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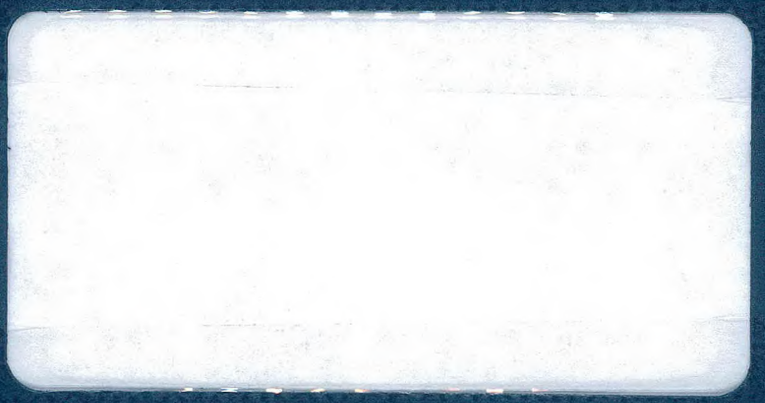
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GERAGHTY & MILLER, INC.
Environmental Services

A Heidemij Company

REPORT ON THE GEOPHYSICAL SURVEY
SYRACUSE CHINA LANDFILL
SYRACUSE, NEW YORK

January 1995

Prepared for

Syracuse China Manufacturing Company
Post Office Box 4820
Syracuse, New York 13221-4820

Prepared by

Geraghty & Miller, Inc.
24 Madison Avenue Extension
Albany, New York 12203
(518) 452-7826

TRANSMITTAL MEMORANDUM

TO: Distribution

FROM: Steven Scharf
Remedial Section A, BWRA, Division of Hazardous Waste Remediation

RE: Syracuse China Facility
Site Name/ID No.

DATE: January 20, 1995

Please find ☒ attached ☐ under separate cover the following document(s) regarding the subject site:

☐ Scope of Work: _____ ☐ Work Plan: _____

☐ RI Report: _____ ☐ FS Report: _____

☐ Design Documents: _____ ☐ QAPP: _____

☐ PRAP: _____ ☐ ROD: _____

☐ Our Comments Regarding: _____

☒ Other: Report on Geophysical Survey at the Syracuse China Landfill

These are transmitted :

☐ For your review/approval. Please provide written comments by February 10, 1995.

☐ For your information/records.

If you have any questions or need additional information, please contact ☑ myself
or ☐ (518) 457-7343 at _____.

Remarks: _____

Distribution: C. Branagh Region 7 D. Heder CRA

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REPORT ON THE GEOPHYSICAL SURVEY
SYRACUSE CHINA LANDFILL
SYRACUSE, NEW YORK

January 19, 1995

Prepared by GERAGHTY & MILLER, INC.

William J. Gray
Project Scientist/Project Manager

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Senior Associate/Project Officer

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2. Anomalous Total Magnetic Field on November 16 and 17, 1994, Syracuse China Landfill, Syracuse, New York.

3. Vertical Gradient of Total Magnetic Field on November 16 and 17, 1994, Syracuse China Landfill, Syracuse, New York.

4. Magnetic Model of One Drum at a Seven Foot Depth.

5. Magnetic Model of Twenty Drums at a Five Foot Depth.

REPORT ON THE GEOPHYSICAL SURVEY
SYRACUSE CHINA LANDFILL
SYRACUSE, NEW YORK

INTRODUCTION

At the request of Syracuse China Manufacturing Company, Geraghty & Miller, Inc. conducted a magnetometer survey at the Syracuse China Landfill site in Syracuse, New York. The data was collected on November 16 and 17, 1994. The purpose of the survey was to outline areas in the western portion of the landfill where appreciable amounts of metal may have been buried and to attempt to determine whether drums are present in the areas where significant amount of metal are indicated. This report provides a description of the field procedures and data processing activities, and presents the interpretation, conclusion, and recommendations resulting from the geophysical investigation.

METHODOLOGY

SURVEY GRID

Prior to data collection, a grid system was established. North-south lines, spaced 40 feet apart, were surveyed and staked. Additional stakes were placed along these lines at 50 foot intervals. These locations were surveyed by Lehr Land Surveyors of Liverpool, New York (see Figure 1). In addition to the surveyed points, pin flags were placed midway between the 40 foot lines to allow control of the survey along lines spaced 10 feet apart.

FIELD DATA RECORDING

The magnetic field data was recorded using a Envi-Mag magnetometer manufactured by Scintrex, Toronto, Canada, Ltd. This instrument is a proton procession magnetometer which measures the strength of the magnetic field at any point. The instrument automatically

measures both the total magnetic field strength and the vertical gradient of the total magnetic field. The data is recorded in solid state memory in the instrument and is downloaded to a portable computer at regular intervals.

Prior to the start of the magnetic survey, a base station was established away from the landfill in an area where magnetic anomalies were not evident. The base station was used to record the natural variations of the earth's magnetic field. The base station instrument was a GSM-19 magnetometer manufactured by GEM System, Inc. of Richmond Hill, Ontario, Canada.

Both the total magnetic field and the vertical gradient of the total magnetic field were recorded over the western portion of the landfill. Data was recorded by traversing along north-south lines spaced 10 feet apart. The magnetometer recorded data automatically at one reading per second. Using this recording interval, data points are spaced approximately three feet apart providing more than adequate resolution for this survey.

DATA PROCESSING

The base station data indicated that only small diurnal changes occurred in the earth's magnetic field during the magnetometer survey such that corrections for these changes were minimal. A constant magnetic field value is determined using the base station data. To observe magnetic anomalies more clearly, the constant magnetic field value was subtracted from the magnetic field value at every data point. The map resulting after this value has been removed is called the Anomalous Total Field (ATF). The ATF is presented on Figure 2. It should be noted that the removal of the constant magnetic field from the data does not change the shape or amplitude of the anomaly and therefore does not influence their interpretation. The ATF data has been contoured and is on Figure 1. The vertical gradient data is also presented as a contoured map (see Figure 3). These maps form the basis for the interpretation of the magnetic field results.

DATA INTERPRETATION

The target for this survey are anomalies which may represent buried drums. In order to interpret magnetic data it is important to have an estimate of the magnitude of the expected anomalies. Modeling has therefore been performed, using the software program Magix-XL, to estimate the magnitude of these expected anomalies. One drum buried at a depth of about 5 feet results in a magnetic anomaly of about 25 gammas, see Figure 4. Twenty drums buried at approximately the same depth produces an anomaly whose amplitude is about 700 gammas, see Figure 5.

The interpretation of magnetic data is done mostly using the ATF data (Figure 2). However, the vertical gradient data (Figure 3) is used to confirm the anomaly locations. It is also useful when diurnal drift of the magnetic field occurs since this data is not influenced by such drift. The data showed that very little diurnal activity was present during the survey, with variations in the total magnetic field strength of only 10 to 20 gammas. Since anomalies being searched for are anticipated to the hundreds of gammas, the diurnal influence is insignificant. Vertical gradient data is also useful where magnetic sources exist at several discrete depths. Specific depth discrimination was not observed on the vertical gradient data, suggesting that metal sources may be scattered vertically throughout the landfill.

The Anomalous Total Magnetic Field map (Figure 2) can be roughly divided into three regions. Region one includes the entire southern 100 feet of the survey grid. This region shows many negative anomalies (dark blue) which result mostly from the influence caused by the power lines which run east to west across the southern boundary of the landfill. Region two, located in the northwestern portion of the landfill, encompasses the area from 100 feet north to 450 feet north and from zero feet east to approximately 170 feet east. This region contains only fairly small isolated anomalies. The third region encompasses the northeastern portion of the landfill, from 100 feet north to 450 feet north and from 170 feet east to 520 feet east. This region contains numerous small to moderate anomalies. Many

of these anomalies have amplitudes of a few hundred gammas whereas a few of them have anomalies of over 1000 gammas. Figure 1 shows the largest of these anomalies, labeled A through J. It is important to note that a magnetic anomaly normally includes both a magnetic high and a magnetic low. The magnetic low, which usually occurs on the northern side of an anomaly, results from south magnetic poles being induced by the earth's magnetic field as it exits the metal body giving rise to the anomaly. Each of the anomalies identified is discussed below.

- Anomaly A is an isolated anomaly having an amplitude of about 700 gammas. It is defined mostly along one line and has therefore a fairly limited areal extent.

- Anomaly B is a conglomerate of a number of anomalies whose amplitude is large (1,000 to 2,000 gammas) but the areal extent of most of the anomalies are relatively small (generally less than 10 feet). These anomalies generally appear to represent small to moderate size metallic objects at a fairly shallow depth. The larger anomaly on the eastern side of this region has a high amplitude (approximately 2,000 gammas) and a somewhat larger areal extent.

- Anomaly C is a modest amplitude anomaly (700 to 900 gammas) having a large areal extent. This anomaly could represent either relatively small amounts of scattered metal at a shallow depth or more significant amounts of metal at greater depths.

- Anomaly D appears to result from two discrete sources, one on the southern end of the anomalous area and one on the northern end of the anomalous area. The anomaly on the northern end of this area has the highest amplitude (approximately 1,000 gammas).

- Anomaly E has a fairly high amplitude (approximately 1,000 gammas) but a fairly small areal extent (approximately 10 feet). It is mostly identified on one line and is slightly larger than anomaly A.

- Anomaly F appears to be comprised of several small magnetic highs (700 to 1,000 gammas). Its areal extent is less than 40 feet.

- Anomaly G is a broad magnetic anomaly of moderate amplitude (500 to 800 gammas). The broad nature and smoothness of this anomaly suggests that it represents a deeper magnetic source.

- Anomaly H is a relatively small anomaly having an amplitude of approximately 300 to 600 gammas. Its areal extent is approximately 20 feet and the anomaly is defined by at least two lines.

- Anomaly I is generally a fairly broad anomaly with a localized high amplitude peak of approximately 1,400 gammas. This anomaly may represent both shallow and deeper sources.

- Anomaly J is a complex anomaly whose amplitude extremes (both positive and negative) are plotted in between the data lines. This suggests, that although the anomaly is real, its amplitudes have been distorted by the contouring. Generally the anomaly has an amplitude of around 1000 gammas and is defined by several data lines.

The above anomalies constitute a set each having different shapes, amplitudes and complexities, but each one indicates buried metal. However, it is not possible to distinguish buried drums from other metal objects. The only criteria with which to categorize these anomalies is to assume a spatial configuration for the drums and then to look for anomalies which indicate this suspected pattern. If we assume that the drums would not be placed in a stacked manner, but rather would be scattered, we can then search for anomalies which

may indicate this pattern. The anomaly which most clearly fits this category is anomaly B, which exhibits scattering. To a much smaller degree anomalies F and J also suggest scattering, although this appears to be minor.

Anomalies which do not appear to indicate scattering are anomalies A and E. These anomalies suggest more local concentrations of buried metal. The broad nature of anomaly C suggests a deeper source. If this is the case then scattering would be difficult to detect since then anomalies from the individual objects would tend to overlap and produce one broad anomaly.

CONCLUSIONS

The magnetic survey has defined several magnetically anomalous areas at the site. These anomalies have been outlined and are labeled A through J in the interpretation. Generally, areas with buried drums exhibit high magnetic amplitude over a moderate to large area. Based upon the results of this magnetic survey, anomaly B is the area with the greatest potential to contain buried drums.

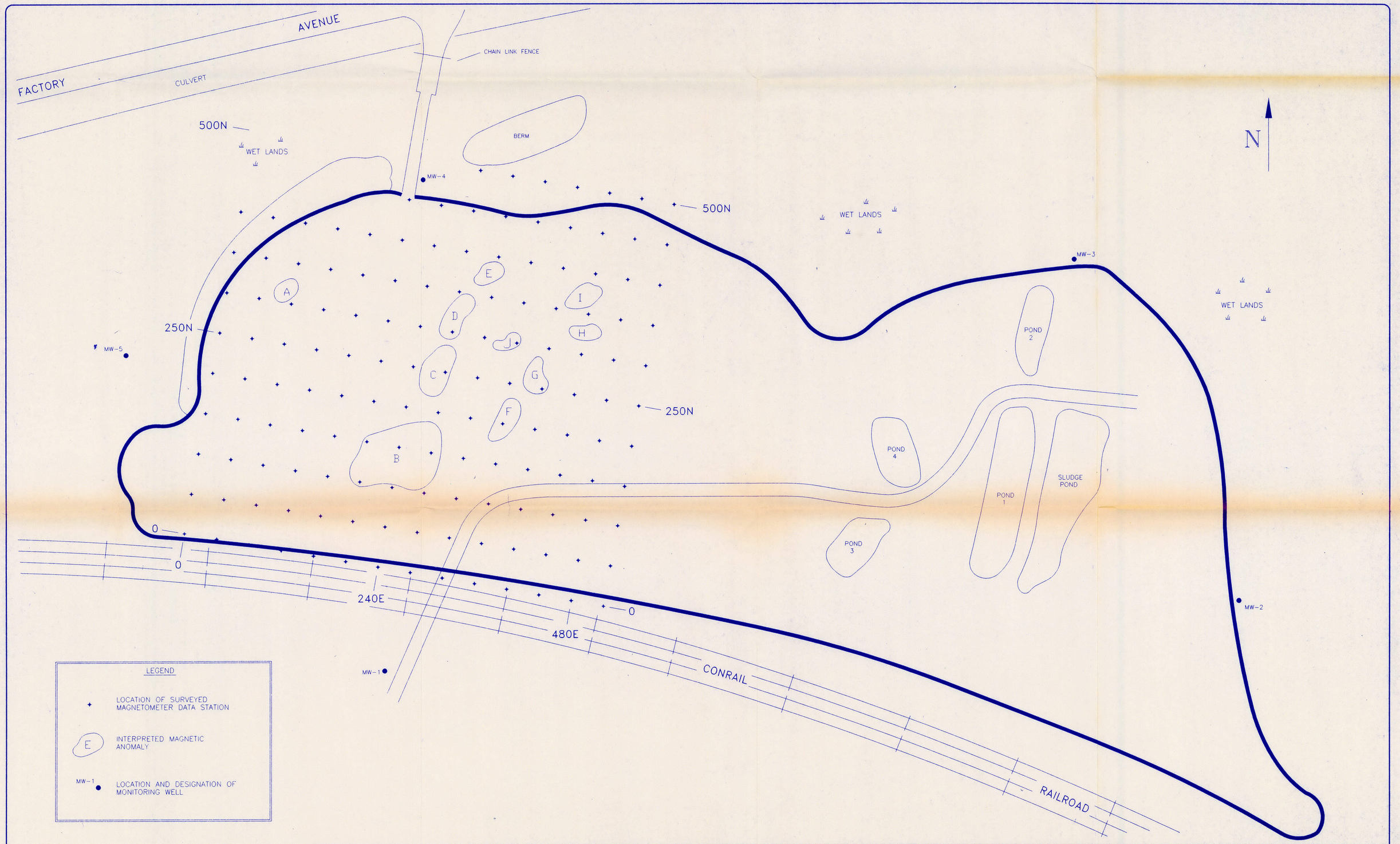
RECOMMENDATIONS

Based on the results of the magnetic survey, it is recommended that a limited pilot excavation be performed to verify the magnetic data collected. The objective of the pilot excavation would be to determine the presence or absence of buried drums and their approximate depth and number. Based on the data collected during the magnetic survey, the following areas should be further investigated:

Anomaly B: Based on its scattered magnetic pattern and high magnetic amplitude, anomaly B best displays the potential for buried drums.

Anomaly C: The broad areal extent of anomaly C may indicate significant amounts of metallic objects, possible buried drums, at greater depths.

FIGURES



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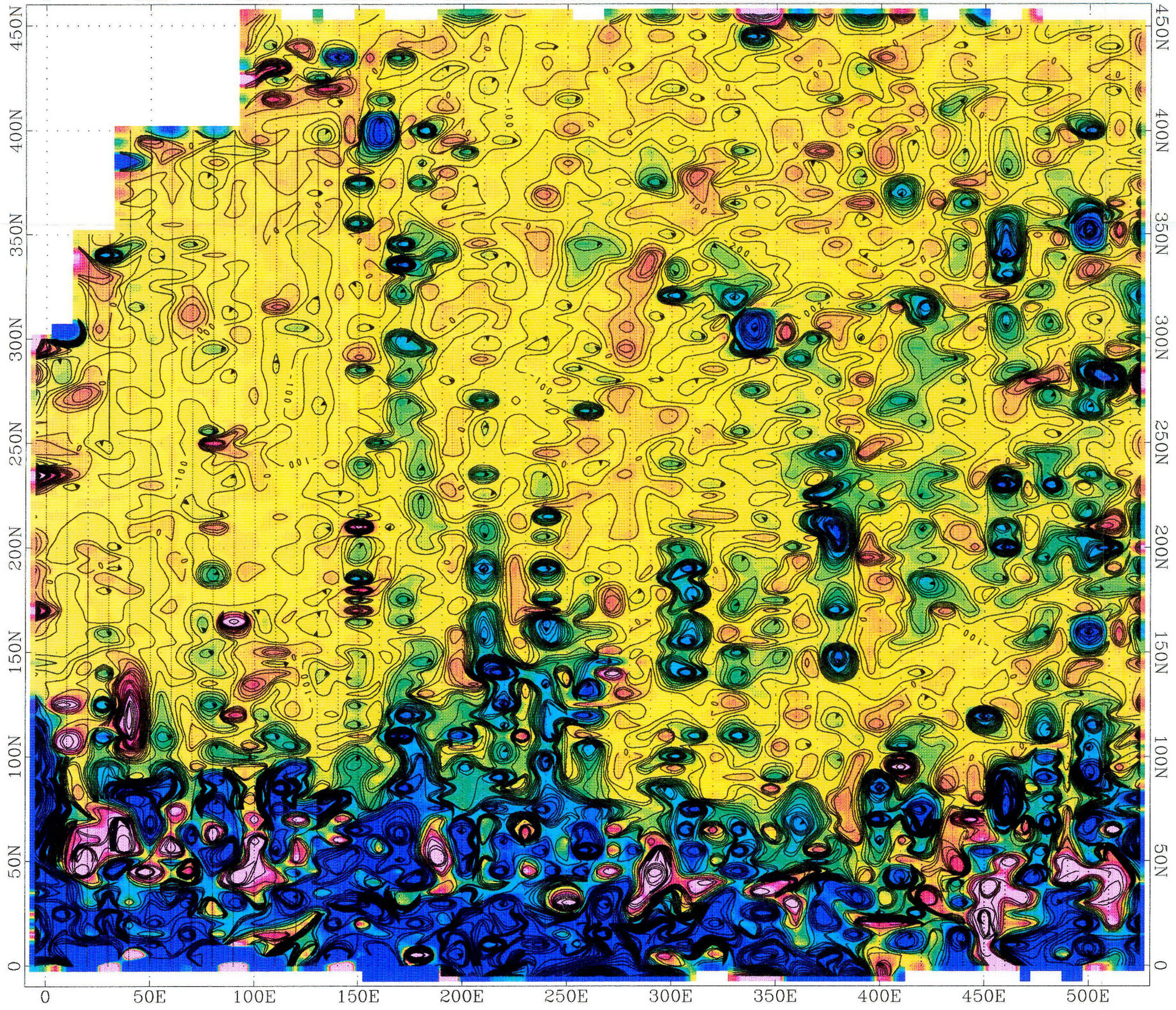
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DRAWING: G126A	PLOT SIZE:
DRAFTED BY: TAD/FJF	DATE: 12-14-94
CHECKED BY: B. GRAY	DATE: 12-14-94
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LOCATION OF SURVEYED MAGNETOMETER DATA STATIONS AND INTERPRETATION OF MAGNETIC DATA
SYRACUSE CHINA LANDFILL,
SYRACUSE, NEW YORK

FIGURE
1



DATA RECORDING PARAMETERS

Data recorded using an ENVI-MAG instrument manufactured by Scintrex, Canada, Ltd.

Data recorded while walking at a slow speed.

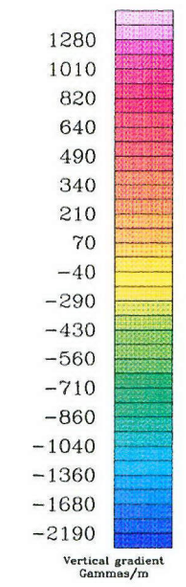
Distance between readings is generally less than 3 feet.

DATA PROCESSING AND PLOTTING PARMETERS

Vertical Gradient data.

Contour interval is 100 gammas.

..... Data points



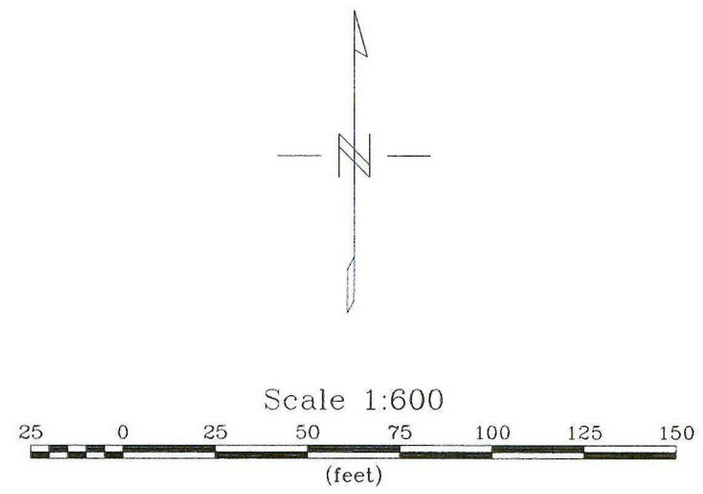


Figure 3

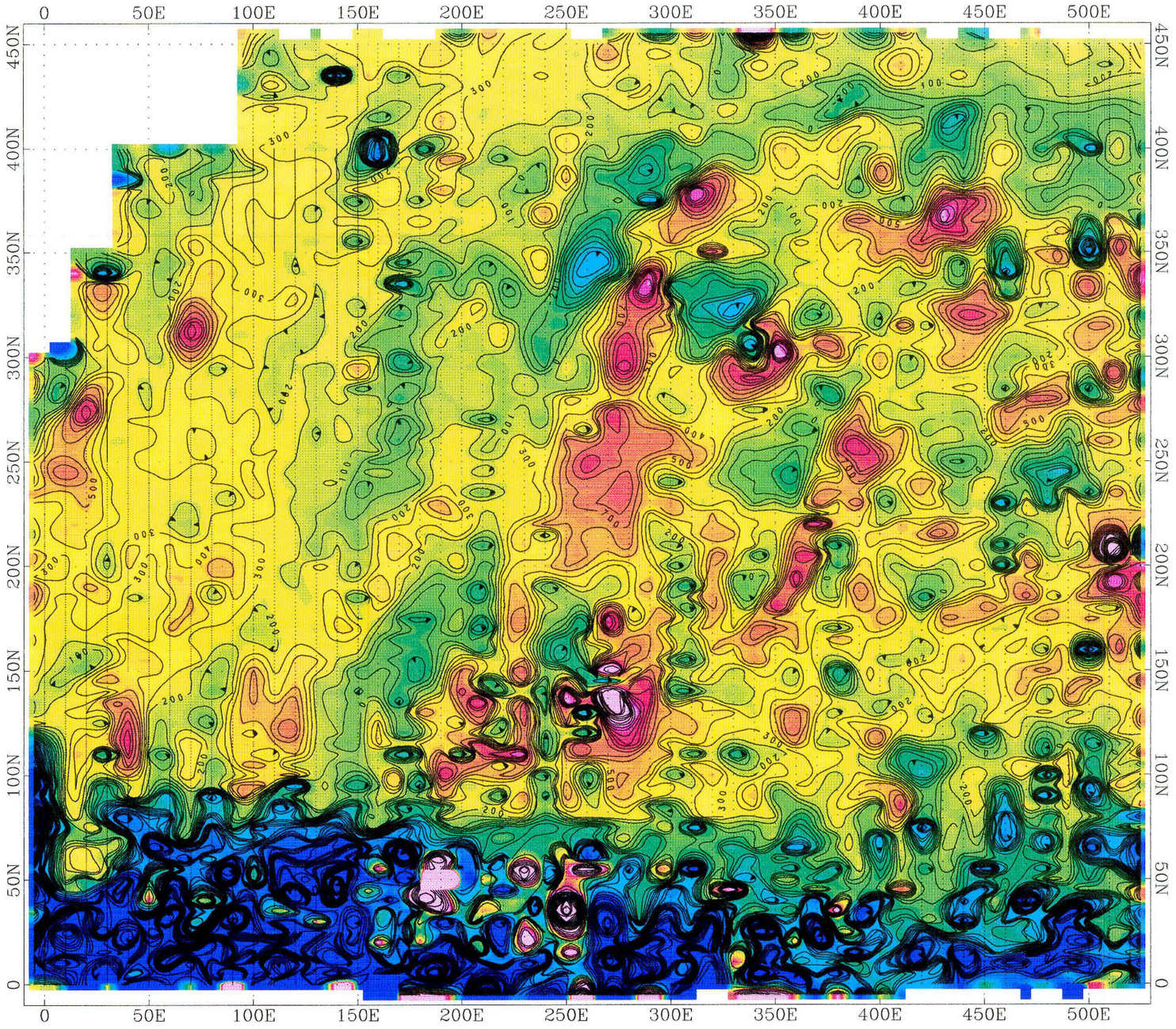
Geophysical Survey

Syracuse China Landfill

Syracuse, New York

Vertical Gradient of Total Magnetic Field.
Data recorded on November 16 & 17, 1994
by Judy Gardner and Ed Wightman.
Data processed by Ed Wightman.

Geraghty & Miller, Inc. Geophysics Group



DATA RECORDING PARAMETERS

Data recorded using an ENVI-MAG instrument manufactured by Scintrex, Canada, Ltd.

Data recorded while walking at a slow speed.

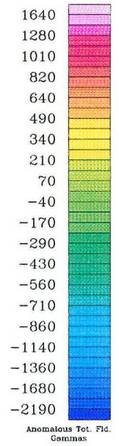
Distance between readings is generally less than 3 feet.

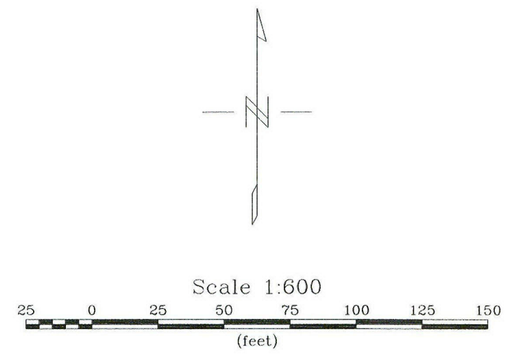
DATA PROCESSING AND PLOTTING PARMETERS

Magnetic field values corrected for diurnal drift.

Contour interval is 100 gammas.

..... Data points





Geophysical Survey

Syracuse China Landfill

Syracuse, New York

Anomalous Total Magnetic Field
Data recorded on November 16 & 17, 1994
by Judy Gardner and Ed Wightman.
Data processed by Ed Wightman.

Geraghty & Miller, Inc. Geophysics Group

Figure 2

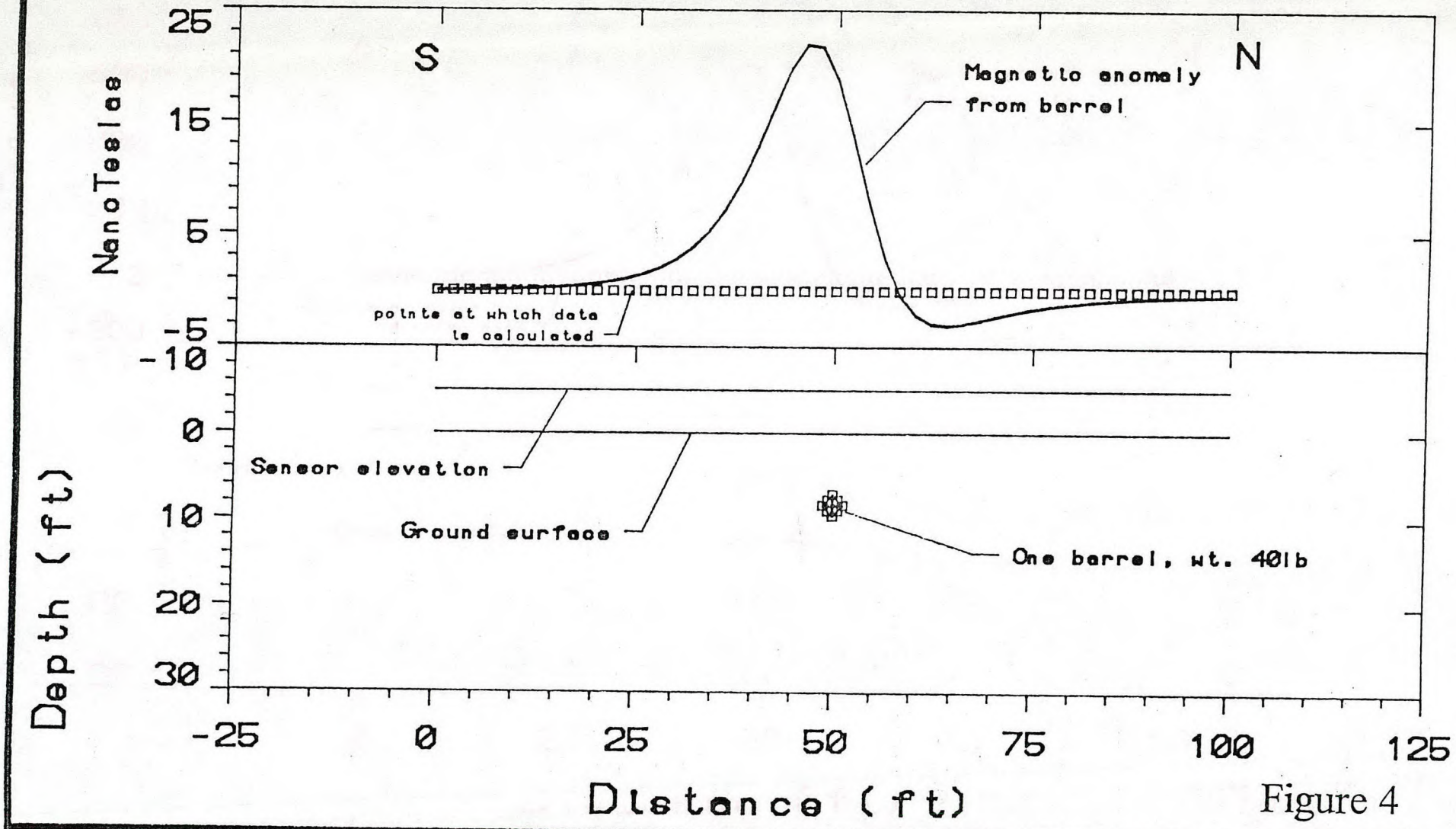


Figure 4

Inducing field : 55000. nt	for: Susceptibility = .04	Magnetic Model
Inclination : 65.00 deg	by: Geraghty & Miller	Model of one barrel
Strike Direction : -90.00 deg		Depth to top 7 ft
Profile Direction : 0.00 deg	Data Set: MODEL / Date: Oct 1991	
All Directions are Clockwise from Magnetic North	Scale: 1:228 / Profile:	Vertical Exaggeration: 1.19 : 1

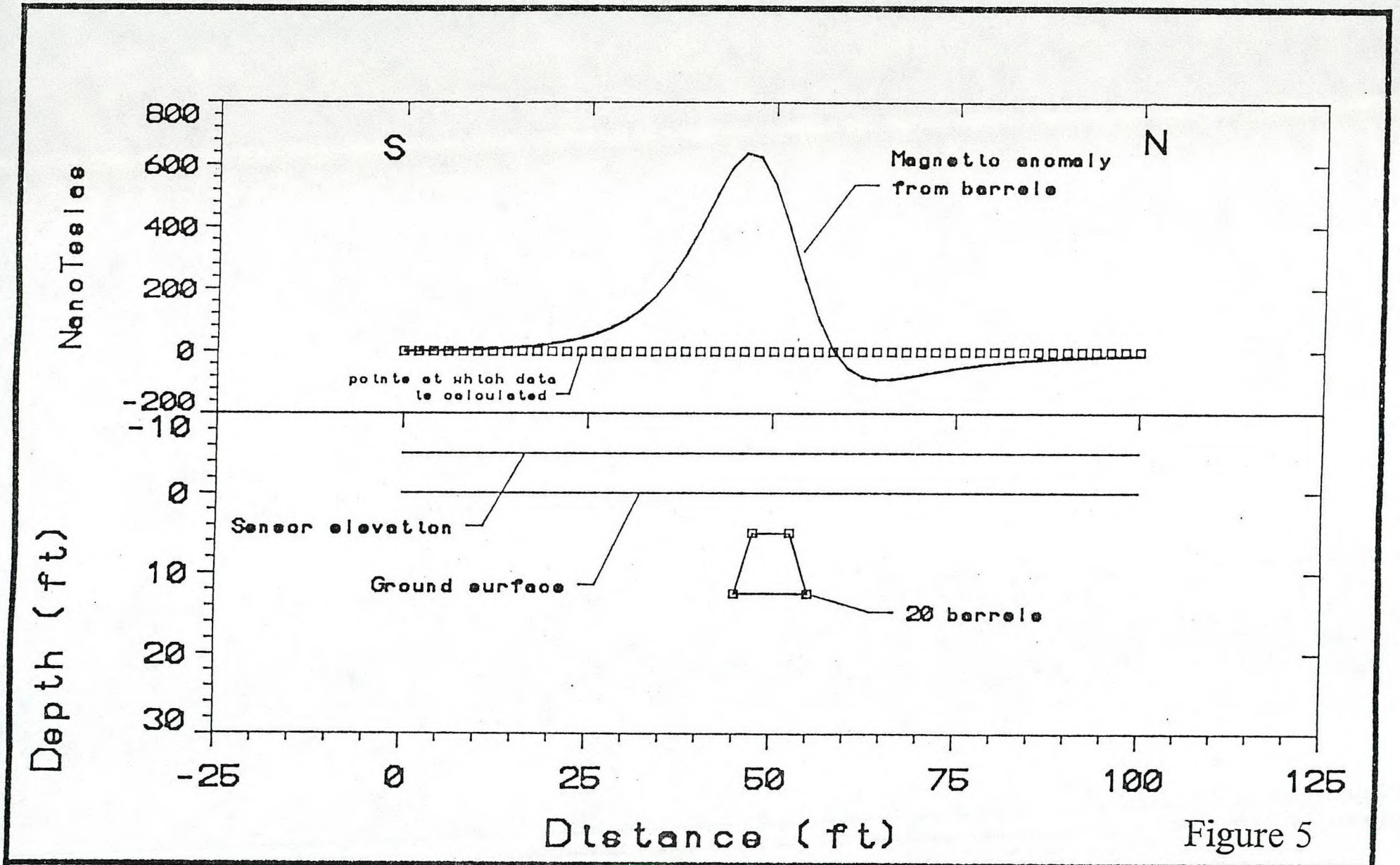


Figure 5

Inducing field : 55000. nt	for: Susceptibility = .04	Magnetic Model
Inclination : 65.00 deg	by: Geraghty & Miller	Model of 20 barrels
Strike Direction : -90.00 deg		Depth 5 ft, neatly stacked
Profile Direction : 0.00 deg	Date Set: DRUM20 / Date: Oct 1991	
All Directions are Clockwise from Magnetic North	Scale: 1:228 / Profile:	Vertical Exaggeration: 1.19 : 1