

TEST PIT INVESTIGATION WORK PLAN

**Onondaga Drum Site
Nedrow, New York**

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Nedrow, New York**

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CONESTOGA-ROVERS & ASSOCIATES

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1.0 INTRODUCTION

The Onondaga Drum Site is situated west of the intersection of Route 11 and Quarry Road on the Onondaga Nation Territory in the Town of Nedrow, New York. The Property occupies approximately 25 acres in a sparsely populated rural area which is used for both residential and agricultural purposes. During the mid-1950s to the early 1980s, waste materials including industrial waste were disposed within an area approximately 15 acres in size. This area is defined as the Site for this investigation. The Site location is presented on Figure 1.1. The Site plan is presented on Figure 1.2.

The U.S. Environmental Protection Agency (EPA) excavated approximately 1,300 surficial and partially buried drums at the Site in the fall of 1991. One thousand and forty six of these drums were found to be empty. The contents of the remaining drums were consolidated in 60 55-gallon drums. The 60 drums were subsequently characterized and disposed of in accordance with the Work Plan entitled "Drum Disposal Plan" prepared by Conestoga-Rovers & Associates (CRA) for Stauffer Management Co. (Stauffer) and approved by the EPA on January 6, 1993.

The "Final Phase I Operations Plan" was prepared by CRA for Stauffer and approved by the EPA on May 27, 1993. The Final Phase I Operations Plan addresses the location of any remaining buried drums at the Site; the excavation and removal of the drums and treatment and/or disposal of the drums and their contents. The Final Phase I Operations Plan consists of the following plans:

- Site Work Plan;
- Clean-Up Plan;
- Sampling and Analysis Plan; and
- Health and Safety Plan.

The general rationale for the work program presented in the Final Phase I Operations Plan is to initially conduct investigatory activities (geophysical survey and test pitting) to define any areas with buried

drums. Once these areas have been defined, an estimate of the magnitude of the drum excavation program can be made and the excavation can be conducted in a systematic fashion to optimize productivity and minimize potential releases to the environment.

This Work Plan presents the test pit program that will be used to investigate areas which have been identified as potentially containing buried drums as a result of non-intrusive field site work.

2.0 INVESTIGATIVE ACTIVITIES

Five investigative activities were conducted to provide information to be used for developing the test pitting program. These activities are:

1. topographic survey and Site grid;
2. delineation of surface debris piles;
3. geophysical survey;
4. aerial photo imagery review; and
5. Site inspection.

A description of each of these activities and the results obtained are presented in the following subsections.

2.1 TOPOGRAPHIC SURVEY AND SITE GRID

A topographic survey was conducted by Niagara Boundary Services. Based on the topographic survey a Site plan was prepared (see Figure 1.2). To aid in the Site activities, a Site grid was developed and staked out in the field at 50-foot intervals. The Site grid is tied into the New York State Plane Coordinate System by a reduction of 93,000 feet from west to east and a reduction of 107,000 feet from south to north. The Site grid is presented on Figure 1.2.

2.2 DELINEATION OF SURFACE DEBRIS PILES

Areas with surface debris were plotted on the topographic Site plan by O'Brien and Gere Engineers. These areas were identified in the field and their locations defined using the Site grid markers. These debris areas will be investigated for potential drummed waste during the test pitting program.

2.3 GEOPHYSICAL SURVEY

A geophysical survey was conducted at the Site during the months of August and September 1993 by O'Brien and Gere Engineers, Inc. The Geophysical Survey Investigation report is presented in Appendix A.

Initially, a magnetometer/gradiometer survey was conducted across the Site. However, due to the large quantity of surficial ferrous material scattered throughout the Site only large anomalies could be detected. Higher resolution (small scale) anomalies could not be discerned. Based on these results, it was decided to conduct an electromagnetic (EM) in-phase survey to provide better resolution. The EM-31 survey identified numerous individual anomaly locations. Each of these locations was marked in the field with a flag and also plotted on Plan 1.

Based on these data, general anomaly areas were defined in which several individual anomalies occurred in close proximity. These anomaly areas are defined on Plan 1. Other anomalies show up as discrete points scattered throughout the Site. It is expected that these anomalies represent shallow buried metal debris. Each of the anomaly areas and discrete point anomalies will be investigated during the test pitting program.

2.4 AERIAL PHOTO IMAGERY REVIEW

An aerial photo imagery review was conducted by CRA on eleven images spanning the years 1951 to 1991. The average gap in photo coverage for the Site was 3.6 years with the largest gap in coverage being 8 years between 1951 and 1959. Generally, observations were noted only where potential or actual deposition of waste occurred. A number of observations were made of significant surface activity. The results of the aerial photo imagery review are presented on Plan 2. Aerial photographs with a description of significant features and activities are presented in Appendix B.

1951

- Surface activity evident only in the far northeast corner of the Site just west of the entrance.
- Stream channel running west to east through the Site varies in width and depth up to 30-feet wide by approximately 20-feet deep between grid lines N84+15 to N85+50 and E82+80 to E87+00 (see Plan 2 for approximate stream channel location).
- Plateau areas north and south of the stream channel are grassed fields generally free of large trees.

1959

- Surface clearing and vehicular traffic has expanded to the area between grid lines N85+50 to N86+75 and E84+00 to E88+00.

1966

- Surface activity covers majority of Site plateau.
- The intermittent stream is less defined with evidence of filling between grid lines N84+65 to N85+90 and E83+60 to E84+40.
- Surface activity extends off-Site on the east side of Site plateau and onto the adjacent hill area.

1967

- The entrance of the intermittent stream into the Site has shifted approximately 200 feet from grid point N87+00, E81+00 to N85+00, E81+00.
- Evidence of debris in the stream bed between grid lines N84+70 to N85+30 and E81+00 to E83+60. This area is identified as 1967-A on Plan 2.

- Significant dumping has occurred off the south, southeast and southwest sides of the Site plateau.
- Significant Site surface/potential depressed area dumping is concentrated between grid lines N83+50 to N86+00 and E82+50 to E86+70. This area is identified as 1967-B on Plan 2.

1972

- First sign of dumping and pushing debris to and over west slopes in irregular area identified as 1972-B on Plan 2.
- Evidence of filling activity in ravine at stream head between grid lines N86+50 to N87+25 and E80+50 to E81+50. This area is identified as 1972-A on Plan 2.
- Majority of intermittent stream noted in 1967 is less defined indicating backfilling.

1975

- Significant increase in surface activity in the form of uniformly shaped objects stacked in rows in irregular area identified on Plan 2 as 1975-A.
- Significantly more dumping in intermittent stream/ravine between grid lines N85+50 to N86+30 and E88+50 to E90+00. This area is identified as 1975-B on Plan 2.
- Scattered surface debris across entire Site.

1977

- Continued use of northern portion of area identified as 1972-B.
- Possible area of excavation between grid lines N86+00 to N86+50 and E81+50 to E82+00.

1978

- Little indication of vehicular activity or dumping.
- Dense vegetation on entire Site plateau.

1981

- Uniformly shaped objects identified in area designated 1975-A are present only in the southwest portion of this area.
- Evidence of additional dumping in ravine in area between grid lines N86+50 to N87+25 and E80+50 to E81+50. This area is identified as area 1975-B on Plan 2.

1985

- Dense vegetation on entire Site plateau.
- Little indication of vehicular activity or dumping.

1991

- Very little evidence of intermittent stream.
- Site trailer and support facilities noted in current location of Site facilities.
- Six large, dark areas, possibly test pits, noted along northern side of Site.

Based on the results of the photo imagery evaluation, it is concluded that waste was primarily placed in the following two areas of the Site:

- 1) the former creek channel which transects the Site in an east-west direction (the actual location of the creek channel may have changed somewhat during the active life of the Site); and
- 2) over the bank of the plateau at several locations identified on Plan 2.

The plateau areas north and south of the former creek channel were used primarily for storage or placement of debris on the ground surface. This is supported by the borehole logs for five groundwater monitoring wells installed at the Site during December 1991 by URS Consultants Inc. as part of the Phase II Investigation Program for the New York State Department of Environmental Conservation (NYSDEC). The borehole logs for these wells indicate that the underlying soil is native material. Waste material was not encountered at any of the monitoring well installations.

The well locations are presented on Figure 1.2. Borehole logs are presented in Appendix C.

2.5 SITE INSPECTION

A Site inspection was conducted to determine if any drums were visible at the ground surface.

One 55-gallon drum was exposed at the surface at grid location N85+00, E85+00 and another at grid location N89+50, E89+00. Several buried drums were identified at approximate grid location N85+50, E88+00.

3.0 TEST PIT INVESTIGATION

Test pits will be excavated at the Site to delineate both the horizontal and vertical limits of any buried drums. The results of the geophysical survey, photo imagery and other visual surface evidence has been used to develop the test pitting program.

The proposed test pit locations are presented on Plan 3. It is to be noted that the actual test pit locations will be selected in the field in conjunction with the EPA field representative.

At each location the test pit will be dug until one of the following conditions are met:

- native soil is encountered;
- groundwater is encountered;
- a depth of 15 feet is encountered; and
- buried metal is no longer indicated using an EM meter.

Test pitting methods to be used to investigate the different areas of the Site are presented in the following subsections.

3.1 DISCRETE EM ANOMALIES

A small track-mounted backhoe will be utilized to investigate all of the discrete point anomalies identified during the EM survey. It is expected that the metal objects at these locations are located close to the ground surface. An EM meter will be used to verify that the location is free of buried metal at the completion of each test pit.

3.2 EM ANOMALY AREAS

The small track-mounted backhoe will also be used to investigate the smaller anomaly areas north and south of the former creek

channel. These areas are also expected to contain shallow buried metal objects.

3.3 SURFACE DEBRIS PILES

At locations where surface debris prevented geophysical testing, a bulldozer will be used to move the debris to allow the backhoe access to the pile area. If the debris pile is relatively small, the entire pile will be moved and an EM meter will be used to screen the area for buried metal objects. If buried metal is detected, test pit(s) will be excavated to investigate the identified anomaly. If buried metal is not detected, no further investigation is required.

At large debris piles, the bulldozer will be used to clear a path to allow test pits to be dug beneath the pile. If significant buried materials are identified beneath the debris pile, additional test pits will be excavated to investigate the extent and nature of the buried materials.

3.4 FORMER CREEK CHANNEL

Test pits approximately 20 feet x 20 feet, will be excavated in the center of the former creek channel. These test pits will be spaced approximately 50 feet apart along the former creek channel alignment. At each test pit location, a large track-mounted backhoe will be used to first identify the former edges of the creek channel. This will be accomplished by digging a trench, starting from the plateau area and advancing until the edge of the bank is located. Once both edges of the bank are defined, the test pit will be excavated in the center of the channel.

If buried drums are identified in any of the test pits, their location will be logged and staked in the field. At the completion of the test pits along the former creek channel alignment, a decision will be made whether to further delineate any buried drum areas. This decision will be made in conjunction with the U.S. EPA field representative.

3.5 AREAS ALONG THE SITE PERIMETER

Waste disposal activities were conducted at several areas along the Site perimeter. At these locations, waste was dumped over the bank of the plateau. These areas will be investigated by digging from the top of the bank using a large backhoe. The test pit will be advanced towards the center of the Site until the edge of the former bank is located. These test pits will be spaced approximately 50 feet apart.

3.6 AREAS WITH IDENTIFIED DRUMS

As presented in Section 2.5, three areas with buried drums have been identified by visual observation. At each of these locations test pits will be excavated to determine the areal and vertical limits of the buried drums. This will be accomplished by digging test pits from the four compass directions surrounding the identified drum(s). Each of these test pits will start a selected distance away from the identified drum(s) and be extended towards the drum(s) until the drums are encountered. Once drums are encountered, the test pit will be terminated and the location of the edge of the drums will be staked. This methodology will also be used if drums are encountered during any of the investigatory test pits described in Sections 3.1 to 3.5.

3.7 ADDITIONAL AREAS IDENTIFIED FROM AERIAL PHOTOGRAPHS

Two areas were identified from aerial photographs that are outside of the geophysical survey area as presented in Section 2.4. The area identified on Plan 2 as '1975-B' showed signs of dumping in the ravine in 1975. The eastern and northern portions of the area identified as '1975-A'

on Plan 2 was used for the staging of various uniformly shaped objects. In 1981, these objects were present only in the southwest portion of this area which was covered by the geophysical survey.

An EM survey will be conducted in these areas to identify any buried metal objects. Test pitting will then be conducted to investigate any anomalies identified by the EM survey.

3.8 METHODOLOGY/PROCEDURE

As described previously, the limits of excavation for each test pit will be determined by the field engineer based on the following criteria:

- depth will not exceed the depth to native soil;
- depth will not exceed 15 feet unless drums are encountered;
- depth will not exceed the depth to the water table; and
- the EM meter verifies the absence of buried metal.

A detailed field log will be recorded for each excavation along with grid coordinates. The type and character of fill (or soil) encountered, the type and characteristics of any refuse, debris or waste material encountered and the depths of any water bearing zones will be noted on each test pit log.

Test pits will be excavated using a track mounted backhoe (or equivalent) with a non-toothed bucket capable of excavating to a depth of 20 feet below the ground surface (BGS). The backhoe operator compartment will be suitably equipped to protect the operator from waste materials or contaminated soil and water. The excavation portion of the backhoe or any portions of it coming in contact with potentially contaminated soil will be steam cleaned (if necessary). Water generated and collected during steam cleaning will be containerized, labeled and stored in the Drum Staging Area.

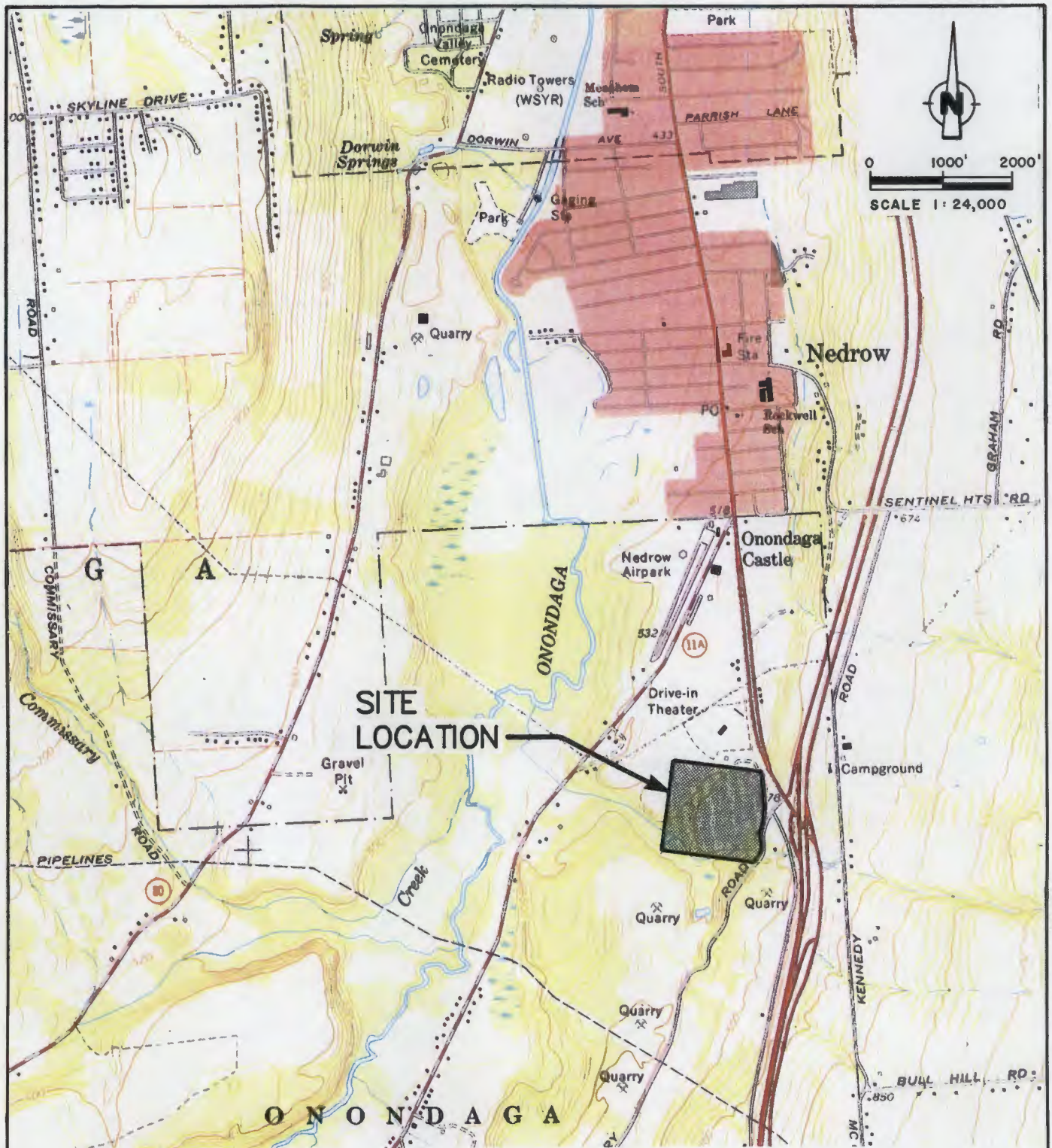
The side slopes of the test pits, and hence their bottom width, will be consistent with OSHA standards presented in 29 CFR Part 1826. Loose soils will require more moderate side slopes in order to reduce sloughing and collapse. Any drums or containers encountered during the course of the test pitting activities will be left in place. Care will be taken to avoid rupturing of any buried drums during the test pitting activities. If necessary, hand shovelling will also be utilized to uncover buried drums. If a drum is ruptured during the test pitting activities, it will be removed from the excavation and handled in accordance with the drum handling procedures presented in Section 3.0 of the Clean-up Plan of the Final Phase 1 Operations Plan.

Additional test pits or trenches may be required in a particular area to adequately define the extent of the buried drums. A strategy similar to what is described in Section 3.6 would be utilized to define the extent of any buried drums encountered.

3.9 DATA REDUCTION/REPORTING

A log of each test pit will be prepared which will include grid location, a description of the soils encountered, visual signs of contamination, depth of any water bearing zones, EM meter results, and any unusual conditions encountered. The test pit will be screened with a PID or OVA, radiation survey meter, explosimeter and HCN vapor analyzer, calibrated daily, as set forth in the HSP. Each test pit will be photographed and/or videotaped to provide a permanent record of the exploration.

The locations of each test pit will be identified by referencing the Site grid system (and will be surveyed into Site coordinates). The locations of any buried drums will be staked in the field, surveyed and plotted on the Site Plan.

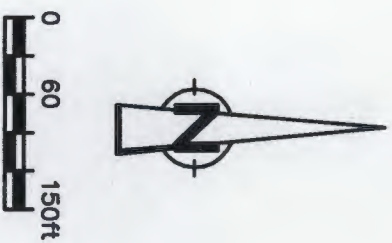


MAP SOURCE: SOUTH ONONDAGA, N.Y.
QUADRANGLE USGS 7.5 SERIES

figure 1.1
SITE LOCATION
Onondaga Drum Site

CRA

5067 (4) SEPT. 24/93 (W) REV.0



LEGEND

- METALLIC SURFACE DEBRIS
- GROUNDWATER MONITORING WELL
- POWER POLES
- WATER BOUNDARY
- DIRT ROAD
- 50 FT. SURVEY GRID

SOURCE:
ORIGINAL TOPOGRAPHIC SURVEY BY
NAGARA BOUNDARY AND MAPPING
SERVICES, NIAGARA FALLS, NEW YORK
SEPTEMBER 1, 1993

figure 1.2
SITE PLAN
TEST PIT INVESTIGATION
Onondaga Drum Site

CRA

APPENDIX A
GEOPHYSICAL SURVEY INVESTIGATION

Onondaga Drum Site
Geophysical Survey Investigation
Nedrow, New York

Introduction:

Geophysical surveys were conducted at the Onondaga Drum Site during the months of August and September, 1993. Figure 1 illustrates the general site location. The purpose of these surveys was to delineate areas which may potentially contain buried drums or other metallic containers. During the initial phase of the survey, magnetometer and gradiometer methods were implemented in accordance with the Scope of Work, which was developed by Conestoga-Rovers & Associates Limited (CRA), on behalf of Zeneca Corporation. However, initial broad-based testing indicated that due to the presence of large quantities of ferrous materials at the site, large anomalies could be detected but higher resolution (small scale) anomalies could not be discerned. To meet the objectives of the Scope of Work, electromagnetic (EM) survey methods were recommended to provide the higher resolution data necessary to complete the geophysical evaluation. Upon mutual agreement of Zeneca, the United States Department of Environmental Protection (USEPA), and CRA, the modified survey methods were implemented.

Prior to initiating the geophysical surveys, a survey grid was completed across the site at fifty foot intervals by Niagara Boundry & Mapping Services, LSPC (Figure 2). Grid stakes located in the field are based upon the New York State Plane Coordinate System (NYSPCS), Central Zone, NAD 27. Moving from west to east, the stations are directly related to the NYSPCS grid by reduction of 93,000 feet. Moving from south to north, the reduction is 107,000 feet.

Magnetometer/Gradiometer Survey:

Magnetometer/gradiometer surveys were to conducted to delineate areas in which drums or other metallic containers may have been buried and to delineate locations for test pit operations. Magnetometers measure total magnetic field intensity resulting from both the earth's inherent magnetic field, as well as secondary magnetic fields emanating from local (surface or subsurface) ferrous materials. Gradiometers are differential magnetometers which measure total magnetic field intensity at two sensors, vertically separated by a fixed distance.

Methods:

The magnetometer and gradiometer surveys were conducted using an EG&G Geometrics Model G-856AX Proton Precession Magnetometer coupled with a G-856AX gradiometer option. The equipment setup allowed for the collection of both total field magnetic data and vertical magnetic gradients at each survey location. Data values were stored in the unit's internal memory in the field and later retrieved for mapping and interpretation. Surveys and equipment calibrations were conducted according to the operational instructions specified by EG&G.

Prior to initiation of the magnetometer/gradiometer survey, base station locations were evaluated for data repeatability and diurnal fluctuations in the earth's magnetic field. The two base stations were setup at grid locations N89+50, E86+50 and N91+75, E85+00. Each base station consisted of a G-856AX magnetometer and control unit to record total magnetic field fluctuations. Prior to collection of magnetic data, the two base station control units were synchronized to provide magnetic data values which could be correlated with respect to time. Total magnetic field data was recorded automatically at five minute intervals for a total of 110 minutes, yielding twenty-two data values at each station. The collected data was downloaded from the control units to a personal

computer for review. A plot of total field magnetism versus time was subsequently constructed which illustrated that diurnal fluctuations in the earth's magnetic field with respect to time were similar at each station and that any influences from secondary magnetic fields emanating from nearby metal scrap piles were not adversely affecting the base station readings. The location at N89+50, E86+50 was subsequently selected to serve as the base station for the remainder of the magnetometer and gradiometer surveys. The plot of total field magnetism versus time for each base station is included in Appendix A.

On August 27, 1993 an initial magnetometer/gradiometer survey was conducted at fifty foot intervals corresponding to the pre-surveyed grid. The broad-based survey was performed to evaluate the magnetometer/gradiometer instrument response in the presence of large piles of metals waste scattered throughout the survey area. This was done as areas exhibiting high magnetic field gradients can result in the collapse of the magnetometer signal causing data to be unreliable. The initial, broad-based survey indicated very high magnetic gradients were present over the survey area, particularly in areas where large quantities of surficial metal waste was present.

Total magnetic field data was collected at the base station to evaluate the diurnal fluctuations in the earth's magnetic field as the magnetometer/gradiometer survey was conducted. Data was recorded automatically at five minute intervals for a total of 315 minutes, yielding 63 data values.

Diurnal fluctuations in the magnetometer data recorded at the base station revealed a range of 37 gammas over the duration of the magnetometer/gradiometer survey. The range in field magnetometer data was 6,416 gammas over the survey period. The change in the base station data represents a small percentage (approximately 0.6%) of the overall change in the field magnetometer

data. Due to the small percentage of diurnal magnetic fluctuations contributing to the field magnetic data, the field magnetic data was not diurnally corrected.

Results:

After the magnetometer/gradiometer survey was completed, the data was plotted on a site map and contoured. The total field magnetometer data was contoured at an interval of 500 gammas due to the strong localized magnetic fields caused by the abundance of surface scrap metal at the site. The gradiometer data was contoured at an interval of 50 gammas/ft. The resulting contour maps, representing total magnetic field and gradiometer data, are illustrated on Figures 3 and 4, respectively. A review of Figures 3 and 4 indicates the presence of several prominent magnetic anomalies and magnetic gradients. A summary of the conclusions drawn from the magnetometer and gradiometer survey are as follows:

- Numerous dipolar magnetic anomalies are evident across the site. Each anomaly can be attributed to large surface scrap metal piles located adjacent to many of the dipolar anomalies.
- A strong linear east-west trend of dipolar magnetic anomalies exists between survey grid line N86+50 and N85+00. As evident on aerial photographs of the site, a creek or drainage swale was once located in this area, but now appears to be filled to the level of the surrounding grade. This is also an area where numerous surface drums were previously located.
- The magnetometer/gradiometer survey was effective in evaluating large scale anomalies such as the infilled drainage swale. However, the survey was ineffective in providing specific, isolated locations of buried metallic materials (drums).

Electromagnetic (EM) Survey:

EM surveys were conducted at the site to evaluate the presence of buried metallic materials. The objectives of the electromagnetic survey were to locate areas in which drums or other metallic

containers may have been buried and to delineate these areas for subsequent test pit operations.

Methods:

EM surveys operate using principals of electromagnetic induction. EM surveys completed at the site were conducted using a Geonics EM-31 non-contacting terrain conductivity meter. The EM-31 is configured with a transmitter coil and a receiver coil. The transmitter coil generates a current (primary field), which in turn magnetically induces a current (secondary field) in the ground. The secondary field magnetically induces a current in the receiver coil. The transmitter coil sends out wave forms with known current direction, strength, and phase. Changes in the direction, strength, and/or phase caused by properties of the ground are detected at the receiver coil and measured on an analog display. Depths at which objects can be resolved in the subsurface depends mainly on the intercoil spacing of the particular EM unit. The EM-31 has a fixed intercoil spacing of 3.66 meters which provides a maximum probing depth of approximately 6 meters under ideal conditions.

The EM-31 was operated in a quadrature phase mode to evaluate changes in ground conductivities and/or resistivities, as well as, in an in-phase mode to detect buried metallic materials. Preliminary EM-31 quadrature phase and in-phase surveys were completed on September 1, 1993 to assess the effectiveness of such surveys given the site conditions. The ability of the EM-31 in-phase surveys to refine magnetometer/gradiometer anomalies was of particular interest. Also of interest was the degree to which the surface metal scrap piles affected the EM-31 in-phase data.

The EM-31 in-phase survey was conducted by walking along the established grid lines within the survey areas, and continuously monitoring the output meter, noting needle deflections on the analog display. These deflections indicate the pressence of metallic materials, either surface, subsurface,

or both which are encountered during the survey. Generally, stronger needle fluctuations (pegging off-scale) represent large metallic objects, higher concentrations of metallic objects, or shallow depth of burial. During the survey, anomalies which were encountered in the field were flagged and located on a field survey map.

During the EM-31 quadrature phase survey, two ground conductivity values were recorded at each grid node. This was accomplished by orienting the transmitter and/or receiver coil in a north-south direction and east-west direction and noting each reading in a field book. Recording two readings at 90° orientations provides information on the lateral homogeneity of the subsurface at each measurement location. The preliminary EM-31 terrain conductivity data is included on Table 1.

Results of Preliminary EM Surveys:

Twenty-five survey lines were completed during the preliminary EM in-phase survey. The lines were traversed in alternating north and south directions with responses being noted in a field book. The results of the preliminary EM-31 in-phase survey are as follows:

- The EM-31 in-phase survey exhibited less effects from the large scrap metal piles than the magnetometer/gradiometer survey.
- The EM-31 provided reliable subsurface results to within approximately five feet of the surface piles.
- Preliminary in-phase survey results indicate that more refined surveys could be completed despite the presence of debris piles, thus providing more precise anomalous locations across the site.

Preliminary EM-31 quadrature phase data was collected along thirteen survey lines. Generally, data was collected at fifty foot intervals, however the intervals were decreased to ten feet when

approaching anomalous areas identified by the magnetometer/gradiometer survey. Results of the EM quadrature phase survey are as follows:

- Quadrature phase data indicated the presence of heterogeneous, low conductive (resistive), unsaturated soils at the site. Conductivity values ranged from approximately 1.6 to approximately 43 mmhos/meter. The majority of values were less than 10 mmhos/meter. The higher conductivity values likely represent increases in soil moisture content. Large scale, negative values (off-scale) likely represent the presence of buried metallic material and generally correlate with EM-31 in-phase and magnetometer anomalies detected along the infilled drainage swale located between survey lines N84+50 and N87+00.

Based on the preliminary EM results it was decided that an EM in-phase survey would provide the highest resolution and complete coverage of the site.

EM-31 In-Phase Survey:

The EM-31 in-phase survey was conducted from September 2, 1993 through September 7, 1993. In-phase data was collected continuously along each survey line. The survey lines were traversed in alternating north and south directions with ten foot spacing between each survey line. Surveying at ten foot intervals with the EM-31 provides a coverage overlap of approximately two feet between each successive survey line. Areas which contained large surface scrap metal piles or heavy amounts of scattered surface scrap metal adjacent to piles were not surveyed. Surficial debris piles are shown on Figure 5.

EM in-phase anomalies were marked in the field with orange pin-flags as each anomaly was encountered. Small, isolated amounts of surface metal (eg. tire rims, seat springs, etc.) which caused in-phase responses were removed, when possible, and the area then resurveyed. Small, isolated pieces of surface scrap metal which could not be removed from the areas to be surveyed were marked in the field with blue pin-flags.

EM-31 In-Phase Survey Results:

EM-31 in-phase anomalies, which indicate subsurface metallic materials, are illustrated on Figure

5. The results of the in-phase survey are as follows:

- Two major areas of in-phase anomalies are evident. One area is located in the northern portion of the site, between grid lines N88+50 to N91+50 and E82+50 to E87+00. The second area is located in the southern portion of the site, extending from grid lines N84+50 to N87+00 and E81+00 to E88+00. This second area of in-phase anomalies is located over the previously infilled drainage swale.
- Small groupings of scattered in-phase anomalies are evident in the central portion of the site, extending between grid line N86+50 to N88+50.

Table 1
Onondaga Drum Site
Nedrow, New York

EM-31 Quad Phase Survey

	N-S	E-W
Base Station		
N89 + 50, E86 + 50	8.4	7.4
N89 + 50, E86 + 50	8.6	7.8
N90 + 50, E86 + 50	8.4	9.6
N90 + 00, E86 + 50	10	9.5
N89 + 50 (Base)	8.4	9.6
N89 + 00, E86 + 50	8.8	7.6
N88 + 50, E86 + 50	9.2	8.4
N88 + 00, E86 + 50	9.8	9.4
N87 + 50, E86 + 50	scrap pile	
N87 + 00, E86 + 50	11	10
N87 + 00, E85 + 50	7.8	10
N87 + 50, E85 + 50	12	11
N88 + 00, E85 + 50	5	8.8
N88 + 50, E85 + 50	scrap pile	
N89 + 00, E85 + 50	11	11
N89 + 00, E85 + 00	6.2	13
N88 + 50, E85 + 00		
N88 + 00, E85 + 00	10	10
N87 + 50, E85 + 00	9.2	9
N87 + 40, E85 + 00	9	9.4
N87 + 30, E85 + 00	5.6	3.2
N87 + 20, E85 + 00	9	9
N87 + 10, E85 + 00	10	10
N87 + 00, E85 + 00	10	10
N86 + 90, E85 + 00	27	22
N87 + 00, E84 + 50	11	10
N86 + 90, E84 + 50	6.6	9.6
N86 + 80, E84 + 50	11	7.4
N87 + 10, E84 + 00	10	10
N87 + 00, E84 + 00	9.8	11
N86 + 90, E84 + 00	8.8	8.8
N86 + 80, E84 + 00	5.2	7.8
N87 + 20, E83 + 50	9	12
N87 + 10, E83 + 50	9	8.8
N87 + 00, E83 + 50	12	11

Table 1
Onondaga Drum Site
Nedrow, New York

EM-31 Quad Phase Survey

	N-S	E-W
N86 + 90, E83 + 50	10	5.4
N86 + 80, E83 + 50	<0	<0-
N86 + 70, E83 + 50	10	9
N86 + 60, E83 + 50	9.2	10
N86 + 50, E83 + 50	10	10
N86 + 40, E83 + 50	10	<0
N86 + 30, E83 + 50	9.2	9.8
N86 + 20, E83 + 50	10	9.4
N86 + 10, E83 + 50	6.6	5
N86 + 00, E83 + 50	8.8	6.2
N86 + 50, E83 + 00	14	13
N86 + 40, E83 + 00	10	10
N86 + 30, E83 + 00	10	10
N86 + 20, E83 + 00	12	11
N86 + 10, E83 + 00	12	10
N86 + 00, E83 + 00	3.2	5.6
N85 + 90, E83 + 00	<0	14
N85 + 80, E83 + 00	<0	21
N85 + 70, E83 + 00	11	32
N85 + 60, E83 + 00	<0	<0
N84 + 50, E83 + 00	7	7
N84 + 60, E83 + 00	8	6.8
N84 + 70, E83 + 00	8	8
N84 + 80, E83 + 00	8	7.6
N84 + 90, E83 + 00	8.4	6.8
N85 + 00, E83 + 00	8.8	7.6
N85 + 00, E83 + 50	6	3.4
N85 + 10, E83 + 50	8.4	3.8
N85 + 20, E83 + 50	<0	<0
N85 + 30, E83 + 50	<0	<0
N85 + 40, E83 + 50	<0	<0
N85 + 50, E83 + 50	<0	<0
N85 + 00, E84 + 00	9.4	9
N85 + 10, E84 + 00	<0	<0
N85 + 20, E84 + 00	<0	<0

Table 1
Onondaga Drum Site
Nedrow, New York

EM-31 Quad Phase Survey

	N-S	E-W
N84 + 50, E84 + 50	10	9.6
N84 + 60, E84 + 50	11	10
N84 + 70, E84 + 50	11	10.5
N84 + 80, E84 + 50	3.2	6.6
N84 + 90, E84 + 50	<0	<0
N85 + 00, E84 + 50	<0	<0
N84 + 00, E85 + 00	9.2	8.8
N84 + 10, E85 + 00	10	10
N84 + 20, E85 + 00	14	12
N84 + 30, E85 + 00	<0	<0
N84 + 40, E85 + 00	<0	<0
N84 + 50, E85 + 00	10	<0
N85 + 00, E85 + 00	<0	<0
N85 + 10, E85 + 00	<0	<0
N85 + 20, E85 + 00	<0	<0
N85 + 30, E85 + 00	<0	<0
N85 + 40, E85 + 00	15	25
N85 + 50, E85 + 00	15	8
N85 + 60, E85 + 00	<0	<0
N85 + 70, E85 + 00	8.4	8.4
N85 + 80, E85 + 00	3.4	6.8
N85 + 90, E85 + 00	2.8	6.4
N86 + 00, E85 + 00	12	14
N84 + 50, E85 + 50	9.2	9.2
N84 + 60, E85 + 50	9.8	8.6
N84 + 70, E85 + 50	11	6.2
N84 + 80, E85 + 50	11	12
N84 + 90, E85 + 50	11	11
N85 + 00, E85 + 50	<0	<0
N85 + 10, E85 + 50	<0	<0
N85 + 20, E85 + 50	<0	<0
N85 + 30, E85 + 50	<0	<0
N85 + 40, E85 + 50	42	42
N85 + 50, E85 + 50	40	38
N84 + 50, E86 + 00	9.8	9.8
N84 + 60, E86 + 00	7.2	1.6
N84 + 70, E86 + 00	10	10

Table 1
Onondaga Drum Site
Nedrow, New York

EM-31 Quad Phase Survey

	N-S	E-W
N84 + 80, E86 + 00	10	<0
N84 + 90, E86 + 00	<0	<0
N85 + 00, E86 + 00	<0	<0
N85 + 10, E86 + 00	<0	<0
N85 + 20, E86 + 00	<0	<0
N85 + 30, E86 + 00	<0	<0
N85 + 40, E86 + 00		
N85 + 50, E86 + 00	<0	<0
N85 + 60, E86 + 00	<0	<0
N85 + 70, E86 + 00	<0	<0
N85 + 80, E86 + 00	<0	<0
N85 + 90, E86 + 00	<0	<0
N86 + 00, E86 + 00	<0	<0

MAGNETOMETER DATA RECORDED AT BASE STATION
N91+75,E85+00

Julian Date	Time	Magnetometer Reading (gammas)
238	143800	55745.3
238	144300	55747.2
238	144800	55747.0
238	145300	55747.9
238	145800	55748.5
238	150300	55748.3
238	150800	55749.2
238	151300	55747.9
238	151800	55748.4
238	152300	55748.5
238	152800	55749.8
238	153300	55752.4
238	153800	55754.0
238	154300	55759.4
238	154800	55757.7
238	155300	55755.4
238	155801	55753.3
238	160301	55751.8
238	160801	55751.7
238	161301	55751.9
238	161801	55750.9
238	162301	55747.4

MAGNETOMETER DATA RECORDED AT BASE STATION
N89+50,E86+50

Julian Date	Time	Magnetometer Reading (gammas)
238	143300	55730.4
238	143800	55730.0
238	144300	55731.8
238	144800	55731.3
238	145300	55732.6
238	145800	55733.1
238	150300	55734.1
238	150800	55735.0
238	151300	55732.9
238	151800	55733.3
238	152300	55733.5
238	152800	55734.4
238	153300	55737.5
238	153800	55739.0
238	154300	55744.1
238	154800	55742.8
238	155300	55740.0
238	155800	55738.9
238	160300	55736.6
238	160800	55736.7
238	161300	55737.0
238	161800	55736.3
238	162300	55732.5

MAGNETOMETER READING (GAMMAS)

5730.0

5740.0

5750.0

5760.0

BASE STATION NH113, C 03700

MAGNETOMETER BASE STATION COMPARISON

0120110

TIME

1438 0

1443 0

1448 0

1453

1458

1503

1508

1513

1518

1523

1528

1533

1538

1543

1548

1553

1558

1603

1608

1613

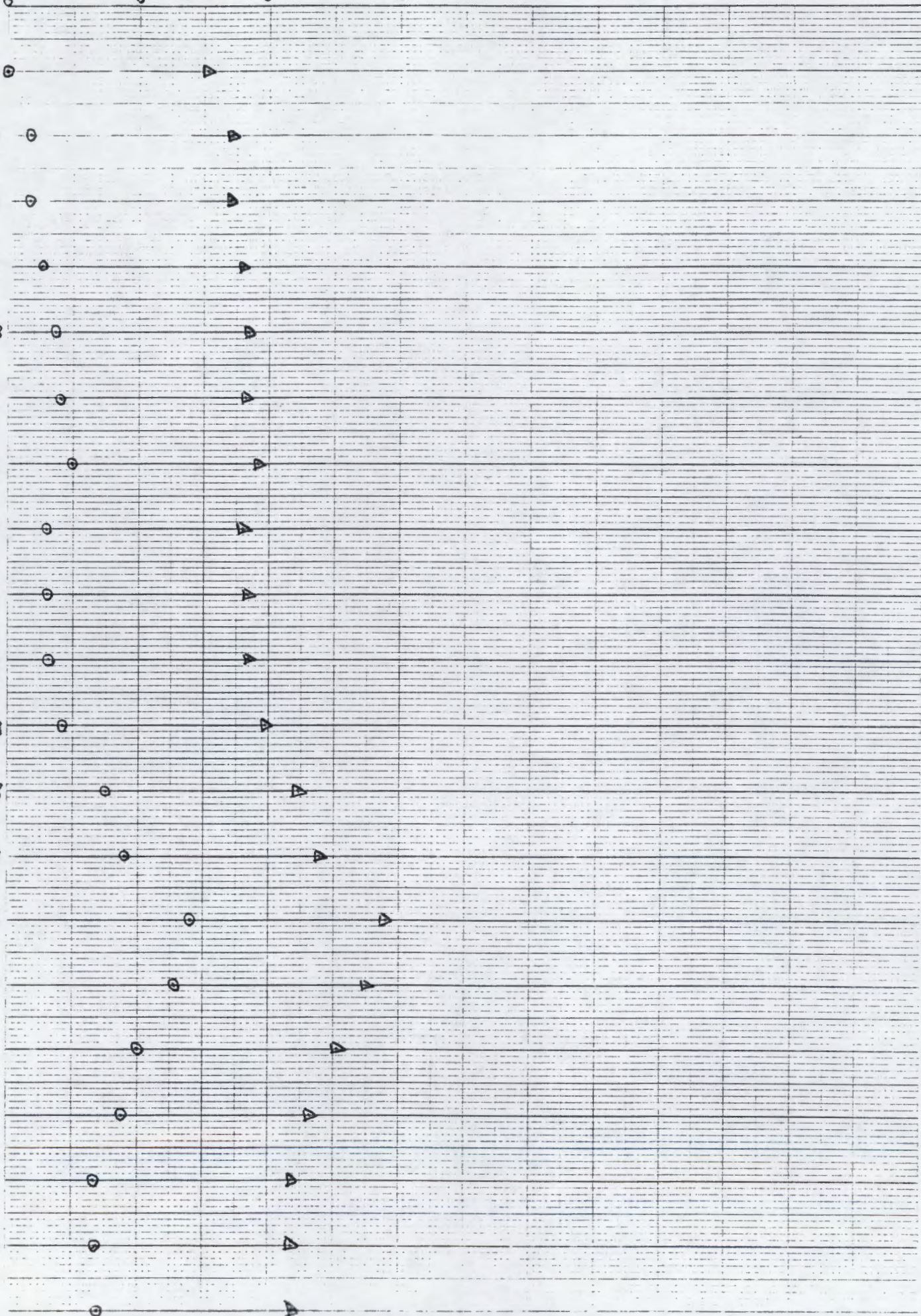




FIGURE 1

ONONDAGA DRUM SITE NEDROW, NEW YORK

SITE LOCATION MAP



0 2000 4000



APPROX. SCALE IN FEET



ADAPTED FROM: NORTHWEST TULLY 15' QUAD., SOUTH ONONDAGA, NEW YORK

9/22/83

2488.421.276

8.5X11

FIGURE 2
ONONDAGA DRUM SITE
NEDROW, NEW YORK

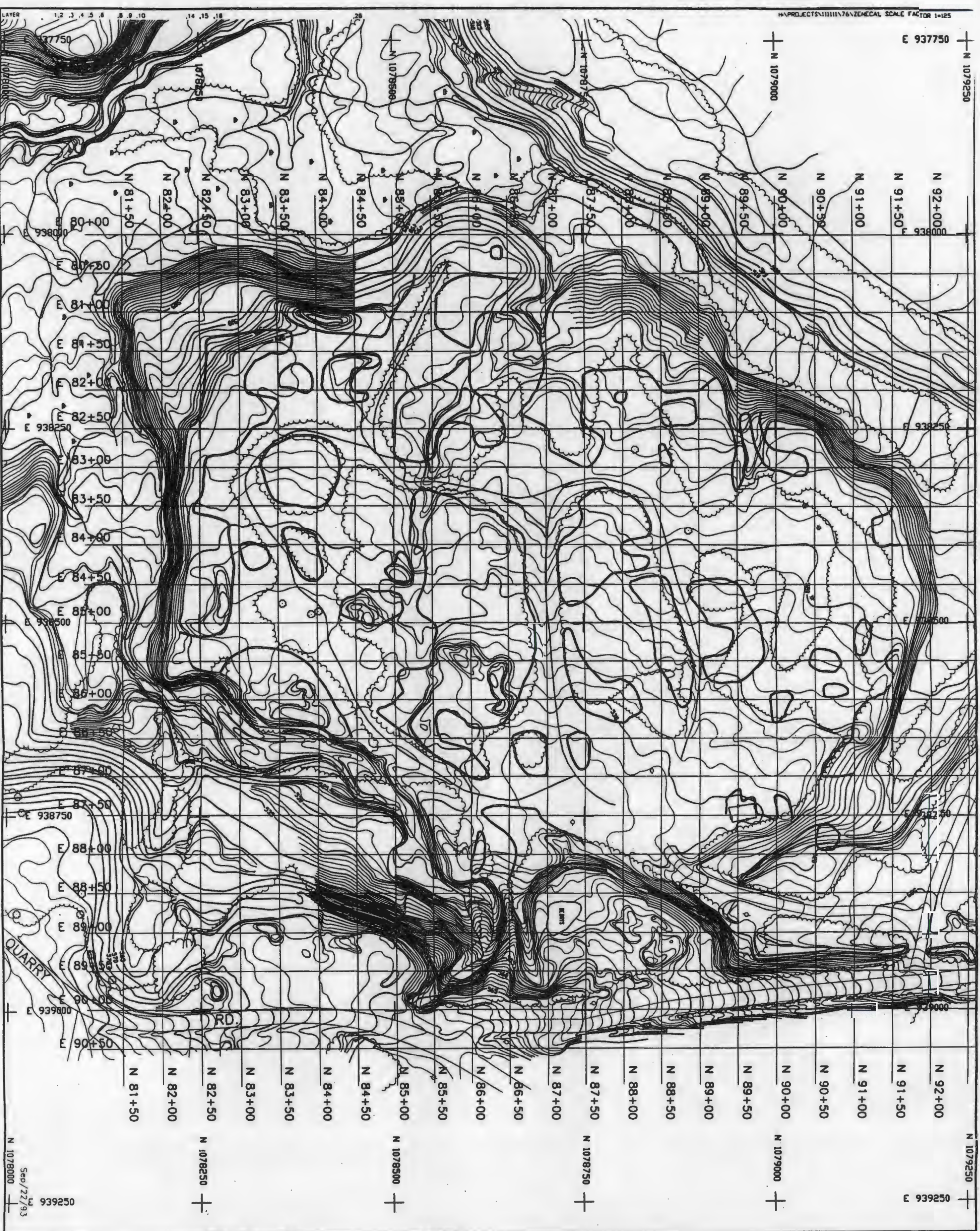
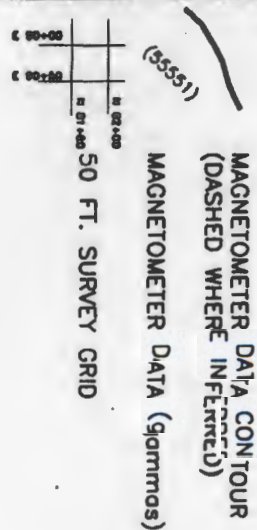


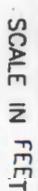
FIGURE 3



MAGNETOMETER DATA (gammmas)
(DASHED WHERE INFERRRED)

50 FT. SURVEY GRID

TOTAL FIELD MAGNETOMETER SURVEY RESULTS



O'BRIEN & GERE
ENGINEERS, INC.

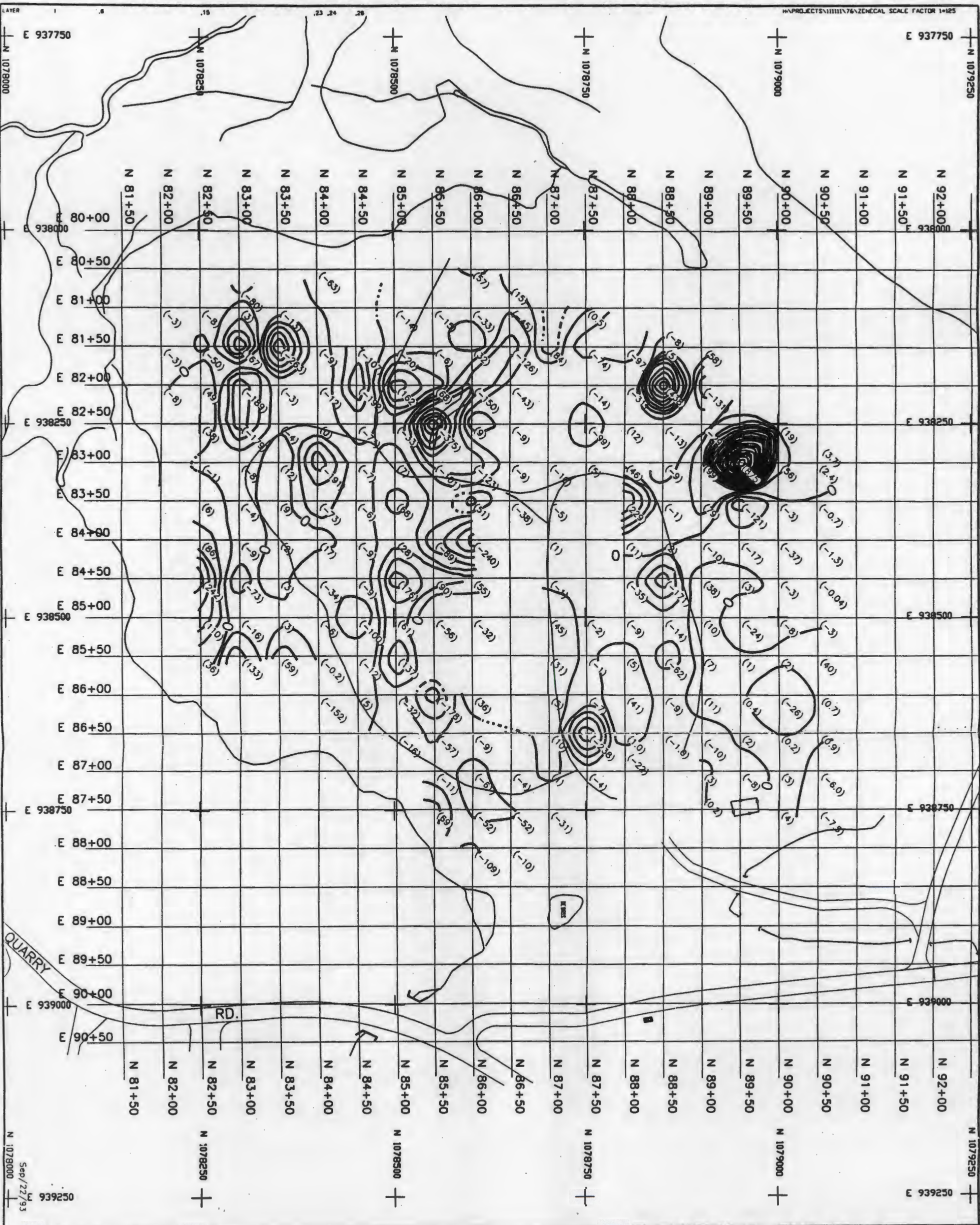
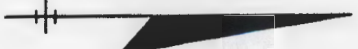


FIGURE 4

ONONDAGA DRUM SITE
NEDROW, NEW YORK



LEGEND

GRADIOMETER CONTOUR (DASHED
WHERE INFERRED)

GRADIOMETER DATA (gammas/ft)

50 FT. SURVEY GRID



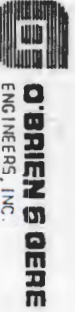
CONTOUR INTERVAL = 50 gammas/ft

GRADIOMETER
SURVEY RESULTS



SCALE IN FEET

2488.421.276



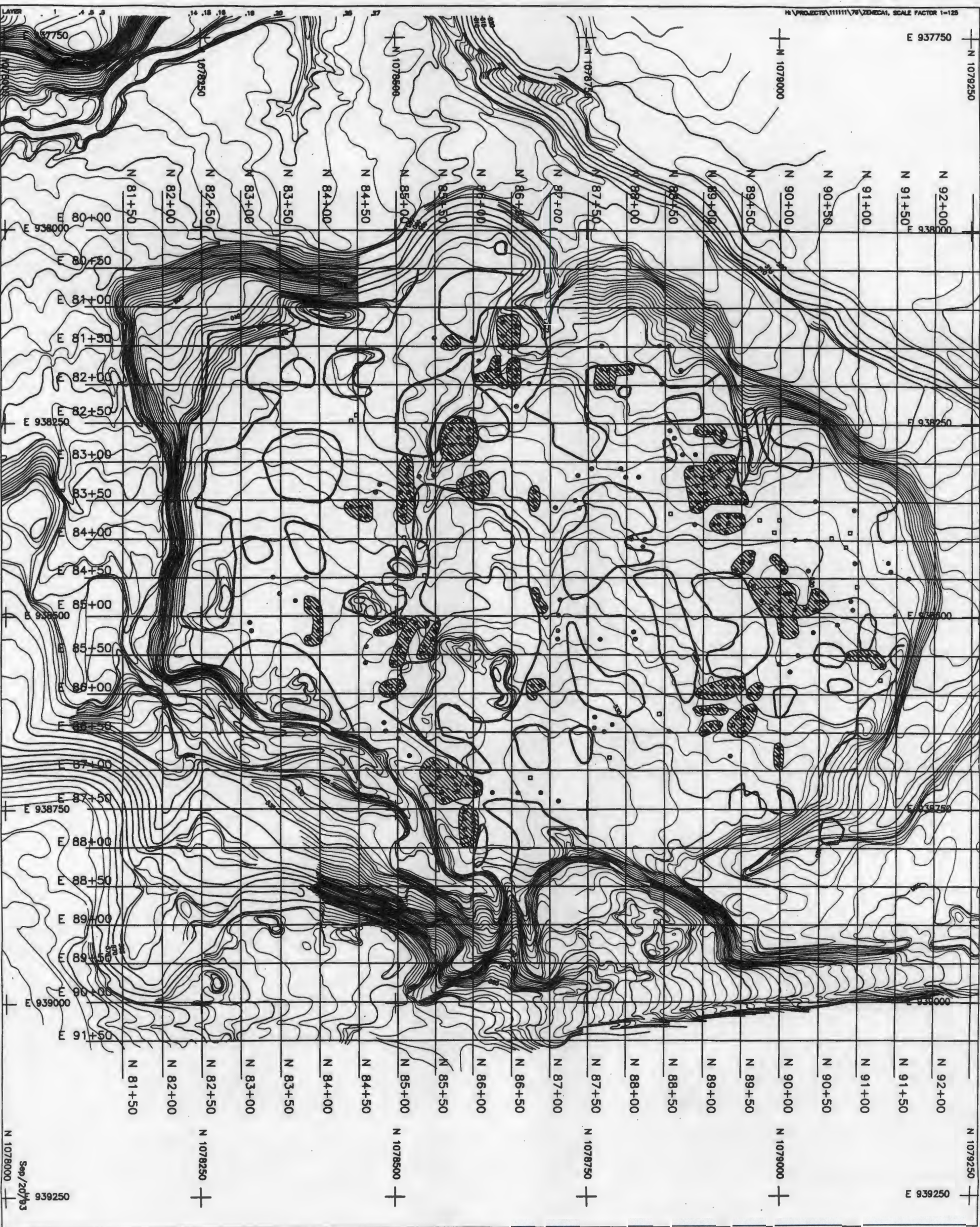
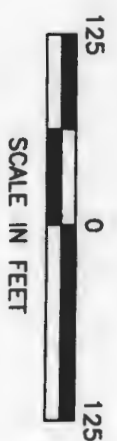


FIGURE 5
ONONDAGA DRUM SITE
NEDROW, NEW YORK



LEGEND

- SURFACE DEBRIS PILES
- EM-31 IN-PHASE ANOMALY
- ◻ EM-31 IN-PHASE ANOMALY (SURFACE METAL)
- ▨ AREAS OF CONCENTRATED EM-31 IN-PHASE ANOMALIES
- 50 FT. SURVEY GRID



2488.421.276



APPENDIX C

GROUNDWATER MONITORING WELL INSTALLATION LOGS

DRILLING SUMMARY

Geologist:

Daniel Sheldon

Drilling Company:

American Auger

Driller:

Rocky Baye

Date:

12/11/91

GEOLOGIC LOG

depth(ft.)	lithology
0-9.0	Clayey silt, trace to some gravel
9.0-19.0	F/m sand, some gravel
19.0-28.5	F/c sand and gravel
28.5-29.0	Clay, some silt

WELL DESIGND
E
P
T
H
(Ft.)

Elevation 525.21

Elevation 523.67

Protective casing and lockable cap

Ground Level

AUGERHOLE

8.2 inch dia.

29.0 feet length

15.0

17.0

18.0

28.0

29.0

WELL RISER

2.0 inch dia.

19.5 feet length

WELL SCREEN

2.0 inch dia.

10.0 feet length

CASING MATERIAL

Surface: Steel

Monitor: Schedule 40 PVC

SCREEN MATERIAL

Type: Schedule 40 PVC

Slot Size: .010"

SEAL MATERIALSeal #1 Type Bentonite Pellets
Setting: 15.0'-17.0'Seal #2 Type NA
Setting:**FILTER MATERIAL**

Type: #3 Q-Rok

Setting: 17.0'-29.0'

ROCK CORING

Cored Interval: NA

Core Diameter: NA

Reamed Diameter: NA

LEGEND

	Cement/Bentonite Grout
	Bentonite Seal
	Silica Sandpack

Client: NYSDEC

Project: Onondaga Nation
Site-B

Project No. 35235.12

URS
Consultants Inc.Monitoring Well
Construction DetailsWell Number:
MW-1

DRILLING SUMMARY

Geologist:

Daniel Sheldon

Drilling Company:

American Auger

Driller:

Rocky Baye

Date:

12/10/91

GEOLOGIC LOG

depth(ft.)	lithology
0-1.0	Clayey silt, some fill
1.0-7.0	F/c sand and silt, trace gravel
7.0-25.0	Coarse gravel, some clayey silt and limestone fragments
25.0-32.5	F/c sand, trace gravel
32.5-35.5	F/c sand and gravel

WELL DESIGN

Elevation 533.51

Elevation 531.65

Protective casing and lockable cap

Ground Level

AUGERHOLE

8.2 inch dia.

35.0 feet length

19.0

22.0

24.0

WELL RISER

2.0 inch dia.

25.9 feet length

D

E

P

T

H

(Ft.)

WELL SCREEN

2.0 inch dia.

10.0 feet length

34.0

35.0

35.5

Cave In

CASING MATERIAL

Surface: Steel

Monitor: Schedule 40 PVC

SCREEN MATERIAL

Type: Schedule 40 PVC

Slot Size: .010"

SEAL MATERIALSeal #1 Type Bentonite Pellets
Setting: 19.0'-22.0'Seal #2 Type NA
Setting:**FILTER MATERIAL**

Type: #3 Q-Rok

Setting: 22.0'-35.0'

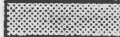
ROCK CORING

Cored Interval: NA

Core Diameter: NA

Reamed Diameter: NA

LEGEND

	Cement/Bentonite Grout
	Bentonite Seal
	Silica Sandpack

Client: NYSDEC

Project: Onondaga Nation
Site-B

Project No. 35235.12

URS
Consultants Inc.Monitoring Well
Construction DetailsWell Number:
MW-2

DRILLING SUMMARY

Geologist:

Daniel Sheldon

Drilling Company:

American Auger

Driller:

Rocky Baye

Date:

12/11/91

GEOLOGIC LOG

depth(ft.) lithology

0-2.0 Clayey silt

2.0-28.0 F/m sand
trace silt28.0-35.0 F/c sand
and gravel,
trace silt

D

E

P

T

H

(Ft.)

Elevation 526.10

Elevation 523.53

Protective casing and lockable cap

Ground Level

AUGERHOLE

8.25 inch dia.

33.3 feet length

19.9

21.8

23.3

33.3

35.0

Cave In

WELL RISER

2.0 inch dia.

25.9 feet length

WELL SCREEN

2.0 inch dia.

10.0 feet length

WELL DESIGN**CASING MATERIAL**

Surface: Steel

Monitor: Schedule 40 PVC

SCREEN MATERIAL

Type: Schedule 40 PVC

Slot Size: .010"

SEAL MATERIALSeal #1 Type Bentonite Pellets
Setting: 19.9'-21.8'Seal #2 Type NA
Setting:**FILTER MATERIAL**

Type: #3 Q-Rok

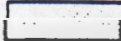
Setting: 21.8'-33.3'

ROCK CORING

Cored Interval: NA

Core Diameter: NA

Reamed Diameter: NA

LEGEND Cement/Bentonite Grout Bentonite Seal Silica Sandpack

Client: NYSDEC

Project: Onondaga Nation
Site B

Project No. 35235.12

URS
Consultants Inc.Monitoring Well
Construction DetailsWell Number:
MW-3

DRILLING SUMMARY		
Geologist: Daniel Sheldon		
Drilling Company: American Auger		
Driller: Rocky Baye		
Date: 12/12/91		
GEOLOGIC LOG		
depth(ft.)	lithology	
0-2.0	Clayey silt	
2.0-27.3	F/m sand with silty clay layers	
27.3-36.0	Silty clay, trace f/m sand	
WELL DESIGN		
CASING MATERIAL	SCREEN MATERIAL	SEAL MATERIAL
Surface: Steel	Type: Schedule 40 PVC	Seal #1 Type Bentonite Pellets Setting: 31.7'-34.0'
Monitor: Schedule 40 PVC	Slot Size: .010"	Seal #2 Type Bentonite Pellets Setting: 21.0'-23.0'
FILTER MATERIAL	ROCK CORING	LEGEND
Type: #3 Q-Rok	Cored Interval: NA	Cement/Bentonite Grout Bentonite Seal Silica Sandpack
Setting: 23.0'-31.7'	Core Diameter: NA	
	Reamed Diameter: NA	
Client: NYSDEC	Project: Onondaga Nation Site-B	Project No. 35235.12
URS Consultants Inc.	Monitoring Well Construction Details	Well Number: MW-4

Protective casing and lockable cap

Elevation 520.01

Elevation 517.49

Ground Level

AUGERHOLE
8.25 inch dia.
34.0 feet length

WELL RISER
2.0 inch dia.
27.0 feet length

WELL SCREEN
2.0 inch dia.
5.0 feet length

21.0

23.0

25.0

30.0

31.7

34.0

(Ft.)

DRILLING SUMMARY

Geologist:
Daniel Sheldon
Drilling Company:
American Auger
Driller:
Rocky Baye
Date:
12/13/91

GEOLOGIC LOG

depth(ft.)	lithology
------------	-----------

0-1.5	Clayey silt
-------	-------------

1.5-16.5	F/m sand trace silt, silty clay, seams
----------	---

16.5-20.0	Silty clay, trace f/m sand
-----------	----------------------------------

WELL DESIGN**CASING MATERIAL**

Surface: Steel

Monitor: Schedule 40 PVC

FILTER MATERIAL

Type: #3 Q-Rok

Setting: 10.8'-17.7'

SCREEN MATERIAL

Type: Schedule 40 PVC

Slot Size: .010"

ROCK CORING

Cored Interval: NA

Core Diameter: NA

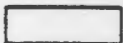
Reamed Diameter: NA

SEAL MATERIAL

Seal #1 Type Bentonite Pellets
Setting: 17.7'-18.5'

Seal #2 Type Granular Bentonite
Setting: 8.6'-10.8'

LEGEND

 Cement/Bentonite Grout
 Bentonite Seal
 Silica Sandpack

Client: NYSDEC

URS
Consultants Inc.

Project: Onondaga Nation
Site-B

Monitoring Well
Construction Details

Project No. 35235.12

Well Number:
MW-5

Elevation 514.72

Elevation 512.90

Protective casing and lockable cap

Ground Level

AUGERHOLE

8.25 inch dia.
18.5 feet length

8.6

10.8

12.0

17.0

17.7

18.5

20.0

Cave In

WELL RISER

2.0 inch dia.
13.8 feet length

WELL SCREEN

2.0 inch dia.
5.0 feet length

D
E
P
T
H
(Ft.)

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO.

MW-1

PROJECT: ONONDAGA NATION - SITE B

SHEET NO. 1 OF 1

CLIENT: NYSDEC

JOB NO.: 35235.12

BORING CONTRACTOR: American AUGER

BORING LOCATION: Side Gradient

GROUND WATER:

CAS. SAMP CORE TUBE

GROUND ELEVATION: 523.67

DATE TIME LEV TYPE TYPE SS (Split-Spoon)

DATE STARTED: 12/11/91

12/11 9:30A 22.0' Hole at 23' DIA.

DATE FINISHED: 12/11/91

12/12 9:30A 21.9' Top of Riser WT.

DRILLER: ROCKY BAYE

12/18 1:40P 22.50' Top of Riser FALL

GEOLOGIST: DANIEL Sheldon

* Measurements From GRADE - POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				HNU (ppm)	REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION		CLASS USCS		
		S-1	SS	2 6 5 5	35	GRAY-BRN	MED STIFF	Clayey Silt, Trace to some well sorted GRAVEL		ML	0.0	• Sl. moist
						↓	↓					
5		S-2	SS	12 17 11 9	20	BRN	STIFF				0.0	• HARD Augering 3-4' • Limestone Frgs. at 6'
						↓	↓					
9						↓	↓					
10		S-3	SS	13 9 7 6	45	BRN	MED DENSE	FINE to MEDIUM SAND, Few COARSE SAND AND GRAVEL SEAMS (6" TYP) TRACE Silt		SW	4.0	• Moist • Environ- mental Sample 9-11
						↓	↓					
15		S-4	SS	3 5 7 7	50	LT. BRN					0.0	• U. Moist at 15'
						↓	↓					
20		S-5	SS	7 7 11 13	60	DARK BRN	MED DENSE	FINE to COARSE SAND AND GRAVEL trace Silt and Clay		SW- GW	0.0	• Wet at 20.5'
21		S-6	SS	7 6 6 4	25	↓	↓				0.0	• Geotech. Sample 23- 25'
		S-7	SS	8 6 6 7	35	↓	↓				0.0	
25		S-8	SS	8 12 11 10	30	↓	↓				0.0	
28.5		S-9	SS	3 4 4 7	40	↓	LOOSE				0.0	
						ND/BRN	MED STIFF	CLAY, some silt, tr. sand		CL		
30	END of Boring							Boring Completed at 29.0'				
35												

COMMENTS

Hole ADVANCED with a Mobile B-57 drill rig equipped with 4 1/4" Augers.
PID readings taken on split spoon samples and drill cuttings.PROJECT NO.
BORING NO.35235.12
MW-1

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO.

MW-2

PROJECT: ONONDAGA NATION - SITE B

SHEET NO. 1 OF 1

CLIENT: NYSDEC

JOB NO.: 35235.12.

BORING CONTRACTOR: AMERICAN AUGER

BORING LOCATION: Upgradient

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 531.65

DATE TIME LEV* TYPE

TYPE

SS (SPLIT-SPoon)

DATE STARTED: 12/10/91

12/10 2:00 PM 28.5 Hole at 31.5'

DIA.

2"

DATE FINISHED: 12/10/91

12/10 32.1 " " 32.8'

WT.

140lb.

DRILLER: ROCKY BAYE

* FROM GROUND SURFACE

FALL

30"

GEOLOGIST: DANIEL SHELDON

12/13 1:15 P 28.22 TOP OF RISEN

POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
28.5		S-1	SS	2 2	60	D. BRN	SOFT	CLAYEY SILT, SOME FILL	-	• Brick Frags.
31.5				5 10		LT. BRN	MED STIFF	FINE TO COARSE SAND AND SILT, SOME CLAY, TRACE GRAVEL	ML-SW	• Geotechnical Sample, 4-6'
32.1		S-2	SS	6 5	40					• Sl. Moist
32.8				4 4						• Environmental Sample, 8-10'
32.8		S-3	SS	4 4	60	BRN GRAY	LOOSE	COARSE GRAVEL, SOME SILT AND SAND, TRACE CLAY, SOME Limestone Frag- MENTS	GM	• Sl. Moist
32.8				6 6						
32.8		S-4	SS	15 26	20		V. DENSE			• HARD Augering at 16.0 Feet
32.8				25 19						
32.8		S-5	SS	49 60	45					Clayey Silt layer 19-20'
32.8				34 22						
32.8		S-6	SS	14 40	5					
32.8				43 43						
32.8		S-7	SS	12 17	60	BRN	DENSE	FINE TO COARSE SAND, TRACE GRAVEL, SILT AND CLAY	SW	• WET • Geotech Sample 25.5-27.5'
32.8		S-8	SS	6 12	70					
32.8				17 21						
32.8		S-9	SS	4 5	80					
32.8				8 12						• Geotech Sample 31.5-33.5'
32.8		S-10	SS	13 10	70					Boring Com- pleted at 35.5'
32.8				14 17		BRN	MED DENSE	FINE TO COARSE SAND AND GRAVEL, Tr. Silt	SN-GM	
32.8		S-11	SS	13 8	65					
32.8				17 12						

COMMENTS

Hole advanced with a Mobile B-57 drill rig equipped with 4 1/4" Augers.
 PID readings taken on split spoon samples and drill cuttings. No readings above
 background.

PROJECT NO.

35235.12

BORING NO.

MW-2

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO.

MW-3

PROJECT: ONONDAGA NATION - SITE B

SHEET NO. 1 OF 1

CLIENT: NYSDEC

JOB NO.: 35235.12

BORING CONTRACTOR: AMERICAN AUGER

BORING LOCATION: SIX GRADIENT

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 523.53

DATE 12/11

TIME 2:15 P

LEV 25.5

TYPE BOREHOLE

TYPE DIA.

SS (Split-Span)

DATE STARTED: 12/11/91

DATE FINISHED: 12/11/91

12/11

2:15 P

25.5

BOREHOLE

DIA.

2"

WT.

140 lb

* From Ground SURFACE

Completion

WT.

FALL

30"

GEOLOGIST: DANIEL Shelton

12/13 1:20 P

27.80

TOP OF Riser

POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
2	Loess	S-1	SS	4 7 4 8	65	D. BRN ↓	MED STIFF ↓	CLAYEY SILT, TRACE TO SOME GRAVEL	ML	• Rust mottles at 2'
5		S-2	SS	5 6 6 7	50	LT. BRN ↓	MED. DENSE ↓	FINE TO MEDIUM SAND, TRACE SILT	SW	• Geotech. Sample • DRY
10		S-3	SS	4 4 4 4	75	↓	↓	↓	↓	
15		S-4	SS	3 3 3 3	60	BRN. ↓	↓	↓	↓	• DRY
20		S-5	SS	5 4 6 8	90	↓	↓	↓	↓	• moist at 20.5'
25	12/16	S-6	SS	1 2 1 2	90	↓	↓	↓	↓	• ENV. Sample • Wet at 25' • Geotech. Sample 26-28'
28		S-7	SS	3 1 2 6	80	↓	↓	↓	↓	
30		S-8	SS	14 17 11 17	5	BRN ↓	MED DENSE ↓	FINE TO COARSE SAND AND GRAVEL, TRACE Silt	SW- GW	
		No sample, over-drilled				↓	↓	↓	↓	
		S-9	SS	5 6 6 8	65	↓	↓	↓	↓	
35		S-10	SS	5 5 7 9	75	GRAY ↓	↓	↓	↓	• WET
BORING Completed AT 35.0'										

COMMENTS HOLE ADVANCED with a Mobile B-57 drill rig equipped with 4 1/4" Augers.
PID reading taken on split-spoon samples AND drill cuttings. No readings ABOVE
background.

PROJECT NO.

35235.12

BORING NO.

MW-3

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO.

MW-4

PROJECT: ONONDAGA NATION - SITE 3

SHEET NO. 1 OF 1

CLIENT: NYSDEC

JOB NO.: 35235.12

BORING CONTRACTOR: AMERICAN AUGER

BORING LOCATION: DOWNGRADIENT

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 517.99

DATE

TIME

LEV

TYPE

TYPE

SS (Split-Spoon)

DATE STARTED: 12/12/91

12/12

1:00 P

29.3

Bene Hole

DIA.

2"

DATE FINISHED: 12/12/91

Completion

WT.

140 lb.

DRILLER: ROCKY BAYE

From G.S.

FALL

30"

GEOLOGIST: DANIEL SHELDON

12/13

1:24 P

29.3

TOP OF RISER

POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE				DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"	RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
2	S.S.	S-1	SS	2 7	40	D.BRN LT BRN	MED STIFF	CLAYEY SILT, TRACE ORGANIC MATERIAL	ML	• Olive Green mottles
	S.S.	S-2	SS	2 2	20	BRN	LOOSE	Fine to MEDIUM SAND, Some Fine to COARSE	SW- SM	• SI. Moist
5	S.S.	S-3	SS	2 3	20			Gravel. Trace to Some Silt		• Trace Root material • SI. Moist
	S.S.	S-4	SS	2 2	40					
	S.S.	S-5	SS	7 6	50					
10	S.S.	S-6	SS	5 5	60					
11.6	S.S.	S-7	SS	6 7	60	BRN	MED DENSE	FINE SAND, TRACE SILT	SW	• SI. Moist
	S.S.	S-8	SS	5 6	60					
15	S.S.	S-9	SS	7 8	70	RD/BRN	MED STIFF	CLAY AND SILT, Tr. SAND	CL- ML	CLAY layer 14.5 - 15.4' Root HOLES
	S.S.	S-10	SS	6 5	75	BRN	MED DENSE	FINE TO MEDIUM SAND	SW	
	S.S.	S-11	SS	7 9	70					
20	S.S.	S-12	SS	6 8	70	RD/BRN	STIFF	CLAY, TRACE SAND IN PARTINGS	CL	CLAY layer 19.3- 19.4'
20.5	S.S.	S-13	SS	7 7	90	BRN	MED DENSE	FINE TO MEDIUM SAND	SW	BRN. clayey silt seam (1") at 20' Root material present
21.5	S.S.	S-14	SS	15 15	90	RD/BRN	STIFF	CLAY, Tr. SAND IN PARTINGS	CL	• Moist @ 25.5'
	S.S.	S-15	SS	7 10	70	BRN	MED DENSE	FINE TO MEDIUM SAND, TRACE SILT	SW	• Wet @ 26'
25	S.S.	S-16	SS	6 8	80					
27.3	S.S.	S-17	SS	1 8	80					
	S.S.	S-18	SS	9 6	90	RD/BRN	MED STIFF	CLAYEY SILT, TRACE FINE TO MEDIUM SAND	CL	
30	S.S.	S-19	SS	6 6	90					
	S.S.	S-20	SS	6 7	90					
	S.S.	S-21	SS	4 4	85					• Moist GRAY SAND PARTINGS 31-32'
	S.S.	S-22	SS	4 5	85					
	S.S.	S-23	SS	2 2	95					
35	S.S.	S-24	SS	4 4	95					• Wet gray silty SAND seam AT 35' (3")
36	S.S.	S-25	SS	2 6	90					
	S.S.	S-26	SS	7 8	90					

COMMENTS

Boring completed at 36' Hole advanced with a Mobile B-57 drill
 rig equipped with 4 1/4" augers. PTD readings taken on split-spoon samples
 and drill cuttings. No readings above background.

PROJECT NO.

35235.12

BORING NO.

MW-4

* Environmental Sample
 ** Geotech Sample

URS CONSULTANTS, Inc.

TEST BORING LOG

BORING NO.

MW-5

PROJECT: ONONDAGA NATION - Site B

SHEET NO. 1 OF 1

CLIENT: NYSDEC

JOB NO.: 35235.12

BORING CONTRACTOR: AMERICAN AUGER

BORING LOCATION: DOWNGRADIENT

GROUND WATER:

CAS.

SAMP

CORE

TUBE

GROUND ELEVATION: 512.90

DATE

TIME

LEV

TYPE

TYPE

SS(Split-Spoon)

DATE STARTED: 12/13/91

12/18

—

16.43

Top of Riser

DIA.

2"

DATE FINISHED: 12/13/91

12/19

—

16.56

—

WT.

140 lb.

DRILLER: ROCKY BAYE

FALL

30"

GEOLOGIST: DANIEL SHEDDEN

POCKET PENETROMETER READING

REVIEWED BY:

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
1.5		S-1	SS	2 6	2 9	60	BRN	MED STIFF	CLAYEY Silt, Root Material	ML	• Rock in NOS of sampler • Moist @ 8' RED/BRN Clay seams (3") at 9' and 10.5' • wet @ 15' • Environmental sample, 14-16' • Wet Gray SAND PARTINGS 19.5-20.0'
							BRN	LOOSE	FINE to MEDIUM SAND, Some FINE to COARSE GRAVEL, TRACE Silt	SW	
5		S-2	SS	5 4	4 6	45	↓	↓	↓	↓	
6		S-3	SS	4 4	4 5	55	BRN	LOOSE	FINE to MEDIUM SAND, TRACE Silt, Few CLAY SEAMS (3" TYP)	SW	
10		S-4	SS	5 8	7 9	40	↓	MED DENSE	↓	↓	
15		S-5	SS	3 2	4 3	70	↓	LOOSE	↓	↓	
16.5		S-6	SS	2 3	2 7	70	RED/BRN	SOFT	CLAY, Some Silt, FINE SAND IN PARTINGS	CL	
20	END OF BORING	S-7	SS	4 2	2 4	90	↓	↓	↓	↓	
							Boring Completed At 20.0'				
25											
30											
35											

COMMENTS: Hole advanced with a Mobile B-57 drill rig equipped with 4 1/4" Augers. PID readings taken on split-spoon samples and drill cuttings. No readings above background.

PROJECT NO.

35235.12

BORING NO.

MW-5

* Geotechnical Sample