIGATIVE SUPPORT

3.1 Background Investigation - All available information regarding disposal practices at the landfill site shall be obtained as part of the remedial investigation. This shall include interviews of some of the present and former landfill employees, review of available historical aerial photographs and other pertinent records and documents. This review shall include those documents indentified in Appendix D. In addition to the review of historical aerial photographs, new aerial photography will be obtained at the indicated areas on Figure 3.1.

3.2 Site Inspection - Prior to commencing on-site activities, a site inspection shall be conducted to obtain general information concerning the topographic and geologic setting of the site, and general information concerning landfill disposal and operating procedures, past and present. During the site inspection, a preliminary air field screen shall be conducted as outlined in Section 3.5. In accordance with the Health and Safety Plan (Appendix B), areas that exhibit organic vapor levels that exceed background concentrations will require Level C protection. (The Health and Safety Plan also requires Level B protection in the event that the photoionization detector readings exceed 5 ppm.)

Another objective of the site visit shall be to inspect existing monitoring wells. Access to the proposed monitoring well locations shall also be evaluated to determine the type of drilling equipment necessary for well installation.

3.3 Site Mapping - An updated topographic map of the landfill site and its surroundings shall be prepared as part of the Phase 1 Remedial Investigation. The map shall be prepared from new aerial photogrammetry taken as part of this RI, with the appropriate vertical and horizontal ground survey control.

The aerial photos shall be capable of being used to prepare topographic maps with a scale of 1" = 50' and a 2' contour interval. For the pur-

poses of the Remedial Investigation, these maps shall be reduced to a scale of 1" = 200', so that the landfill site and its environs can be shown on a single plan sheet. The approximate limits of the aerial photograph coverage and mapping coverage are shown in Figure 3.1.

The vertical ground control shall be based on USGS mean sea level datum. The horizontal ground control will be tied into the appropriate grid system, if it is available within 1 mile of the existing landfill access road.

The ground survey shall also be used to locate certain features not shown by the aerial photogrammetry, and to provide horizontal and vertical locations for all monitoring wells, test pits, surface water sample stations, limits of refuse, and other pertinent investigative locations. A baseline and bench marks shall be established on the landfill site and tied to permanent features.

Base maps shall be prepared using the new aerial photogrammetry and ground control survey. These maps shall show the existing ground contours, site detail, scale, legends, north arrow, existing and proposed monitor well locations, along with other necessary site details. These base maps shall be used to prepare individual maps showing groundwater contours and flow direction, extent of refuse, and other information related to groundwater contamination, hydrogeology and potential receptors.

The ground survey shall include measurement of existing property line monumentation to enable placement of the site property lines on the new mapping. The ground survey shall also identify portions of the property lines in the field as a means of clarifying the relationship of the refuse disposal areas to the site limits.

3.4 Drilling Contractor Procurement - The drilling subcontractor shall be selected during the Phase 1 Remedial Investigation, after a firm schedule for installation of the wells has been established. Prospective contractors shall demonstrate that they are experienced and proficient

in work under sanitary landfill site conditions, and meet OSHA standards of Health and Safety as set forth in 20 CFR 1910.1000. On the basis of this procurement process, a drilling contractor shall be selected.

3.5 Air Field Screen - A 200-foot grid of the site shall be developed for an air field screen survey using the equipment listed in the following paragraph. The grid shall cover the entire refuse mound and extend a minimum of 100 feet out from the mound in all directions, or until background air levels are encountered, whichever is further.

The following detection equipment shall be used during the field air screening survey:

1. A photoionization detector, calibrated to the air-bourne organic contaminants expected to be present; and,

2. A combustible gas indicator (CGI); and,

3. An organic vapor analyzer (OVA).

A record of wind directions (wind rose) during the field screening activities shall be maintained. A base map of the site shall be prepared showing the survey grid and the instrument readings.

3.6 Private Well Inventory - An attempt shall be made to inventory all of the private wells that are located at residences along the roads that surround the landfill site. Approximately 70 private wells shall be included in the survey.

The inventory shall attempt to identify the type of well and depth. Both the homeowners and local drilling companies shall be contacted to obtain this information. Well characteristics shall be measured if the

well is easily accessible. Well elevations shall be surveyed and related to the Mean Sea Level Datum.

Based on this inventory, sixteen (16) wells shall be selected for sampling and analysis under Section 4.3.5. The results of the inventory and the recommended sampling locations shall be submitted to the State for approval, prior to collection of samples under Section 4.3.5.

3.7 Water Supply for Field Investigation - Potable water for equipment cleaning and drilling purposes shall be obtained from the City water distribution system. Water shall be delivered to the site in a tank truck.

A water sample shall be collected from the City water system at the beginning of the study so that the results will be available prior to commencing the drilling program. A second sample shall also be collected and analyzed from the drilling water supply vehicle at the commencement of the drilling phase of the work. Sampling and analysis of City water is described in Sections 4.3.6 and 5.2.4.

3.8 Project Planning - The planning tasks to be conducted during the Phase 1 remedial investigation shall include:

- Identifying the potential remedial action objectives and likely remedial action alternatives for this project, as described in Section 3.9
- Identifying the need and the schedule for treatability studies to better screen and define the potential remedial alternatives under Phase 2
- Preliminarily identifying the ARARs expected to apply to both site characterization and site remediation activities, as described in Section 3.10

- Identifying and documenting health and safety protocols required during field investigations and preparing a site health and safety plan, as described in Section 3.12.

3.9 Preliminary Remedial Action Objectives - At the conclusion of analyzing the existing site information, potential remedial action objectives shall be identified for each contaminated medium and a preliminary range of remedial action alternatives and associated technologies shall be identified. This identification shall be a general classification of potential remedial actions based upon the initially identified potential routes of exposure and associated receptors.

A preliminary list of broadly defined alternatives shall be developed. This list shall include a range of alternatives in which treatment significantly reduces the toxicity, mobility, or volume of waste; one or more alternatives that involve containment with little or no treatment; and a no-action alternative. The list shall be limited to only those alternatives that are relevant and have some significant potential for being implemented at the site.

3.10 Preliminary Identification of Potential ARAR's - Preliminary ARAR's (Applicable or Relevant and Appropriate Requirements) shall be identified during the Phase 1 RI. ARAR identification shall continue throughout this RI/FS as more information is gained from the site conditions, site contaminants, and remedial action alternatives.

The potential contaminant-specific and location-specific ARAR's shall be identified on the basis of the compilation and evaluation of existing site data. A preliminary evaluation of potential action-specific ARARs shall be made to assess the feasibility of remedial technologies being considered at this time. In addition to the Federal ARAR's, more stringent State ARAR's shall also be identified, if they exist. Other Federal and State criteria, advisories, and guidance and local ordinances shall also be considered in the development of remedial action alternatives.

3.11 Identification of Initial Data Quality Objectives (DQO) - Data needs shall be identified by evaluating the existing data and determining what additional data, if any, are necessary to characterize the site, better define the ARAR's, and narrow the range of preliminary identified remedial alternatives.

Using the specific investigative techniques outlined herein, this RI/FS shall obtain data to define source areas of contamination, the potential pathways of migration, and the potential receptors and associated exposure pathways to the extent necessary to:

- Determine whether, or to what extent, a threat to human health or the environment exists; and,
- Develop and evaluate remedial alternatives (including the no-action alternative),

If additional data are needed in subsequent phases of this RI, the intended uses of the data shall be identified, strategies for sampling and analyses shall be developed, data quality objectives (DQO) shall be established, and priorities shall be assigned according to the importance of the data in meeting the objectives of this RI/FS.

3.12 Project Plans - Task-specific plans shall be prepared during the early stages of the Phase 1 RI and submitted to the State for review and approval. These plans shall include a Sampling and Analysis Plan (SAP), health and safety plan, operations plan, and the public participation plan.

3.12.1 Sampling and Analysis Plan (SAP) - The SAP shall consist of two parts: (1) a quality assurance project plan (QAPP) that describes the policy, organization, functional activities, and quality assurance and quality control protocols necessary to achieve DQO's dictated by the intended use of the data; and (2) the field sampling plan (FSP) that

provides guidance for all fieldwork by defining in detail the sampling and data-gathered methods to be used on a project.

The QAPP shall include the following 14 standard elements:

- Project Description
- Project Organization and Responsibilities
- QA Objectives for Measurement
- Sampling Procedures
- Sample Custody
- Calibration Procedures
- Analytical Procedures
- Data Reduction, Validation, and Reporting
- Internal Quality Control
- Performance and Systems Audits
- Preventative Maintenance
- Data Assessment Procedures
- Corrective Actions
- Quality Assurance Reports

The second part of the SAP is the FSP. The FSP shall consist of the following 6 elements:

- Site Background
- Sampling Objectives
- Sample Location and Frequency
- Sample Designation
- Sampling Equipment and Procedures
- Sample Handling and Analysis

3.12.2 Health and Safety Plan - A Health and Safety Plan shall be prepared to support the field effort. It shall be a refinement of the Appendix B Plan. It shall conform to the contractor's health and safety programs, which shall be in compliance with OSHA. The site Health and Safety plan shall be prepared concurrently with the sampling plan.

The plan shall include maps and a detailed site description, results of previous sampling activities, and field reports. Potentially hazardous operations, exposures, and prescribed appropriate protective measures shall be reviewed along with the proposed activities. The Health and Safety Plan shall include the following 10 elements:

1. The name of a site health and safety officer and the names of key personnel and alternates responsible for site safety and health .

2. A safety and health risk analysis for existing site conditions, and for each site task and operation.

3. Employee training assignments.

4. A description of personal protective equipment to be used by employees for each of the site tasks and operations being conducted.

5. Medical surveillance requirements.

6. A description of the frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used.

7. Site control measures.

8. Decontamination procedures.

9. Standard operating procedures for the site.

10. A contingency plan.

3.12.3 Public Participation Plan - In accordance with the requirements of Environmental Conservation Law (ECL) Part 27-1313, a Public Participation Program shall be conducted.

A formal public participation plan shall be prepared and submitted during the initial stages of the Phase 1 RI/FS. The following outline lists the basic components of Public Participation Plan.

1. Public Meetings - Three (3) public meetings shall be held during the course of the Remedial Investigation/Feasibility Study (RI/FS). These public meetings shall be held at the following times:

    1. After State approval of this Work Plan and prior to commencing the RI/FS;
    2. At the conclusion of Phase 1; and
    3. When the Record of Decision is prepared.

    (Note: Meetings 1 and 2 will be part of the Phase 1 RI/FS. Meeting 3 will be part of a subsequent phase)

    Each meeting shall be announced in a local newspaper at least two (2) weeks in advance of the scheduled meeting date. Meeting announcements shall be distributed by mail to all local officials and citizens who have expressed an interest in the site. Announcements shall emphasize that the purpose of the meeting is to exchange information, receive public comments and to respond to the public's questions, but not to receive formal testimony.

2. Press Releases and Fact Sheets - Fact sheets, direct mailings, and press releases shall be presented to the public in a short and simple format using non-technical language which is easily understood by all parties. Fact sheets and press releases shall be distributed at all briefings and public meetings. All written material shall be dated and will include names and numbers of persons to contact for further information.

3. Mailing List - A mailing list shall be developed and maintained for the site including state and local agencies, elected officials, media, and interested citizens. Those attending public meetings shall also be provided the opportunity to add their names to the mailing list.

4. Information Centers - Project files and information shall be maintained at repositories to be named at a later date. Available information shall include the Public Participation Plan, the Work Plan, RI/FS reports, fact sheets, and press releases.

5. Contact - A Public Participation Coordinator shall be assigned to be responsible for coordinating the flow of information in the community. This individual shall assist in the preparation of fact sheets, press releases, technical summaries, and shall be the person to contact for additional information.

The initial meeting shall be conducted as outlined in Part 375.7:

doesn't follow - something missing here? *

A. A notice and brief analysis of the proposed remedial program shall be published and made available to the public. The notice shall include:

   1. an explanation of the proposed program;
   2. a summary of the State's reasons for selecting the proposed program over the alternatives considered (if this information is made available to the City by the State);
   3. notification of a thirty day period for submission of written comments;
   4. notification of an opportunity for submission of oral comments at a public meeting at or near the site;

B. A public meeting shall be held at or near the site, at which time City and State representatives shall describe the proposed program.

Within twenty-one (21) calendar days after the public meeting, the following shall be made available to the public at the Information Centers:

1. a transcript of the public meeting;

2. a notice and brief analysis of the remedial program selected for implementation which includes a discussion of any significant changes from the proposed remedial program will be published and made available to the public; and,
3. a response to each of the significant comments, criticisms and new data submitted to the City.

C. If the remedial program that is implemented differs in any significant respect from the remedial program published, an explanation of the significant differences and the reasons such changes were made shall be published, under B.2, above.

D. Publication shall include, at a minimum, publication of a legal notice in a local newspaper of general circulation. In addition, comments received from the public and a transcript of the public meeting shall be made available for public inspection and copying at the Information Centers.

3.12.4 Operations Plan - A preventative action plan shall be prepared during the initial stages of the Phase 1 RI/FS. The plan shall describe the steps to be taken to provide site security during the remedial investigation. The plan shall present measures to coordinate operating activities between City employees and remedial field investigation workers.

In addition, the plan shall provide:

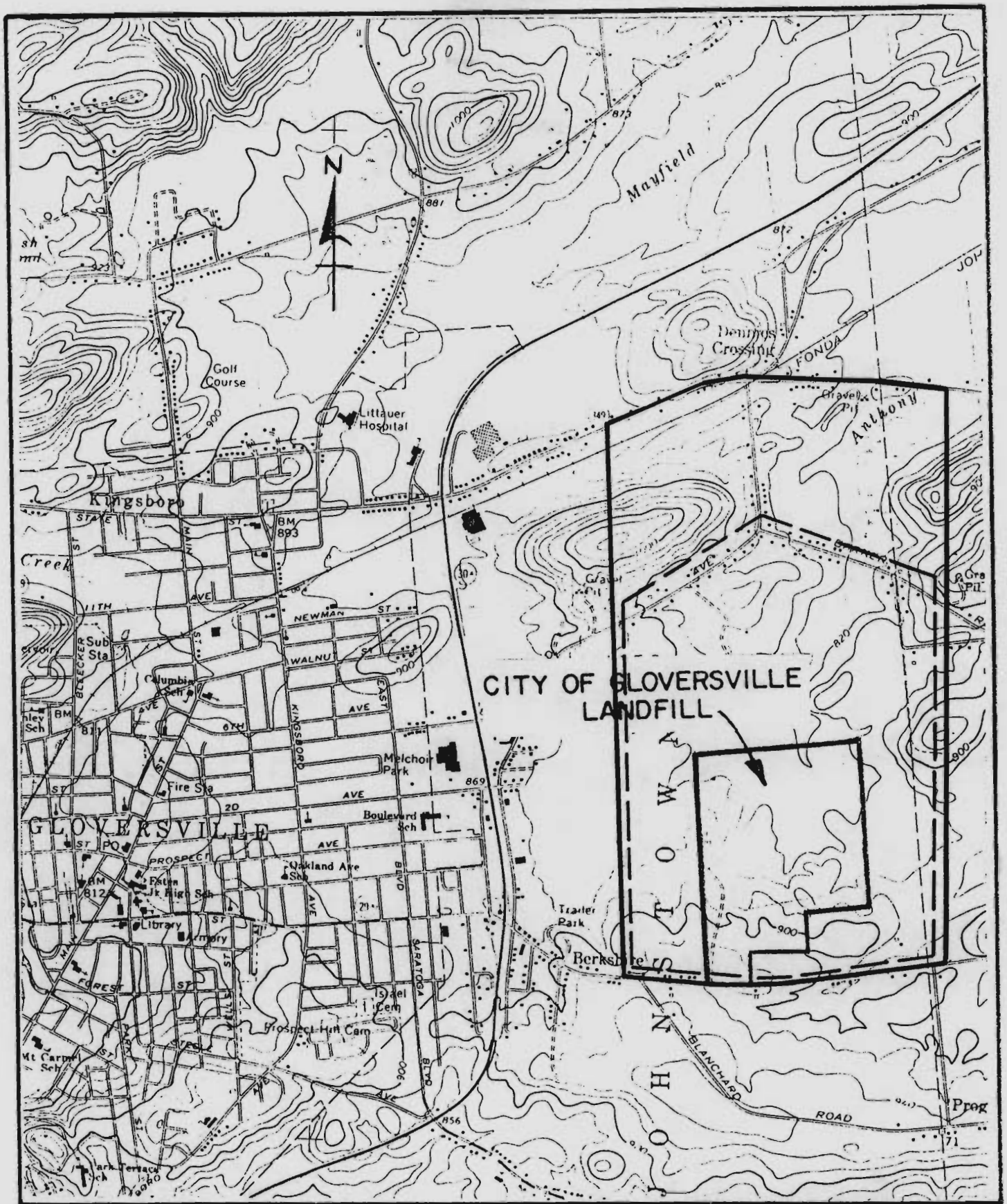
1. a notification procedure for city employees in the event of unacceptable health situations;
2. procedures to isolate/identify "hot zones" at the site;
3. the proper security of remedial investigation equipment (i.e., sampling equipment, drill rigs, etc.);
4. fugitive dust control measures;

5. measures to control surface water run-off/run-on generated by daily landfill activities, and RI activities;
6. identification of drilling waste disposal methods and details, as discussed in Section 4.1.6. The area selected for disposal of drilling fluids shall be indicated on the new site maps and coordinated with the City, prior to construction of the earth berm retention area.

In the event that acceptable health levels are exceeded during the monitoring of ambient air samples, city employees shall be immediately notified by field investigation workers. Appropriate measures shall be exercised on a case-by-case basis in accordance with the Health and Safety Plan (i.e. half-face respirators, full-face respirators, or immediate site evacuation) and the contaminated area ("hot zones") shall be clearly identified and marked with surveying tape. If evacuation is deemed appropriate, no personnel may gain access to the contaminated area until acceptable health levels have been restored.

All remedial investigative equipment associated with the sampling, monitoring, or drilling activities at the landfill be properly secured and identified. Any equipment (i.e., drill rigs, continuous air monitoring equipment, etc..) remaining on site after normal business hours shall be properly locked and secured from possible vandalism.

If ambient air sampling demonstrates particulate levels that exceed thresholds established in the Health and Safety Plan, then dust control implementation strategies shall be utilized. In this event, City employees shall be immediately notified of the particulate levels and the proper remediation action that is recommended.



AERIAL PHOTO COVERAGE ——

MAPPED AREA (2' CONTOURS) — — —

REMEDIAL INVESTIGATION
SANITARY LANDFILL
CITY OF GLOVERSVILLE, N.Y.

TIGHE & BOND, INC.

FIGURE NO. 3.1

AERIAL PHOTOGRAMETRY LIMITS

SCALE: 1"=2000' SEPT. 1988

SECTION 4

PHASE 1 FIELD WORK

SECTION 4
PHASE 1 FIELD WORK

4.0 Geophysical Surveys - The initial field work shall consist of subsurface geophysical investigations. Proposed monitoring well locations shall be selected after completion of the geophysical surveys and submitted to the State for review and approval prior to installation of the monitoring wells.

4.0.1 Seismic Refraction Survey - This survey shall be used to further delineate the depth, structure and areal extent of the clay aquiclude identified by Dunn Geoscience in 1980. The survey shall be conducted using a 24-channel signal processing instrument with initial geophone spacings of five feet to delineate the clay surface. Maintaining the same shot point, the geophone cable shall then be extended from 60 to 300 feet and a geophone spacing of 20 feet shall be employed to provide deeper penetration, with the objective of determining bedrock depth. Actual geophone spacings may be modified in the field by the supervising geophysicist.

The preliminary survey line locations are shown on Figure 4.1. The location of the actual survey lines shall be based on the initial site survey, access restraints created by the recently formed ponds, and aerial survey.

All stations shall be shot in two directions to aid in data interpretation. All stations shall be surveyed for elevation to aid in depicting surface variations.

4.0.2 Earth Resistivity Survey - Two survey techniques shall be used. The first technique is a vertical sounding (Wenner or Schlumberger array) with increasing electrode spacings to provide deeper penetration. The survey technique used shall be capable of achieving depth penetration of at least fifty feet, although the

possibility of intermediate aquicludes may mask the survey results below the aquicludes.

The results of these soundings shall be used to determine the depth of any shallow leachate plume. The results of these soundings shall also be interpreted in an attempt to determine the presence of a deep leachate plume. This information, coupled with the results of the seismic survey, shall be used to determine the electrode spacing for conducting the second survey technique, which shall be a profiling survey in the shallow sediments. The profiling survey shall be conducted by traversing the seismic survey line using an electrode array of constant spacing. Alternatively, the profiling shall be performed using an electromagnetic terrain conductivity instrument which provides a more rapid and higher resolution delineation of higher conductivity (lower resistivity) groundwater.

The soundings shall be run at the same locations as the seismic stations. Profiling, with either the resistivity meter or conductivity meter, shall be run continuously along the geophysical survey lines shown on Figure 4.1.

4.0.3 Magnetometer Survey - A magnetometer survey for ferrous metals shall be conducted around the perimeter of refuse mounds to help delineate the edge of waste materials.

The survey area shall include mounded areas, separate from the main fill area.

4.1 Monitor Well Locations - Based on the site inspection, site mapping, and geophysical investigations and other available information, the locations and methods of construction for the proposed groundwater monitoring wells shall be submitted for review by the State prior to commencing the well installation work.

The wells installed as part of the 1980 Dunn Geoscience study of the site shall be evaluated during the initial site inspection for use as water-level monitoring points (Section 3.2). If the wells are physically accessible as water level monitoring points, they shall be pumped down to confirm that they are connected hydraulically to the aquifer.

The City and the State field representatives shall be authorized to modify the field program as conditions warrant. This shall include altering well locations, depth and screen settings to reflect the geologic features encountered.

Monitoring wells shall be installed in Phase 1 at the locations shown in Figure 4.1 and as discussed hereafter. These proposed locations shall be adjusted to reflect the results of the geophysical studies.

Cluster Well Location 87-1 - The wells shall be located above the basal till (or above the bedrock if the till is not present), at the water table, and, if the geology is as shown on Figure 2-2, at an intermediate location.

Cluster Well Location 87-2 - This cluster well shall be installed at the location of Well DO-3 which was installed in 1980. The wells shall be set above the basal till, below the clay aquiclude, above the clay aquiclude and straddling the water table. If the water-table aquifer above the clay is less than 20 feet thick, only one well shall be installed above the clay. The screen in this well shall extend above the water table.

Cluster Well Location 87-3 - Four (4) wells shall be installed at this location with screen settings as described in 87-2.

Cluster Well Location 87-4 - This location is at Well DO-2 which was installed in 1980. Four (4) wells shall be installed at this location with screen settings as described in 87-2.

Cluster Well Location 87-5 - This location is at Well DO-1, which was installed in 1980. Four multi-depth wells shall be installed at this location with screen settings as described in 87-2.

Cluster Well Location 87-6 - Three (3) groundwater monitoring wells shall be included at this location, depending on geophysics and soil conditions. Two inch diameter PVC wells shall be installed.

Landfill Well 87-7 and 87-8 - An attempt shall be made to drill and install two wells in the refuse mound. The borings shall extend at least five (5) feet below the bottom of the refuse. The wells shall be screened across the water table. The level of effort expended on these two wells shall be limited to five (5) working days.

Boring, soil sampling, well installation, well development and permeability testing shall be conducted in accordance with the Standard Procedures in Appendix A, the requirements of Sections 4.1.1 - 4.1.5, and the Sampling and Analysis Plan (Section 3.12.1).

4.1.1 Borings - The initial deep boreholes shall be drilled by the rotary method using water as the drilling fluid. The source of water shall be from the city water system, as discussed in Section 3.7. A sample of this water shall be analyzed at the beginning of all work. A follow-up sample of the City water shall be collected from the drilling water supply vehicle and analyzed at the beginning of drilling. Refer to Sections 4.3.6 and 5.2.4 for additional information.

In locations with multiple well installations, the deep borehole shall be installed first. If no basal till is present, the deep boreholes shall confirm the depth to bedrock. If a basal till layer is encountered, the deep boreholes at locations 87-1, 87-2, 87-3, 87-4, 87-5 and 87-6 will be advanced to bedrock to determine the nature and extent of the till. The portion of the borehole which penetrates the till shall be backfilled with a bentonite/cement grout and the deep well screen shall be completed above the till. All drilling equipment shall be steam cleaned between uses.

4.1.2 Soil Sampling - Soil samples shall be taken continuously from the deep bore hole at each location using a split-spoon sampler in accordance with the Standard Procedures in Section A-1 of Appendix A. Clay soils shall be collected in Shelby tubes, rather than the split spoon samples, for subsequent soil testing. Soils shall be classified by the field geologist, using the Unified Soil Classification system, and reported in the boring logs. The soil samples shall be placed in glass containers and analyzed for organic vapors, using the on-site photoionization detector.

At least two (2) soil samples shall be analyzed for grain-size distribution for each new cluster well location in native soil. However, more samples will be analyzed if necessary to characterize the entire geologic column. Grain size analysis shall include both sieve and hydrometer analysis to determine the full range of grain size. It is estimated that a total of twelve (12) soil samples will be analyzed.

4.1.3 Well Drilling and Installation - The deep well at each well cluster location shall be installed in the deep boring. The well shall have five to ten feet of 20-slot screen, sand packed to two feet above the screen. A bentonite seal shall be installed above the sand pack, and the remainder of the annulus shall be filled with a cement/bentonite mixture. The upper formation shall be cased off with a temporary casing to avoid introduction of contaminants to the deeper aquifer. This casing shall be withdrawn when the borehole is grouted. As described in Appendix A-1, drilling "muds" shall be used in the event of a borehole collapse in order to advance the boring to the prescribed depth and shall be approved by a State on-site representative.

Similarly, the wells to be installed just below the clay shall be installed through temporary casings which shall isolate the upper zone. In all cases, the temporary casing and the drilling rig's circulation system shall be flushed clean, prior to drilling into the

lower formation. All wells to be installed above the clay shall be drilled and installed through hollow-stem augers.

Monitoring wells shall be installed in accordance with Section A-3 of Appendix A. In summary, except as specified below, wells shall consist of 2-inch PVC pipe with threaded, flush joints. No glues or other additives shall be used in the installation of the wells. Each well shall be installed with ten feet of 2-inch NSF-approved PVC screen, with casing extending to approximately two feet above the surface. All wells shall be protected by a steel casing with locking cap.

As discussed in Section 4.1.5, one well cluster shall be constructed of 4-inch PVC. In addition, another cluster believed to be downgradient of the site shall be constructed of stainless steel. The selection of the well clusters to be constructed of these materials shall be made in the submission identifying well locations, which shall be submitted after the geophysical investigations.

4.1.4 Well Development - Each well shall be developed by repeated evacuation of the well in accordance with the procedures in Section A-3 of Appendix A. Well development shall be accomplished by pumping, or by mechanical surging and bailing. Well development shall continue until it is determined by the field geologist that turbid-free samples can be obtained.

4.1.5 Permeability Testing - Each well shall be permeability tested to determine the water-bearing capacities of the soil. Permeability tests shall be rising head or falling head tests, whichever is more appropriate as determined in the field. The data from the permeability tests shall be used in conjunction with the groundwater flow nets to determine the amount of groundwater flowing through the area. The permeability tests shall be run using a pressure transducer and data logger to assure early data acquisition. The initial static water level shall be determined using a steel tape and chalk.

The pressure transducer shall be cleaned with distilled water and submerged in the well to a predetermined depth which shall be below the expected change in water level during the test. The data logger shall be programmed to record water levels at intervals appropriate to the expected well response (as observed during well development). A solid slug of known volume shall then be introduced to the well and the water level shall be allowed to regain its equilibrium. The slug shall then be removed and the water-level response shall be recorded until at least 90 percent recovery is observed. The short time-interval data shall be analyzed according to the formula developed by Hvorslev (1951). The analytical methodology for the tests shall be included in the remedial investigation report. If the wells can be pumped continuously by suction, 2-hour drawdown and recovery tests shall be run.

One well cluster shall be constructed of 4-inch PVC casing and screen so that a submersible pump can be installed. During Phase 1, the pump shall be installed and operated for up to 24 hours in each well of the cluster. Water-level measurements shall be taken in other on-site well clusters installed in close proximity to the 4" well to obtain distance-drawdown and time-drawdown relationships.

4.1.6 Disposal of Drilling and Well Testing Wastes - All cuttings generated from the installation of monitoring wells shall be disposed of at the active portion of the sanitary landfill.

All fluids generated by well development, pump tests and evacuation for samples shall be discharged on the refuse mound and allowed to infiltrate near the active disposal area, but not in a location being used by vehicles at the time.

The disposal of drilling wastes shall be coordinated with the City's operation of the landfill, as indicated in the Operations Plan (Section 3.12.4). In general, the cuttings shall be placed at the toe of the active disposal area and covered with refuse and cover ma-

terial. An earthen berm retention area shall be created on the top lift of the refuse mound for disposal of the drilling fluids and well test fluids. As indicated in the scope for the Operations Plan, the location of the drilling fluids disposal area shall be determined using the new site mapping and location of the active refuse disposal area at the time of drilling.

Drilling fluids from each boring and well test fluids shall be tested in the field for pH and specific conductance at the time of disposal and the date recorded.

Drilling fluids shall be pumped to the disposal area by the drilling contractor.

4.2 Test Pits - Test pits shall be excavated to accurately identify areas used for solid waste disposal. The exact number and location of the test pits shall be determined in the field by City and State field representatives. These test pits shall be excavated six (6) feet below the ground surface using a backhoe in accordance with the Standard Procedures in Section A-2 of Appendix A. An HNu photoionization detector shall be utilized during test pit excavation to monitor for the presence of organic vapors and to protect the health and safety of the field staff. Soil samples shall be collected in areas where elevated readings are observed, and transferred in appropriate containers for further HNu analysis. A log of all test pits shall be developed to document soil stratigraphy and HNu readings. All unusual stratigraphy (i.e. discolored or odorous strata) shall be documented, sampled and analyzed. Additional site investigations shall include other mounds or disposal areas identified during the field investigation.

4.3 Sampling - The collection of water and soil samples shall be in accordance with the Standard Procedures in Appendix A. Samples shall be obtained in a manner which minimizes agitation of the monitoring wells. A matrix of sample types and locations is included in Appendix E.

4.3.1 Groundwater - One to two weeks following installation of the new monitoring wells, all of the new monitoring wells at the landfill site shall be sampled. Prior to evacuation of the well and sampling, water-level readings shall be measured to the nearest 0.01' and recorded for each well, in accordance with Section A-5 of Appendix A.

Samples shall be collected in accordance with Section A-5 of Appendix A. Samples shall be collected in the appropriate containers for the analyses outlined in Section A-12. Field measurements shall also be taken for temperature, pH and specific conductance, in accordance with procedures defined in Appendix A.

Ten percent (10%) of all samples shall also have duplicates collected. Further, 10% of all field samples shall be spiked. The quality assurance provisions shall be defined in more detail in the QAPP to be prepared under Section 3.12.1.

One (1) sample from each well cluster shall also be collected and field filtered for metals analysis. The filtered and unfiltered samples shall be eligible cost items under the Environmental Quality Bond Act funding. The unfiltered samples shall be the samples of record.

Field filtration of samples shall follow the protocol established in the State's draft "Proposed Division Technical and Administrative Guidance Memorandum Policy Regarding Non-Filtration/Filtration of Groundwater Samples Collected for Metals Analysis." The samples to be field filtered shall be measured for turbidity and the integrity of the well shall be confirmed if the turbidity equals or exceeds 50 ntu. One (1) sample from each well cluster shall be field filtered as discussed in the preceding paragraph.

Measurements shall also be taken of the methane gas in the shallowest well at each location. Measurements shall be made with a

combustible gas indicator in accordance with Section A-14 of the Standard Procedures.

4.3.2 Surface Water and Leachate Seeps - Surface water samples shall be collected at the six (6) locations shown on Figure 4.1. Sites SW-1 and SW-2 shall be located as shown in Figure 4.1. Site SW-3 is midway between the site and Barker Road. Sites SW-4 and SW-5 are further downstream in Anthony Creek. Site SW-6 is east of the landfill.

Three (3) surface water samples (SW-7, 8 and 9) shall also be collected from the pond located just south of Barker Road.

Each surface water sampling site location shall be permanently marked. In addition, the ground survey shall accurately identify the location of each surface water sampling point.

Leachate seeps shall be identified, based on the site inspection described under Section 3.2. Each of these sites shall be permanently marked and located by the ground survey. The specific conductance of each seep shall be measured in the field.

Surface water samples and leachate samples shall be collected in accordance with Section A-4 of Appendix A.

4.3.3 Stream Sediments - Stream sediment samples shall be obtained from the same nine (9) surface water sampling points discussed in Section 4.3.2. In addition, two (2) sediment samples shall be collected from leachate seeps with the highest specific conductance readings.

All sediment samples shall be collected using a hand operated sampling corer. Samples shall be eighteen inches (18") in length and shall be collected in six inch (6") increments at locations SW-3, SW-7 (pond inlet) and SW-4. At the other locations only the top

6" of sediment shall be collected. Stream sediments shall be sampled in accordance with the Standard Procedures outlined in Section A-8 of Appendix A.

4.3.4 Soils - Soil samples shall be obtained via continuous split-spoon sampling during the boring phase of the work, in accordance with Section 4.1.2 and field screened for organic vapors. Samples shall be transferred to glass containers and HNu readings obtained from each. Grain size analysis shall be performed on selected soil samples, as discussed in Section 4.1.2. One (1) soil sample from each of the two (2) in-fill wells shall be retained for analysis.

4.3.5 Private Well Sampling - Sixteen (16) private wells located on the periphery of the landfill shall be sampled and analyzed. Approximately ten (10) of the residential wells shall be located north of the landfill and the remaining six (6) shall be located to the east, south, and west. The wells shall be selected based on the procedures in Section 3.6

The State may collect split samples for independent analysis.

4.3.6 Sampling of City Water - Water used for installation of monitoring wells shall be obtained from the Gloversville municipal supply. Samples of City water shall be collected as discussed in Section 3.7.

4.3.7 Sample Identification and Preservation - All samples shall be identified, indicating the project site (GSL), sample source, date, time, and sample collection. These procedures are described in further detail in Section A-13 and Section A-12, respectively, of Appendix A.

All sample preservation shall be in accordance with SW846 guidelines, detailed in Section A-12 of this document.

4.3.8 Chain-of-Custody - Strict chain-of-custody procedures and forms shall be followed, starting with the issuance of clean containers in the laboratory through and including the return of the samples to the analytical laboratory. Details regarding the chain-of-custody procedures are presented in Section A-13 of Appendix A.

4.4 Water Level Measurements - Five rounds of water level measurements shall be obtained from all of the existing and new observation wells during Phase 1. The first round of water level measurements shall be obtained during the first sampling period. The second and third rounds shall be obtained at monthly intervals. Two (2) more quarterly rounds shall be taken thereafter.

4.5 Sampling Frequency - The Phase 1 scope of work shall include collection and analysis of one (1) round of samples. The first round shall include all ground water, surface water, private well, sediment, soil and leachate samples.

4.6 Stream Flow Measurement - The cross-sectional area of individual creek reaches shall be measured at sampling locations. The creek discharge shall be determined at each location using a portable flow meter. The reach stations shall be marked, and several days of data shall be collected to determine temporal changes.

4.7 Air Monitoring - The Phase 1 investigations shall include collection and analysis of ambient air samples in accordance with the program outlined herein.

Continuous air samples shall be collected at six (6) locations at the perimeter of the site during the Phase 1 RI/FS. The locations shall be selected in the field at the time of monitoring, based on wind directions. Approximately 3-4 locations shall be downwind, with the remaining locations being upwind and at other sensitive receptors.

Samples shall be collected over eight (8)-hour periods during three (3) separate events at each of the six (6) locations. One (1) eight hour event shall be during normal landfill operations, one (1) during off-hours and one (1) during either type of period.

An on-site meteorology station shall be provided during sampling periods to measure wind speed and direction.

Tenax/Carbon sampling tubes shall be used for collection of volatile organic compounds. Samples shall be analyzed for the volatile organic compounds in the Target Compound list.

Particulates shall be collected to determine total particulate concentrations and for analysis of total chromium and the extrable organic compounds listed in the Target Compound list. High-volume air samples shall be used to collect particulate samples at locations within 200 feet of existing 110-volt power supplies. All other particulate samples shall be collected using battery powered samplers.

The need for additional monitoring to meet the ARARs established for the site and the data needs for health evaluations shall be determined in Phase 1, for implementation in Phase 2, if required.

The downwind receptor impacts shall be studied using EPA-approved dispersion models and New York State recommended estimate methods. The meteorological data required for the model shall be taken from the nearest recording station, such as the Albany Airport.

The calculated receptor concentrations of target compounds and potential toxic compounds will be compared to the ARARs established for this project.

4.8 Wildlife Survey - The Phase 1 RI/FS shall include a Natural Resource Assessment consisting of the following elements:

4.8.1 Mapping - Wetland and surface water areas shall be identified and mapped based on interpretation of the new aerial photographs and limited field verification. The limits of these areas shall be shown on the site mapping.

4.8.2 Rare Species Identification - The potential presence of any rare, endangered, or threatened species of plant and animals shall be identified. Also, any State listed species of special concern within the project area shall be identified.

4.8.3 Macroinvertebrate Sampling - Macroinvertebrate sampling shall be conducted in shallow low-flowing water and in ponds. The sampling locations shall coincide with each of the surface water sampling locations. In streams, three (3) replicate Surber samples shall be taken. At each pond location, two Eckman dredge samples shall be taken. There shall be three rounds of sampling to quantify the species present, abundance, diversity indices, and water quality determinations based on the health of the macroinvertebrate population. These samples shall be in the spring, summer and fall. A control area shall be sampled during each of the sampling rounds. Species shall be identified to the family and genus level. A collection voucher shall be made available to the State.

4.8.4 Fish Collection - During the late spring and fall, fish shall be collected from stream segments and at pond locations in the vicinity of the surface water monitoring locations. The fish shall be collected using electroshocking or other suitable collection techniques.

The fish collection work shall document endangered species, species present/absent, abundance, life stages, comparisons of different sites, and presence of abnormalities. A control section of stream in an unaffected nearby area shall also be sampled. The collection shall provide samples for tissue sampling (Section 4.8.6).

4.8.5 Toxicity Study - Toxicity studies shall be conducted in the areas of concentrated leachate plumes. These tests shall include three in situ 96 hour tests of young fish under three different hydrologic conditions. Laboratory 96 hour tests, and laboratory tests using water fleas shall be conducted in Phase 2 if results from the in situ studies warrant additional testing under controlled conditions.

4.8.6 Tissue Sampling - A preliminary tissue sampling study shall be conducted on composite samples to analyze a broad range of potential bioaccumulated toxins. The preliminary study shall sample white sucker, brown trout, snapping turtle, and shrews. Each species group shall be composited to yield the net levels of bioaccumulation for the species group.

The following species and samples (one each) shall be tested:

- large, older sucker
- large, older brown trout
- snapping turtles
  - liver (or liver composite)
  - muscle composite
- shrews
  - muscle
  - whole body composite

The tissue samples (and composites) shall be analyzed for the Toxic Compound list in Table 5-1.

4.8.7 Sampling and Analysis Plan - The Sampling and Analysis Plan described in Section 3.12.1 shall include a description of the Wildlife Survey investigation methods outlined in this Section 4.8.

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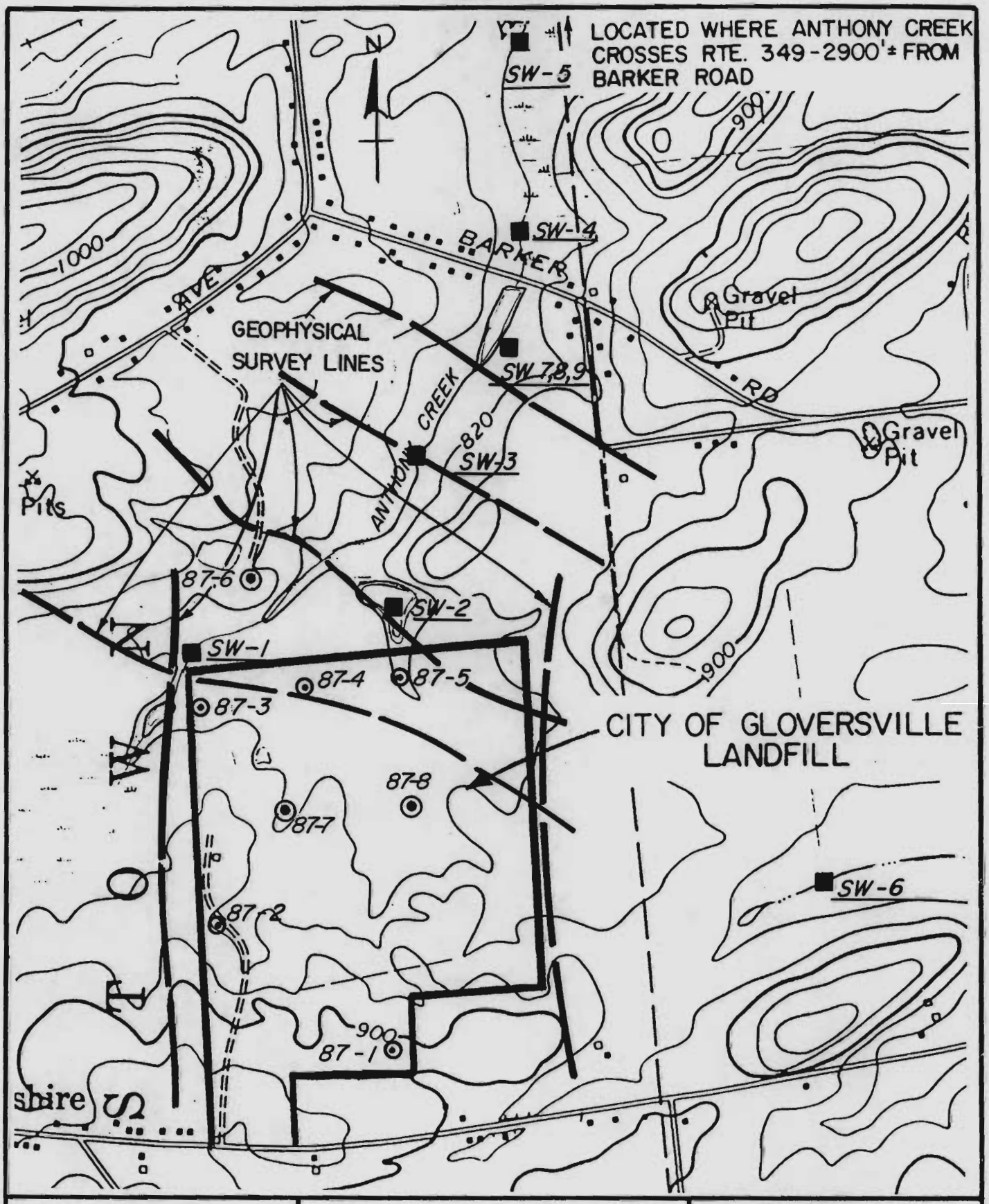

LEGEND		
■ SW-1 = PROPOSED SURFACE WATER SAMPLING LOCA.	REMEDIAL INVESTIGATION SANITARY LANDFILL CITY OF GLOVERSVILLE, N.Y.	FIGURE NO. 4.1 PROPOSED WELLS & SAMPLING POINTS
⊙86-1 = PROP. MONITOR WELL CLUSTER LOCATION	TIGHE & BOND, INC.	SCALE: 1"=1000' SEPT., 1986

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REVISED 9/20/88

SECTION 5

LABORATORY ANALYSES

SECTION 5
LABORATORY ANALYSES

5.1 General - The quantitative analyses of all samples collected during this Remedial Investigation shall be in accordance with New York State Department of Environmental Conservation (DEC) Superfund and Contract Laboratory Protocol (SCLP). The specific analytical laboratory that will conduct this work shall be selected from the State's list of Certified Laboratories and shall be subject to State approval. The laboratory selected shall submit a complete documentation package for all analyses performed. In addition, the subcontract shall include that the selected laboratory will adhere to the New York State Superfund laboratory protocol. The laboratory shall be selected prior to commencement of the Remedial Investigation. The laboratory's Quality Assurance/Quality Control Program shall be submitted to the State for approval shortly thereafter.

5.2 Parameters - The first round of samples shall be analyzed for the Target Compound List (TCL) compounds and additional parameters using the methods listed in Table 5-1. Analysis shall be conducted in accordance with DEC Superfund and Contract Laboratory Protocol (SCLP) and the procedures specified in this section. Splits of any samples may be collected by the State for concurrent analysis.

A matrix of the samples to be collected is included in Appendix E.

5.2.1 Groundwater and Surface Water - After development, all groundwater monitoring wells shall be sampled and screened on-site for pH, Eh, specific conductance, and temperature. All surface water samples shall follow the same sampling and analysis procedure.

Analysis for the first round shall include the TCL components and additional parameters using the methods shown in Table 5-1 and Table 5-2.

The private wells to be sampled in the Phase 1 of this RI shall be analyzed for the TCL and Table 5-2 parameters using EPA method 524 for volatile organic compounds and the Table 5-1 and 5-2 methods for all other analytes.

A total organic halogen (TOX) balance on each sample shall be performed.

5.2.2 Leachate Seeps - Two (2) seeps with the highest specific conductance reading shall be analyzed using the methods in Table 5-1 and Table 5-2.

5.2.3 Sediment - Sediment samples shall be analyzed using the methods in Table 5-1 and Table 5-2.

5.2.4 City Water Sampling - City water samples shall be analyzed using the methods in Tables 5-1 and 5-2.

5.2.5 Soil - One (1) soil sample from each of the two (2) in-fill monitoring well borings shall be analyzed using the methods in Table 5-1 and Table 5-2.

5.2.6 Wildlife Survey Analysis - The tissue samples specified in Section 4.8.6 shall be analyzed for the parameters in Table 5-1.

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Table 5-1 (Revised)
Analysis Parameters and Methods - Round 1 Samples

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TCL - Volatiles

1. Target Compound List (TCL) and Contract Required Detection Limits (CRDL)**

	CAS Number	(CRDL) Detection Limits* Low Water[a] ug/L	Low Soil Sediment ug/Kg	Alt. Method SW 846
Chloromethane	74-87-3	10	10	8010
Bromomethane	74-83-9	10	10	8010
Vinyl chloride	75-01-4	10	10	8010
Chloroethane	75-00-3	10	10	8010
Methylene chloride	75-09-2	5	5	8010
Acetone	67-64-1	10	10	----
Carbon Disulfide	75-15-0	5	5	----
1,1-Dichloroethene	75-35-4	5	5	8010
1,1-Dichloroethane	75-35-3	5	5	8010
trans-1,2-Dichloroethene	156-60-5	5	5	8010
Chloroform	67-66-3	5	5	8010
1,2-Dichlroethane	107-06-2	5	5	8010
2-Butanone (methylethyl ketone)	78-93-3	10	10	8015
1,1,1-Trichloroethane	71-55-6	5	5	----
Carbon tetrachloride	56-23-5	5	5	8010
Vinyl acetate	108-05-4	10	10	----
Bromodichloromethane	75-27-4	5	5	8010
1,1,2,2-Tetrachloroethane	79-34-5	5	5	8010
1,2-Dichloropropane	79-87-5	5	5	8010
trans-1,3-Dichloropropene	10061-02-6	5	5	8010
Trichloroethene	79-01-6	5	5	8010
Dibromochloromethane	124-48-1	5	5	8010
1,1,2-Trichloroethane	79-00-5	5	5	8010
Benzene	71-43-2	5	5	8020
cis-1,3-Dichloropropene	10061-01-5	5	5	8010
2-Chloroethyl vinyl ether	110-75-8	10	10	----
Bromoform	75-25-2	5	5	8010
2-Hexanone	591-78-6	10	10	----
4-Methyl-2-pentanone	108-10-1	10	10	8015
Tetrachloroethene	127-18-4	5	5	8010
Toluene	108-88-3	5	5	8020
Chlorobenzene	108-90-7	5	5	8010
Ethyl Benzene	100-41-4	5	5	8020
Styrene	100-42-5	5	5	8020
Total Xylenes				

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TCL - Base/Neutral/Acid Extractables

	CAS Number	(CRDL) Detection Limits* Low Water[c] ug/L	Low Soil Sediment[d] ug/Kg			Alt. Method
Phenol	108-95-2	10	water		330	8040
bis(2-Chloroethyl)ether	111-44-4	10	PQL		330	----
2-Chlorophenol	95-57-8	10	ug/L		330	8040
1,3-Dichlorobenzene	541-73-1	10	8120	10	330	8010
1,4-Dichlorobenzene	106-46-7	10	"	15	330	"
Benzyl alcohol	100-51-6	10	-------		330	----
1,2-Dichlorobenzene	95-50-1	10	8120	10	330	8010
2-Methylphenol	95-48-7	10	-------		330	----
bis(2-Chloroisopropyl) ether	39638-32-9	10			330	
4-Methylphenol	106-44-5	10			330	
N-Nitroso-dipropylamine	621-64-7	10			330	
Hexachloroethane	67-72-1	10			330	8120
Nitrobenzene	98-95-3	10			330	8090
Isophorone	78-59-1	10			330	8090
2-Nitrophenol	88-75-5	10			330	8040
2,4-Dimethylphenol	105-67-9	10			330	8040
Benzoic acid	65-85-0	50			1600	----
bis(2-Chloroethoxy)methane	111-91-1	10			330	----
2,4-Dichlorophenol	120-83-2	10			330	8040
1,2,4-Trichlorobenzene	120-82-1	10			330	----
Naphthalene	91-20-3	10			330	8100
4-Chloroaniline	106-47-8	10			330	----
Hexachlorobutadiene	87-68-3	10			330	8120
4-Chloro-3-methylphenol (p-chloro-m-cresol)	59-50-7	10			330	8040
2-Methylnaphthalene	91-57-6	10			330	----
Hexachlorocyclopentadiene	77-47-4	10			330	8120
2,4,6-Trichlorophenol	88-06-2	10			330	8040
2,4,5-Trichlorophenol	95-95-4	50			1600	----
2-Chloronaphthalene	91-58-7	10			330	8120
2-Nitroaniline	88-74-4	50			1600	----
Dimethyl phthalate	131-11-3	10			330	8060
Acenaphthylene	208-96-8	10			330	8100
3-Nitroaniline	99-09-2	50			1600	----
Acenaphthene	83-32-9	10			330	8100
2,4-Dinitrophenol	51-28-5	50			1600	8040
4-Nitrophenol	100-02-7	50			1600	8040
Dibenzofuran	132-64-9	10			330	----

Revised - 9/20/88

TCL - Base/Neutral/Acid Extractables

	CAS Number	(CRDL) Detection Limits* Low Water[e] ug/L	Low Soil Sediment[d] ug/Kg	Alt. Method
2,4-Dinitrotoluene	121-14-2	10	330	8090
2,6-Dinitrotoluene	606-20-2	10	330	8090
Diethylphthalate	84-66-2	10	330	8060
4-Chlorophenyl phenyl ether	7005-72-3	10	330	----
Fluorene	86-73-7	10	330	8100
4-Nitroaniline	100-01-6	50	1600	----
4,6-Dinitro-2-methylphenol	534-52-1	50	1600	8040
N-nitroso-diphenylamine	86-30-6	10	330	----
4-Bromophenyl phenyl ether	101-55-3	10	330	----
Hexachlorobenzene	118-74-1	10	330	8120
Pentachlorophenol	87-86-5	50	1600	8040
Phenanthrene	85-01-8	10	330	8100
Anthracene	120-12-7	10	330	8100
Di-n-butyl phthalate	84-74-2	10	330	8060
Fluoranthene	206-44-0	10	330	8100
Pyrene	129-00-0	10	330	8100
Butyl benzyl phthalate	85-68-7	10	330	8060
3,3'-Dichlorobenzidine	91-94-1	20	660	----
Benzo(a)anthracene	56-55-3	10	330	8100
bis(2-ethylhexyl)phthalate	117-81-7	10	330	8060
Chrysene	218-01-9	10	330	8100
Di-n-octyl phthalate	117-84-0	10	330	8060
Benzo(b)fluoranthene	205-99-2	10	330	8100
Benzo(k)fluoranthene	207-88-9	10	330	8100
Benzo(a)pyrene	50-32-8	10	330	8100
Indeno (1,2,3-cd)pyrene	193-39-5	10	330	8100
Dibenz(a,h)anthracene	53-70-3	10	330	8100
Benzo(g,h,i)perylene	191-24-2	10	330	8100

TCL - Pesticides/PCBs

	CAS Number	(CRDL) Detection Limits* Low Water[e] ug/L	Low Soil/Sediment[f] ug/Kg	Alt. Method
alpha-BHC	319-84-6	0.05	8.0	8080
beta-BHC	319-85-7	0.05	8.0	
delta-BHC	319-86-8	0.05	8.0	
gamma-BHC (Lindane)	58-89-9	0.05	8.0	
Heptachlor	76-44-8	0.05	8.0	
Aldrin	309-00-2	0.05	8.0	
Heptachlor epoxide	1024-57-3	0.05	8.0	
Endosulfan I	959-98-8	0.05	8.0	
Dieldrin	60-57-1	0.10	16.	
4,4'-DDE	72-55-9	0.10	16.	
Endrin	72-20-8	0.10	16.	
Endosulfan II	33213-65-9	0.10	16.	
4,4'-DDD	72-54-8	0.10	16.	
Endosulfan sulfate	1031-07-8	0.10	16.	
4,4'-DDT	50-29-3	0.10	16.	
Endrin ketone	53494-70-5	0.10	16.	
Methoxychlor	72-43-5	0.5	80.	
Chlordane	57-74-9	0.5	80.	
Toxaphene	8001-35-2	1.0	160.	
AROCLOR-1016	12674-11-2	0.5	80.	
AROCLOR-1221	11104-28-2	0.5	80.	
AROCLOR-1232	11141-16-5	0.5	80.	
AROCLOR-1242	53469-21-9	0.5	80.	
AROCLOR-1248	12672-29-6	0.5	80.	
AROCLOR-1254	11097-69-1	1.0	160.	
AROCLOR-1260	11096-82-5	1.0	160.	

TCL - Inorganic Parameters

Elements Determined by Inductively Coupled Plasma
Submission or Atomic Absorption Spectroscopy

Parameter			Contract Required Detection Level[1] (ug/L)	CV[2]
Aluminum			200	
Antimony	7040	7041	60*	
Arsenic	7060	7061*	10	
Barium	7080	7081	200*	
Beryllium	7090	7091	5*	
Cadmium	7130	7131	5*	
Calcium			5000	
Chromium (TOTAL)	7190+7191		10	
Cobalt	(7200+7201)		50*	
Copper	7211	7210	25*	
Iron	7381	7380	100	
Lead	7421	7420	5*	
Magnesium			5000	
Manganese	7461	7460	15	
Mercury (CV)	H20 7470	Soil 7471	0.2*	2
Nickel	7521	7520	40*	
Potassium			5000	
Selenium	7740	7741*	5*	
Silver	7761	7760	10	
Sodium		7770	5000	
Thallium	7841	7840	10	
Vanadium	7911	7910	50*	
Zinc	7951	7950	20*	
Tin			40	

Table 5-2

Additional Round 1 Analysis Parameters

	Method	Reference
Soil/Sediment Samples		
Chromium, hexavalent	312B	2
Chromium, trivalent	(1)	1
Groundwater/Surface Water Samples		
pH	150.1	1
Specific Conductance	120.1	1
Temperature	170.1	1
Total Organic Carbon (TOC)	415.2	1
Total Dissolved Solids (TDS)	160.1	1
Chloride	407A	2
Sulfate	375.4	1
Chromium, hexavalent	312B	2
Chromium, trivalent	(1)	1
Bicarbonate	406A/406C (2)	2
Carbonate	406A/406C (2)	2
Surface Water Samples		
Ammonia		
- Ionized	(3)	
- Total	(3)	

Notes:

(1) To be calculated by difference between total chromium and hexavalent chromium
(2) Actual method to be selected during sampling and field analysis for pH, alkalinity and carbon dioxide
(3) Methods shall be selected when SAP is prepared.

References:

1. Manual of Methods for Chemical Analysis of Water and Wastes, EPA-600-4-79-020, Cincinnati, OH, 1983.

2. Standard Methods for the Examination of Water and Wastewater, 15th ed., American Public Health Association, 1015 Eighteenth Street, NW, Washington, D.C., 1985.

EG5/B/8

SECTION 6

DATA ASSESSMENT AND

PUBLIC HEALTH EVALUATION

SECTION 6
DATA ASSESSMENT AND PUBLIC HEALTH EVALUATION

6.1 Data Assessment - Following the completion of the surveys, tests, and studies described above, the City shall conduct a thorough review of the data generated by such field work. Based on such review and other available information, the City shall prepare a written assessment of whether hazardous substances have been released from the landfill site and, if so, the areal and vertical extent of such release and the environmental impacts thereof. At a minimum, the data review and assessment shall address:

1. The geology in the vicinity of the landfill site.

2. The hydrogeology in the vicinity of the landfill site, including horizontal and vertical groundwater flow patterns.

3. The impact of such release of hazardous substances, if any, on the groundwater underlying and downgradient of the landfill site.

4. The impact of such release of hazardous substances, if any, on surface water in the vicinity of the landfill site including Anthony Creek.

5. The impact of the release of hazardous substances, if any, upon private residential wells in the vicinity of the landfill site.

6. The potential exposure to wildlife species and habitat created by the release of hazardous substances, if any, from the site.

6.2 Public Health Evaluation - The public health evaluation portion of this RI/FS shall be patterned after the Superfund Public Health

Evaluation Manual prepared by the U.S. EPA Office of Emergency and Remedial Response in October 1986, which outlines the various elements of the public health evaluation process.

Under the Phase 1 RI/FS, a baseline public health evaluation shall be initiated. The ability to complete the baseline evaluation during Phase 1 will depend on the need to obtain additional data during Phase 2. The data requirements developed during the baseline evaluation shall contribute to defining the Phase 2 scope, if necessary.

The Phase 1 RI/FS shall also initiate the analysis of remedial alternatives and the development of performance goals. This task will not be completed until the end of the FS.

6.2.1 Baseline Evaluation - The baseline evaluation shall include some or all of the following steps:

- selection of indicator chemicals
- assessment of exposure concentrations of indicator chemicals and comparison with ARARs.
- estimation of human intakes
- review of indicator chemicals toxicity
- characterization of human health risks for potential carcinogens and noncarcinogenic effects.

6.2.2 Development of Health-Based Performance Goals - This task shall include analysis of health-based performance goals for the proposed remedial alternatives. The goals shall address source control remedies and migration management alternatives. As indicated in the EPA guidance manual, the emphasis of this approach shall be to use risk analysis techniques to set target levels of contaminant concentrations at exposure points.

EG5/C

SECTION 7

FEASIBILITY STUDY (FS)

SECTION 7
FEASIBILITY STUDY (FS)

7.1 FS Overview - The feasibility study shall proceed in three phases: the development of alternatives, the screening of the alternatives, and the detailed analysis of alternatives.

The FS shall be conducted in accordance with the procedures outlined in the "Guidance For Conducting Remedial Investigations and Feasibility Studies Under CERCLA", March 1988.

The Phase 1 RI/FS shall include development of alternatives and initial screening of alternatives, as outlined in Section 7.2 and started in Section 7.3. The subsequent portions of the FS described herein shall be part of the Phase 2 RI/FS, as outlined in Section 7.3 and 7.4.

7.2 Development of Alternatives

7.2.1 Purpose of Alternative Development - A list of alternatives shall be developed that protect human health and the environment and encompass a range of appropriate waste management options. Appropriate waste management shall include, depending on site-specific circumstances, eliminating the hazardous substances at the site, reducing hazardous substances, containments, or some combination of elimination, reduction, and containment. The alternatives shall be developed concurrently with the RI site characterization.

7.2.2 The Development of Alternatives Process - Alternatives for remediation shall be developed by assembling combinations of technologies and the media to which they apply. This process shall consist of the following basic six steps:

- Development of remedial action objectives specifying the contaminants and media of interest, exposure pathways, and remediation goals that permit a range of treatment and containment alternatives to be developed. The objectives de-

veloped shall be based on contaminant-specific ARAR's when available, and risk-related factors.

- Development of general response actions for each medium of interest defining containment, treatment, excavation, pumping, or other actions, individually or in combination, that may be taken to satisfy the remedial action objectives for the site.

- Identification of volumes or areas of media to which general response actions might be applied, taking into account the requirements for protection as identified in the remedial action objectives and the chemical and physical characterization of the site.

- Identification and screening the technologies applicable to each general response action to eliminate those that cannot be implemented technically at the site. The general response actions shall be further defined to specify remedial technology types (e.g., the general response action of treatment can be further defined to include chemical or biological technology types).

- Identification and evaluation of technology process options to select a representative process for each technology type retained for consideration.

- Assembly of the selected representative technologies into alternatives representing a range of treatment and containment combinations, as appropriate.

The FS shall include the alternative of providing public water supplies for potentially impacted private wells.

7.3 Screening of Alternatives - The following three steps shall be conducted during the screening of alternatives:

- the alternatives shall be further refined as appropriate
- the alternatives shall be evaluated conceptually to determine their effectiveness, implementability, and cost
- a decision shall be made, based on this evaluation, as to which alternatives should be retained for further analysis.

During this phase, the remedial action objective developed earlier for each medium or operable unit shall be revised as necessary to incorporate additional public health evaluation information generated from the RI. The areas and quantities of contaminated media shall also be reevaluated with respect to the effects of interactions between media.

7.3.1 Effectiveness Evaluation - Each alternative shall be evaluated to determine the short-term and long-term protection it will provide with respect to reductions in toxicity, mobility, or volume. The reduction of toxicity, mobility, or volume shall refer to changes in one or more characteristics of the hazardous substances or contaminated media by the use of treatment that decreases the threats or risks associated with the hazardous material.

7.3.2 Implementation Evaluation - The implementation alternatives shall be evaluated during screening. This evaluation shall consider the possible combination of process options with respect to the site conditions. The implementation evaluation shall consider the technical feasibility to construct, reliably operate, and meet technology-specific regulations for each alternative. The evaluation shall also include operation, maintenance, replacement, and monitoring of the technical components of each alternative, if required, into the future after the remedial action is complete. The implementation evaluation shall consider the administrative feasibility to obtain approvals from other offices and agencies, the availability of treatment, storage and disposal services.

7.3.3 Cost Evaluation - Cost estimates for screening alternatives shall be based on the following list of cost-estimating data:

- costs curves;
- generic unit costs;
- vendor information;
- conventional cost-estimating guides; and
- prior similar estimates as modified by site-specific information

7.4 Detailed Analysis of Alternatives - Each alternative shall be assessed against nine evaluation criteria list below during the detailed analysis:

1. Short-term effectiveness
2. Long-term effectiveness and permanence
3. Reduction of toxicity, mobility, or volume
4. Implementability
5. Cost
6. Compliance and ARAR's
7. Overall protection of human health and the environment
8. State acceptance
9. Community acceptance

The results of this assessment shall be arrayed such that comparisons can be made among alternatives and the key tradeoffs among alternatives can be identified.

The evaluations conducted during the detailed analysis shall include previous evaluations conducted during the development and screening of alternatives. Any treatability study data and additional site characterization information that may have been collected during the RI shall be included in the detailed analysis.

The results of the detailed analysis shall provide the basis for identifying a preferred alternative and preparing the proposed plan. The detailed analysis mechanism shall include the following.

- Further definition of each alternative with respect to the volumes or areas of contaminated media to be addressed, the technologies to be used, and any performance requirements associated with those technologies.

- An assessment and a summary of each alternative against the nine evaluation criteria.

- A comparative analysis among the alternatives to assess the relative performance of each alternative with respect to each evaluation criterion.

EG5/R

SECTION 8

PHASE 2 FIELD WORK

SECTION 8
PHASE 2 FIELD WORK

8.1 General - If it is determined during Phase 1 of this RI/FS that additional data are required to assess the areal and vertical extent of any release of hazardous substances from the landfill site and the environmental impacts thereof, the City shall implement Phase 2 of this RI/FS to acquire such data. If necessary to achieve the objectives of this RI/FS, Phase 2 shall include the following:

8.2 Soil Gas Survey - A soil gas survey shall be designed and conducted in Phase 2 if the results of the Section 4.0.2 Resistivity Survey do not provide a definition of the plume limits and if the level of organic compounds from the samples collected from the shallowest monitoring well at each cluster location exceed the threshold levels established in Section 8.4.

If it is determined that soil analysis is necessary to complete the Feasibility Study of remedial alternatives, the City shall collect and analyze soil samples in accordance with a scope of work to be jointly determined by the State and the City.

8.3 Expanded Residential Well Sampling - If hazardous substances released from the landfill site are detected in the private well sampling conducted pursuant to Section 4.3.5 or it is determined based on the data obtained pursuant to this RI that hazardous substances from the landfill site are migrating toward private residential wells in the vicinity of the landfill site, the City shall conduct an expanded residential well sampling program. Such expanded residential well sampling program shall include those private residences in the vicinity of the landfill site not previously sampled which are determined to be at risk from hazardous substances migrating from the landfill site.

8.4 Additional Monitoring Well Installation - If, based on the data obtained during Phase 1 of this RI, it is determined that additional

monitoring wells are necessary to determine the areal and vertical extent of the release of hazardous substances, if any, from the landfill site, the City shall install such additional groundwater monitoring wells as are necessary to the determination of the extent of any off-site release. The additional wells may include additional surficial or bedrock wells, if necessary to obtain such data.

The criteria used to identify the contaminant levels beyond which it is not necessary to search for and determine the plume limits shall be the ARARs established for this project. In general, the ARARs shall be the more stringent of drinking water standards and groundwater standards.

8.5 Additional Sampling and Analysis - Results from the Phase 1 soil and water sampling shall be evaluated to determine the need for subsequent analysis.

If it is determined that additional sampling is necessary to determine the areal and vertical extent of the release of hazardous substances, if any, from the landfill site, or to complete the Feasibility Study of remedial alternatives, one sampling round may be required during Phase 2 of this Remedial Investigation.

If it is determined that the ARARs for analytes are less than the detection limits required by the State contract laboratory protocol (CLP) and the analytes are not detected in the Phase 1 analysis, the City shall collect additional samples for analysis using procedures yielding lower detection limits in accordance with a scope of work to be jointly determined by the State and the City. Said analysis shall be limited to established analytical procedures and equipment method detection limits.

8.6 Wildlife Survey - Results from the Phase 1 wildlife assessment shall be evaluated to determine the need for additional investigations.

If it is determined that additional wildlife assessment investigations are necessary to further define landfill impacts or complete the health evaluations, the City shall conduct additional investigations in accordance with a scope of work to be jointly determined by the State and the City.

8.7 Public Health Evaluation - Following the acquisition of any data pursuant to Phase 2 of this remedial investigation, the City shall refine the preliminary Public Health Evaluation described in Section 6.2 to address such data.

8.8 Treatability Investigations - If after screening the alternatives it is determined that treatability information is required, the City shall conduct treatability studies in accordance with a scope of work to be jointly determined by the State and the City.

8.8.1 Objectives of Treatability Investigations - If treatability investigations are required, they shall:

- Provide sufficient data to allow treatment alternatives to be fully developed and evaluated during the detailed analysis and remedial design of a selected alternative.
- Reduce the uncertainty of cost and performance data for treatment alternatives to acceptable levels so that a remedy can be selected.

8.8.2 Overview of Treatability Investigations - The decision to conduct treatability investigations shall be made jointly by the City and State by evaluating the cost and time required to complete the investigations with the potential value of the information in resolving uncertainties associated with selection of a remedial action. The need for treatability investigations shall be evaluated in Phase 1 for possible inclusion in Phase 2.

If treatability investigations are required in Phase 2, they shall be conducted in accordance with the following steps:

- Determine data needs by reviewing site data and available literature on technologies to determine if data are sufficient to evaluate the alternatives.

- If available data are not sufficient, perform treatability tests, as appropriate, to determine performance, operating parameters, and relative costs of potential remedial technologies.

- Evaluate the data to ensure that data quality objectives are met.

8.9 Air Monitoring - Results from the Phase I air field screen (Section 3.5) and Air Monitoring (Section 4.7) shall be evaluated to determine the need for additional investigations.

If it is determined that additional air monitoring is necessary to further define landfill impacts or complete the health evaluations, the City shall conduct additional monitoring in accordance with a scope of work to be jointly determined by the State or the City.

EG5/P

APPENDIX A

STANDARD PROCEDURES

Field Quality Assurance Program
Municipal Landfill
Gloversville, New York

Tighe & Bond, Inc.
Consulting Engineers
Easthampton, Massachusetts

SECTION A-1

OVERBURDEN BORING
HOLLOW STEM AUGER

A-1.1 Purpose - To conduct an earth boring employing the hollow stem auger method for geotechnical explorations and hazardous waste site investigations.

A-1.2 Equipment - Sectional hollow stem auger flights with a minimum inside diameter of 2½ inches, and, the following equipment:

- Drill Rods, minimum size equivalent to the "A" rod, (1-5/8 inch O.D. and 1-1/8 inch I.D.)
- Hollow stem auger plug
- Drive hammer (1) 300 pound and (1) 140 pound ± 5 pounds
- 2-inch O.D. split spoon sampler
- Roller bit and diamond corer bit
- Water tank and pump

A-1.3 Procedures - The boring is advanced by rotating a single section of hollow stem auger into the soil to desired depth or the limit of the auger section. To continue advancing the bore hole, additional auger flights are added one at a time, repeating this sequence until the required depth is reached. When an obstruction is met, the driller must attempt to penetrate the obstruction by the use of a roller bit or by coring. If attempts to penetrate the obstruction are unsuccessful, the boring will be abandoned.

Hollow stem auger techniques should be employed without the use of drilling water while drilling on hazardous waste sites. If water is deemed necessary by driller, its use must be approved by the drilling inspector. When water is used to advance boring it must not be recirculated back into the boring.

The auger plug must be in place at the auger head while bore hole is being advanced to prevent soil from being transported through auger unless split spoon samples are being collected.

In the event of a collapse of the walls of the bore hole drilling, drilling "mud" may be used to stabilize the boring.

A-1.4 Records and Documentation - The details of the boring shall be recorded on a boring log, including the following information at a minimum:

- Name and address of the drilling firm.
- Dates and times of starting, stopping and completion of the boring.
- Name of the driller.
- Diameter and depth of boring and record of casing.
- Make and type of equipment used, including drilling methods.
- Descriptions of all soil and rock strata encountered with the driller's best estimate of the depths at which changes in material occur.
- Descriptions of water levels and drilling fluid behavior.
- Descriptions of water bearing zones, including depth thickness and estimated yield.
- Split spoon blow counts per six inch drive interval.

A-1.5 Special Notes - Augers and sampling equipment shall be steam cleaned between holes.

Whenever standard operating procedures are varied, it shall be recorded. The drilling inspector should also record any detected odor from boring, and depth encountered.

However, depths of auger investigations may be limited by groundwater conditions, soil characteristics, and the equipment used.

SECTION A-2

TEST PITS

A-2.1 Purpose - Test pits are excavated as a means of determining subsurface soil, rock conditions, limits of refuse and to provide access for subsurface soil sampling.

A-2.2 Equipment -

- Wheeled or tracked backhoe
- Polypropylene scoop
- Stainless steel laboratory spoon
- Appropriate sample containers

A-2.3 Procedures - Prior to initiating excavations, all portions of the backhoe that will contact the excavation shall be steam cleaned to remove oil, grease, and other residue.

The test pit will be laid out with survey stakes and documented by ground survey on site plans.

Soil shall be carefully excavated to the required depth and stockpiled. Sidewall slopes shall be as vertical as possible, consistent with appropriate safety considerations.

Samples shall be obtained from stockpiled material using a polypropylene scoop and transferred directly to a suitable sample container.

In instances where precise sampling depth is required, samples may be obtained directly from the excavation sidewall utilizing a stainless steel laboratory spoon and transferred to a suitable sample container. This procedure shall only be utilized (1) when sidewalls exhibit sufficient stability to prevent slumping, and (2) when total excavation depth is less than the maximum allowed by OSHA regulations for non-shored excavations (five feet).

Before measuring the groundwater depth, if encountered, the groundwater table shall be allowed to stabililize. In general, at least one (1) and preferably two (2) hours. Stabilization time shall be recorded on the test pit field log.

After samples have been capped, they will be contained, preserved and handled in accordance with standard procedures in Section A-12.

Labeling will follow procedures in Section A-13.

Upon completion of the investigation, the test pit shall be backfilled and compacted so as not to present a personnel safety hazard. If it is necessary to leave a test pit open overnight or unattended, it shall be surrounded by a suitable barrier and clearly marked by "Danger" signs.

A-2.4 Records and Documentation - The details of the test pit shall be recorded in a test pit log, including the following information at a minimum:

- Identification number of test pit.
- Name and address of excavation company.
- Name of equipment operator and name of inspector.
- Date and time of test pit excavation and backfilling.
- Horizontal dimensions and depth of test pit.
- Make and type of equipment.
- Description of all material encountered, including soil strata, and depths at which changes in material occur.
- Depth to water surface.

A-2.5 Special Notes - At least 72 hours prior to excavation, "Digsafe" shall be contacted to determine the possible presence of underground utilities in the area of the excavation. If no such structures are indicated, the clearance number assigned by "Digsafe" shall be recorded in the "Remarks" section of the Test Pit Field Log. If utilities are present, the appropriate utility will locate and mark the structures.

SECTION A-3

MONITOR WELL INSTALLATION
OVERBURDEN WELLS

A-3.1 Purpose - Overburden wells are installed to provide access to groundwater for sampling purposes, determination of groundwater elevation, and to monitor fluctuations in groundwater elevation.

A-3.2 Equipment -

- Schedule 40 PVC pipe, 2-inch diameter, flush-joint threaded
- Schedule 40 PVC slotted wellscreen, 2-inch diameter, 0.01-inch slots, flush-joint threaded
- Stainless steel, 2-inch diameter, well equipment (one dig well cluster)
- Bentonite clay
- Ottawa sand
- Cement grout
- Metal pipe, 3-inch or 4-inch diameter, 5-foot length, with slide-on cap and locking device
- Valve gate box, 5¼-inch and 16-inch, with bolted cover plate, if flush installations are required
- 100-foot fiberglass tape with weighted end

A-3.3 Procedures - Install borehole to the selected depth. Assemble and install the observation well pipe and screen. Well tip must be fitted with a threaded or slip-on plug. All pipe sections shall be connected by dry threading of the joints. No glue, solvents, or lubricating compound shall be used to make up the connections. The well pipe assembly must be carefully lowered into the borehole to ensure centering of the well in the hole. After installation, the drilling inspector and the drilling contractor will carefully measure the depth to the well tip and record the measurement on the well log.

Install a sand filter around the wellscreen to at least two feet (2') above the screen. Grain size of the sand shall be appropriate for the slot size of the screen (normally 0.01 inch).

Withdraw the casing and install a bentonite clay seal approximately two feet (2') thick above the sand filter. Pump a cement-bentonite - CaO slurry into the annulus above the bentonite seal to a depth just below grade.

Square cut the well pipe stick-up approximately 2 feet above grade.

Install a five foot (5') section of metal pipe (3 inches or 4 inches diameter) equipped with a slide-on, lockable cap, approximately three

feet (3') into the borehole. Complete the installation by cement grouting the metal pipe in place.

If well head completions must be flush with the ground surface, a street box or lockable valve gate box may be installed in lieu of the metal pipe. Installation consists of square-cutting the riser pipe two inches (2") below grade and cement grouting the box in place.

Paint the well protective pipe or box to inhibit rust formation and increase visibility. Paint the well number in one inch (1") numerals of a contrasting color.

A standard detail depicting the well construction is shown in the attached figure (No. A-3.1).

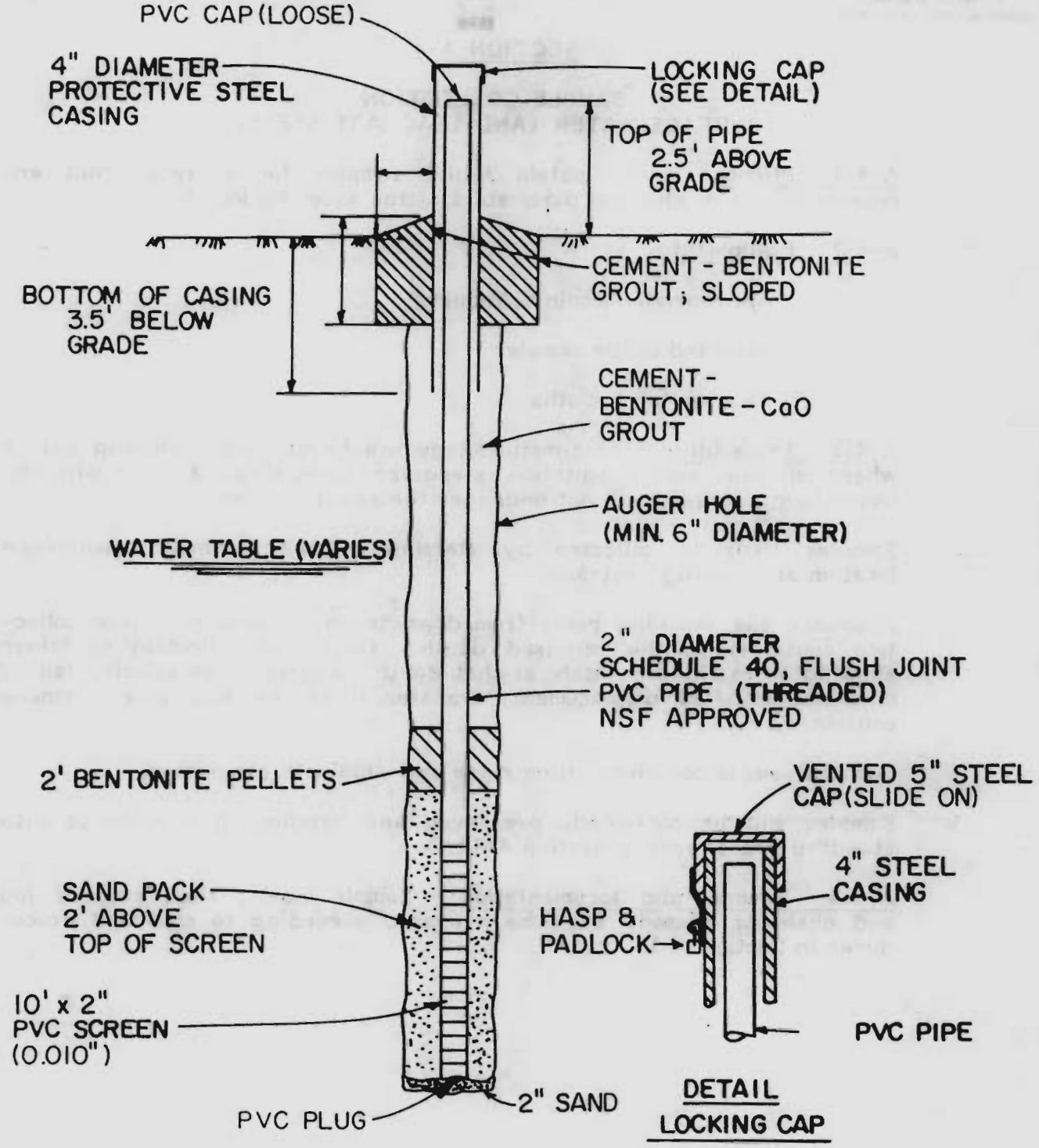
A-3.4 Records and Documentation - Well installation will be recorded on the drilling log for the hole. Installation details to be recorded include total well depth, screen depth and length, filter and seal depths and thicknesses, well head completion type, and any other details or measurements deemed necessary by the field engineer.

A-3.5 Special Notes - Metal protective pipe or valve gate boxes shall be steam cleaned prior to installation to remove cutting oil or other residue.

The monitoring wells will be developed at the conclusion of installation. During well development the discharge water will be monitored for pH, conductivity and temperature. PID readings will also be made (see Section A-9 for procedures). Water produced by development may be discharged freely if there is no PID response. Disposition of development water will be on the active disposal area of the landfill.

Method A - Suction Pump Development
If the static water level in the monitor well is less than 25 feet, a suction pump may be used for well development. The well should be pumped until the water is clear and free of suspended sediments.

Method B - Development
If the wells can not be pumped by suction, the well development shall proceed using a combination of mechanical surging and bailing, until discharge is clear and free of fines.



STANDARD GROUNDWATER MONITORING WELL

	REMEDIAL INVESTIGATION SANITARY LANDFILL CITY OF GLOVERSVILLE, N.Y. TIGHE & BOND, INC.	FIGURE NO. A-3.1 MONITORING WELL DETAIL NO SCALE SEPT., 1986

SECTION A-4

SAMPLE COLLECTION
SURFACE WATER (AND LEACHATE SEEPS)

A-4.1 Purpose - To obtain liquid samples for analyses that are representative of chemical parameters at the sampling location.

A-4.2 Equipment -

- Appropriate sample containers
- Weighted bottle sampler
- Rags or terry cloths

A-4.3 Procedures - This methodology will be utilized in flowing waters where minimum sample agitation is required, and direct contact with the liquid being sampled will not endanger the sampling team.

Samples shall be collected by starting at the furthest downstream location and moving upstream.

Approach the sampling point from downstream. Submerge closed collection container to the required depth. Open the collection container allowing it to fill completely at that depth. Retrieve the sample, taking care not to allow displacement; transfer it to the appropriate sample container.

Cap the sample container, then rinse and wipe with clean rags.

Samples will be contained, preserved and handled in accordance with standard procedures in Section A-12.

A-4.4 Records and Documentation - Sample labels, field records log and chain of custody shall be prepared according to standard procedures in Section A-13.

SECTION A-5

SAMPLE COLLECTION
GROUNDWATER MONITORING WELLS

A-5.1 Purpose - To obtain liquid samples for analysis to determine general quality of the groundwater at the sampling location.

A-5.2 Equipment -

- Appropriate sample containers
- Well evacuation pump
- Teflon bailers
- Sampling cable
- 100-foot fiberglass tape with weighted end or electronic water measuring device
- Rags or terry cloth
- Chalk

A-5.3 Procedures - Measure depth to groundwater to the nearest 0.01-foot using a 100-foot fiberglass tape or electronic water measuring device. (Reference is top of protective steel casing).

Prior to sample collection, three times the volume of standing water in the well will be removed using the following method:

- Measure total well depth to the nearest 0.1-foot from the top of the riser pipe using the 100-foot fiberglass tape or electronic water measuring device.
- Measure depth to groundwater to the nearest 0.01-foot from the top of the riser pipe using the 100-foot fiberglass tape coated with chalk or electronic water measuring device.
- Calculate the volume of standing water in the well using the above measurements and the inside diameter of the well.

Method A - Bailing
Using a pre-cleaned teflon bailer of known volume, bail three times the volume of water calculated above from the well.

Allow sufficient time for well to recharge before initiating sampling.

Method B - Pumping
Using a clean submersible pump (either electric motor driven or inert gas driven), pump three times the volume of water calculated above from the well.

If the well is evacuated prior to pumping three volumes, allow the well to recharge and then continue pumping.

After three volumes have been evacuated, allow sufficient time for well to recharge before initiating sampling.

Clean the pump and tubing by pumping and rinsing with potable water, rinsing the pump and tubing with methanol (for organics) and 1:1 nitric acid (for metals), and pumping and rinsing with potable water again.

Using a clean dual check valve, bottom draw teflon bailer, withdraw a sample from the well.

Transfer the sample from the bailer directly into the sample container by pouring the liquid down the side of the container with minimum turbulence. This procedure is critical to minimize loss of volatile materials from the sample through aeration.

Cap the sample container.

Wipe down the bailer with clean rags to dry it and store the bailer in a plastic bag separate from any stock of clean bailers.

Samples will be contained, preserved and handled in accordance with standard procedures in Section A-12.

A-5.4 Records and Documentation - Sample labels, field records log and chain of custody shall be prepared according to standard procedures in Section A-13.

A-5.5 Special Notes - Separate pre-cleaned bailers will be used for each well sampled to preclude cross-contamination.

Cleaning procedure for bailers is presented in the laboratory QA/QC document.

SECTION A-6

SAMPLE COLLECTION
RESIDENTIAL WELLS

A-6.1 Purpose - Residential/private well sampling is undertaken to determine the quality of drinking water available to residents in an area proximate to and potentially affected by a suspected contaminant source and to determine groundwater levels.

A-6.2 Equipment -

- Appropriate sample containers
- Permission of the homeowner or occupant to conduct the sampling.

A-6.3 Procedures - The procedures to be following during the residential water supply sampling are as follows:

- Determine volume of holding/pressure tank.
- Trace the cold water system and look for in-house treatment devices, such as filters, water softeners, carbon columns, etc.
- Using an empty container of known volume and a stop-watch, determine kitchen faucet flow rate.
- Run kitchen faucet for a time adequate to waste two volumes of holding tank.
- If no treatment devices exist, collect samples at kitchen faucet. If any treatment devices exist in the system, collect sample prior to the device.

Samples will be contained, preserved and handled in accordance with standard procedures in Section A-12.

A-6.4 Records and Documentation - Sample labels, field records log and chain of custody shall be prepared according to standard procedures in Section A-13.

SECTION A-7

SAMPLE COLLECTION
SUBSURFACE SOIL

A-7.1 Purpose - Subsurface soil samples are collected to determine the physical characteristics or levels of contamination of overburden material at any desired depth.

A-7.2 Equipment and Materials -

- Appropriate sample containers
- Split-spoon sampler with appropriate drill rods
- Drill rig with 140 pound drive weight
- Stainless steel laboratory spoons
- Clean rags or terry cloths

A-7.3 Procedures - After boring and cleanout of the hole to the desired sampling depth, assemble the sampler and lower it carefully to the bottom of the hole.

With the split spoon sampler set at the bottom of the hole, the drill rod should be marked at three consecutive 6-inch intervals for measuring the blows per 6 inches of driving. If the sampler is above the bottom of the casing, this indicates that the bottom has been disturbed and soil has risen up the casing, the casing should be advanced to below the disturbed soil.

The sampler should be driven by a 140-pound weight falling freely 30 inches. Check to make sure that the fall is 30 inches by marking the drive head and that the hammer is falling freely. Be certain that the rope is fully released to permit complete free fall of the hammer. The number of blows to drive each 6-inch interval should be recorded. The sampler should be driven at least 18 inches, unless the blow count exceeds 100 blows per 6 inches or unless refusal is met. When the blow count exceeds 100 blows per 6 inches, the driving may be stopped and the sampler removed. The number of blows and the inches penetrated should be recorded. After driving in dense soils, the drill rods may have to be turned clockwise to free the sampler for removal. Turning counterclockwise will only loosen the joints, and the sampler may be dropped in the hole. Bumping up the rods should be avoided, if possible, because it tends to reduce the amount of soil recovery. However, it is sometimes necessary in very dense soils in order to free the sampler.

When the sampler is brought to the ground surface, it should be opened immediately, and the length of recovery should be measured and recorded. Any loose wash at the top of the sample should not be counted as part of the recovery. If recovery is less than 6 inches,

another sample should be taken immediately below this sample, except in certain instances, such as where rock is encountered and coring is necessary.

If recovery is insufficient, put sampler back down hole and proceed as follows: If original depth is reached, drive sampler 18 inches and record blows as new sample; if original depth is not reached, redrive sampler to recover disturbed material, record both the original blow count and that sample recorded or redrive.

Remove sample with a clean laboratory spoon and transfer it directly to a suitable sample container.

Samples will be contained, preserved and handled in accordance with standard procedures.

Wash the split spoon with water and wipe it down with clean rags or terry cloths.

A-7.4 Records and Documentation - Sample labels, field records log and chain of custody shall be prepared according to standard procedures in Section A-13.

Penetration resistance will be recorded on standard boring log forms.

SECTION A-8

SAMPLE COLLECTION
STREAM SEDIMENTS

A-8.1 Purpose - Sediment samples underlying streams are collected to describe the physical characteristics of the sediment or to investigate contamination in the sediments.

A-8.2 Materials and Equipment -

- Appropriate sample containers
- Pond sampler with disposable collection jars
- Hand corer
- Stainless steel laboratory spoon
- Stainless steel or polypropylene tray
- Clean rags or terry cloths
- 3/4-inch nylon line

A-8.3 Procedures -

Method A - Hand Corer

This method will be utilized in shallow (less than 3 feet) water depths when a relatively undisturbed sample is required or when samples of up to 18 inches depth are required. If necessary, Teflon or brass core liners may be used with this technique to prevent cross-contamination.

- Position sampling platform downstream of sample collection point, or locate technician (in boots) downstream of location.
- Assemble a pre-cleaned hand corer by inserting a metal nosepiece into the assembly. Inspect to insure proper operation of the check valve.
- Insert the corer through the water column into the sediment and force it in with a smooth pressure.
- Twist the corer approximately 90° and slowly withdraw it in a single motion.
- Remove the nosepiece and withdraw the sample into a stainless steel or polypropylene tray.

- Transfer the sample to a suitable sample container using a stainless steel laboratory spoon.
- Cap the sample container.
- Flush the corer with clean water to remove any residual sediment.
- Wash the sample tray with clean water and wipe it down with rags or terry cloths.

Method B - Bottom Sampler (Ponar)
This method can be used when disturbance of the area sediment will not affect sample integrity.

- Remove cross-bar pin.
- Attach pole to ring at top of opening mechanism.
- Lift sampler, allowing free-moving cross-bar to catch the notch that keeps the sampler open.
- Lower the samples to the sediment surface.
- Apply pressure with the pole, then lift to collect the sediment.
- Bring the sample to the surface and pour off the water through the screened openings.
- Spread the samples open (observe hinge).
- Transfer sediment sample to appropriate container.
- Flush sampler with clean water to remove residual sediment, and wash.

A-8.4 Records and Documentation - Sample labels, field records log and chain of custody shall be prepared according to standard procedures in Section A-13.

Samples will be labeled, preserved, and stored in accordance with these Standard Procedures.

SECTION A-9

AIR MONITORING
PHOTOIONIZATION DETECTOR (PID)

A-9.1 Purpose - To provide operating procedures for the HNu Systems Model PI 101 photoionization detector for field surveying of organic vapors.

A-9.2 Equipment -

- HNu Systems Model PI 101 Photoionization Detector

A-9.3 Procedures -

Preparation for Use

- Assemble the photoionization probe by screwing the handle to the probe body and inserting the probe extension into the probe body.

- Connect the probe to the meter by matching the alignment keys on the 12 pin connector, pressing down, and twisting the connector lock until a distinct snap is felt.

- Turn the function switch to the battery check position. The needle should swing into or above the green arc on the scaleplate. If it does not, the unit must be recharged before use.

- Turn the function switch to the standby position and rotate the zero potentiometer until the meter reads zero. At this setting, the probe fan should turn on, and the UV light source should be on. A distinct hum indicates operation of the fan, while a purple glow in the probe tube indicates UV light source is operational.

- Turn the function switch to the 0-20 ppm scale setting. The meter needle should read between 0.5-0.7 ppm.

Operation

- The probe should be held in close proximity to the area being monitored to provide the most accurate reading. The lowest possible scale range should also be selected. In environments where levels of volatile organics are unknown, initially use the 0-2000 ppm scale and then change to lower scales, if appropriate.

- Do not allow the probe intake to directly contact soil or liquid materials. This will disrupt the air flow to the UV light source and may contaminate the probe.

- When detecting organics in soil samples, collect soil in clean glass jars, leaving 1/4 to 1/3 volume of head space. Cover with aluminum foil and jar lids. After covering, let samples stand in a warm place (about 20°C) for 14-30 minutes. Shake samples for 15 to 30 seconds before puncturing foil with PID proble.

- Water samples will be handled in the same manner as soils when screening for organics with a PID instrument.

- After completion of monitoring, the meter should be turned off, cleaned and repacked.

A-9.4 Special Notes - For general monitoring in environments where gas mixtures are present, the pot span adjustment should be set at 9.8.

If monitoring for a single gas is undertaken, sensitivity of the instrument to that compound may be increased by adjustment of the pot span. The HNu instruction manual provides tables of pot span settings for various compounds.

Instruments are laboratory calibrated on thirty day cycles. During projects requiring repeated use of the meter for more than one day, calibration will be checked in the field daily using a factory supplied standard gas.

This instrument will not detect methane or other natural gases.

A-9.5 Documentation - Readings will be recorded in field record log in accordance with the standard procedures in Section A-13.

SECTION A-10

pH METER

A-10.1 Purpose - To provide operating procedures for the Orion digital pH/mv meter, Model 211, in order to measure the pH of a water sample in the field.

A-10.2 Equipment -

- Pre-cleaned driller jars
- Three (3) pH laboratory buffer solution with pH's of 4.0, 7.0 and 10.0
- Glass rod
- Distilled or de-ionized water
- Squeeze bottle
- Clean paper towels
- Orion digital pH/mv meter, Model 211 (with battery fully charged)
- Meter operation and maintenance instruction manual

A-10.3 Procedures - Two-buffer standardization.

Select two buffers whose pH values bracket the expected sample pH with one buffer being pH 7.0. Calibrate meter according to procedures outlined in the instruction manual.

Rinse pH electrodes with distilled water between pH measurements of buffer solutions and prior to sample measurement.

Allow all samples and buffers to reach the same temperature before attempting a measurement (unless an automatic temperature probe is used).

Quickly stir buffers and samples with a clean glass rod prior to pH measurement. Samples should be measured immediately after collection.

Place rinsed electrode in the unknown sample and allow about one minute for the reading to stabilize. Record pH measurement as digitized on meter display. Also record temperature and mv by adjusting control switch.

Recalibrate meter every 2 or 3 hours if pH measurements are being made continuously.

A-10.4 Documentation - Readings will be recorded in field record log in accordance with the standard procedures in Section A-13.

SECTION A-11

CONDUCTIVITY METER

A-11.1 Purpose - To provide operating procedures for the YSI Model 33 analog conductivity meter in order to measure the specific conductance of a water sample in the field. Temperature and salinity can also be measured with this unit.

A-11.2 Equipment -

- Pre-cleaned driller jars
- Standard solution of 1000 uS/cm at 25°C
- Glass stirring rod
- Distilled or de-ionized water
- Squeeze bottle
- Clean paper towels
- YSI Model 33 Conductivity Meter (with battery fully charged)
- Meter operation and maintenance instruction manual

A-11.3 Procedures - Check the instrument according to specified procedures in the manufacturer's instruction manual.

Calibrate the conductivity meter, following calibration procedures outlined in the instruction manual and using standard solution.

Calculate the cell constant according to outlined procedures.

Avoid calibrating on one meter range and making measurements on another.

Maintain calibration solution and sample at the same temperature.

Quickly stir sample with glass stirring rod prior to placement of cell in sample.

Place rinsed cell in sample solution and record digitized conductance and voltage readings. Measure specific conductance immediately after sampling.

Multiply recorded measurements by the cell constant to convert to actual conductance values.

A-11.4 Documentation - Readings will be recorded in field record log in accordance with the standard procedures in Section A-13.

SECTION A-12

SAMPLE CONTAINERS, PRESERVATION, TRANSPORT AND STORAGE

A-12.1 Hydrogen Ion (pH)

A-12.1.1 Apparatus and Materials

- Clean polyethylene or glass bottles; previously cleaned with Alconox detergent and rinsed with distilled water.
- Electronic pH meter with temperature compensation adjustment. Glass electrode: Glass electrodes are available for measurement over the entire pH range with minimum sodium ion error types for high pH-high sodium samples. Reference electrode: Use a calomel, silver-silver chloride, or other constant-potential electrode.
- Two standard buffer solutions of known pH (i.e. 4 and 10).

A-12.2 Specific Conductance

A-12.2.1 Apparatus and Materials

- Polyethylene or glass bottles; previously washed with Alconox detergent and rinsed with distilled water.

A-12.2.2 Sample Collection, Preservation, and Handling

- Store samples at 4°C.
- All samples must be analyzed within 24 hours. It is preferable to determine conductance on-site when possible. If on-site determination is not possible, the sample should be stored at 4°C for no more than 24 hours. However, before measuring sample conductance, allow it to warm to 25°C or make a temperature correction and report results at 25°C.

A-12.3 Total Organic Carbon (TOC)

A-12.3.1 Apparatus and Materials

- Glass bottles, with Teflon lined caps.
- Concentrated hydrochloric acid (HCl) (ACS).

A-12.3.2 Container Preparation

- Wash 40 ml vials with screw caps and Teflon-faced silcone septa separately, utilizing detergent and hot tap water.
- Rinse thoroughly with de-ionized water.

- Place vials, caps, and septa on pre-cleaned aluminum foil (as described above) in an oven and bake for one (1) hour at 105°C.

- Allow the vials to cool with the septa properly inserted and the caps screwed on loosely. Tighten down caps when cool.

- Store vials in an area not subject to contamination by air or other sources.

A-12.3.3 Sample Collection, Preservation, and Handling

- Acidify samples with concentrated hydrochloric acid to pH of 2.0 or less.

- Store samples at 4°C.

- All samples should be analyzed within 24 hours of collection. Avoid exposure of the sample to light and atmosphere, minimize storage time.

A-12.4 Ammonia

A-12.4.1 Apparatus and Materials

- Polyethylene or glass bottles.

- Concentrated sulfuric acid, H_2SO_4 (ACS).

A-12.4.2 Sample Collection, Preservation, and Handling

- In the event that a prompt analysis is impossible, add concentrated sulfuric acid to lower sample pH to less than 2.

- All samples should be analyzed within 24 hours of collection.

A-12.5 Nitrate and Nitrite

A-12.5.1 Apparatus and Materials

- Polyethylene or glass bottles.

- Concentrated sulfuric acid, H_2SO_4 (ACS).

A-12.5.2 Sample Collection, Preservation, and Handling

- Store samples at 4°C.

- All samples should be analyzed within 24 hours of collection.

- If nitrate or nitrate plus nitrite are to be determined, preserve the sample by addition of H_2SO_4 to a pH of 2.0 or less.

Sulfuric acid should not be added to samples requiring analysis for nitrite only.

A-12.6 Method 624 Purgeables

A-12.6.1 Apparatus and Materials

- The water sample is to be collected in two (2) 40 ml vials with Teflon-faced silicone septa and screw caps and maintained at 4°C.

A-12.6.2 Container Preparation

- Wash 40 ml vials with screw caps and Teflon-faced silicone septa separately, utilizing a detergent and hot tap water.
- Rinse thoroughly with de-ionized water.
- Place vials, caps, and septa on pre-cleaned aluminum foil (as described above) in an oven, and bake for one (1) hour at 105°C.
- Allow the vials to cool with the septa properly inserted and the caps screwed on loosely. Tighten down caps when cool.
- Store vials in an area not subject to contamination by air or other sources.

A-12.6.3 Sample, Preservation, and Handling - The following procedures apply to sampling directly with the sample vial:

- Collect a single undisturbed sample of water for the analysis of volatile organics. Submerge the sample vial just below the surface upside down and slowly invert. Accomplish this task creating as little disturbance as possible.
- Allow the vial to fill and reach equilibrium with its surrounding reservoir for several seconds.
- Place the cap over the mouth of the vial so that the septum is properly oriented and screw down the cap firmly.
- Invert the vial to discover any entrapped air bubbles. If such is the case, the sample will be discarded and another 40 ml vial selected and filled.
- Collect a replicate sample per instructions above.
- Label the sample vials with the appropriate designated sample tag.

- Place the properly labeled sample vials in an appropriate carrying container maintained at 4°C throughout the sampling and transportation period.

A-12.7 Method 625 Extractable (Base/Neutrals, Acids, and Pesticides)

A-12.7.1 Apparatus and Materials

- Sample bottle - Amber glass, 1 liter to 1 gallon volume. The container must be washed and solvent rinsed before use to minimize interferences.

- Bottle Caps - Threaded to fit sample bottles. Caps must be lined with Teflon. Aluminum foil may be substituted if sample is not corrosive.

A-12.7.2 Sample, Preservation, and Handling

- Samples must be collected in glass containers. Conventional sampling practices should be followed, except that the bottle must not be prerinsed with sample before collection.

- The sample must be iced or refrigerated from the time of collection until extraction.

- All samples must be extracted within 7 days and completely analyzed within 30 days of collection.

A-12.8 Method 608 Organochlorine Pesticides and PCB's

A-12.8.1 Apparatus and Materials

- Sample bottle - Amber glass, 1 liter or 1 quart volume. The container must be washed and solvent rinsed before use to minimize interferences.

- Bottle Caps - Threaded to screw on to the sample bottles. Caps must be lined with Teflon. Foil may be substituted if sample is not corrosive.

A-12.8.2 Sample, Preservation, and Handling

- Samples must be collected in glass containers. Conventional sampling practices should be followed, except that the bottle must not be prewashed with sample before collection.

- The sample must be iced or refrigerated from the time of collection until extraction.

- All samples must be extracted within 7 days and completely analyzed within 30 days of collection.

A-12.9 Metals

A-12.9.1 Apparatus and Materials

- Polyethylene or glass bottles.
- Nitric acid (1 + 1): Mix equal volumes of concentrated nitric acid, HN_3 (ACS), with de-ionized water.
- De-ionized water.

A-12.9.2 Sample Collection, Preservation, and Handling

- Wash and rinse sample container thoroughly with 1 + 1 nitric acid, then with de-ionized water before use.
- Acidify the sample with 1 + 1 nitric acid to a pH of 2.0 or less. Normally, 3 ml of 1 + 1 nitric acid per liter should be sufficient to preserve the samples. This will keep the metals in solution and minimize their adsorption on the container wall.
- All samples should be analyzed within 6 months of collection. An exception is mercury analysis, which must be completed within 28 days.

SECTION A-13

SAMPLE DOCUMENTATION

The following written procedures shall be utilized when samples are collected, transferred, stored, analyzed or destroyed. These procedures are established to create an accurate written record that can be used to trace the possession and handling of the sample from the time it is collected to its disposal.

Samples will be coordinated with documentation by a 3-digit sample identification number preceded by the letter "F".

A-13.1 Logging of Samples - The accountability of a sample begins when the sample containers are distributed to the field sampling team. Sample labels, chain-of-custody forms and field data record, with: field record log must be completed at the time of sampling. The following chain-of-custody procedure must be implemented by the sample collector to assure sample integrity. Entries will be made in waterproof ink during sampling.

Sample Labels
Complete and attach labels for all samples upon collection. The following information is required:

- Client
- Job number
- Sample identification number
- Sample location/sample source
- Date/Time sampled
- Collector
- Preservative

Chain of Custody

- The original of the chain-of-custody form must accompany the samples at all times after collection. A copy of the chain-of-custody form is kept by the sample collector.

- When transferring possession of samples, the individuals relinquishing and receiving will sign, date and note the time on the chain-of-custody form.

- When samples are shipped, the shipper will note the method of shipment, courier name, and way bill number, if possible, in the appropriate location on the form. The shipper will keep a copy of the way bill and attach it to his copy of the chain-of-custody form.

The chain-of-custody form will contain information to distinguish each sample from any other sample. This information will include:

1. The project for which sampling is being conducted.

2. The medium being sampled (air, groundwater, soil, etc.)

3. The sampling date and time.

4. The specific sampling location in sufficient detail to allow resampling at the same location.

5. Sample identification number.

6. Initials of the person performing the sampling.

Field Record Log

The field record log will document sampling activities and related details. Complete at each sampling location with the following information:

- Client/Job number
- Project Manager
- Sample Collector/other personnel
- Time/Date/Weather
- Location Description
- Sampling methods/field analysis methods
- Containers/Preservation/Parameters
- Sample medium
- Equipment
- Field analysis records
- Comments/Special Requirements

EG4/F

TIGHE & BOND *CONSULTING ENGINEERS ENVIRONMENTAL SPECIALISTS*

CHAIN-OF-CUSTODY RECORD

Project _____ Sheet _____ of _____

Location _____ Job No. _____

Sample Collector(s) _____ Shipping Info (if applicable)

_____ _____

Sampling Point	Date	Time	Sample Type(s)	Remarks

1. Relinquished By: Date/Time Received By: Date/Time

(Analytical Laboratory - Clean containers) (Sample Collector(s))

2. Relinquished By: Date/Time Received By: Date/Time

(Sample Collector(s))

3. Relinquished By: Date/Time Received By: Date/Time

4. Relinquished By: Date/Time Received By: Date/Time

(Analytical Laboratory)

EG4/G

50 Payson Avenue
Easthampton, Mass. 01027
TEL. 413-527-5600
413-533-3991

SECTION A-14

COMBUSTIBLE GAS INDICATOR

A-14.1 Purpose - To provide operating procedures for the Onmark Model 6 Combustible Gas Indicator to measure natural gas content of air samples in the field.

A-14.2 Equipment -

- Onmark Model 6 Combustible Gas Indicator (CGI), with aspirator and suction tubing.

- Meter operation and maintenance instruction manual.

A-14.3 Procedures - Check the instrument according to specified procedures in the manufacture's instruction manual.

Prior to leaving the office, check meter to insure that the batteries are good. Calibrate meter using bottled methane gas of a known concentration, if available.

Once in the field, turn unit on and adjust voltage setting by squeezing aspirator to remove any traces of gas, setting the selector to the voltage setting, and using the voltage adjust control to set the proper voltage reading.

If the meter has not been calibrated in the laboratory, adjust the zero reading by turning the selector to "5%" and using the zero adjust control to move the indicator needle to zero.

If the meter was adjusted in the laboratory on methane gas, do not zero adjust in the field.

In order to take a reading, place the suction tube in the area to be measured, and draw the sample through the meter by squeezing the aspirator. If the reading is off the 5% scale, turn the selector to the 100% setting.

Meter readings are in "% Combustible Gas".

A-14.4 Documentation - Readings will be recorded in field record log in accordance with the standard procedures in Section A-13.

APPENDIX B

HEALTH AND SAFETY PLAN

APPENDIX B

HEALTH AND SAFETY PLAN

B.1 Purpose - The purpose of this Plan is to establish personnel safety/protection standards and mandatory safety operating procedures relative to physical and chemical hazards encountered on the site, to establish contamination zones and decontamination procedures (if necessary), and to provide for contingencies which may arise during the course of the site operations.

B.2 Applicability - The provisions of this Safety Plan are mandatory for all personnel who are permitted access to the site during subsurface explorations and sampling operations. This plan is also applicable to drilling operations in areas downgradient of the site where contaminated groundwater or soil is suspected. All engineering personnel and drilling subcontractors are required to read and adhere to all aspects of this plan.

B.3 Responsibilities

B.3.1 Safety Officer - The Safety Officer shall:

a) Monitor compliance of workers relative to pre-established personnel protection levels (i.e. use of necessary clothing and equipment) to ensure the safety of personnel. This includes subcontractor personnel.

b) Notify the project manager of discrepancies or violations of the Safety Plan.

c) Evaluate weather and chemical hazard information, and recommend any necessary modifications to work plans and personnel protection levels to maintain personnel safety. Cancel operations if adverse weather conditions preclude safe completion of tasks.

d) Monitor the total volatile organic concentration in the breathing zone of the site personnel via a photo-ionizing detector (HNu or equivalent). A daily log of all HNu readings will be maintained by the site Safety Officer.

e) Monitor the workers for heat stress and fatigue.

f) Conduct daily safety briefing for all on-site personnel.

g) Report daily to the corporate project engineer.

B.4 Site Information

B.4.1 Site Control - Work Zones - It is not anticipated that conditions on the site will require elaborate measures to achieve

complete site security or restriction of normal site activities and access.

For the purposes of this investigation, 100-foot diameter restriction zones will be established at each work area using stakes and plastic ribbon.

B.4.2 Personnel Decontamination Area - Personnel decontamination shall occur in the area immediately outside of the access gates of the exclusion zone. Decontamination activities in this zone are described in Section B.7 of this plan.

The decontamination area will feature a plastic lined open head drum for the containment of expendable materials such as Tyvek, spent respirator cartridges, and gloves. Two wash tubs will be located in this area for the washing and rinsing of boots and outer gloves.

A first aid kit, emergency eyewash, and a supply of drinking water will be located just outside (upwind) of the personnel decontamination area.

Water for washing and rinsing of gloves and boots will be drawn from the supply of water on the drilling truck. A stock of disposable coveralls, gloves and other items will also be located in the personnel decontamination area.

All personnel entering or leaving the exclusion zone will be required to pass through the personnel decontamination area and either don or doff the appropriate level of personnel protection and effect the required decontamination procedures.

B.5 Personnel Protection - Personnel protective equipment and safety requirements must be appropriate to protect against the known or worst potential hazards on the site. Protective equipment should be selected based on the concentrations and possible routes of exposure to known or potential worst case substances. All engineering personnel engaged in work on-site will be participants in the Tighe & Bond medical monitoring program described hereinafter, or a similar program.

It is anticipated that Level D protection will be sufficient for all of the work undertaken at the site. Whenever Level D is in use, constant monitoring of the breathing zone of the workers utilizing a photo-ionizer will be effected. If the total volatile organic concentration (as indicated by the PID) in the breathing zone of the workers exceeds predetermined background levels, work shall cease and the crew will exit the exclusion zone for Level C protection.

Whenever Level C is in use, the breathing zone of the workers will also be monitored constantly utilizing a photoionization detector. If the total volatile organic concentration (as indicated by the PID) in the breathing zone of the workers approaches 50 ppm, work shall cease and the crew will exit the exclusion zone for Level B protection.

The specific respiratory protective device selected for Level C protection is the MSA Ultrawin with GMC-H (464027) combination cartridges. The GMC-H cartridge is approved for Organic Vapors, Formaldehyde, HCL, SO2, Dusts, Fumes, Mists, Radionuclides and Asbestos. TC Approval Code #23C-154.

It shall be the responsibility of the Site Safety Officer to continuously monitor the ambient air quality in the breathing zone of the workers. The Site Safety Officer is responsible for upgrading the level of personnel protection.

B.6 Communications and Training - The Site Safety Office shall conduct a briefing of all personnel covering the following topics:

1. Nature of the hazards suspected to be present.

2. A description of the levels of personnel protection selected for this operation and the procedures for donning and decontamination from these levels.

3. Emergency procedures in the event of fire, explosion and medical emergency.

4. Proper equipment decontamination procedures.

5. Description of and delineation of the site control procedures and the established work zones.

6. Forbidden practices in the exclusion and decontamination zones.

A daily report by the Site Safety Officer shall be made for the purposes of reviewing the events of the day , problems encountered and proposed changes in the Plan.

B.7 Decontamination Procedures

B.7.1 Personnel Decontamination - If Level C or greater protection is used, personnel are required to follow the decontamination procedures listed below, as they apply to the gear being worn:

a) Wash boots thoroughly with clean water to remove gross contaminants.

b) Scrub down outer boots in decon solution and rinse with water.

c) Remove boots.

d) If wearing reusable raingear, it should be cleaned in a similar manner as the boots.

e) Disposable Tyveks should be removed and placed in trash barrel located within the decontamination area.

f) Spent cartridges can also be discarded in the trash barrel.

g) Remove outer gloves and wash in same manner as boots while wearing disposable gloves.

h) Use a new set of disposable gloves to clean additional equipment including hard hat, safety glasses, etc.

i) Decontamination wash and rinse water will be allowed to percolate into the landfill.

B.7.2 Equipment Decontamination -

a) Decontamination of drilling equipment including drill rigs, backhoes, drill rods, augers, etc. will take place at the site of each boring/test pit prior to moving to subsequent locations. Decontamination of such equipment will entail a thorough steam cleaning or washing and rinsing of the equipment with high pressure water followed by air drying. In addition, the tires and undercarriages of vehicles exiting areas identified as having hazardous wastes will be sprayed with high pressure water and allowed to dry before leaving the former hazardous waste and sludge areas. Care will be taken to minimize the risk of decontamination runoff leaving the exclusion zone.

b) High pressure wash water will be generated by a cold pressure wash pump.

c) Sampling equipment such as bailers, pump intake hoses, etc. may be decontaminated within the personnel decontamination area provided that the equipment is thoroughly rinsed with clean water and allowed to air dry before leaving the work zone.

d) The rinse water from this operation will be allowed to percolate into the landfill.

e) Contaminated soil brought to the surface during well installation activities with a TOV greater that 100 ppm as registered by the field HNu will be contained in 55-gallon drums for removal to a secure landfill following completion of the project.

B.8 Emergency Procedures

B.8.1 Inhalation -

1) If warning signals such as: dizziness, nausea, headache, shortness of breath, burning sensation in mouth, throat or

lung are apparent, the victim should leave the contaminated air space immediately.

2) If unconscious, the victim should be pulled out of the contaminated area immediately. Rescuers should make sure they are wearing proper respiratory and protective equipment before attempting the rescue.

3) If the victim is no longer breathing, mouth-to-mouth resuscitation or some other form of artificial respiration should begin immediately away from the contaminated area.

Medical attention should be obtained as soon as possible.

B.8.2 Skin Exposure - The skin should be washed with copious amounts of soap and water. If clothing is contaminated, it should be removed immediately and the skin washed thoroughly with running water. If a shower is available, it should be used immediately and clothes should be removed while showering. This procedure may be life-saving as certain highly toxic chemicals are rapidly absorbed through the skin.

All contaminated parts of the body, including the hair, should be thoroughly decontaminated. It may be necessary to wash repeatedly.

B.8.3 Ingestion - Vomiting should be induced except when the substance presents an aspiration hazard, such as from a petroleum product; or when the substance is strong acid or alkali. To induce vomiting, a tablespoon of salt or powdered mustard in a glass of warm water or syrup of ipecac from the First Aid kit can be taken as an emetic.

Drinking plenty of water and placing a finger down the throat may also be effective in inducing vomiting. The treatment should be repeated until vomit is clear.

Medical attention should be obtained immediately.

B.8.4 Eyes - If a toxicant should get into the eyes, they should be washed with plenty of water. The eye itself should be held open, rotated, and flooded with water so that all surfaces are washed thoroughly. Washing should be continued for at least 15 minutes.

Medical attention should be obtained immediately.

B.9 Levels of Protection

B.9.1 General -

LEVEL A

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

LEVEL B (Emergency)

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

LEVEL C (Normal)

Level C protection should be selected when the types and concentrations of respirable materials are known, have adequate warning properties, or are reasonably assumed to be not greater than the protection factors associated with air-purifying respirators; and exposure to the few unprotected areas of the body (i.e., neck and back of head) is unlikely to cause harm. Continuous monitoring of site and/or individuals should be established. Level C will be the minimum protection employed during drilling activities.

LEVEL D

Level D is the basic work uniform and is the minimum level of protection for all site operations.

B.9.2 Level A -

A. Personnel Protection Equipment

- Positive pressure SCBA (OSHA/NIOSH approved) operated in the positive pressure mode.
- Totally encapsulated suit (boots and gloves attached).
- Gloves - inner (tight-fitting and chemical-resistant).
- Boots - chemical-protective, steel toe and shank. Depending on suit boot construction, worn over suit boot.

- Gloves - outer, chemical-resistant. Depending on suit construction, worn over suit gloves. May be replaced with tight-fitting, chemical-resistant gloves worn inside suit gloves.
- Underwear - cotton, "long-john" type (optional).
- Hard hat (under suit).
- Disposable protective suit, gloves and boots. Worn under or over encapsulating suit.
- Coveralls (under suit).
- 2-way radio communications.

B. Criteria for Use

Use Level A:

1. When the type(s) and concentrations(s) of toxic substances are known to require the highest level of combined protection to the respiratory tract, skin, and eyes. These conditions would be:

   a) Atmosphere which are "immediately dangerous for life and health" (IDLH). IDLH's are detailed in the NIOSH/OSHA's "Pocket Guide to Chemical Hazards" and/or other references.

   b) Known atmosphere or potential situations that would affect the skin or eyes, or could be absorbed into the body through these surfaces in toxic quantities.

      - Potential situations are those where vapors may be generated or splashing may occur through site activities
      - Standard reference books should be consulted to obtain concentrations hazardous to skin, eyes, or mucous membranes.
      - Oxygen deficient atmospheres with above conditions.

2. At sites where the type(s) and/or potential concentration(s) of toxic substances are unknown.

   a) Unless there is information available to strongly indicate otherwise, the site should be presumed to present hazards to the respiratory system, skin,

and eyes. Level A protection would provide the highest level of protection for the initial entry team.

b) Enclosed areas such as building, railroad cars, ship holds, etc.

3. When total vapor readings of 500 ppm to 1,000 ppm are obtained on instruments such as the photo-ionizer (HNU) or organic vapor analyzer (OVA).

It is not anticipated that work will be done under conditions requiring Level A protection. If such conditions are encountered, operations will cease immediately and all personnel will immediately leave the area until conditions improve.

B.9.3 Level B -

A. Personnel Protective Equipment

- Positive pressure SCBA (OSHA/NIOSH approved) operated in the positive pressure mode.
- Hooded, two-piece chemical-resistant suit.
- Gloves - outer, chemical-protective.
- Boots - outer (chemical-protective, steel toe and shank).
- 2-way radio communications.
- Hard hat.
- Face shield (optional).

B. Criteria for Use

Use Level B:

1. When the type(s) and concentrations(s) of hazardous substances are known to require the highest degree of respiratory protection; but a lower level of skin protection, i.e. in

a) Atmospheres which are "immediately dangerous for life and health" (IDLH). Type(s) and concentration(s) of vapors in air do not present a hazard to the small, unprotected areas of the body.

b) Atmospheres with concentrations of known substances greater than protection factors associated with full-face, "air purifying" respirators with appropriate cartridges.

c) Atmospheres with less than 19.5 percent oxygen.

2. When a determination is made that potential exposure to the body parts not protected by a fully encapsulated suit (primarily neck, ears, etc.) is highly unlikely.

3. Total vapor levels range from 5 ppm-500 ppm on instruments such as the photo-ionizer or organic vapor analyzer and the atmosphere does not contain suspected high levels of toxic substances affecting skin or eyes.

4. Normal drilling and sampling operations will cease if conditions are such that Level B protection would be required.

B.9.4 Level C -

A. Personnel Protective Equipment

- Half-face, air-purifying respiration (OSHA/NIOSH approved).
- Chemical-resistant clothing.
- Gloves - outer (chemical-protective).
- Gloves - inner (tight-fitting, chemical-resistant type or woven liners).
- Hard hat (face shield optional).
- Boots - outer (chemical-protective, steel toe and shank).
- Safety glasses.

B. Criteria for Use

1. Site known to contain potentially hazardous materials resulting in air concentrations requiring a protection factor afforded by a full-face, air-purifying respirator (OSHA/NIOSH approved).

2. Well-documented, reliable history of site and patterns of prior entry.

3. No evidence to suspect acute or chronic toxicity to exposed skin.

4. Total vapor reading between background and 5 ppm on instruments such as the photo-ionizer and portable GC.

Continuous air or personnel monitoring should occur while wearing Level C protection.

B.9.5 Level D -

A. Personnel Protective Equipment

- Chemical-resistant clothing.
- Boots/Shoes - safety or chemical-resistant steel-toed boots.
- Boots - outer (chemical protective heavy rubber throw-away).
- Half-face respirators immediately available.
- Safety glasses or safety goggles.
- Gloves.

B. Criteria for Use

1. No indication of airborne health hazards present.
2. No gross indication above background on the photo-ionizer and/or organic vapor analyzer.
3. Continuous air or personnel monitoring should occur while wearing Level D protection.

B.10 Medical Monitoring - All engineering personnel and subcontractors engaged in on-site activities shall be participants in a medical monitoring program similar to the following. As participants in this program, these individuals will have had recent physical examinations.

The primary goal of this medical monitoring program is to provide evaluation and ongoing surveillance of the health status of employees potentially exposed to toxic substances as a result of their work-related activities. An active health monitoring program for those employees potentially at risk is an important tool in evaluating the effects of chronic low-level exposures or acute exposures related to operations at hazardous waste sites. The effects of low-level exposures may not become apparent until years after the initial exposure.

This medical monitoring program is a comprehensive blend of laboratory testing, personnel medical history evaluation, physical examination, and specific systematic testing.

Each participant in this medical monitoring program undergoes a complete occupational history evaluation, physical examination including the following parameters:

- Pulmonary Function Studies
- Complete Blood Count
- Chemical Blood Profile
- Urinalysis
- Chest X-Ray
- Electrocardiogram

Following the establishment of each participant's baseline values for the above parameters, an annual re-evaluation is conducted to monitor potential changes due to work with hazardous materials.

In addition to this annual re-examination, provisions are made for specific post-exposure examinations in the event of a suspected exposure during a particular field event.

The program shall meet or exceed the minimum requirements established in OSHA standard 29 CFR 1910.120.

EG4/H

APPENDIX C

EXCERPTS FROM 1980 DUNN GEOSCIENCE CORPORATION STUDY OF THE GLOVERSVILLE SANITARY LANDFILL

APPENDIX C

EXCERPTS FROM 1980 DUNN GEOSCIENCE CORPORATION STUDY OF THE GLOVERSVILLE SANITARY LANDFILL

7.0 HYDROLOGY

7.1 Surface Water

The regional surface drainage patterns are not well defined due to the presence of a thick glacial cover and a very porous soil cover. The drainage pattern is a rectangular one with a deranged pattern overprint. This drainage pattern indicates bedrock joint control and glacial disorientation of the original drainage pattern.

The site is located near the headwaters of the Anthony Creek. The creek flows southwest to northeast along the north property line. Near Mayfield, approximately three miles northeast, the Anthony Creek enters the Sacandaga Reservoir. Also present on the site is a man-made lake near monitoring well DO-2 which enters into Anthony Creek.

7.2 Groundwater

The regional groundwater flow pattern parallels the general flow direction of surface drainage. The flow pattern is controlled both regionally and locally by the existing topography and the distribution of unconsolidated aquifers present.

Recharge to the groundwater aquifers is mainly from precipitation and from the sand and gravel kame delta to the south.

7.3 Aquifers

Located within the study area are two aquifers: the kame delta sand and gravel and the lacustrine sand. The

glacial outwash deposit contains clay aquiclude layers which inhibit groundwater flow.

The kame delta can produce significant quantities of groundwater whenever the kame delta gravels are below the water table. Recharge to this aquifer is from precipitation. The lacustrine sands are not major groundwater producers due to the fine grain size which limits the transmissibility of the aquifer. Recharge to this system is mainly from groundwater discharge from the adjacent kame delta and infiltration of precipitation. A very limited deep shale aquifer also should occur. The ground water is controlled by fractures and joints (secondary porosity) and yields are very low. The rock "aquifer" is not influenced by the landfill because of the two aquicludes of lacustrine clay and till which are present in-between the landfill and the bedrock.

7.4 Site Hydrology

Plate 2* is a groundwater contour map which shows the elevation of the water table on July 16, 1980. The ground-water flow direction is downgradient from the kamic hills towards the Anthony Creek. The groundwater gradient is moderately gentle, approximately one-foot drop per 120-foot horizontal distance. The gentle gradient is due in part to the lack of any groundwater barriers within the aquifers.

The respective depths to the groundwater table, as measured on July 16, 1986, were: DO-1, 6.75 feet; DO-2, 5.75 feet; and DO-4, 5.30 feet.

*Plate 2 is reproduced as Figure 2.3.

8.0 SOILS

A soils report of the site was prepared by the Fulton County Soil Conservation District and the Soil Conservation Service of the United States Department of Agriculture, in December, 1976. Soils in the area are predominantly loamy sands, loamy fine sands and sand (Windsor loamy sand - 170B) with some fine sandy loam (Williamson - 152B) and loamy sand (Deerfield - 171B). The materials have a fairly high permeability.

Descriptions of the subsurface materials encountered are attached hereto.

9.0 GROUNDWATER QUALITY

Indicator scan and total chromium samples from all wells at this site were collected on July 17, 1980, . . . The indicator scan, which consists of parameters commonly used to detect leachate, was run on all three groundwater samples from this site. Due to the tanning wastes accepted at this site, total chromium was also run on all samples. . . . the chemical results from C. T. Male Associates, P.C. . . . are listed in Table 1.

The groundwater quality at this site is somewhat variable. The upgradient well shows elevated levels of total iron and total chromium relative to all of the downgradient wells. Total chromium was less than 0.01 mg/l in all the downgradient wells. DO-4 shows the best quality groundwater. DO-1 and DO-2 exhibited slightly elevated chloride, TDS and TOC values. DO-1 has a relatively low pH value. The reason is not known. Overall, the results indicate that the Gloversville landfill has a minimal impact on the groundwater quality at this time. Based on the results of this study and a review of water quality data from New York State Department of Environmental Conservation, Division of Solid Waste files, the site is deemed to comply with RCRA Groundwater Quality Standards.

TABLE 1

		Monitoring Wells (Dunn Sequence Number)				
		UO-1	DO-1	DO-2	DO-3	DO-4
Parameter	Units	(054)	(053)	(052)	(051)	(055)
pH (field)	s.u.	7.5	5.6	7.3	8.2	7.8
Eh (field)	mv	150	175	108	147	105
conductivity (field)	umhos/cm	58	265	330	195	208
temperature (field)	°C	9.9	11	11	22.5	13
pH (lab)	s.u.	6.65	6.2	7.5	8.3	7.95
chloride	mg/l	ND*	29	19.3	11.6	ND*
total iron	mg/l	4.2	0.50	0.68	0.32	0.28
TDC	mg/l	65	236	220	69	58
TOC	mg/l	16	20	33	13	13
total chromium	mg/l	0.03	<0.01	<0.01	<0.01	<0.01
turbidity	NTU	55	2.0	2.25	1.5	1.75

ND* indicates none detected

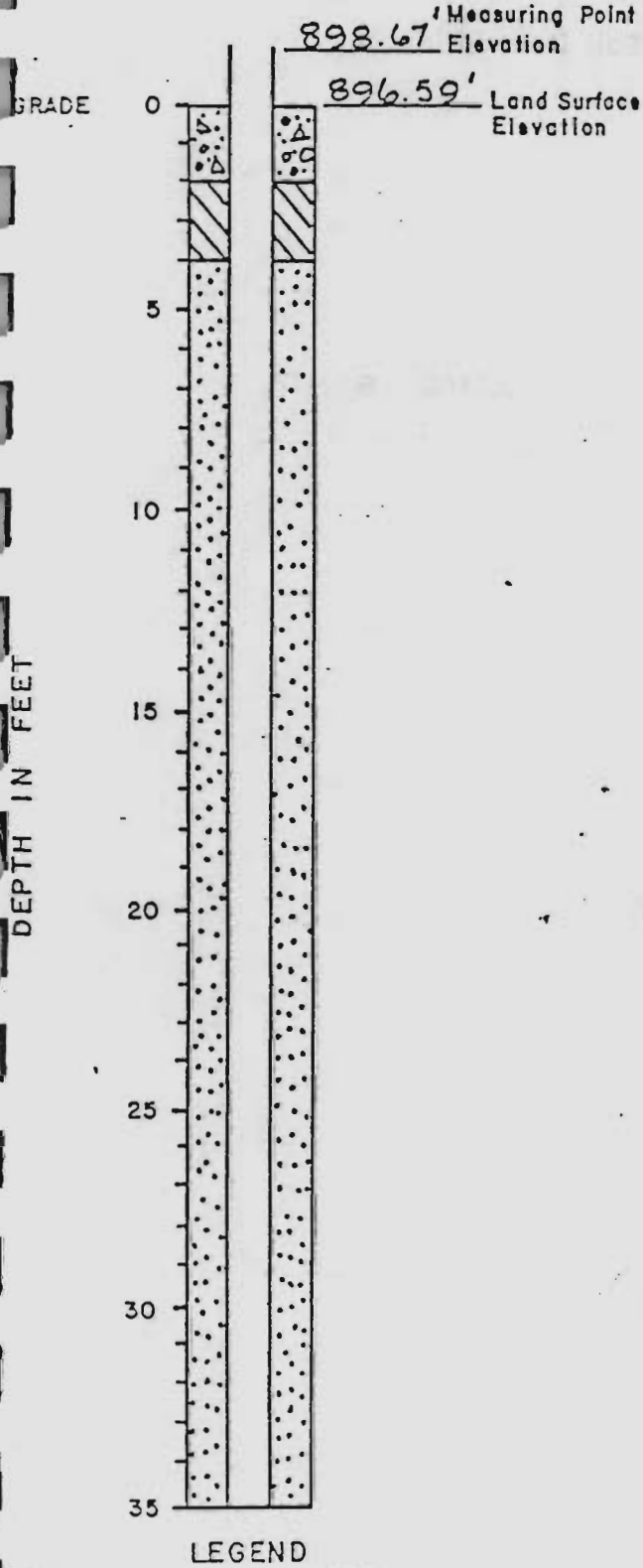
EG5/A

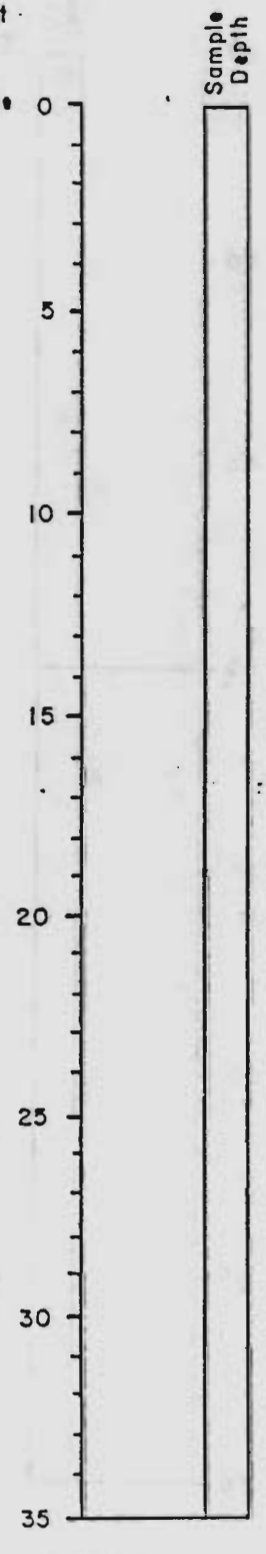
DUNN GEOSCIENCE CORP.
5 Northway Lane North
Latham, New York 12110

PROJECT: *RCRA Contract for Groundwater Quality Assessment*
PROJECT NO. *15-2-1831*
CONTRACT NO. *NYSDEC-C-162001*

DATE DRILLED: 4-7-80
DRILLED BY: SMT
TOTAL DEPTH: 50'

SITE NAME: GLOVERSVILLE
WELL NO: UO-1 PAGE 1 of 2
REGION NO: 5 FACILITY NO: 18508





LEGEND

Screen

Backfill

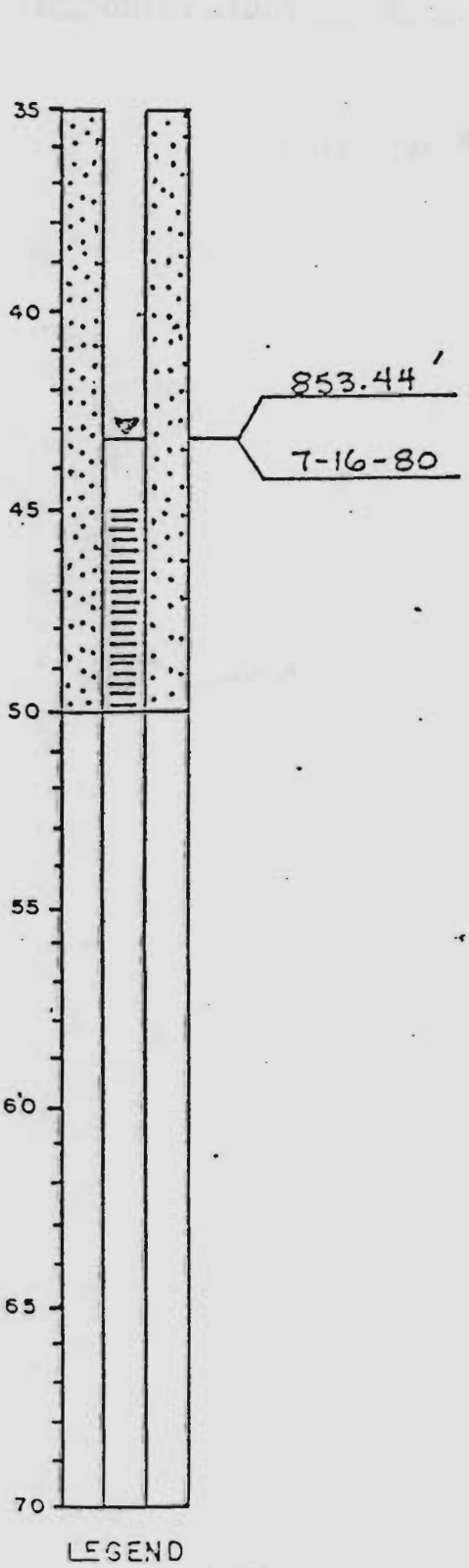
NOTE:

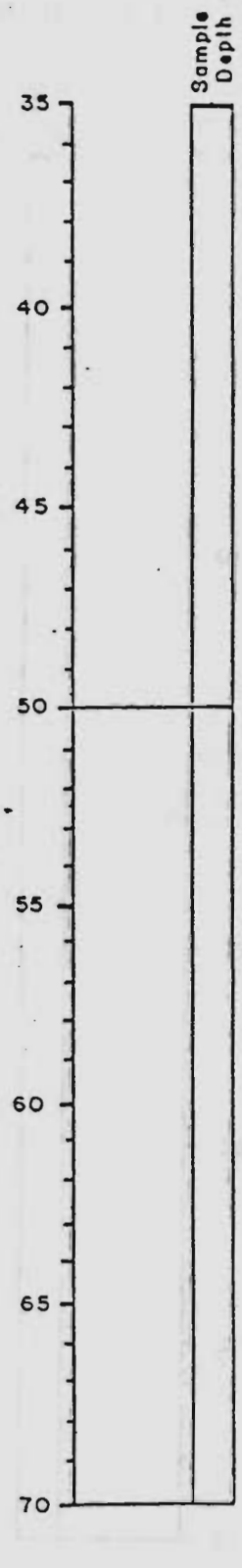
For test borings/monitoring wells in excess of 35 feet, the

DUNN GEOSCIENCE CORP.
5 Northway Lane North
Latham, New York 12110

PROJECT: *RCRA Contract for Groundwater Quality Assessment*
PROJECT NO. *15-2-1831*
CONTRACT NO. *NYSDEC-C-162001*

SITE NAME: GLOVERSVILLE
WELL NO: UO-1 PAGE 2 of 2
TOTAL DEPTH: 50'





Soil Description

KAME SAND

LEGEND

Screen
Sand
Backfill
Grout seal

DUNN GEOSCIENCE CORP.
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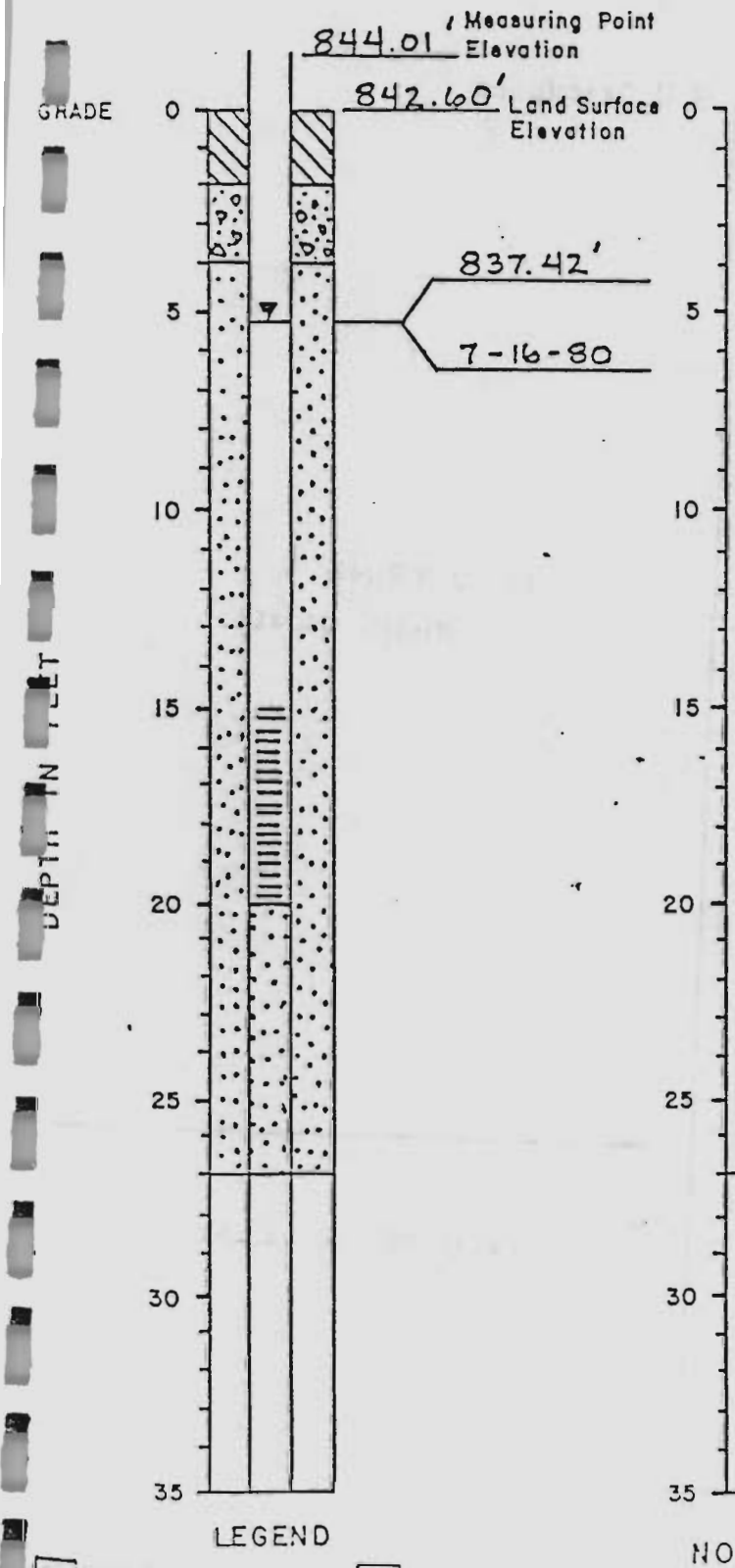
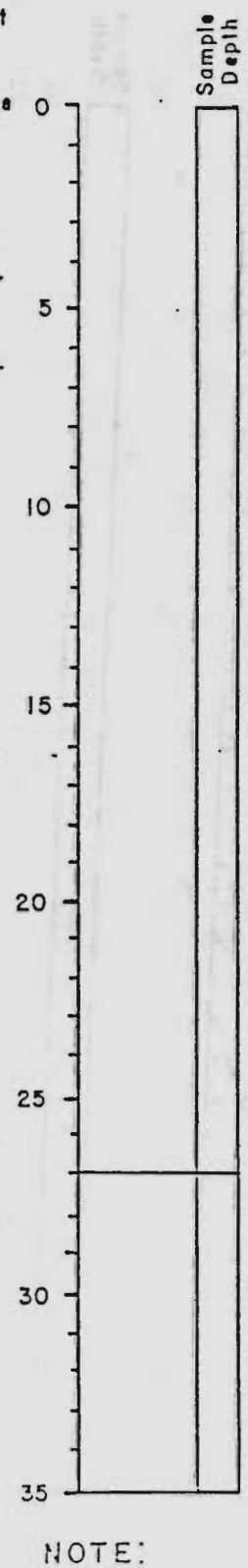
Latham, New York 12110

PROJECT: *RCRA Contract for Groundwater Quality Assessment*
PROJECT NO. *15-2-1831*
CONTRACT NO. *NYSDEC-C-162001*

DATE DRILLED: 4-8-80
DRILLED BY: SMT
TOTAL DEPTH: 27'

SITE NAME: GLOVERSVILLE
WELL NO: DO-1 PAGE 1 of 1
REGION NO: 5 FACILITY NO: 18508





Soil Description

LACUSTRINE FINE SAND

LACUSTRINE CLAY

LEGEND

Screen

Backfill

NOTE:

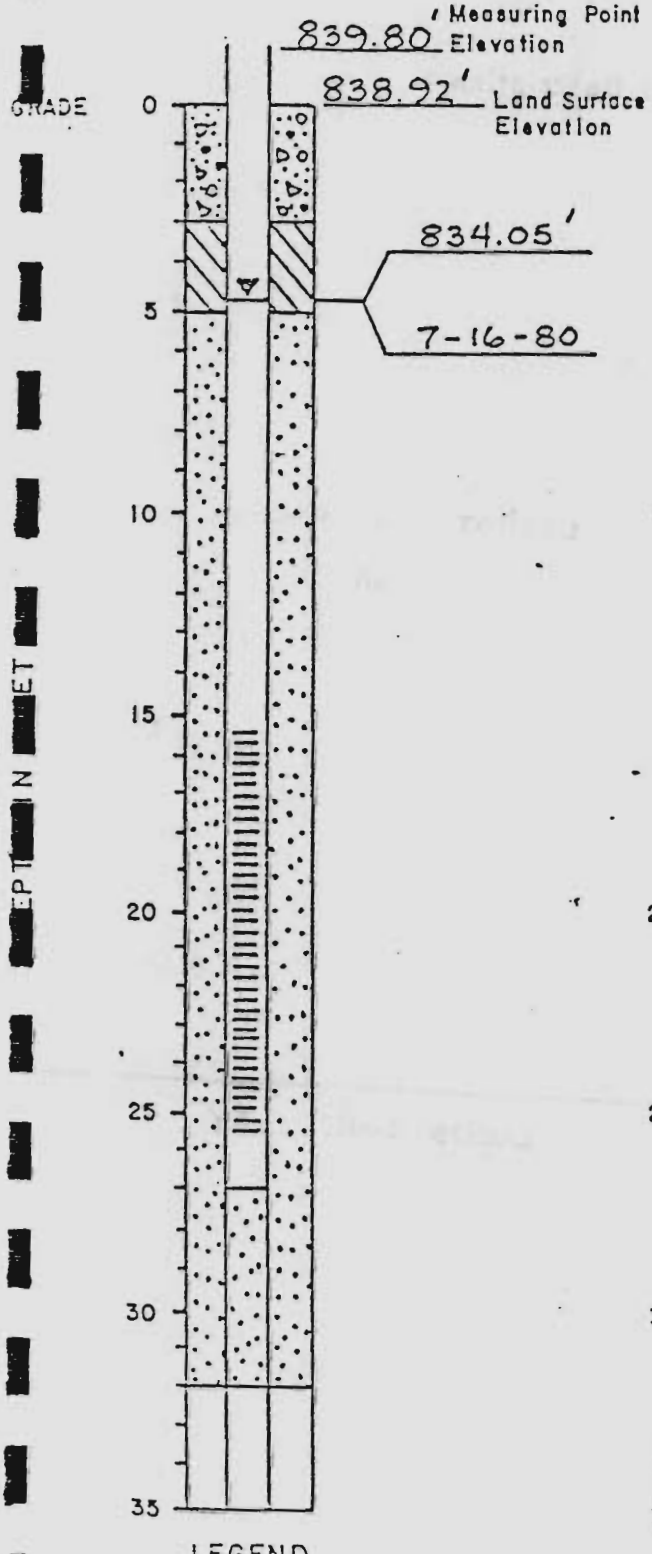
For test borings/monitoring wells in excess of 35 feet, the

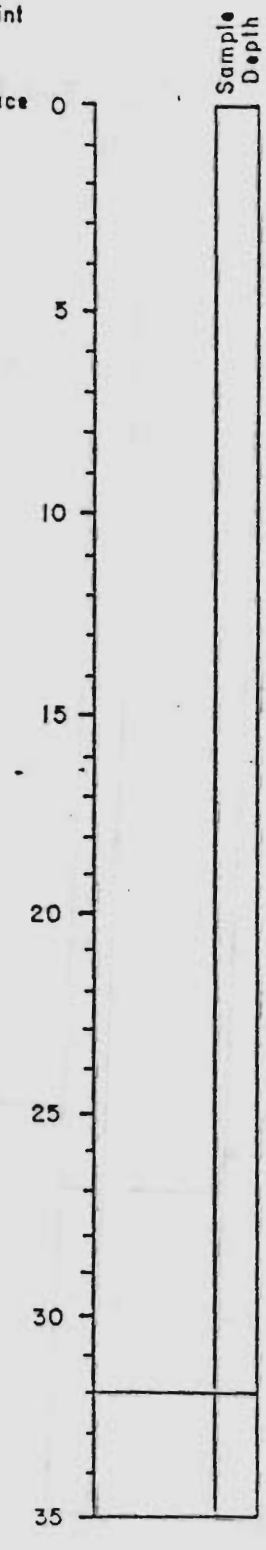
DUNN GEOSCIENCE CORP.
5 Northway Lane North
Latham, New York 12110

PROJECT: *RCRA Contract for Groundwater Quality Assessment*
PROJECT NO. *15-2-1831*
CONTRACT NO. *NYSDEC-C-162001*

DATE DRILLED: 4-3-80
DRILLED BY: SMT
TOTAL DEPTH: 32'

SITE NAME: GLOVERSVILLE
WELL NO: DO-2 PAGE 1 of 1
REGION NO: 5 FACILITY NO: 18508





Soil Description

LACUSTRINE
FINE SAND

LACUSTRINE CLAY

LEGEND
Screen
Backfill

NOTE:
For test borings/monitoring wells in excess of 35 feet, the

[redacted]

INSPECTOR _____ SURFACE ELEV. _____

DRILLER Rappold BORING STARTED 4/8/80

HELPER Stone - George BORING COMPLETED 4/8

RIG NO. J-2 STATION On

OFF SET _____

SAMPLING

SS SIZE 1-3/8" ID 2" OD

HAMMER: 140 DROP: 30"

ST SIZE _____ ST SIZE _____

CASING USED 25.0' SIZE 4"

WATER LEVEL OBSER

WL: _____ WS OR WD

WL: _____ BCR

WL: _____ AB

WL: _____ 24 Hr. AB

JOB NO. 72040D BORING NO. DO-1 CLIENT Dunn Geoscience

WEATHER sunny TEMP. 50

Boring Location

Gloversville Landfill

ABBREV

F.T. - Fr
W.O. - W
S.S. - Sp
D.B. - D
P.A. - P
R.B. - R
W.S. - W
W.D. - W
B.C.R. - B
R
A.C.R. - A
R
A.B. - A

Sample No.	Depth or Elevation From	Depth or Elevation To	Sampling Method	PENETRATION RECORD: Hydraulic Pressure PSI — Time Sec. Hour	Pressure While Sampling	Pressure While Coring	Split Spoon Blows 6"	6"	6"	6"	Casing Blows Per Foot	R Length Recovered in Feet	Q_p Penetrometer Test in TSF	Sample Description
							← 2 Feet →							
1	0.0	2.0	SS				2	3	5	5		1.0		Light brown, fine sand, some silt
	2.0	5.0	SS											
2	5.0	7.0	SS				5	5	6	7		1.8		Brown, fine sand (wet)
	0.0	10.0	RB				Casing to 10.0							
3	10.0	12.0	SS				9	11	13	17		1.5		Brown, fine sand (wet)
	10.0	15.0	RB				Casing to 15.0							
4	15.0	17.0	SS				7	7	9	8		1.0		Brown, fine sand (wet)
	15.0	20.0	RB				Casing to 20.0							
5	20.0	22.0	SS				5	11	17	17		1.5		Grey brown, silty sand, clay seams
	20.0	25.0	RB				Casing to 25.0							
6	25.0	27.0	SS				11	18	10	15		0.9		Grey brown, silty sand, clay seams
														End of boring 27.0'
														Monitoring well set with wellscreen from 1
														20' B. G. - Silica sand backfill to 4', gr
														@ surface

[redacted] & [redacted]ER [redacted]TES[redacted]NG, INC. – 5[redacted] Main [redacted] Castleton, N.Y. 12033 Telephone: (518) 732-7205

INSPECTOR _____ SURFACE ELEV. _____

DRILLER Rappold BORING STARTED 4/3/80

HELPER Stone BORING COMPLETED 4/3

RIG NO. J-2 STATION On

OFF SET _____

SAMPLING

SS SIZE 1-3/8" ID 2" OD

HAMMER: 140 DROP: 30"

ST SIZE _____ ST SIZE _____

CASING USED 30.0' SIZE 4"

WATER LEVEL OBSERVATIONS

WL: _____ WS OR WD

WL: _____ BCR

WL: _____ AB

WL: _____ 24 Hr. AB

JOB NO. 72040D BORING NO. D0-2 CLIENT Dunn Geoscience

WEATHER sunny TEMP. 45

Boring Location: Gloversville Landfill

Sample No.	Depth or Elevation From	Depth or Elevation To	Sampling Method	PENETRATION RECORD: Hydraulic Pressure PSI – Time Sec. Hour	Hydraulic Pressure PSI – Pressure While Sampling	Hydraulic Pressure PSI – Pressure While Coring	Split Spoon Blows 6"	Split Spoon Blows 6:	Split Spoon Blows 6"	Split Spoon Blows 6"	Casing Blows Per Foot	R Length Recovered in Feet	Q_p Penetrometer Test in TSF	Sample Description
							← 2 Feet →							
1	0.0	2.0	SS				2	1	3	6		1.6		Brown fine sand
	2.0	5.0	RB											
2	5.0	7.0	SS				12	12	13	16		1.7		Brown fine sand, trace silt (wet)
	0.0	10.0	RB				Casing to 10.0							
3	10.0	12.0	SS				5	7	6	7		1.0		Brown fine sand, trace silt (wet)
	10.0	15.0	RB				Casing to 15.0							
4	15.0	17.0	SS				9	9	10	11		1.2		Brown fine sand, trace silt (wet)
	15.0	20.0	RB				Casing to 20.0							
5	20.0		SS				8	9	8	8		1.9		Brown fine sand, trace silt, change @ 21.
5A		22.0												Grey clayey silt
	20	25.0	RB				Casing to 25.0							Change @ 24.5' to
6	25.0	27.0	SS				10	10	8	8		1.5		Brown fine sand, trace silt
	25.0	30.0	RB				Casing to 30.0							
7	30.0	32.0	SS				8	6	8	7		1.2		Grey silt with clay seams
														End of boring 32.0'
														Monitoring well set with wellscreen from to 25.5' B. G. - Silica sand backfill to grouted @ surface

ABBREV
F.T. - F
W.O. - W
S.S. - S
D.B. - D
P.A. - P
R.B. - R
W.S. - W
W.D. - W
B.C.R. - B
A.C.R. - A
A.B. - A

SOIL & MATERIAL TESTING, INC. – 57 So. Main Street,, Castleton, N.Y. 12033 Telephone: (518) 732-7205 Sheet 1 of 2

INSPECTOR Hanson
DRILLER Rappold
HELPER Stone – George
RIG NO. J-2

SURFACE ELEV.
BORING STARTED 4/7/80
BORING COMPLETED 4/7
STATION On
OFF SET

SAMPLING
SS SIZE 1-3/8" ID 2" OD
HAMMER: 140 DROP: 30"
ST SIZE ST SIZE
CASING USED 50.0 SIZE 4"

WATER LEVEL OBSERVA
WL: WS OR WD
WL: BCR
WL: AB
WL: 24 Hr. AB

JOB NO. 72040D BORING NO. DO-3 CLIENT Dunn Geoscience

WEATHER sunny TEMP. 50

Boring Location: Gloversville Landfill

ABBREVIA
F.T. - Fish
W.O. - Wash
S.S. - Split
D.B. - Diam
P.A. - Powe
R.B. - Rock
W.S. - Whit
W.D. - Whit
B.C.R. - Bel Re
A.C.R. - Aft Re
A.B. - Aft

Sample No.	Depth or Elevation From	To	Sampling Method	PENETRATION RECORD: Hydraulic Pressure PSI — Time Sec. Hour	Pressure While Sampling	Pressure While Coring	Split Spoon Blows 6"	6"	6"	6" (2 Feet)	Casing Blows Per Foot	R Length Recovered in Feet	Q_p Penetrometer Test in TSF	Sample Description
1	0.0	2.0	SS				2	3	2	3		1.0		Brown, fine sand, trace silt
	2.0	5.0	SS											
2	5.0	7.0	SS				5	5	3	3		1.5		Brown gravel, fine sand
	0.0	10.0	RB				Casing to 10.0							
3	10.0	12.0	SS				9	12	13	15		0.9		Brown fine sand
	10.0	15.0	RB				Casing to 15.0							
4	15.0	17.0	SS				9	12	16	17		0.9		Brown, fine sand (wet)
	15.0	20.0	RB				Casing to 20.0							
5	20.0	22.0	SS				18	20	23	39		1.0		Brown grey, fine-medium sand
	20.0	25.0	RB				Casing to 25.0							
6	25.0	27.0	SS				18	50	35	53		.05		Brown grey, fine-coarse sand
	25.0	30.0	RB				Casing to 30.0							
7	30.0	31.5	SS				65	100	100			.05		Brown fine sand
	30.0	35.0	RB				Casing to 35.0							
8	35.0	37.0	SS				51	69	82	89		1.0		Brown, fine sand
	35.0	40.0	RB				Casing to 40.0							

Continued

[redacted] RI[redacted] ES [redacted], If[redacted] - 57[redacted] Ma[redacted] eet, [redacted]stle[redacted], N.Y. [redacted]033 [redacted]elep[redacted]: (9[redacted]732-[redacted]5 [redacted] [redacted] [redacted] [redacted] of [redacted]

INSPECTOR _____ SURFACE ELEV. _____

DRILLER Rappold BORING STARTED 4/7/80

HELPER Stone-George BORING COMPLETED 4/7

RIG NO. J-2 STATION On

OFF SET _____

SAMPLING

SS SIZE 1-3/8" ID 2" OD

HAMMER: 140 DROP: 30"

ST SIZE _____ ST SIZE _____

CASING USED 50.0' SIZE 4"

WATER LEVEL OBSERV

WL: _____ WS OR WD

WL: _____ BCR

WL: _____ AB

WL: _____ 24 Hr. AB

JOB NO. 72040D BORING NO. D0-3 CLIENT Dunn Geoscience

WEATHER sunny TEMP. 50

Boring Location

Sample Description

ABBREV
F.T. - Fi
W.O. - W
S.S. - Sp
D.B. - Di
P.A. - Po
R.B. - Ro
W.S. - Wi
W.D. - Wi
B.C.R. - Be
R
A.C.R. - Af
R
A.B. - Af

Sample No.	Depth or Elevation From	Depth or Elevation To	Sampling Method	PENETRATION RECORD: Hydraulic Pressure PSI — Time Sec. Hour	Pressure While Sampling	Pressure While Coring	Split Spoon Blows 6"	6"	6"	6" (2 Feet)	Casing Blows Per Foot	R Length Recovered in Feet	Q_p Penetrometer Test in TSF	Sample Description
9	40.0	42.0	SS				20	28	32	47		1.0		Brown, fine sand
	40.0	45.0	RB				Casing to 49.0							
10	45.0	47.0	SS				12	20	26	21		NR		
11	47.0	49.0	SS				16	18	22	30		1.0		Brown, fine sand
	49.0	50.0	RB				Casing to 50.0							
														End of boring 50.0'
														Monitoring well set with wellscreen from 4
														to 50' B.G. - Silica sand backfill to 4',
														grouted @ surface
														Thought this was existing well?

APPENDIX D

STUDIES TO DATE

APPENDIX D

Studies to Date
Gloversville Landfill

1. Dunn Geoscience Corporation, "Open Dump Inventory, Groundwater Quality Evaluation" prepared for the New York State Department of Environmental Conservation under the Resource Conservation Recovery Act, September 19, 1980.

2. SCS engineers, "Evaluation of Sanitary Landfill Operations", April, 1981.

3. Fulton County Soil Conservation District and the USDA Soil Conservation Service soils report of the site, December, 1976.

4. Adirondack Environmental Services Laboratory Report (one leachate sample), October 28, 1985.

5. Aerial photographs of the site taken in 1975, 1982 and 1983.

6. New York State Attorney General's Office leachate sampling and conductivity study.

7. New York State Department of Health homeowner analyses.*

8. Wehran Engineering, "Engineering Investigations at Inactive Hazardous Waste Sites in the State of New York Phase I - Gloversville Landfill, Johnstown, Fulton County, New York." Prepared for New York Department of Environmental Conservation, April 1986.

9. U.S. Geological Survey, "The Ground-Water Resources of Fulton County, New York." Prepared for the State of New York, Department of Conservation, Water Power and Control Commission, Bulletin GW-24, 1951.

* The City is awaiting receipt of this information from the State.

EG4/O

APPENDIX E

SAMPLING MATRIX

Appendix E
Gloversville Sampling Matrix

Sample Medium	Sample Location	Number of Sampling Points	Refer to Table for Parameters	Number of Sample Containers per Point	Total[1] Number of Samples Containers	Number/Type QA/QC Sample
Cluster Monitoring Well (4),(5),(6),(7)	87-1	3	A	11	33	(6),(8),(9)
Cluster Monitoring Well (4),(5),(6),(7)	87-2	2	A	11	22	(6),(8),(9)
Cluster Monitoring Well (4),(5),(6),(7)	87-3	4	A	11	44	(6),(8),(9)
Cluster Monitoring Well (4),(5),(6),(7)	87-4	4	A	11	44	(6),(8),(9)
Cluster Monitoring Well (4),(5),(6),(7)	87-5	4	A	11	44	(6),(8),(9)
Cluster Monitoring Well (4),(5),(6),(7)	87-6	3	A	11	33	(6),(8),(9)
Landfill Monitoring Well (5)	87-7	1	A	11	11	(6),(8),(9)
Landfill Monitoring Well (5)	87-8	1	A	11	11	(6),(8),(9)
Test Pit-Soil Sample (4)	TP-1	1	B	3	3	(6)
Test Pit-Soil Sample (4)	TP-2	1	B	3	3	(6)
Test Pit-Soil Sample (4)	TP-3	1	B	3	3	(6)
Test Pit-Soil Sample (4)	TP-4	1	B	3	3	(6)
Test Pit-Soil Sample (4)	TP-5	1	B	3	3	(6)
Test Pit-Soil Sample (4)	TP-6	1	B	3	3	(6)
Surface Water (5)	SW-1	1	A	11	11	(6),(8),(9)
Surface Water (5)	SW-2	1	A	11	11	(6),(8),(9)
Surface Water (5)	SW-3	1	A	11	11	(6),(8),(9)
Surface Water (5)	SW-4	1	A	11	11	(6),(8),(9)
Surface Water (5)	SW-5	1	A	11	11	(6),(8),(9)
Surface Water (5)	SW-6	1	A	11	11	(6),(8),(9)
Stream Sediment-Soil Sample	SS-1	1	B	3	3	(6)
Stream Sediment-Soil Sample	SS-2	1	B	3	3	(6)
Stream Sediment-Soil Sample	SS-3	1	B	3	3	(6)
Stream Sediment-Soil Sample	SS-4	1	B	3	3	(6)
Stream Sediment-Soil Sample	SS-5	1	B	3	3	(6)
Stream Sediment-Soil Sample	SS-6	1	B	3	3	(6)
Pond Water (5)	SW-8	1	A	10	10	(6),(8),(9)
Pond Water (5)	SW-8	1	A	10	10	(6),(8),(9)
Pond Water (5)	SW-9	1	A	10	10	(6),(8),(9)

Appendix E
Gloversville Sampling Matrix (continued)

Sample Medium	Sample Location	Number of Sampling Points	Refer to Table for Parameters	Number of Sample Containers per Point	Total[1] Number of Samples Containers	Number/Type QA/QC Sample
Pond Sediment-Soil Sample (12)	PS-7	1	B	3	3	(6)
Pond Sediment-Soil Sample (12)	PS-8	1	B	3	3	(6)
Pond Sediment-Soil Sample (12)	PS-9	1	B	3	3	(6)
Leachate Seep (10),(11)	SW-10	1	A	11	11	(6),(8),(9)
Leachate Seep (10),(11)	SW-11	1	A	11	11	(6),(8),(9)
Leachate Sediment-Soil Sample	LS-10	1	B	3	3	(6)
Leachate Sediment-Soil Sample	LS-11	1	B	3	3	(6)
Private Well (5)	PW-1	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-2	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-3	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-4	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-5	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-6	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-7	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-8	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-9	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-10	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-11	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-12	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-13	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-14	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-15	1	A	11	11	(6),(8),(9)
Private Well (5)	PW-16	1	A	11	11	(6),(8),(9)
City Water (Section 3.7)	CW-1	1	A	11	11	
City Water (Section 3.7)	CW-2	1	A	11	11	
Landfill Monitoring Well - Soil Sample	87-7-SS	1	B	3	3	(6)
Landfill Monitoring Well - Soil Sample	87-8-SS	1	B	3	3	(6)
Total	--	70		--	615	32 (See Table C)

(1) All samples analyzed for Target Compound List (TCL) except where noted (See Table 5-1)
(2) At least two soil samples will be analyzed for grain-size distribution for each new cluster well location.
(3) A total of twelve (12) soil samples will be collected for grain size analysis which will include both sieve and hydrometer analysis.
(4) HNu photoionization detector will be utilized at these sampling points.
(5) Field measurements will be taken for temperature, pH and specific conductance.
(6) 10% of all samples will have duplicates collected and 10% of all field samples will be spiked.
(7) One sample from each well cluster will be collected and field filtered for metals analysis.
(8) One trip blank per day will be prepared.
(9) One wash/equip. blank per 10 locations will be prepared (water only) for each sample. In addition, one wash/equip. blank per 3 locations will be prepared for VOA.
(10) Specific conductance from each seep will be field measured.
(11) Taken from the two (2) highest specific conductance readings from the Leachate Seeps.

TABLE A

Groundwater/Surface Water/Private Wells/City Water

Parameters	No. of Sample Containers
VOC	3
Inorganics (see Table 5-1)	1
Pesticides/PCB's	1
BNA (semivolatile)	1
TOC	1
Chromium, (hexavalent, trivalent)	1
Cyanide	1
TDS, Sulfate, Bicarbonate, Carbonate, Chloride, Ammonia	1
Mercury	1
	11

TABLE B

Sediment/Soil

Parameters	No. of Sample Containers
VOC	2
Pesticides, PCB's, Semivolatikes, Inorganics (see Table 5-1), Chromium (hexavelent and trivalent)	1
	3

TABLE C

QA/QC Samples

10% of the total samples will have duplicates @ 92 total sampling points	9
One sample per well cluster	6
One trip blank/day @ 5 days	5
One wash/equip per 10 locations for all samples	3
One wash/equip per 3 locations for VOA	9
Total	32

IG4/BB