APPENDIX B-4

Geophysical Survey within the Proposed Eastern Bypass Construction Zone

Final Report

Geophysical Survey within the Proposed Eastern Bypass Construction Zone Fort McClellan Anniston-Oxford, Alabama

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Table of Contents

1.0 EXECUTIVE SUMMARY **2**

2.0 INTRODUCTION **3**

3.0 PROJECT OBJECTIVES **4**

4.0 SITE DESCRIPTION **5**

5.0 GEOPHYSICAL SURVEY: PROCEDURES AND METHODOLOGIES **6**

5.1 COORDINATE SYSTEMS 6
5.2 SURVEY POSITIONS 6
5.3 GEOPHYSICAL DATA ACQUISITION 6
5.4 FIELD DEPLOYMENT ISSUES 7
5.5 GEOGRAPHICAL INFORMATION SYSTEMS 8
5.6 DATA PROCESSING 8
5.7 DATA ANALYSIS PROCEDURES 9
5.8 FEATURES OBSERVED IN THE GEOPHYSICAL DATA 10

6.0 TARGET PARAMETERS **11**

6.1 AREA SPECIFIC TARGET RESULTS 11
6.1.1 Area 1 ..... *11*
6.1.2 Area 2 ..... *11*
6.1.3 Area 3 ..... *11*
6.1.4 Area 4 ..... *12*
6.1.5 Area 5 ..... *12*
6.1.6 Area 6 ..... *12*

7.0 DELIVERABLES **13**

ATTACHMENT A: TARGET LISTINGS **1**

APPENDIX 1: FORT MCCLELLAN GEOPHYSICAL MAPS **1**

APPENDIX 2: GEOPHYSICAL PROVE-OUT REPORT **1**

List of Tables

Table 1. Coordinate System Information. 6

1.0 EXECUTIVE SUMMARY

Sanford Cohen and Associates, Inc. (SC&A) was contracted by ZAPATAENGINEERING, P.A. to analyze data obtained during a geophysical survey within the proposed Eastern Bypass construction zone at Fort McClellan Army Depot. The installation is located in Anniston, Alabama approximately 60 miles east of Birmingham. The geophysical survey objective was to detect, locate and discriminate possible unexploded ordnance (UXO) at the site. Data collection was performed by USA Environmental, Inc. using the Geonics EM-61 electro-magnetic induction instrument. This instrument was selected on the basis of the geophysical proveout results, obtained form surveys performed on March 3 & 9, 1999 (Appendix 2). Data were collected on 100x100 foot grids, using a 2.5 foot cross-line spacing and a .64 foot in-line sample spacing. Positioning was accomplished using a tick wheel and grid positions marked by Sain Associates, Inc., using survey markers, prior to the geophysical survey. surveyed in be Sanin Associates, Inc. These positions were summarily integrated within a geographical information system (GIS) to allow for processing and analysis of the geophysical data.

The geophysical survey was performed on six (6) separate areas within Fort McClellan between March 10 and March 17, 1999. See Appendix 1 for the locations of these areas. In total, USA Environmental, Inc. collected approximately 10 acres of EM-61 electromagnetic data, which was subsequently processed and analyzed by SC&A to produce a catalogue of suspected targets. A total of 1,315 anomalies were accurately detected and located.

2.0 INTRODUCTION

Sanford Cohen and Associates, Inc. (SC&A) was contracted by ZAPATA ENGINEERING, P.A. on July 20, 1998 to provide it's geophysical analysis and interpretation expertise on a geophysical survey at Fort McClellan in Anniston, Alabama. This work was performed in support of the construction of the Eastern Bypass at the Fort McClellan Army Depot. The geophysical survey objective was to detect unexploded ordnance (UXO) items by conducting a high-resolution geophysical investigation within six (6) predefined areas using methods described in the geophysical prove-out, Appendix 2. Data was acquired using an electro-magnetic induction unit, Geonics EM-61, in the tick-wheel mode with a 2.5-foot lane spacing and a .64 foot in-line sample spacing. Approximately ten (10) total acres were surveyed by USA Environmental, Inc. between March 10 and March 17, 1999. SC&A then processed and analyzed the EM-61 data sets to produce a catalog of targets.

3.0 PROJECT OBJECTIVES

The objective of this project was to perform a non-intrusive geophysical investigation within the proposed Eastern Bypass EE/CA at Fort McClellan, Alabama and produce a listing of subsurface targets interpreted to be potential unexploded ordnance (UXO). This report describes work performed by SC&A for ZAPATA ENGINEERING, P.A. under contract no. DACA87-95-D-0026 for the US Army Engineering and Support Center (CEHNC).

This report provides a description of the geophysical survey methods implemented, obstacles encountered, data processing procedures utilized, analysis methods employed, and the results generated. Included are tables, figures, and maps that illustrate points in the text and help document the results.

4.0 SITE DESCRIPTION

Geophysical surveys were conducted in the vicinity of Summerall Gate, located at the western boundary of Fort McClellan, Alabama. The Summerall Gate is located north of I-20, east of Birmingham, along route 21. The site is inside the Summerall gate and is comprised of six survey areas.

Several site-specific aspects affected the geophysical survey in terms of site access, sensor system deployment methodology and efficiency. These aspects include tree density, cultural features, and local geology. They are discussed in Section 5.4.

5.0 GEOPHYSICAL SURVEY: PROCEDURES AND METHODOLOGIES

Prior to the geophysical survey, a geophysical prove-out was performed to determine the most appropriate equipment to use at the site. The Geonics EM-61 electro-magnetic induction sensor was selected as the most suitable instrument, with positioning accomplished via tick wheel. Appendix 2 contains a copy of the submitted geophysical prove-out report which describes the various technologies tested and the results obtained.

5.1 Coordinate Systems

Geophysical data must be integrated with other geographic information from a site. This includes data from existing archival databases, compiled by CEHNC as well as data currently being compiled. Establishment of a uniform coordinate reference was essential to the success of the project.

SC&A incorporated a coordinate system, geographical datum, and spatial units consistent with the existing geographical information system (GIS) files provided on the project. These parameters are provided in Table 1.

Table 1. Coordinate System Information.

Datum	NAD83
Coordinate System	US State Plane
Projection Zone	Alabama East
Units	US Survey Feet

5.2 Survey Positions

Real-time GPS data was not collected due to the high density of the foliage in the area. Geophysical data were positioned using the tick wheel on the EM-61 and survey control points provided by Sain Associates, Inc. This positioning methodology was tested during the geophysical proveout and determined to be the best available technology for the site.

5.3 Geophysical Data Acquisition

A Geonics EM-61 electro-magnetic induction instrument was deployed as the survey

sensor. The EM-61 is a nonintrusive sensor technology. A primary magnetic field is induced by a short current pulse. This field induces a secondary magnetic field in conductive objects. The transient secondary magnetic field induces a current in the coils that is converted to a measured voltage (in milliVolts). By taking the ratios of these fields and applying a multiple to it, a quantifiable measurement in millivolts (mV) can be obtained.

Measurments were spaced .64 feet in the in-line direction and 2.5 feet in the cross-line direction. This line-based collection was applied at every grid on the site. Grids were surveyed along the line from the southwest corner moving towards the northwest corner. The line was subsequently shifted towards the northeast corner by a line-spacing. This collection geometry was adhered most of the time except where it was logistically infeasable. During the life of the project an average coverage rate of approximately 2 acres per survey day was achieved.

USA Environmental Inc. ran the EM-61 data logger in the field and downloaded the collected data to a computer at lunch and at the end of each field day. These data sets were checked by USA Environmental Inc. to ensure data quality. Calibration of the instrument was performed each day, in the morning. A quality control check was also done following data download, during the analysis of the geophysical data.

5.4 Field Deployment Issues

During the survey, several site-specific features caused complications in the data collection. These features included extensive foliage, cultural features, geological conditions, and general weather conditions.

ZAPATA ENGINEERING, P.A. cleared much of the underbrush prior to the start of any geophysical activity at the site. A minor storm over the weekend of March 13 downed several large trees within some of the survey grids of area 3. The trees and shrubs were avoided as much as possible without compromising the integrity of the data.

The six areas comprising the site contained other physical items that affected the geophysical survey including trees, fencing, barbed wire, flag poles, and inclines. Furthermore, much of the local geology contains sufficient iron, to be called "hot rocks". These rocks may have influenced the targets that were picked at the site.

The weather conditions in March in the Anniston-Oxford area were extremely favorable for data collection. Site conditions ranged from warm days in the 60's to wet conditions in the 40's. Weather conditions had no effect on the productivity of data collection except for the fallen trees following the weekend storm.

5.5 Geographical Information Systems

SC&A constructed a site-specific Geographical Information System (GIS) for the purpose of facilitating subsurface geophysical analysis. Numerous site-specific issues were resolved before this comprehensive GIS became fully functional, on site. These issues included: definition of the site-specific coordinate system and datum, coordination with ZAPATA and CEHNC on digital deliveries, identification of all data format and data transfer protocols, and definition of all cartographic symbololgy and nomenclature to produce ready-to-use deliverables.

All analytical work performed was executed within SC&A's Fort McClellan-GIS system. The GIS utilized was a MicroStation CAD platform integrated with the Intergraph MGE suite of GIS applications.

5.6 Data Processing

EM-61 data were downloaded utilizing software that accompanied the instrument from Geionics. USA Environmental, Inc. performed the data download, archived the data sets, and reviewed them for quality control during lunch breaks and at the end of each day. Data was reviewed using their Geonics' DAT61 software and then exported from their native formats into more versatile ASCII formats (XYZ) using Geometrics' Magmapper. SC&A reviewed the data again, the following day; the data were then integrated to create formatted ASCII data files (ADF) containing the raw geophysical data. An ADF file is a three-column space delimited ASCII format file with a standard header and footer, and

contains the XY coordinate and sensor value for each recording point. All individual ADF files from each day were combined into an ADF file and interpolated onto regularly-spaced grids. These grid files (GRD files) were created within Intergraph's MGE Application and then geo-referenced utilizing the site-specific GIS.

5.7 Data Analysis Procedures

All data analysis procedures were conducted at SC&A's GIS Service Center in Lowell, Massachusetts. The ADF files from each day were compiled and subsequently subdivided into files representing 100x100 foot grid areas as located by the land surveyors. Automated procedures were used to process the data, assess each data line for data quality, and assess each data set for spatial accuracy. Data were then interpolated onto right-rectangular grids for analysis.

After reaching the grid stage, an automatic target detection procedure is applied to the GRD files for each zone. Targets are picked using a threshold algorithm that works from the outer part of the amplitude distribution towards the noise level. Peaks are localized at the given threshold level and then picked. The resultant targets' coordinates are then loaded into GIS design files designated for the appropriate survey area (1-6).

Using the GIS, the operator accepts, rejects, or modifies each target. Additionally, the operator can add targets not identified by the automated procedure or remove false detections caused by geologic effects or noise in the data. The target review process results in a listing of retained automatic detections and new operator identified targets.

The Fort McClellan site has significant cultural features (barbed wire) and geologic features (hot rocks) within it that they may affect the resultant data quality, however; no digital filters were applied to the data sets in an attempt to remove or mitigate the effects of these noise sources. Due to the nature of the EM-61 system, hot rocks would not represent a significant effect on the data. Larger objects, such as barbed wire, are obvious anomalies within the gridded data.

5.8 Features Observed in the Geophysical Data

A wide variety of features are observed in the EM-61, these include: isolated targets, compound targets, geologic features, and man-made structures. SC&A analysts utilized field notes provided by ZAPATA ENGINEERING, P.A. and the procedures mentioned in Section 5.7 to assign the proper parameters as discussed below.

6.0 TARGET PARAMETERS

As described above in Section 5.8, each of the targets was analyzed to produce characterization parameters. Attachment A provides a listing of all target data and is organized by surveyed areas (1-6) and by survey grid. The grid numbering is illustrated on the accompanying maps for each area and numbered according to the southeastern most control marker. Target Identification (ID) numbers were assigned to each detected target based on the survey area, grid number, and anomaly number. For example, S03-G18-A06 is the sixth target located in grid eighteen of survey area three.

6.1 Area Specific Target Results

Geophysical analysis of the EM-61 data was performed in six (6) separate areas. Plots of these areas for an area overview and the 100x100 foot survey grid images are found in Attachment 1.

6.1.1 Area 1

Area 1 was a sparsely tree covered area that also included the 100x100 foot geophysical prove-out grid. Target density was variable and revealed patches of area composed of target clusters. Surface barbed-wire in two separate grids yielded a complex potential target location within the area. Missing data, by survey marker 111, was due to heavy brush impeding the EM-61's progress. A total of 264 possible targets were found in this area.

6.1.2 Area 2

The north and north-eastern grids in Area 2 contain the highest number of targets. Large cluster anomalies are found paralleling the transect 208-209. A total of 130 targets were located in Area 2.

6.1.3 Area 3

Area 3 contains the highest target density of all areas surveyed; most notably to the south and northeast of the surveyed region. Trees that had fallen during the previous weekend's storm caused gaps in the data sets. Linear anomalies have been noticed in the data, in Grid 09, these are most likely due to barbed-wire which was noted to extend across this

grid and through others. This type of feature is also noticeable in Grids 03 & 19. A total of 528 potential targets were delineated in Area 3.

6.1.4 Area 4

The target density in Area 4 was the least compared to all of the other areas. A large tree is distinguished in the middle of Grid 04. There are two rather large anomalies also identified in the southwest corner of Grid 03, and one in the northwest corner of Grid 01. Only 125 targets were located in this area.

6.1.5 Area 5

Only two (2) 100'x100' grids were surveyed in Area 5. Target densities in these grids are typical to those witnessed in Area 1. A total of 59 anomalies were identified as targets in Area 5.

6.1.6 Area 6

Several target clusters are present in Area 6. Two clusters are located in Grid 11. Another is located in the south central part of Grid 06. Target clusters are also indentified in Grids 07 & 08. Dense brush caused missed data at the south end of the area. The missed triangular areas to the north of Area 6 were surveyed. However, due to the direction that data was collected, positioning of the data values in the grid format was not possible. Analyses of these raw data sets indicate that no large-scale anomalies were identified in these areas. 225 potential targets were characterized in Area 6.

7.0 DELIVERABLES

The following is a description of the data and map deliverables associated with this report.

- Attachment A contains a listing of all targets detected within each grid in the six surveyed areas. ID, easting and northing have been provided for each target.

- Appendix 1 contains a color target map for all the surveyed grids.

- Appendix 2 contains the geophysical prove-out report

- Digital data is provided on CD. The following digital file types are organized and written to CD: ADF, GRD, DGN, DOC, TXT, and XLS files.

    - An ADF file is an ASCII file containing an easting, northing, and EM-61 data value. The ADF files contain raw geophysical data for each survey.

    - A GRD file is an Intergraph format grid data file which can be overlaid on targets and planimetrics in a MicroStation design (DGN) file when using an Intergraph GIS. GRD files are provided for each map and area.

    - DGN files are MicroStation format design files containing vector information such as modified planimetrics, zone boundaries, and target locations. These DGN files can also be exported into DXF format for integration with other GIS software.

    - Relevant documents are provided as either Microsoft Word DOC files, ASCII text (TXT) files.

    - Spreadsheets are provided as Microsoft Excel XLS files.

ATTACHMENT A: TARGET LISTINGS

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

Target ID	Easting	Northing
S01-G01-A01	660741.10	1164328.24
S01-G01-A02	660734.40	1164320.44
S01-G01-A03	660734.23	1164318.15
S01-G01-A04	660738.47	1164315.27
S01-G01-A05	660764.07	1164303.65
S01-G01-A06	660751.10	1164295.69
S01-G01-A07	660784.80	1164298.48
S01-G01-A08	660813.93	1164278.01
S01-G01-A09	660798.97	1164261.95
S01-G01-A10	660781.49	1164269.35
S01-G01-A11	660804.33	1164280.22
S01-G01-A12	660798.18	1164256.59
S01-G01-A13	660780.59	1164283.60
S01-G02-A01	660739.28	1164276.28
S01-G02-A02	660740.86	1164270.29
S01-G02-A03	660704.64	1164274.23
S01-G02-A04	660703.85	1164268.40
S01-G02-A05	660698.81	1164274.07
S01-G02-A06	660734.09	1164256.28
S01-G02-A07	660742.28	1164253.92
S01-G02-A08	660699.91	1164262.89
S01-G02-A09	660698.65	1164256.28
S01-G02-A10	660702.43	1164258.17
S01-G02-A11	660713.46	1164247.30
S01-G02-A14	660732.83	1164248.72
S01-G02-A15	660721.49	1164285.26
S01-G02-A16	660744.48	1164262.26
S01-G02-A17	660719.75	1164260.85
S01-G02-A18	660716.13	1164263.68
S01-G02-A19	660738.81	1164257.54
S01-G02-A20	660738.81	1164252.97
S01-G02-A21	660729.36	1164266.04
S01-G02-A22	660690.62	1164263.68
S01-G02-A23	660784.17	1164240.37
S01-G02-A24	660783.38	1164234.23
S01-G02-A25	660772.04	1164241.00
S01-G02-A26	660737.24	1164229.19
S01-G02-A29	660708.89	1164235.96
S01-G02-A30	660710.94	1164225.88
S01-G02-A31	660706.06	1164218.01
S01-G02-A32	660710.78	1164216.75

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S01-G02-A33	660711.26	1164213.44
S01-G02-A34	660740.71	1164215.80
S01-G02-A35	660740.86	1164212.18
S01-G02-A36	660713.77	1164198.80
S01-G02-A37	660689.36	1164198.17
S01-G02-A38	660711.57	1164231.08
S01-G02-A39	660734.09	1164244.31
S01-G02-A40	660728.74	1164247.46
S01-G02-A41	660697.56	1164233.51
S01-G02-A42	660699.65	1164222.63
S01-G02-A43	660673.26	1164223.67
S01-G02-A44	660671.62	1164221.28
S01-G02-A45	660665.81	1164225.46
S01-G02-A46	660691.00	1164223.07
S01-G02-A47	660703.22	1164205.78
S01-G02-A48	660715.59	1164210.10
S01-G04-A01	660623.78	1164115.60
S01-G04-A02	660624.08	1164111.73
S01-G04-A03	660597.25	1164107.70
S01-G04-A04	660608.43	1164118.88
S01-G04-A05	660651.81	1164063.28
S01-G04-A06	660636.31	1164093.84
S01-G04-A07	660659.56	1164073.27
S01-G04-A08	660579.81	1164090.26
S01-G04-A09	660601.73	1164088.02
S01-G04-A10	660590.40	1164092.94
S01-G04-A11	660592.04	1164087.13
S01-G04-A12	660591.74	1164081.91
S01-G04-A13	660605.16	1164093.09
S01-G04-A14	660613.65	1164091.60
S01-G04-A15	660612.16	1164071.18
S01-G04-A16	660613.95	1164086.53
S01-G04-A17	660590.40	1164105.46
S01-G04-A18	660588.62	1164064.47
S01-G04-A19	660588.62	1164056.72
S01-G04-A20	660588.77	1164048.82
S01-G04-A21	660584.44	1164065.36
S01-G04-A22	660584.74	1164031.83
S01-G04-A23	660616.34	1164028.99
S01-G04-A24	660616.64	1164033.17
S01-G04-A25	660626.33	1164029.89
S01-G04-A26	660649.73	1164041.96
S01-G04-A27	660654.65	1164040.02
S01-G04-A28	660654.35	1164044.20
S01-G04-A29	660660.61	1164054.04

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S01-G04-A30	660598.76	1164016.63
S01-G04-A31	660610.68	1164015.29
S01-G04-A32	660587.43	1164039.73
S01-G04-A33	660620.08	1164007.09
S01-G04-A34	660605.77	1164021.85
S01-G04-A35	660600.40	1164036.75
S01-G04-A36	660554.49	1164053.00
S01-G04-A37	660556.43	1164055.53
S01-G04-A38	660653.80	1164034.60
S01-G04-A39	660652.24	1164032.29
S01-G04-A40	660652.56	1164033.76
S01-G04-A41	660652.53	1164033.78
S01-G04-A42	660588.02	1164114.86
S01-G04-A43	660604.42	1164010.86
S01-G04-A44	660606.36	1164009.33
S01-G04-A45	660612.80	1164005.46
S01-G04-A46	660585.50	1164024.08
S01-G05-A01	660568.64	1164028.40
S01-G05-A02	660560.75	1164035.71
S01-G05-A03	660575.21	1164017.97
S01-G05-A04	660581.32	1164012.75
S01-G05-A05	660567.75	1164010.22
S01-G05-A06	660563.13	1164009.62
S01-G05-A07	660548.67	1164014.09
S01-G05-A08	660554.04	1164004.26
S01-G05-A09	660583.56	1163999.64
S01-G05-A10	660592.95	1164002.62
S01-G05-A11	660596.82	1163992.78
S01-G05-A12	660585.64	1164014.54
S01-G05-A13	660582.36	1163992.93
S01-G05-A14	660540.18	1164031.09
S01-G05-A15	660554.19	1163973.11
S01-G05-A16	660559.85	1163975.64
S01-G05-A17	660549.72	1163966.25
S01-G05-A18	660551.06	1163959.54
S01-G05-A19	660514.39	1163953.73
S01-G05-A24	660577.89	1163958.95
S01-G05-A25	660578.34	1163954.18
S01-G05-A26	660582.51	1163956.41
S01-G05-A27	660581.91	1163950.30
S01-G05-A28	660580.72	1163941.95
S01-G05-A29	660577.44	1163934.95
S01-G05-A30	660567.31	1163934.05
S01-G05-A31	660563.28	1163932.56
S01-G05-A32	660566.86	1163930.03

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S01-G05-A33	660599.50	1163959.39
S01-G05-A34	660590.11	1163945.53
S01-G05-A35	660610.53	1163975.79
S01-G05-A36	660588.77	1163992.93
S01-G05-A37	660531.42	1163939.73
S01-G05-A38	660519.16	1164013.95
S01-G08-A01	660756.72	1164043.58
S01-G08-A02	660772.52	1164047.69
S01-G08-A03	660764.52	1164034.97
S01-G08-A04	660781.55	1164066.98
S01-G08-A05	660771.09	1164078.06
S01-G08-A06	660756.31	1164084.42
S01-G08-A07	660754.26	1164076.21
S01-G08-A08	660738.66	1164051.38
S01-G08-A09	660737.64	1164064.52
S01-G08-A10	660736.61	1164068.83
S01-G08-A11	660772.52	1164056.72
S01-G08-A12	660728.61	1164068.21
S01-G08-A13	660716.29	1164068.21
S01-G08-A14	660697.62	1164081.55
S01-G08-A15	660696.18	1164079.29
S01-G08-A16	660699.47	1164075.39
S01-G08-A17	660704.19	1164088.53
S01-G08-A18	660705.21	1164083.60
S01-G08-A19	660700.29	1164069.24
S01-G08-A20	660730.25	1164049.54
S01-G08-A21	660716.50	1164077.65
S01-G08-A22	660786.48	1164057.33
S01-G08-A23	660716.91	1164110.07
S01-G08-A24	660727.79	1164105.55
S01-G08-A25	660727.79	1164099.81
S01-G08-A26	660736.61	1164108.43
S01-G08-A27	660736.20	1164103.09
S01-G08-A28	660735.79	1164088.73
S01-G08-A29	660769.03	1164129.97
S01-G08-A30	660789.56	1164101.45
S01-G08-A31	660764.31	1164136.13
S01-G08-A32	660753.85	1164140.85
S01-G08-A33	660749.13	1164126.90
S01-G08-A43	660746.46	1164112.74
S01-G08-A47	660707.26	1164095.09
S01-G08-A48	660705.22	1164062.28
S01-G08-A49	660779.49	1164041.92
S01-G08-A50	660770.87	1164030.03
S01-G09-A01	660684.16	1164056.72

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S01-G09-A02	660653.76	1164026.46
S01-G09-A03	660681.04	1164035.25
S01-G09-A04	660685.36	1164036.30
S01-G09-A05	660679.54	1164018.86
S01-G09-A06	660674.63	1164043.01
S01-G09-A07	660688.19	1164049.86
S01-G09-A08	660697.13	1164050.46
S01-G09-A09	660682.23	1164068.94
S01-G09-A10	660682.23	1164062.98
S01-G09-A11	660673.88	1164059.70
S01-G09-A12	660689.62	1163967.04
S01-G09-A13	660715.68	1163959.45
S01-G09-A14	660712.61	1163992.28
S01-G09-A15	660715.89	1163993.72
S01-G09-A16	660729.84	1163977.50
S01-G09-A17	660724.51	1163974.02
S01-G09-A18	660729.64	1163973.40
S01-G09-A19	660673.82	1163997.00
S01-G09-A20	660670.13	1164006.03
S01-G09-A21	660698.04	1163974.63
S01-G09-A22	660711.78	1163950.62
S01-G09-A23	660716.50	1163970.94
S01-G09-A24	660644.47	1164003.16
S01-G09-A25	660637.09	1163997.62
S01-G09-A26	660693.11	1164008.49
S01-G09-A27	660685.52	1164010.95
S01-G09-A28	660670.95	1164011.16
S01-G09-A29	660645.70	1164010.54
S01-G09-A30	660703.58	1163965.81
S01-G09-A31	660700.09	1163964.58
S01-G09-A32	660692.28	1164019.78
S01-G09-A33	660691.67	1164023.88
S01-G09-A34	660699.47	1164030.45
S01-G09-A35	660699.06	1164034.35
S01-G09-A36	660713.22	1164033.53
S01-G09-A37	660731.07	1164042.97
S01-G09-A38	660700.08	1164064.11
S01-G09-A39	660709.96	1164054.28
S01-G09-A40	660705.02	1164053.26
S01-G09-A41	660697.62	1164055.22
S01-G09-A42	660652.58	1164033.76
S01-G09-A43	660705.26	1164062.30
S01-G10-A01	660623.80	1163964.46
S01-G10-A02	660608.89	1163941.51
S01-G10-A03	660617.54	1163936.59

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S01-G10-A04	660624.99	1163951.34
S01-G10-A05	660624.55	1163934.50
S01-G10-A06	660603.53	1163929.58
S01-G10-A07	660600.25	1163940.02
S01-G10-A09	660637.90	1163900.76
S01-G10-A10	660641.18	1163900.96
S01-G10-A11	660648.98	1163938.93
S01-G10-A12	660650.62	1163941.18
S01-G10-A13	660657.40	1163916.15
S01-G10-A14	660657.81	1163953.70
S01-G10-A15	660691.67	1163939.13
S01-G10-A16	660685.51	1163934.82
S01-G10-A17	660658.42	1163961.71
S01-G10-A18	660675.05	1163954.93
S01-G18-A01	660641.37	1164224.11
S01-G18-A02	660628.85	1164197.88
S01-G18-A03	660633.17	1164199.82
S01-G18-A04	660620.05	1164203.24
S01-G18-A05	660610.81	1164163.89
S01-G18-A06	660607.98	1164158.38
S01-G18-A07	660598.29	1164154.50
S01-G18-A08	660601.87	1164136.92
S02-G06-A01	661291.26	1163974.42
S02-G06-A02	661274.62	1163991.96
S02-G06-A03	661300.25	1163967.77
S02-G06-A04	661286.21	1163945.96
S02-G06-A05	661289.03	1163943.99
S02-G06-A06	661339.50	1163921.85
S02-G06-A07	661326.39	1163916.07
S02-G06-A08	661304.27	1163960.48
S02-G06-A09	661359.95	1163965.98
S02-G06-A10	661351.49	1163978.95
S02-G06-A11	661350.08	1163974.44
S02-G06-A12	661306.38	1163978.81
S02-G06-A13	661272.71	1163965.63
S02-G06-A14	661312.18	1163909.04
S02-G06-A15	661267.43	1164000.88
S02-G07-A01	661345.50	1164091.79
S02-G07-A02	661352.09	1164081.41
S02-G07-A03	661326.68	1164084.22
S02-G07-A04	661331.81	1164081.54
S02-G07-A05	661319.48	1164067.25
S02-G07-A06	661342.93	1164063.22
S02-G07-A07	661320.94	1164102.05
S02-G07-A08	661355.99	1164056.38

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S02-G07-A09	661338.41	1164078.12
S02-G07-A10	661348.78	1164041.24
S02-G07-A11	661284.05	1164023.78
S02-G07-A12	661287.23	1164022.56
S02-G07-A13	661284.91	1164017.80
S02-G07-A14	661285.15	1164014.50
S02-G07-A15	661332.05	1164114.48
S02-G07-A16	661357.19	1164064.18
S02-G08-S01	661321.06	1164202.75
S02-G08-S02	661306.38	1164207.46
S02-G08-S03	661289.82	1164206.14
S02-G08-S04	661290.67	1164200.02
S02-G08-S05	661285.02	1164195.41
S02-G08-S06	661257.55	1164180.46
S02-G08-S07	661262.19	1164176.55
S02-G08-S08	661257.55	1164174.59
S02-G08-S09	661260.85	1164184.85
S02-G08-S10	661266.83	1164150.29
S02-G08-S11	661271.72	1164146.51
S02-G08-S12	661288.08	1164174.23
S02-G08-S13	661292.23	1164169.71
S02-G08-S14	661294.44	1164174.84
S02-G08-S15	661302.14	1164154.32
S02-G08-S16	661303.48	1164151.03
S02-G08-S17	661332.42	1164169.71
S02-G08-S18	661329.00	1164180.58
S02-G08-S19	661335.36	1164182.54
S02-G08-S20	661305.19	1164169.10
S02-G08-S21	661299.69	1164167.39
S02-G08-S22	661303.23	1164164.58
S02-G08-S23	661284.55	1164139.18
S02-G08-S24	661295.78	1164133.20
S02-G08-S25	661283.94	1164133.81
S02-G08-S26	661342.81	1164122.21
S02-G08-S27	661345.86	1164118.67
S02-G08-S28	661290.90	1164116.10
S02-G08-S29	661288.22	1164118.67
S02-G08-S30	661265.74	1164124.28
S02-G08-S31	661268.19	1164111.71
S02-G08-S32	661277.71	1164110.97
S02-G08-S33	661273.68	1164113.90
S02-G08-S34	661276.00	1164116.71
S02-G08-S35	661283.70	1164126.96
S02-G08-S36	661320.33	1164212.72
S02-G08-S37	661332.08	1164114.52

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S02-G08-S38	661342.59	1164150.46
S02-G10-A01	661269.40	1164328.86
S02-G10-A02	661268.17	1164325.37
S02-G10-A03	661275.23	1164320.48
S02-G10-A04	661278.90	1164308.53
S02-G10-A05	661260.55	1164314.55
S02-G10-A06	661268.74	1164307.59
S02-G10-A07	661270.24	1164303.26
S02-G10-A08	661266.10	1164305.14
S02-G10-A09	661261.49	1164301.47
S02-G10-A10	661283.32	1164291.59
S02-G10-A11	661286.24	1164293.75
S02-G10-A12	661281.82	1164288.67
S02-G10-A13	661258.57	1164307.68
S02-G10-A14	661346.95	1164289.23
S02-G10-A15	661344.12	1164288.39
S02-G10-A16	661316.08	1164270.69
S02-G10-A17	661301.02	1164272.39
S02-G10-A18	661297.16	1164268.90
S02-G10-A19	661304.79	1164266.93
S02-G10-A20	661300.65	1164261.94
S02-G10-A21	661267.33	1164281.05
S02-G10-A22	661265.45	1164274.37
S02-G10-A23	661278.15	1164274.00
S02-G10-A24	661273.45	1164274.47
S02-G10-A25	661241.64	1164255.83
S02-G10-A26	661259.51	1164252.44
S02-G10-A27	661261.02	1164249.53
S02-G10-A28	661270.52	1164254.80
S02-G10-A29	661272.03	1164249.05
S02-G10-A30	661276.45	1164248.02
S02-G10-A31	661280.22	1164250.47
S02-G10-A32	661281.16	1164247.55
S02-G10-A33	661301.30	1164243.31
S02-G10-A34	661323.89	1164240.87
S02-G10-A35	661324.64	1164243.13
S02-G10-A36	661325.49	1164238.04
S02-G10-A37	661274.67	1164254.04
S02-G10-A38	661329.06	1164239.17
S02-G10-A42	661295.75	1164328.26
S02-G10-A43	661286.56	1164229.08
S02-G10-A44	661296.24	1164225.91
S02-G12-A01	661252.23	1163937.92
S02-G13-A01	661224.42	1164055.87
S02-G13-A02	661226.27	1164060.44

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S02-G13-A03	661229.56	1164057.15
S02-G13-A04	661248.53	1164063.15
S02-G13-A05	661223.71	1164069.42
S02-G13-A06	661221.28	1164044.89
S02-G13-A07	661236.55	1164059.44
S02-G13-A08	661258.19	1164023.69
S02-G13-A09	661256.75	1164018.59
S02-G16-A01	661225.79	1164180.21
S02-G16-A02	661227.63	1164170.56
S02-G16-A03	661232.76	1164174.59
S02-G16-A04	661213.21	1164143.33
S02-G16-A05	661198.44	1164173.50
S02-G16-A06	661239.83	1164104.95
S02-G16-A07	661218.86	1164108.51
S03-G02-A03	659883.35	1164864.65
S03-G02-A04	659884.06	1164861.79
S03-G02-A05	659907.30	1164877.05
S03-G02-A06	659904.17	1164871.92
S03-G02-A07	659900.46	1164857.66
S03-G02-A08	659905.02	1164853.67
S03-G02-A11	659979.61	1164868.21
S03-G02-A12	659980.32	1164862.65
S03-G02-A13	659985.45	1164865.93
S03-G02-A14	659990.30	1164863.93
S03-G02-A15	659989.61	1164837.91
S03-G02-A16	660001.23	1164839.11
S03-G02-A17	659992.38	1164834.23
S03-G02-A18	659950.37	1164832.40
S03-G02-A19	659940.53	1164801.51
S03-G02-A21	659989.34	1164869.92
S03-G02-A22	660005.00	1164841.61
S03-G03-A01	659986.66	1164819.57
S03-G03-A02	659994.68	1164805.28
S03-G03-A03	659982.42	1164807.77
S03-G03-A04	660010.54	1164826.48
S03-G03-A05	660007.77	1164824.18
S03-G03-A06	659956.66	1164797.96
S03-G03-A07	660018.84	1164794.59
S03-G03-A08	660019.14	1164797.35
S03-G03-A09	659973.33	1164777.58
S03-G03-A10	659963.76	1164752.71
S03-G03-A11	659966.49	1164757.36
S03-G03-A12	660032.63	1164768.84
S03-G03-A13	660028.53	1164762.00
S03-G03-A14	660031.81	1164760.09

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S03-G03-A15	660001.97	1164743.70
S03-G03-A17	660018.01	1164746.84
S03-G03-A35	659968.06	1164727.76
S03-G03-A36	659984.10	1164822.12
S03-G03-A37	659974.67	1164816.48
S03-G03-A38	659971.60	1164814.66
S03-G03-A39	660051.22	1164745.37
S03-G03-A40	660020.65	1164728.92
S03-G04-A01	660049.76	1164739.47
S03-G04-A02	660054.20	1164743.05
S03-G04-A03	660059.73	1164737.30
S03-G04-A13	660059.40	1164701.33
S03-G04-A14	660062.43	1164705.56
S03-G04-A15	659980.19	1164704.04
S03-G04-A16	659982.90	1164701.66
S03-G04-A17	660008.80	1164705.34
S03-G04-A18	660038.05	1164697.32
S03-G04-A19	660003.82	1164691.03
S03-G04-A20	660000.02	1164680.63
S03-G04-A21	660004.79	1164681.82
S03-G04-A22	660017.14	1164680.20
S03-G04-A23	660018.55	1164677.27
S03-G04-A25	660092.43	1164673.35
S03-G04-A26	660094.88	1164670.12
S03-G04-A27	660078.74	1164683.94
S03-G04-A28	660082.22	1164657.59
S03-G04-A29	660064.99	1164693.88
S03-G04-A30	660064.57	1164688.11
S03-G04-A31	660070.55	1164676.16
S03-G04-A32	660057.36	1164679.87
S03-G04-A33	660038.09	1164677.19
S03-G04-A34	660028.51	1164678.63
S03-G04-A35	660032.42	1164671.83
S03-G04-A36	660037.89	1164667.50
S03-G04-A37	660045.20	1164662.86
S03-G04-A38	660037.99	1164658.43
S03-G04-A39	660039.95	1164654.93
S03-G04-A40	660050.97	1164670.90
S03-G04-A41	660051.18	1164679.56
S03-G04-A48	660018.31	1164659.57
S03-G04-A49	660059.01	1164688.21
S03-G04-A50	660001.62	1164672.65
S03-G04-A51	660060.04	1164639.47
S03-G04-A52	660069.67	1164708.79
S03-G04-A53	660071.64	1164717.34

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S03-G04-A57	660051.15	1164745.37
S03-G04-A58	660067.75	1164725.59
S03-G04-A59	660088.94	1164651.89
S03-G04-A60	660011.86	1164622.60
S03-G05-A01	660116.17	1164635.25
S03-G05-A02	660127.67	1164608.90
S03-G05-A03	660112.43	1164622.46
S03-G05-A04	660107.39	1164619.36
S03-G05-A05	660083.76	1164610.06
S03-G05-A06	660078.85	1164615.62
S03-G05-A07	660076.53	1164618.59
S03-G05-A08	660111.65	1164601.28
S03-G05-A09	660108.43	1164612.65
S03-G05-A10	660135.93	1164576.48
S03-G05-A11	660110.23	1164571.95
S03-G05-A15	660043.45	1164619.69
S03-G05-A16	660035.83	1164615.87
S03-G05-A17	660037.27	1164613.50
S03-G05-A18	660048.09	1164613.50
S03-G05-A19	660044.56	1164598.08
S03-G05-A20	660045.20	1164602.81
S03-G05-A21	660055.80	1164603.06
S03-G05-A22	660065.00	1164576.87
S03-G05-A23	660065.00	1164571.00
S03-G05-A24	660048.39	1164570.23
S03-G05-A25	660049.16	1164563.59
S03-G05-A26	660051.33	1164560.26
S03-G05-A27	660056.82	1164560.78
S03-G05-A28	660058.35	1164567.16
S03-G05-A29	660071.00	1164545.83
S03-G05-A30	660070.11	1164542.12
S03-G05-A31	660072.15	1164531.65
S03-G05-A32	660082.75	1164538.55
S03-G05-A33	660074.96	1164589.26
S03-G05-A34	660086.84	1164589.77
S03-G05-A35	660083.14	1164587.60
S03-G05-A36	660081.48	1164582.62
S03-G05-A37	660084.03	1164578.66
S03-G05-A38	660091.19	1164579.68
S03-G05-A39	660090.68	1164572.14
S03-G05-A40	660075.73	1164562.95
S03-G05-A41	660085.69	1164559.75
S03-G05-A42	660084.80	1164556.94
S03-G05-A43	660091.19	1164560.39
S03-G05-A44	660089.91	1164556.05

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S03-G05-A45	660098.60	1164551.45
S03-G05-A46	660109.58	1164566.14
S03-G05-A47	660110.09	1164562.56
S03-G05-A48	660112.52	1164561.41
S03-G05-A49	660114.95	1164558.35
S03-G05-A50	660118.02	1164592.07
S03-G05-A51	660123.22	1164564.13
S03-G05-A52	660098.52	1164619.22
S03-G05-A53	660073.37	1164592.87
S03-G05-A54	660060.72	1164635.04
S03-G05-A55	660057.72	1164635.04
S03-G05-A56	660059.22	1164635.08
S03-G05-A57	660089.01	1164651.85
S03-G05-A58	660119.18	1164631.31
S03-G05-A59	660146.81	1164571.18
S03-G05-A60	660099.17	1164543.79
S03-G06-A01	659971.25	1164953.26
S03-G07-A01	659975.04	1164925.25
S03-G07-A02	659997.00	1164929.52
S03-G07-A03	660001.42	1164926.81
S03-G07-A04	660001.71	1164931.38
S03-G07-A05	660015.11	1164927.53
S03-G07-A06	659999.85	1164885.75
S03-G07-A07	660002.14	1164883.32
S03-G07-A12	659995.01	1164865.36
S03-G07-A15	660002.42	1164862.36
S03-G07-A17	660017.68	1164886.89
S03-G07-A20	660037.21	1164928.81
S03-G07-A21	660037.64	1164923.96
S03-G07-A22	660035.93	1164915.98
S03-G07-A29	660032.94	1164900.00
S03-G07-A30	660037.64	1164897.30
S03-G07-A31	660039.78	1164887.60
S03-G07-A32	660044.49	1164885.46
S03-G07-A33	660040.07	1164878.19
S03-G07-A36	660023.67	1164860.79
S03-G07-A37	660024.81	1164856.94
S03-G07-A39	660024.24	1164917.26
S03-G07-A40	660064.74	1164899.58
S03-G07-A41	660051.76	1164917.83
S03-G07-A42	660034.08	1164856.94
S03-G07-A43	660033.79	1164884.18
S03-G07-A44	660067.17	1164926.81
S03-G07-A45	660066.88	1164921.96
S03-G07-A46	660076.15	1164907.98

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S03-G07-A47	660072.16	1164916.11
S03-G07-A48	660064.24	1164937.70
S03-G07-A49	660046.99	1164952.90
S03-G07-A50	660029.02	1164921.66
S03-G07-A51	660069.90	1164869.72
S03-G07-A52	660005.02	1164841.60
S03-G08-A02	660072.73	1164868.63
S03-G08-A03	660081.28	1164863.92
S03-G08-A06	660094.12	1164855.79
S03-G08-A10	660014.23	1164829.89
S03-G08-A11	660031.47	1164825.74
S03-G08-A12	660030.08	1164822.79
S03-G08-A13	660067.16	1164843.09
S03-G08-A14	660083.13	1164839.95
S03-G08-A15	660089.59	1164845.86
S03-G08-A16	660090.42	1164842.91
S03-G08-A17	660089.22	1164839.21
S03-G08-A18	660101.32	1164844.01
S03-G08-A19	660107.13	1164843.55
S03-G08-A20	660108.98	1164840.41
S03-G08-A21	660109.72	1164827.40
S03-G08-A22	660069.47	1164833.49
S03-G08-A23	660068.36	1164830.54
S03-G08-A24	660077.69	1164830.54
S03-G08-A25	660081.10	1164827.77
S03-G08-A26	660080.73	1164819.00
S03-G08-A27	660085.44	1164817.89
S03-G08-A28	660094.49	1164823.80
S03-G08-A29	660102.89	1164820.47
S03-G08-A30	660058.12	1164828.50
S03-G08-A31	660059.87	1164820.29
S03-G08-A32	660061.53	1164816.32
S03-G08-A33	660070.21	1164815.12
S03-G08-A34	660073.62	1164814.20
S03-G08-A35	660081.01	1164808.66
S03-G08-A36	660082.30	1164799.15
S03-G08-A37	660058.76	1164802.56
S03-G08-A38	660062.45	1164799.98
S03-G08-A39	660032.19	1164798.24
S03-G08-A40	660063.79	1164772.66
S03-G08-A41	660076.36	1164762.00
S03-G08-A42	660120.95	1164807.68
S03-G08-A43	660120.82	1164813.62
S03-G08-A44	660115.92	1164809.49
S03-G08-A45	660140.20	1164799.16

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S03-G08-A54	660063.28	1164753.51
S03-G08-A56	660126.37	1164828.59
S03-G08-A57	660024.55	1164809.00
S03-G08-A58	660069.87	1164869.64
S03-G09-A01	660138.78	1164785.60
S03-G09-A02	660142.00	1164779.14
S03-G09-A03	660142.65	1164783.79
S03-G09-A04	660143.30	1164787.15
S03-G09-A05	660131.93	1164786.37
S03-G09-A06	660132.96	1164764.42
S03-G09-A07	660131.41	1164761.96
S03-G09-A12	660112.17	1164761.96
S03-G09-A13	660136.20	1164753.18
S03-G09-A14	660140.97	1164747.62
S03-G09-A15	660137.10	1164742.59
S03-G09-A16	660163.32	1164755.89
S03-G09-A21	660097.19	1164748.66
S03-G09-A22	660096.16	1164742.85
S03-G09-A23	660102.36	1164741.42
S03-G09-A24	660126.13	1164740.77
S03-G09-A25	660123.80	1164737.29
S03-G09-A26	660126.64	1164734.57
S03-G09-A27	660166.29	1164730.31
S03-G09-A28	660163.19	1164724.76
S03-G09-A29	660160.09	1164736.77
S03-G09-A30	660104.95	1164731.73
S03-G09-A31	660104.82	1164726.95
S03-G09-A38	660112.57	1164710.04
S03-G09-A39	660114.89	1164713.78
S03-G09-A40	660119.28	1164704.74
S03-G09-A41	660114.63	1164705.77
S03-G09-A42	660147.57	1164711.71
S03-G09-A43	660147.70	1164715.72
S03-G09-A44	660154.28	1164718.43
S03-G09-A45	660167.33	1164713.91
S03-G09-A46	660184.76	1164710.42
S03-G09-A47	660149.76	1164705.39
S03-G09-A48	660141.63	1164706.68
S03-G09-A49	660098.75	1164705.39
S03-G09-A50	660122.39	1164689.49
S03-G09-A51	660154.54	1164692.72
S03-G09-A52	660107.41	1164682.00
S03-G09-A53	660109.73	1164676.45
S03-G09-A54	660110.25	1164688.33
S03-G09-A55	660111.28	1164669.47

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S03-G09-A56	660063.79	1164744.58
S03-G09-A57	660187.87	1164714.69
S03-G09-A58	660154.76	1164688.75
S03-G09-A59	660143.42	1164682.78
S03-G09-A60	660139.69	1164680.74
S03-G10-A01	660186.83	1164671.80
S03-G10-A02	660182.31	1164673.99
S03-G10-A03	660180.76	1164677.22
S03-G10-A04	660131.82	1164668.05
S03-G10-A05	660170.82	1164665.60
S03-G10-A06	660119.93	1164661.86
S03-G10-A07	660161.00	1164656.56
S03-G10-A08	660181.53	1164654.75
S03-G10-A09	660191.09	1164664.31
S03-G10-A10	660155.57	1164645.45
S03-G10-A11	660139.69	1164648.30
S03-G10-A12	660137.49	1164652.82
S03-G10-A13	660149.37	1164673.22
S03-G10-A16	660125.74	1164642.87
S03-G10-A17	660121.73	1164635.51
S03-G10-A18	660131.67	1164621.30
S03-G10-A19	660150.79	1164623.62
S03-G10-A20	660159.31	1164623.37
S03-G10-A21	660164.73	1164623.50
S03-G10-A22	660163.83	1164619.88
S03-G10-A23	660161.25	1164614.97
S03-G10-A24	660184.88	1164622.72
S03-G10-A25	660157.24	1164610.58
S03-G10-A26	660156.47	1164629.18
S03-G10-A29	660154.53	1164602.96
S03-G10-A30	660157.24	1164602.57
S03-G10-A32	660147.30	1164600.25
S03-G10-A33	660197.79	1164616.38
S03-G10-A34	660195.34	1164612.90
S03-G10-A35	660162.28	1164589.26
S03-G10-A36	660167.70	1164591.71
S03-G10-A37	660169.25	1164589.00
S03-G10-A38	660160.60	1164583.45
S03-G10-A39	660155.82	1164619.09
S03-G10-A40	660203.22	1164614.96
S03-G10-A41	660199.48	1164689.30
S03-G10-A42	660213.76	1164665.80
S03-G10-A43	660196.50	1164660.74
S03-G10-A44	660195.59	1164657.11
S03-G10-A45	660169.75	1164661.39

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S03-G10-A46	660170.79	1164673.46
S03-G10-A47	660116.00	1164641.44
S03-G19-A01	660100.82	1164928.23
S03-G19-A02	660102.96	1164903.71
S03-G19-A07	660102.10	1164921.53
S03-G19-A08	660105.38	1164920.25
S03-G19-A09	660108.38	1164924.81
S03-G19-A10	660165.67	1164895.72
S03-G19-A11	660198.46	1164895.72
S03-G19-A12	660197.84	1164891.68
S03-G19-A13	660186.96	1164872.25
S03-G19-A15	660171.73	1164859.35
S03-G19-A21	660141.57	1164854.84
S03-G19-A22	660135.04	1164849.40
S03-G19-A23	660128.05	1164850.33
S03-G19-A30	660132.24	1164880.49
S03-G19-A31	660137.06	1164882.98
S03-G19-A35	660156.80	1164905.05
S03-G19-A36	660184.94	1164907.07
S03-G19-A37	660180.12	1164909.25
S03-G19-A38	660131.78	1164859.82
S03-G19-A39	660140.02	1164849.25
S03-G19-A40	660159.76	1164867.43
S03-G19-A41	660127.43	1164877.54
S03-G19-A42	660138.62	1164895.10
S03-G19-A44	660146.86	1164914.22
S03-G19-A49	660173.75	1164926.97
S03-G19-A50	660168.47	1164920.44
S03-G19-A51	660171.89	1164914.22
S03-G19-A52	660138.31	1164927.28
S03-G19-A53	660120.59	1164936.14
S03-G19-A56	660154.79	1164950.76
S03-G19-A58	660134.76	1164835.01
S03-G19-A59	660141.29	1164839.04
S03-G19-A60	660124.74	1164832.77
S03-G19-A61	660162.61	1164851.12
S03-G22-A01	659987.71	1164651.94
S03-G22-A02	659992.34	1164651.11
S03-G22-A03	659985.13	1164616.39
S03-G22-A04	659924.64	1164616.04
S03-G22-A05	659949.44	1164618.71
S03-G22-A06	659950.55	1164611.92
S03-G22-A07	659928.64	1164586.23
S03-G22-A08	659984.81	1164593.46
S03-G22-A09	659983.81	1164587.56

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S03-G22-A10	659979.03	1164587.56
S03-G22-A11	659981.92	1164597.68
S03-G22-A12	659957.00	1164612.26
S03-G22-A13	659930.47	1164577.64
S03-G22-A14	659972.37	1164555.28
S03-G22-A15	659964.83	1164550.04
S03-G22-A16	659957.43	1164543.65
S03-G22-A17	659964.83	1164534.46
S03-G22-A18	659975.06	1164542.50
S03-G22-A19	659932.39	1164590.16
S03-G22-A20	659946.82	1164585.94
S03-G22-A21	659988.72	1164570.35
S03-G22-A22	659989.11	1164610.22
S03-G22-A23	660022.71	1164591.05
S03-G22-A24	660021.82	1164587.86
S03-G22-A25	660022.97	1164584.54
S03-G22-A26	660027.44	1164573.04
S03-G22-A27	659997.80	1164606.51
S03-G22-A28	660011.75	1164622.62
S03-G22-A29	660037.49	1164573.22
S03-G24-A01	659965.46	1164684.75
S03-G24-A02	659965.46	1164680.52
S03-G24-A03	659981.21	1164666.67
S03-G24-A04	659983.17	1164653.38
S03-G24-A05	659974.62	1164668.13
S03-G24-A06	659969.43	1164668.88
S03-G25-A01	659929.32	1164760.64
S03-G25-A02	659939.16	1164747.52
S03-G25-A11	659952.67	1164729.79
S03-G25-A12	659953.82	1164727.69
S03-G25-A13	659952.45	1164728.31
S03-G25-A14	659952.45	1164726.81
S03-G25-A15	659952.45	1164729.81
S03-G25-A16	659953.48	1164728.31
S03-G25-A17	659950.95	1164728.31
S03-G25-A20	659966.04	1164703.85
S03-G25-A21	659951.93	1164701.85
S03-G26-A01	659879.21	1164860.65
S03-G28-A01	659908.16	1164903.29
S03-G28-A03	659939.82	1164920.83
S03-G28-A08	659944.95	1164920.69
S03-G28-A09	659885.03	1164910.08
S03-G28-A10	659921.58	1164902.61
S04-G01-A02	660359.91	1165994.45
S04-G01-A03	660401.17	1165978.95

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S04-G01-A04	660398.87	1165976.23
S04-G01-A05	660365.99	1165974.76
S04-G01-A06	660363.47	1165971.20
S04-G01-A07	660385.88	1165959.68
S04-G01-A08	660388.60	1165963.03
S04-G01-A09	660407.66	1165954.87
S04-G01-A10	660418.76	1165940.21
S04-G01-A11	660410.80	1165939.16
S04-G01-A12	660413.32	1165933.92
S04-G01-A13	660375.20	1165940.21
S04-G01-A14	660369.34	1165938.11
S04-G01-A15	660366.82	1165935.81
S04-G01-A16	660362.64	1165956.96
S04-G01-A17	660328.92	1165936.86
S04-G01-A18	660329.97	1165931.20
S04-G01-A19	660337.92	1165936.44
S04-G01-A20	660340.23	1165932.88
S04-G01-A21	660343.79	1165934.55
S04-G01-A22	660347.35	1165943.77
S04-G01-A23	660343.37	1165945.86
S04-G01-A24	660345.67	1165947.95
S04-G01-A25	660377.71	1165984.40
S04-G01-A26	660318.87	1165920.94
S04-G01-A27	660401.59	1165905.65
S04-G01-A28	660406.62	1165977.48
S04-G01-A29	660323.45	1165958.64
S04-G01-A30	660323.06	1165962.20
S04-G01-A31	660421.44	1165946.70
S04-G03-A01	660428.60	1166040.73
S04-G03-A02	660425.04	1166043.04
S04-G03-A03	660425.25	1166039.06
S04-G03-A04	660401.80	1166041.57
S04-G03-A05	660386.09	1166043.67
S04-G03-A06	660398.23	1166087.65
S04-G03-A07	660381.27	1166069.01
S04-G03-A08	660385.25	1166066.70
S04-G03-A09	660381.48	1166064.61
S04-G03-A10	660363.26	1166037.59
S04-G03-A11	660357.82	1166047.23
S04-G03-A12	660359.49	1166067.33
S04-G03-A13	660384.41	1166048.07
S04-G03-A14	660371.22	1166047.02
S04-G03-A15	660371.85	1166042.41
S04-G03-A16	660375.62	1166045.13
S04-G03-A17	660361.79	1166051.42

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S04-G03-A18	660353.84	1166049.74
S04-G03-A19	660350.07	1166055.19
S04-G03-A20	660447.69	1166033.17
S04-G03-A21	660444.77	1166030.04
S04-G04-A01	660394.46	1166129.33
S04-G04-A02	660403.89	1166124.72
S04-G04-A03	660448.29	1166131.63
S04-G04-A04	660448.08	1166125.56
S04-G04-A05	660453.31	1166130.79
S04-G04-A06	660447.66	1166113.41
S04-G04-A07	660429.24	1166149.01
S04-G04-A08	660502.54	1166173.31
S04-G04-A09	660417.30	1166147.97
S04-G04-A10	660425.68	1166119.90
S04-G04-A11	660403.48	1166166.61
S04-G04-A12	660409.13	1166172.47
S04-G04-A13	660421.91	1166200.11
S04-G04-A14	660416.67	1166193.41
S04-G04-A15	660429.45	1166200.11
S04-G04-A16	660424.42	1166187.76
S04-G04-A17	660472.42	1166088.28
S04-G04-A18	660501.93	1166151.32
S04-G04-A19	660496.93	1166144.29
S04-G04-A20	660467.97	1166197.85
S04-G04-A21	660416.45	1166112.77
S04-G05-A01	660452.27	1166231.74
S04-G05-A02	660451.44	1166236.56
S04-G05-A03	660498.98	1166195.72
S04-G05-A04	660499.61	1166190.48
S04-G05-A05	660465.05	1166204.51
S04-G05-A06	660510.70	1166191.53
S04-G05-A07	660448.30	1166213.73
S04-G05-A08	660436.57	1166219.80
S04-G05-A09	660436.78	1166224.20
S04-G05-A10	660431.33	1166234.88
S04-G05-A11	660531.86	1166237.39
S04-G05-A12	660479.29	1166271.95
S04-G05-A13	660475.52	1166270.07
S04-G05-A14	660474.47	1166275.09
S04-G05-A15	660459.38	1166300.86
S04-G05-A16	660485.14	1166299.80
S04-G07-A01	660504.00	1166345.05
S04-G10-A01	660443.89	1166007.22
S04-G10-A02	660449.34	1165995.29
S04-G10-A03	660466.72	1165985.86

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S04-G10-A04	660486.41	1166037.80
S04-G10-A05	660482.64	1166030.05
S04-G10-A06	660476.77	1166017.70
S04-G10-A07	660462.74	1166019.16
S04-G10-A08	660464.42	1166015.81
S04-G10-A09	660475.30	1166049.53
S04-G10-A10	660475.93	1166063.98
S04-G10-A11	660447.68	1166033.13
S04-G10-A12	660517.19	1166066.68
S04-G11-A01	660487.03	1166087.23
S04-G11-A02	660541.49	1166138.33
S04-G11-A03	660515.52	1166115.30
S04-G11-A04	660519.70	1166113.41
S04-G11-A05	660527.66	1166126.61
S04-G11-A06	660500.02	1166089.12
S04-G11-A07	660511.12	1166076.97
S04-G11-A08	660541.28	1166129.54
S04-G11-A09	660508.19	1166150.69
S04-G11-A10	660481.82	1166082.62
S04-G11-A11	660479.25	1166083.78
S04-G11-A12	660480.75	1166083.67
S04-G11-A13	660479.50	1166083.67
S04-G11-A14	660482.25	1166083.67
S04-G11-A15	660480.75	1166083.10
S04-G11-A16	660480.75	1166085.17
S04-G11-A17	660472.30	1166088.26
S04-G11-A18	660480.74	1166083.67
S04-G11-A19	660517.20	1166066.74
S04-G11-A20	660501.89	1166151.31
S04-G12-A01	660546.31	1166215.61
S04-G12-A02	660545.68	1166190.06
S04-G16-A01	660488.29	1165973.92
S05-G04-A01	660486.09	1164232.53
S05-G04-A02	660550.59	1164208.28
S05-G04-A03	660533.27	1164209.27
S05-G04-A04	660520.23	1164206.14
S05-G04-A05	660540.36	1164198.55
S05-G04-A08	660489.39	1164206.47
S05-G04-A09	660488.40	1164210.43
S05-G04-A10	660485.59	1164201.85
S05-G04-A11	660465.80	1164205.15
S05-G04-A12	660461.34	1164186.35
S05-G04-A13	660455.90	1164172.33
S05-G04-A14	660451.28	1164178.60
S05-G04-A15	660444.35	1164166.39

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S05-G04-A16	660467.94	1164162.60
S05-G04-A17	660487.08	1164173.65
S05-G04-A18	660524.03	1164166.23
S05-G04-A19	660527.82	1164167.55
S05-G04-A20	660540.19	1164181.07
S05-G04-A21	660508.52	1164136.53
S05-G04-A22	660510.83	1164136.53
S05-G04-A23	660506.38	1164133.07
S05-G04-A24	660547.28	1164189.65
S05-G04-A25	660529.14	1164143.30
S05-G04-A26	660531.78	1164180.08
S05-G04-A27	660508.86	1164241.43
S05-G04-A28	660461.01	1164200.69
S05-G04-A29	660557.14	1164170.22
S05-G05-A02	660548.27	1164327.06
S05-G05-A03	660551.41	1164323.10
S05-G05-A04	660552.23	1164328.05
S05-G05-A05	660565.26	1164292.09
S05-G05-A06	660577.14	1164265.69
S05-G05-A07	660592.32	1164274.27
S05-G05-A08	660592.48	1164270.15
S05-G05-A09	660600.56	1164275.76
S05-G05-A10	660600.89	1164271.63
S05-G05-A11	660598.58	1164280.87
S05-G05-A12	660546.13	1164269.65
S05-G05-A13	660565.92	1164272.62
S05-G05-A14	660594.96	1164260.91
S05-G05-A15	660598.58	1164256.29
S05-G05-A16	660598.09	1164252.33
S05-G05-A17	660548.93	1164290.93
S05-G05-A18	660531.28	1164247.88
S05-G05-A19	660531.12	1164242.43
S05-G05-A20	660527.66	1164246.39
S05-G05-A21	660530.46	1164235.67
S05-G05-A22	660547.95	1164226.27
S05-G05-A23	660585.23	1164231.87
S05-G05-A24	660562.13	1164230.39
S05-G05-A25	660570.38	1164221.15
S05-G05-A26	660571.21	1164215.71
S05-G05-A27	660568.24	1164214.39
S05-G05-A28	660599.92	1164306.82
S05-G05-A29	660598.45	1164246.90
S05-G05-A30	660597.27	1164244.26
S06-G06-A01	660320.57	1163907.33
S06-G06-A02	660323.55	1163912.73

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S06-G06-A03	660326.52	1163917.38
S06-G06-A04	660329.13	1163914.96
S06-G06-A05	660331.92	1163935.43
S06-G06-A06	660332.66	1163942.31
S06-G06-A07	660326.90	1163943.05
S06-G06-A08	660336.94	1163903.61
S06-G06-A09	660338.43	1163908.08
S06-G06-A10	660322.62	1163894.87
S06-G06-A11	660324.66	1163899.33
S06-G06-A12	660326.15	1163907.89
S06-G06-A13	660347.74	1163943.24
S06-G06-A14	660350.34	1163917.01
S06-G06-A15	660354.25	1163899.89
S06-G06-A16	660357.41	1163926.50
S06-G06-A17	660360.95	1163933.38
S06-G06-A18	660362.44	1163936.17
S06-G06-A19	660366.53	1163941.01
S06-G06-A20	660375.65	1163927.24
S06-G06-A21	660364.30	1163926.50
S06-G06-A22	660376.58	1163911.43
S06-G06-A23	660365.78	1163953.29
S06-G06-A24	660340.67	1163951.99
S06-G06-A27	660324.67	1163965.94
S06-G06-A28	660313.69	1163965.01
S06-G06-A29	660371.55	1163919.61
S06-G06-A30	660308.85	1163957.75
S06-G06-A31	660274.80	1163962.03
S06-G06-A32	660361.14	1163976.92
S06-G06-A33	660348.30	1163980.82
S06-G06-A34	660386.99	1163894.77
S06-G06-A35	660387.75	1163895.44
S06-G06-A36	660386.44	1163896.17
S06-G06-A37	660301.28	1163875.88
S06-G06-A38	660359.83	1163888.57
S06-G06-A39	660386.49	1163896.20
S06-G06-A40	660379.74	1163924.85
S06-G06-A41	660373.81	1163951.26
S06-G06-A42	660358.34	1163990.31
S06-G07-A01	660358.91	1163994.03
S06-G07-A02	660353.14	1163993.47
S06-G07-A03	660294.53	1163980.08
S06-G07-A04	660280.21	1163990.13
S06-G07-A05	660276.11	1163995.15
S06-G07-A06	660277.60	1163997.75
S06-G07-A07	660282.44	1163997.75

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S06-G07-A08	660316.30	1164016.92
S06-G07-A09	660312.77	1164014.31
S06-G07-A14	660349.60	1164008.92
S06-G07-A15	660347.93	1164006.31
S06-G07-A21	660277.79	1164020.64
S06-G07-A22	660327.28	1164060.26
S06-G07-A23	660341.24	1164057.66
S06-G07-A24	660339.56	1164051.15
S06-G07-A25	660338.45	1164045.01
S06-G07-A26	660351.10	1164037.56
S06-G07-A27	660352.21	1164031.43
S06-G07-A28	660334.54	1164029.56
S06-G07-A29	660332.12	1164045.19
S06-G07-A30	660307.93	1164037.94
S06-G07-A31	660311.47	1164037.94
S06-G07-A32	660308.68	1164025.84
S06-G07-A33	660295.10	1164025.84
S06-G07-A34	660281.89	1164054.68
S06-G07-A35	660292.12	1164053.94
S06-G07-A36	660263.47	1164029.94
S06-G07-A37	660287.84	1164000.54
S06-G07-A38	660302.54	1164013.94
S06-G07-A39	660265.70	1164042.03
S06-G07-A40	660256.77	1164053.01
S06-G07-A41	660253.61	1164058.22
S06-G07-A42	660251.19	1164059.33
S06-G07-A43	660260.86	1164054.12
S06-G07-A44	660255.84	1164038.12
S06-G07-A45	660252.49	1164041.84
S06-G07-A46	660250.44	1164047.80
S06-G07-A47	660316.68	1164074.59
S06-G07-A48	660293.61	1164009.66
S06-G07-A49	660339.94	1164080.18
S06-G07-A50	660338.82	1164086.13
S06-G07-A51	660260.49	1163997.95
S06-G07-A52	660259.23	1164003.86
S06-G07-A53	660261.60	1163994.26
S06-G11-A01	660183.26	1163899.90
S06-G11-A02	660185.30	1163903.43
S06-G11-A03	660188.65	1163899.90
S06-G11-A04	660189.58	1163905.85
S06-G11-A05	660186.05	1163888.92
S06-G11-A06	660191.44	1163889.29
S06-G11-A07	660192.56	1163893.94
S06-G11-A08	660195.91	1163900.08

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S06-G11-A09	660227.35	1163940.08
S06-G11-A10	660220.65	1163905.29
S06-G11-A11	660220.09	1163909.20
S06-G11-A12	660235.91	1163905.48
S06-G11-A13	660238.89	1163892.64
S06-G11-A14	660253.96	1163890.04
S06-G11-A15	660248.75	1163908.64
S06-G11-A16	660245.03	1163911.25
S06-G11-A17	660243.17	1163906.22
S06-G11-A18	660239.63	1163921.11
S06-G11-A19	660246.70	1163932.08
S06-G11-A20	660248.93	1163935.80
S06-G11-A21	660251.35	1163926.50
S06-G11-A22	660245.40	1163924.46
S06-G11-A23	660248.38	1163922.59
S06-G11-A24	660251.17	1163919.99
S06-G11-A25	660252.47	1163917.39
S06-G11-A26	660251.91	1163912.92
S06-G11-A27	660261.40	1163920.36
S06-G11-A28	660253.03	1163866.41
S06-G11-A29	660284.10	1163887.06
S06-G11-A30	660241.69	1163955.33
S06-G11-A31	660244.11	1163958.31
S06-G11-A32	660286.36	1163888.87
S06-G11-A33	660287.64	1163882.40
S06-G11-A34	660288.75	1163877.40
S06-G12-A01	660250.62	1163980.82
S06-G12-A02	660245.41	1163980.08
S06-G12-A03	660239.27	1163981.75
S06-G12-A04	660241.51	1163985.47
S06-G12-A05	660257.14	1163984.92
S06-G12-A06	660235.18	1163996.64
S06-G12-A07	660241.69	1164000.73
S06-G12-A08	660251.00	1164018.03
S06-G12-A09	660237.98	1164044.82
S06-G12-A10	660230.35	1164045.01
S06-G12-A11	660233.70	1164040.91
S06-G12-A12	660233.14	1164026.77
S06-G12-A13	660237.05	1164028.08
S06-G12-A14	660230.35	1164015.05
S06-G12-A15	660200.21	1164048.36
S06-G12-A16	660211.56	1164050.40
S06-G12-A17	660219.56	1164045.94
S06-G12-A18	660222.54	1164055.43
S06-G12-A19	660200.02	1164036.45

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S06-G12-A20	660202.81	1164034.03
S06-G12-A21	660204.67	1164037.19
S06-G12-A22	660177.51	1164043.33
S06-G12-A23	660187.93	1163999.42
S06-G12-A24	660190.72	1163996.63
S06-G12-A25	660186.25	1164013.75
S06-G12-A26	660223.28	1163998.87
S06-G12-A27	660222.91	1164013.94
S06-G12-A28	660219.74	1164017.10
S06-G12-A29	660222.91	1164019.89
S06-G12-A30	660219.93	1164022.49
S06-G12-A31	660156.86	1164032.91
S06-G12-A32	660162.44	1164036.64
S06-G12-A33	660161.33	1164032.17
S06-G12-A34	660168.95	1163991.24
S06-G12-A35	660169.89	1163995.15
S06-G12-A36	660176.02	1163994.40
S06-G12-A37	660179.19	1163969.28
S06-G12-A38	660196.12	1163984.91
S06-G12-A39	660205.05	1163955.70
S06-G12-A40	660202.63	1163957.93
S06-G12-A41	660190.91	1164010.03
S06-G12-A42	660202.82	1164024.36
S06-G12-A43	660224.96	1164034.96
S06-G12-A44	660189.79	1164044.82
S06-G12-A45	660223.91	1163972.84
S06-G12-A46	660222.49	1163968.84
S06-G12-A47	660175.83	1163990.08
S06-G12-A48	660176.88	1163983.77
S06-G12-A49	660210.34	1163996.40
S06-G12-A50	660198.75	1164054.50
S06-G12-A51	660256.40	1164011.36
S06-G12-A52	660264.92	1163974.71
S06-G13-A01	660233.14	1164083.15
S06-G13-A02	660228.68	1164066.96
S06-G13-A03	660225.70	1164063.98
S06-G13-A04	660221.05	1164065.47
S06-G13-A05	660205.42	1164067.71
S06-G13-A06	660201.32	1164064.17
S06-G13-A07	660198.16	1164066.22
S06-G13-A08	660195.56	1164057.10
S06-G13-A09	660163.74	1164064.73
S06-G13-A10	660167.46	1164068.08
S06-G13-A11	660144.17	1164056.59
S06-G13-A12	660147.39	1164042.95

Target ID Explanation:
S02-G08-A10
S02 = area 2
G08 = grid 8
A10 = anomaly 10

Downselected Target List

S06-G15-A01	660135.44	1163894.50
S06-G15-A02	660171.91	1163914.22
S06-G15-A03	660153.12	1163879.24
S06-G15-A04	660179.54	1163858.59
S06-G15-A05	660186.98	1163858.41
S06-G15-A06	660183.07	1163848.92
S06-G15-A07	660178.23	1163848.55
S06-G15-A08	660155.53	1163840.36
S06-G15-A09	660154.42	1163842.22
S06-G15-A10	660124.64	1163932.62
S06-G15-A11	660181.60	1163846.51
S06-G16-A01	660147.19	1164029.19
S06-G16-A02	660142.35	1164026.77
S06-G16-A03	660120.58	1164013.75
S06-G16-A04	660128.39	1163997.94
S06-G16-A05	660127.28	1164002.22
S06-G16-A06	660140.86	1163981.01
S06-G16-A07	660144.21	1163978.96
S06-G16-A08	660144.21	1163984.54
S06-G16-A09	660110.34	1164013.20
S06-G16-A10	660107.93	1164009.47
S06-G16-A11	660138.84	1163957.40
S06-G16-A12	660134.75	1163953.67
S06-G16-A13	660120.81	1163935.06
S06-G16-A14	660147.77	1164033.30
S06-G16-A15	660129.57	1164037.91
S06-G18-A01	660086.32	1163885.94
S06-G18-A02	660131.53	1163843.52
S06-G18-A03	660132.46	1163846.50
S06-G18-A04	660131.35	1163840.36
S06-G18-A05	660125.39	1163905.48
S06-G18-A06	660126.70	1163901.94

Appendix 1: Fort McClellan Geophysical Maps

AREA 1

POINT	EASTING	NORTHING
101	668712.72	1164291.22
102	668606.52	1164316.52
103	668620.31	1164133.02
104	668744.11	1164201.89
105	668587.91	1163988.36
106	668795.43	1164213.85
107	668709.23	1164168.32
108	668503.82	1164277.62
109	668626.86	1163994.89
110	668270.63	1163912.10
111	668021.94	1164184.11
112	668765.74	1164221.42
113	668789.84	1163593.69
114	668693.34	1163593.96
115	668742.82	1164348.59
116	668623.53	1164284.30
117	668627.66	1164236.14
118	668607.91	1164142.23

LEGEND

SURVEY MARKER

2 MV 126

GEOPHYSICAL SURVEY

FORT MCCLELLAN
ALABAMA

AREA 1
MARCH 1999

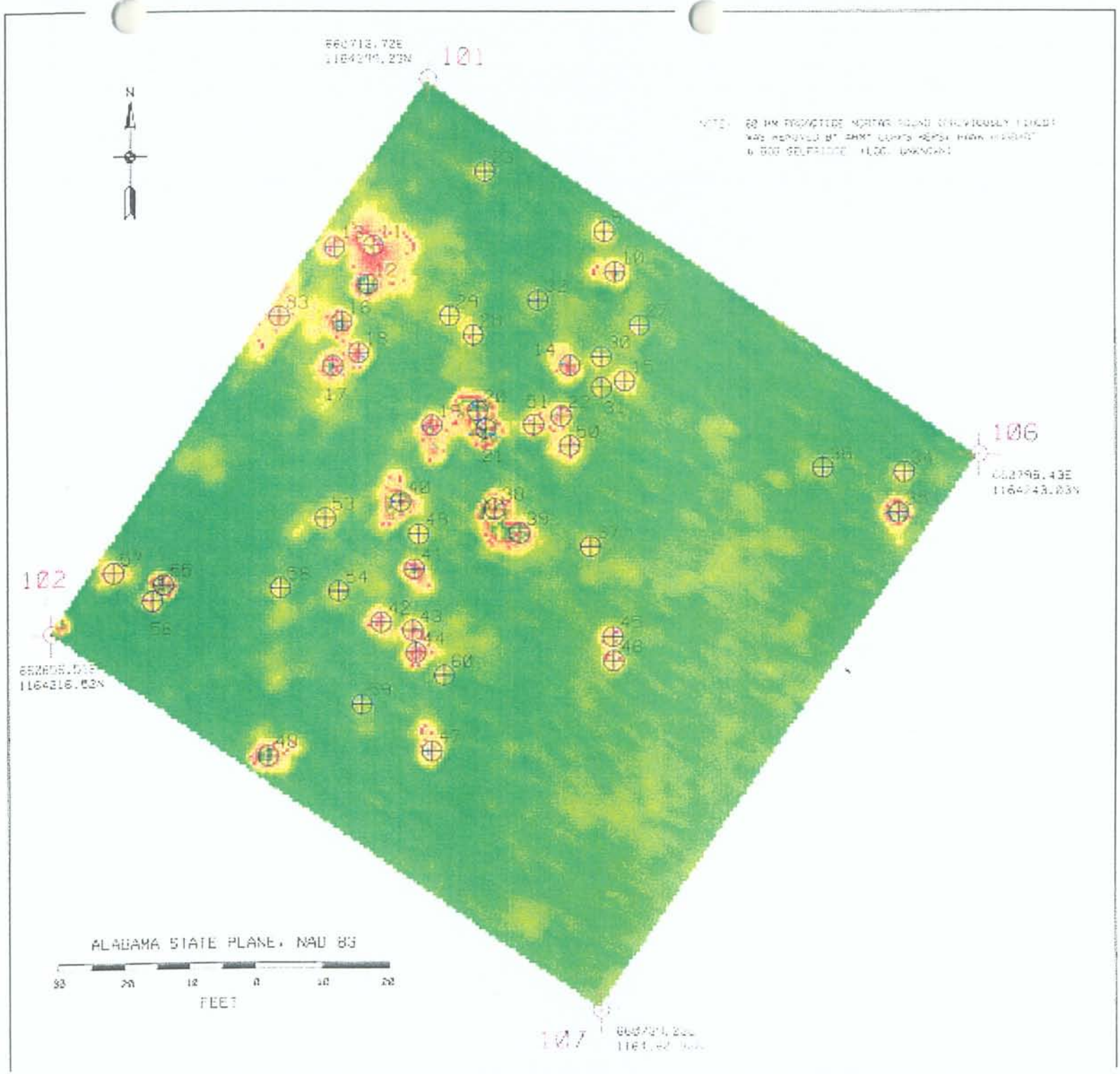
GRID NUMBERING

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

27 TARGET ID NUMBER

FORT MCCLELLAN
ALABAMA

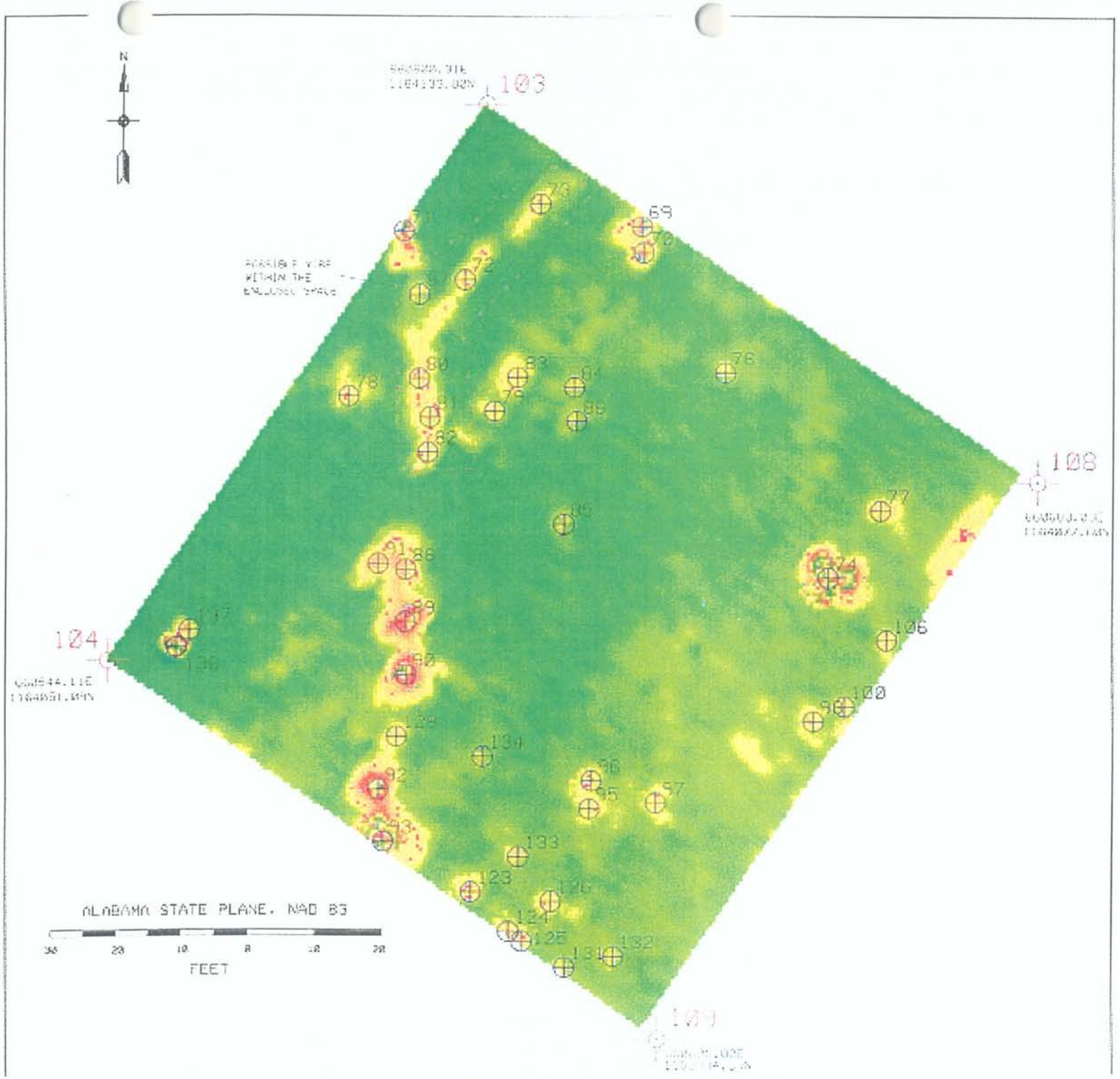
AREA 1
EM 61 DATA
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

69 TARGET ID NUMBER

FORT MCCLELLAN
ALABAMA

AREA 1

EM 61 DATA

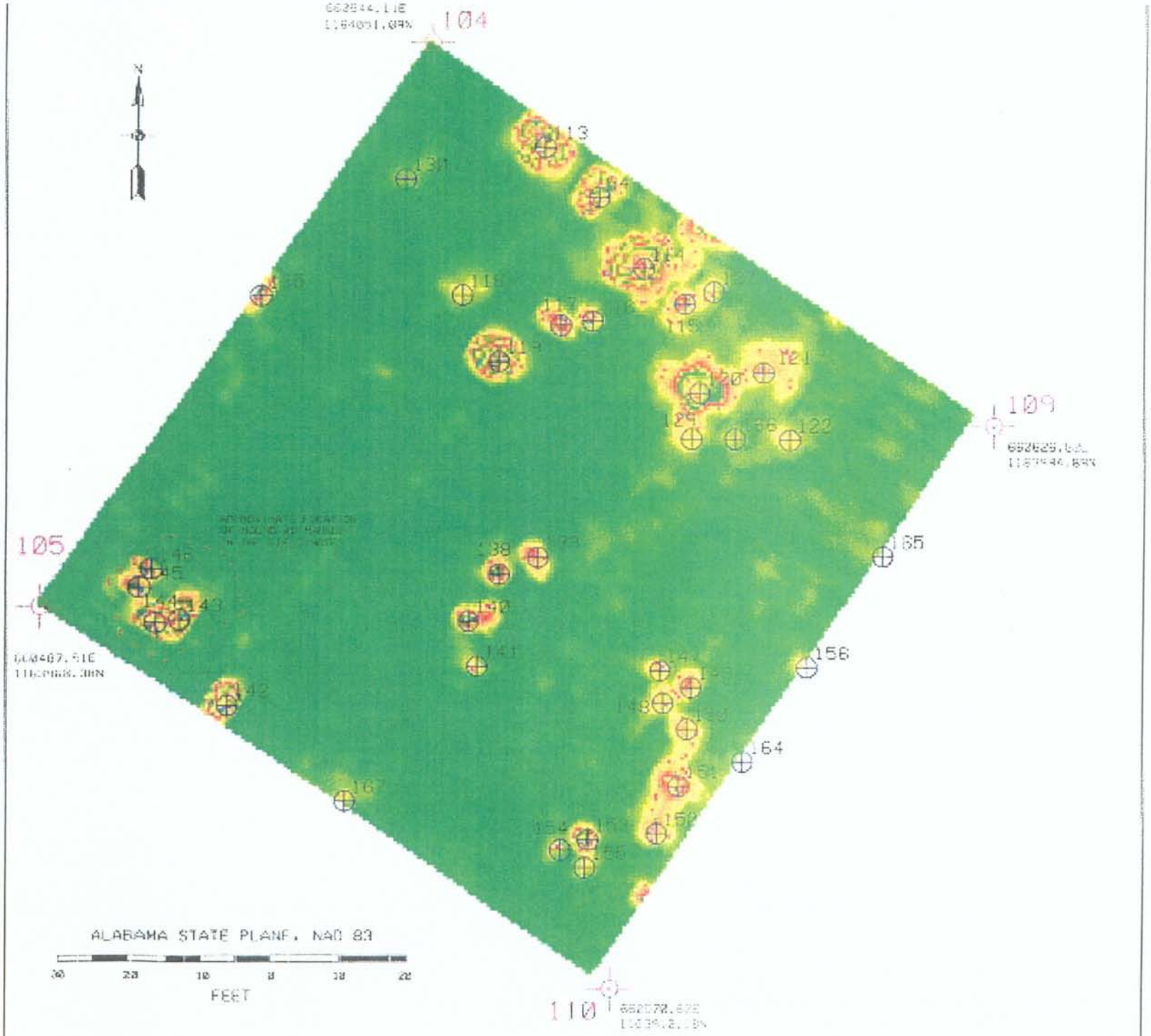
MARCH 18, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

121 TARGET ID NUMBER

3 MV 126

FORT MCCLELLAN
ALABAMA

AREA 1

EM 61 DATA

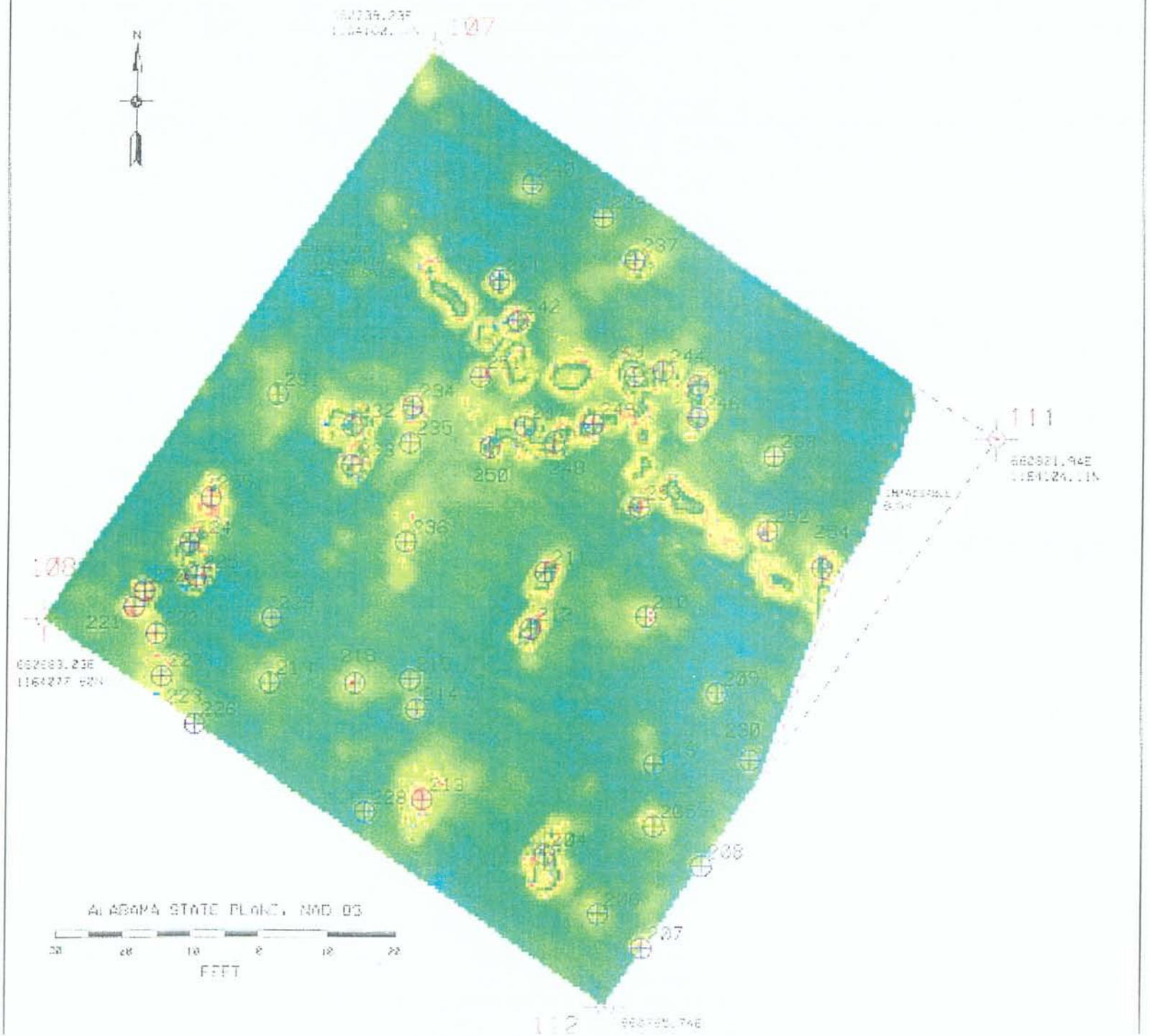
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

105 TARGET ID NUMBER

0 50 100

FORT MCCLELLAN
ALABAMA

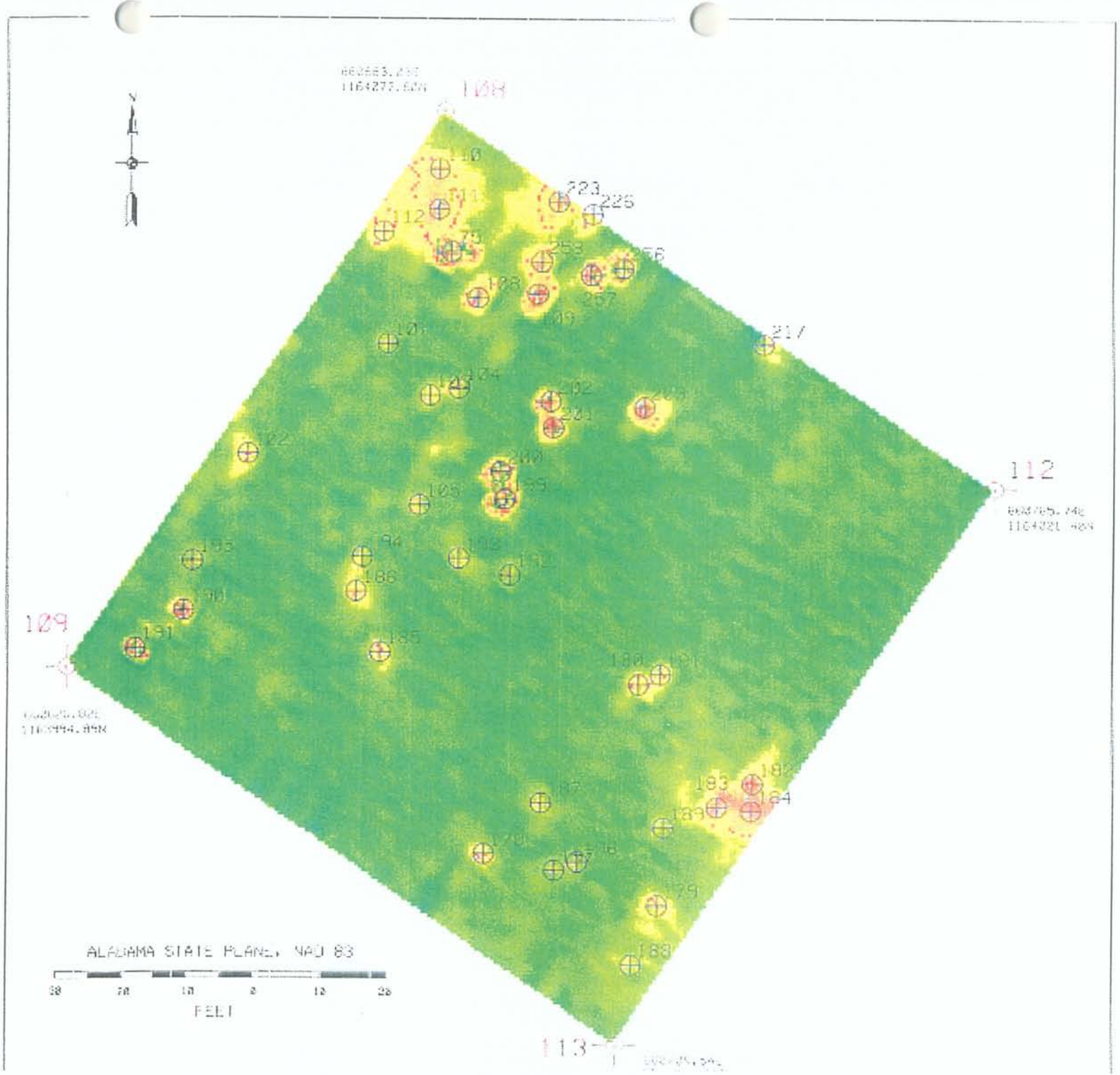
AREA 1
EM 61 DATA
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER



LEGEND

SURVEY MARKER

SEEDED ITEM

217 TARGET ID NUMBER

0 NV 126

FORT MCCLELLAN
ALABAMA

AREA 1

EM 61 DATA

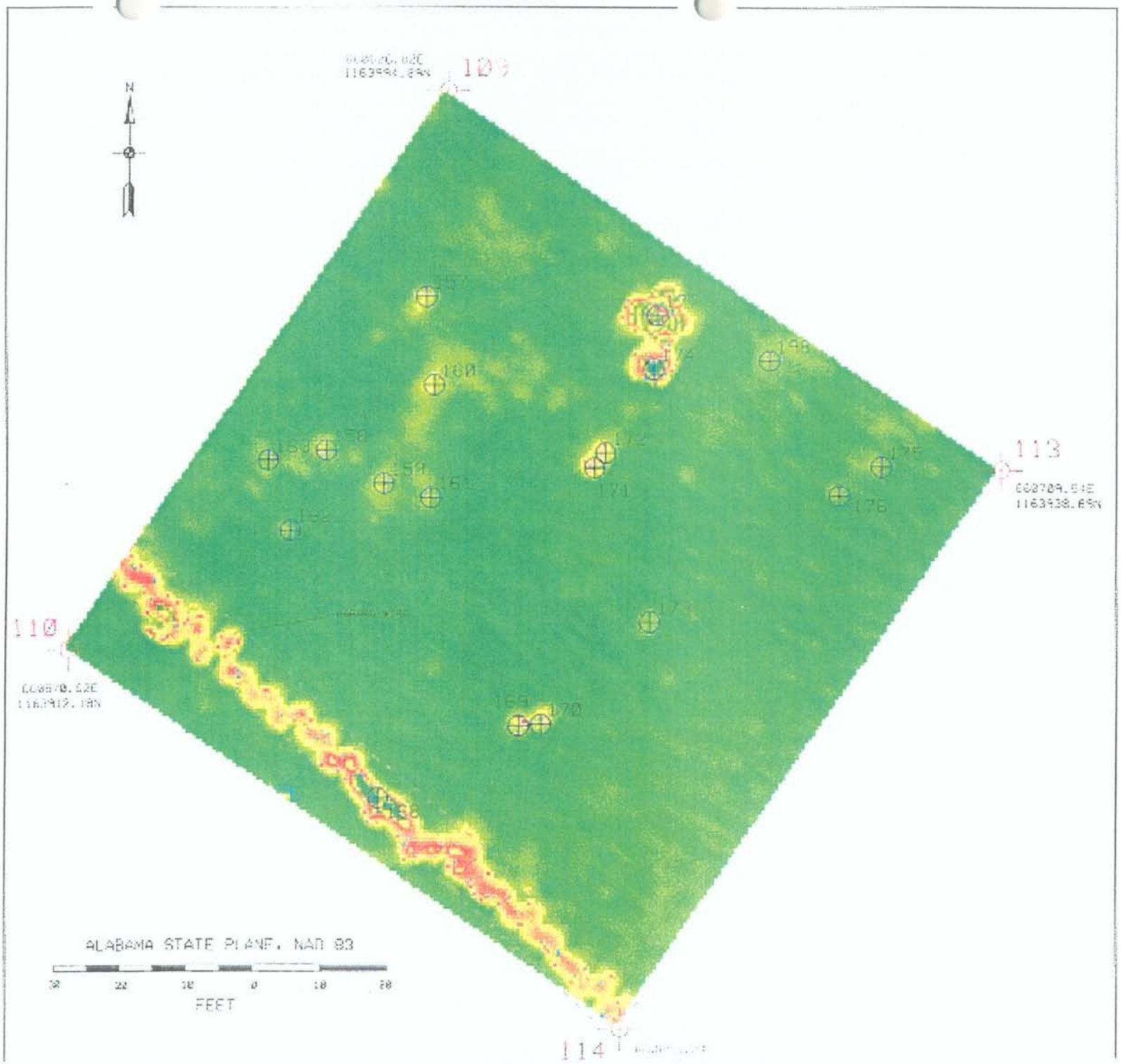
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA PROCESSING:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER



LEGEND

SURVEY MARKER

SEEDED ITEM

198 TARGET ID NUMBER

FORT MCCLELLAN
ALABAMA

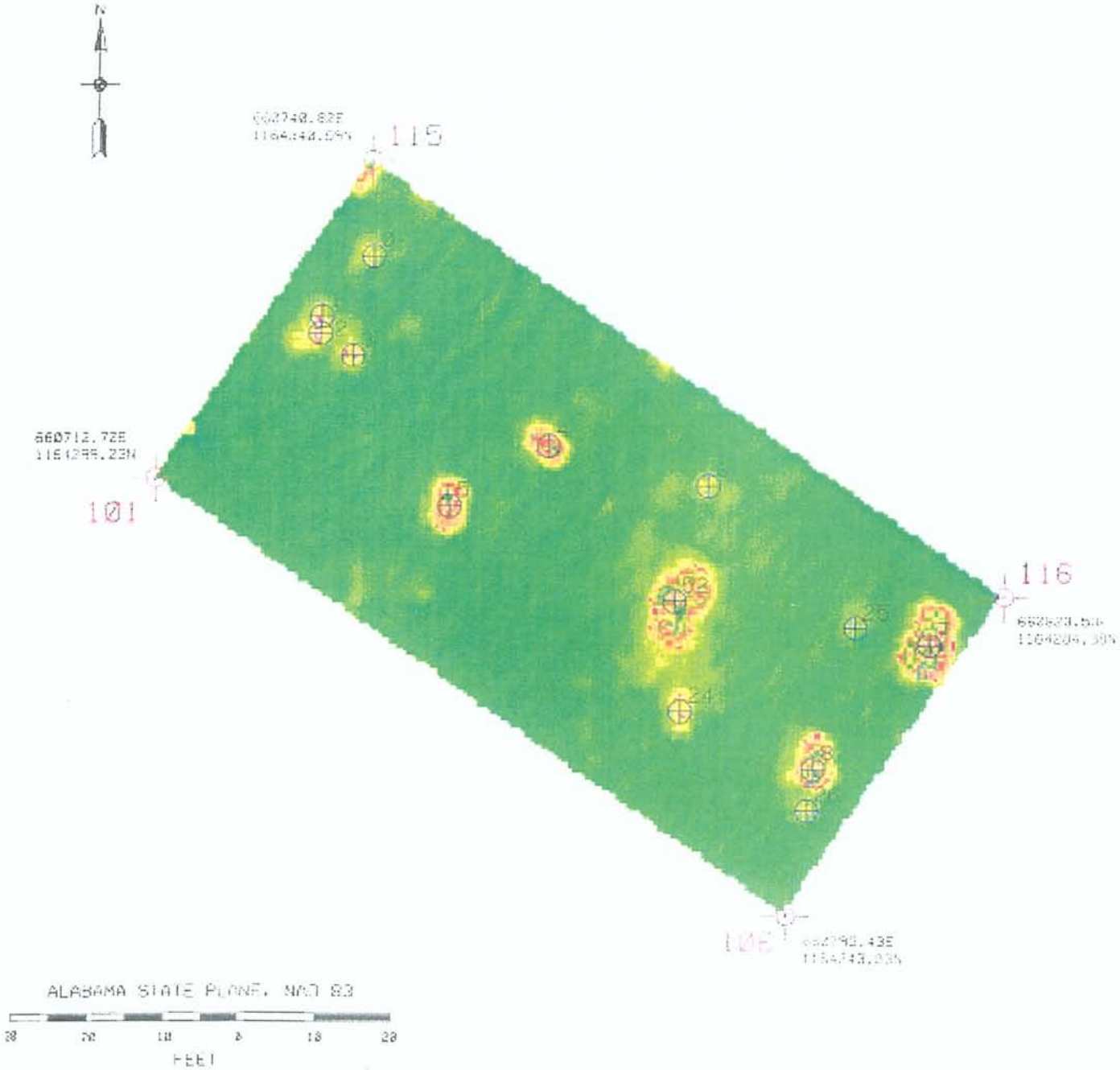
AREA 1
EM 61 DATA
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER



LEGEND

SURVEY MARKER

SEEDED ITEM

TARGET ID NUMBER

FORT MCCLELLAN
ALABAMA

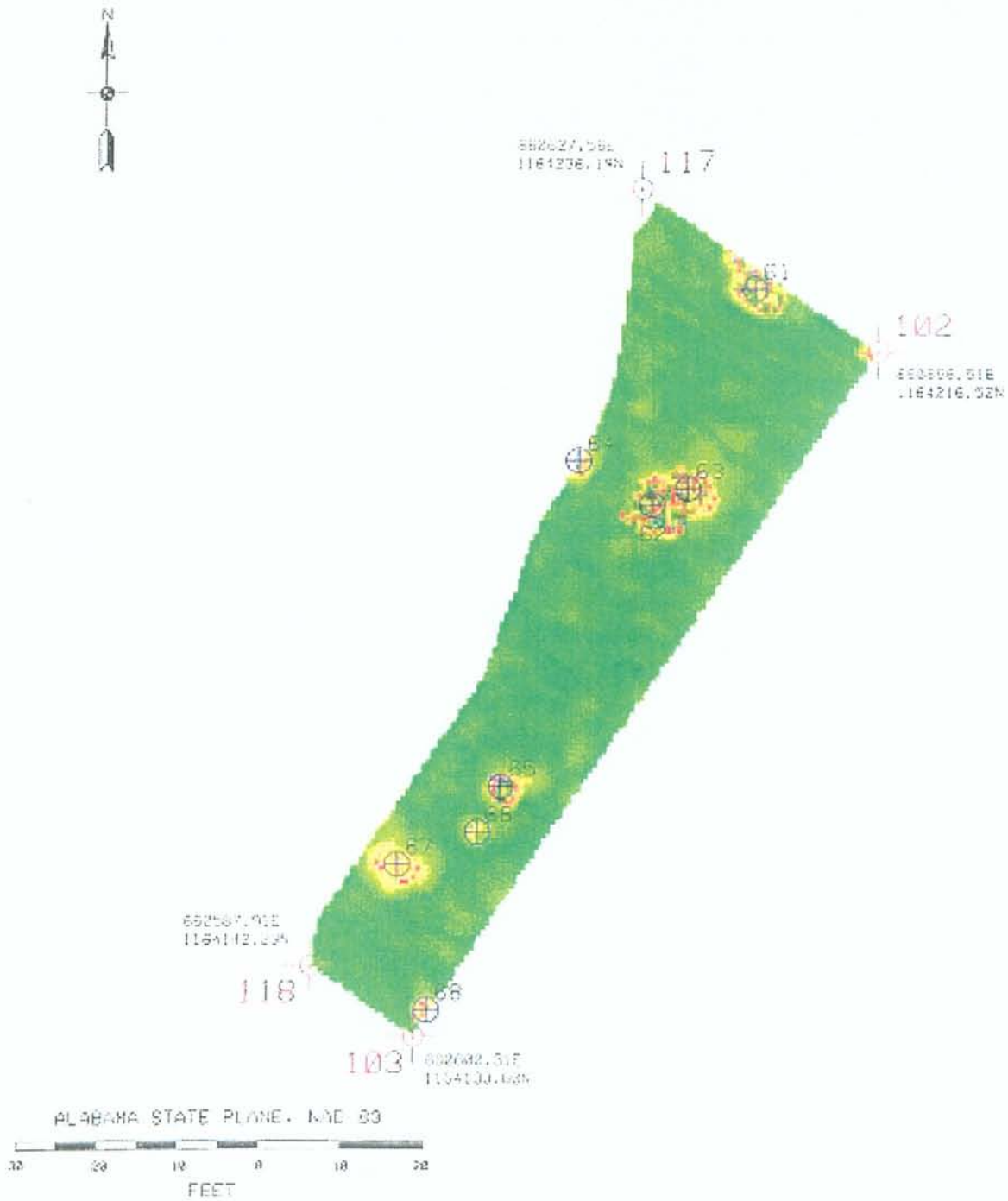
AREA 1
EM 61 DATA
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER



LEGEND

SURVEY MARKER

SEEDED ITEM

61 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

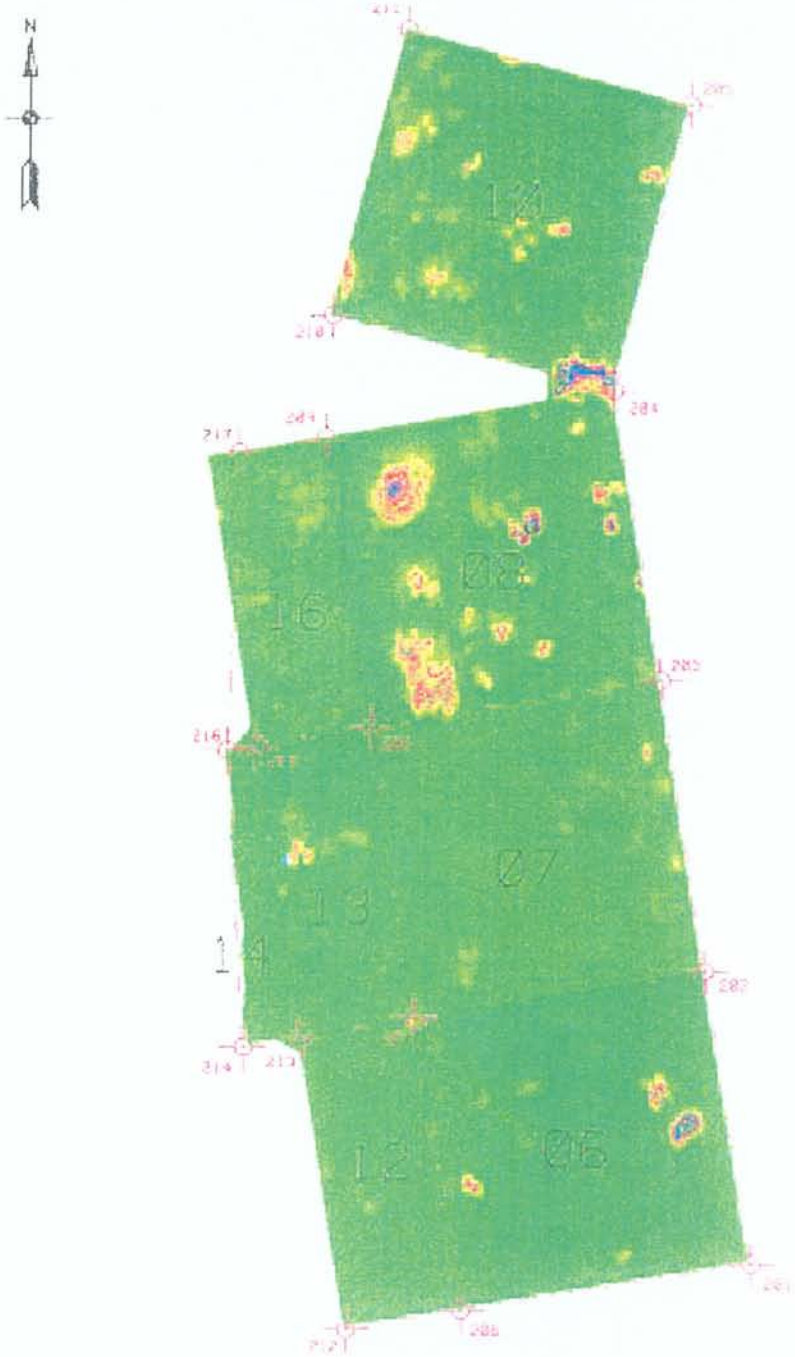
AREA 1
EM 61 DATA
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER



AREA 2

POINT	EASTING	NORTHING
201	661301.77	1163928.05
202	661325.42	1164210.71
203	661349.11	1164117.27
204	661327.68	1164015.84
205	661350.25	1164012.74
206	661315.86	1163925.74
207	661306.70	1164002.41
208	661298.45	1164121.87
209	661231.14	1164159.73
210	661230.29	1164241.48
211	661251.54	1164328.19
212	661243.22	1163867.22
213	661227.24	1163496.68
214	661207.56	1163492.62
215	661210.58	1164054.04
216	661201.12	1164242.91
217	661204.54	1164195.84

ALABAMA STATE PLANE, NAD 83

LEGEND

SURVEY MARKER

8 MV 125

GEOPHYSICAL SURVEY

FORT MCCLELLAN
ALABAMA

AREA 2
MARCH 1999

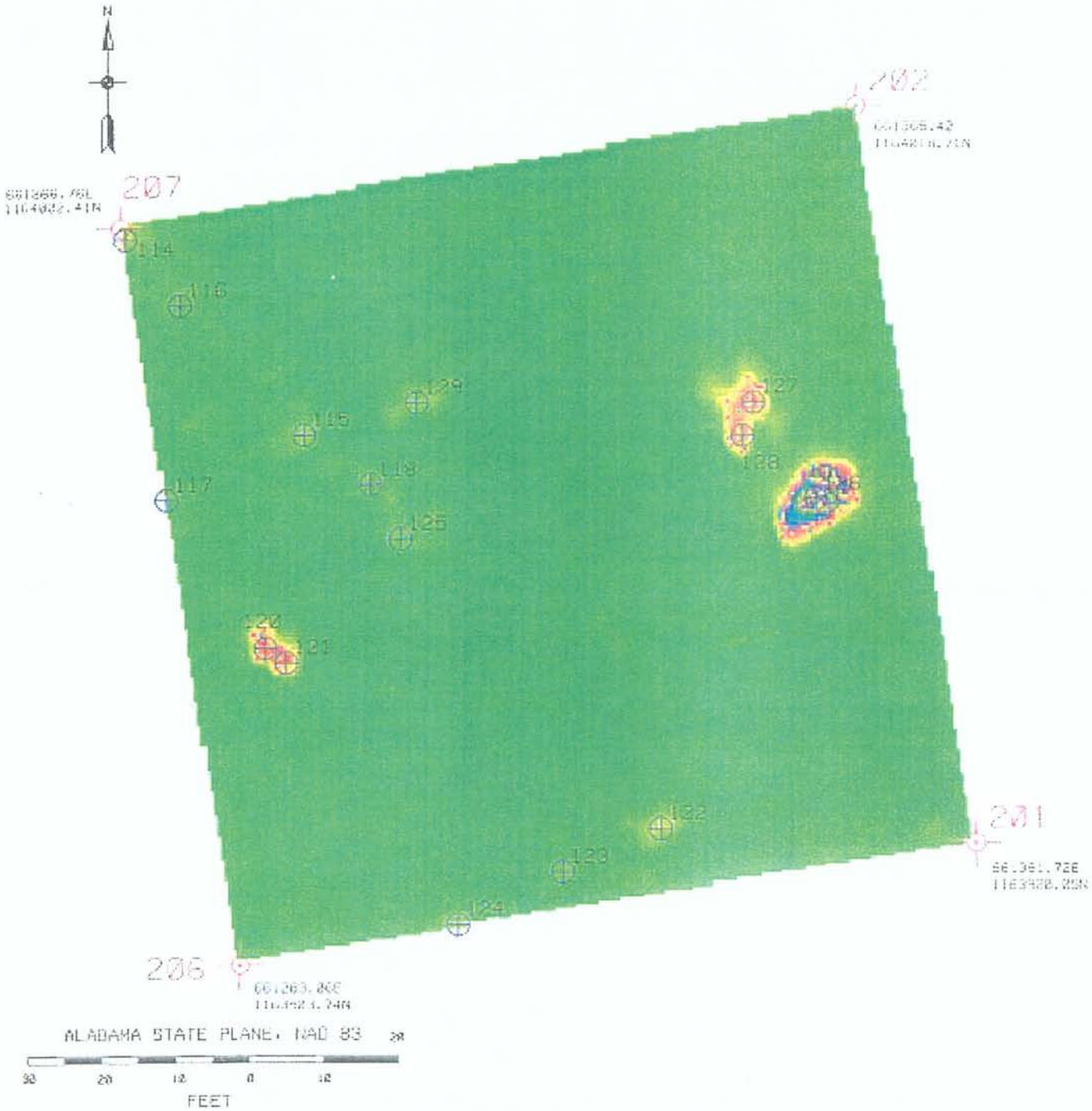
GRID NUMBERING

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

126 TARGET ID NUMBER

0 MV 120

FORT MCCLELLAN
ALABAMA

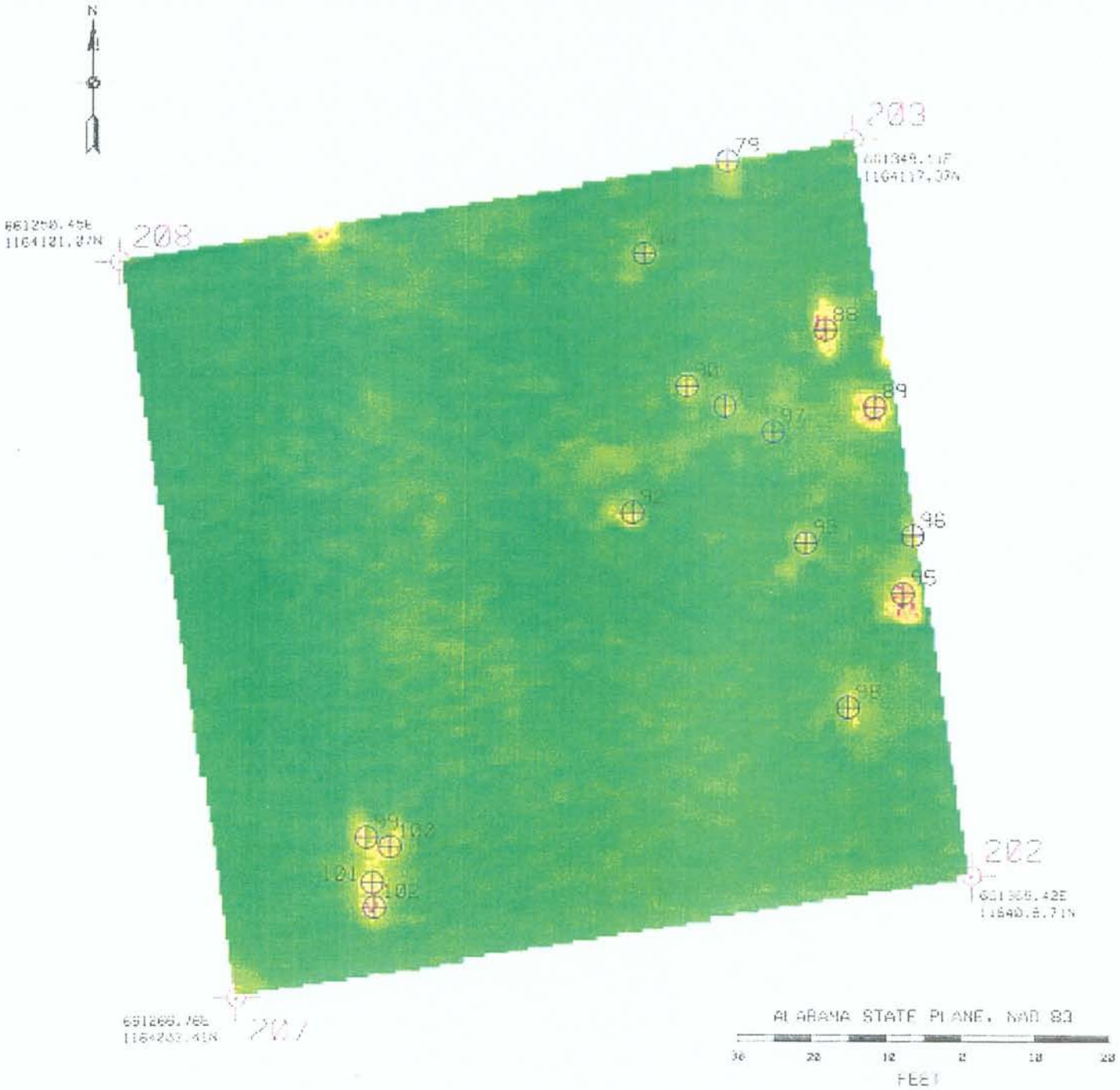
AREA 2
EM 61 DATA
MARCH 11, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

88 TARGET ID NUMBER

0 MV

FORT MCCLELLAN
ALABAMA

AREA 2

EM 61 DATA

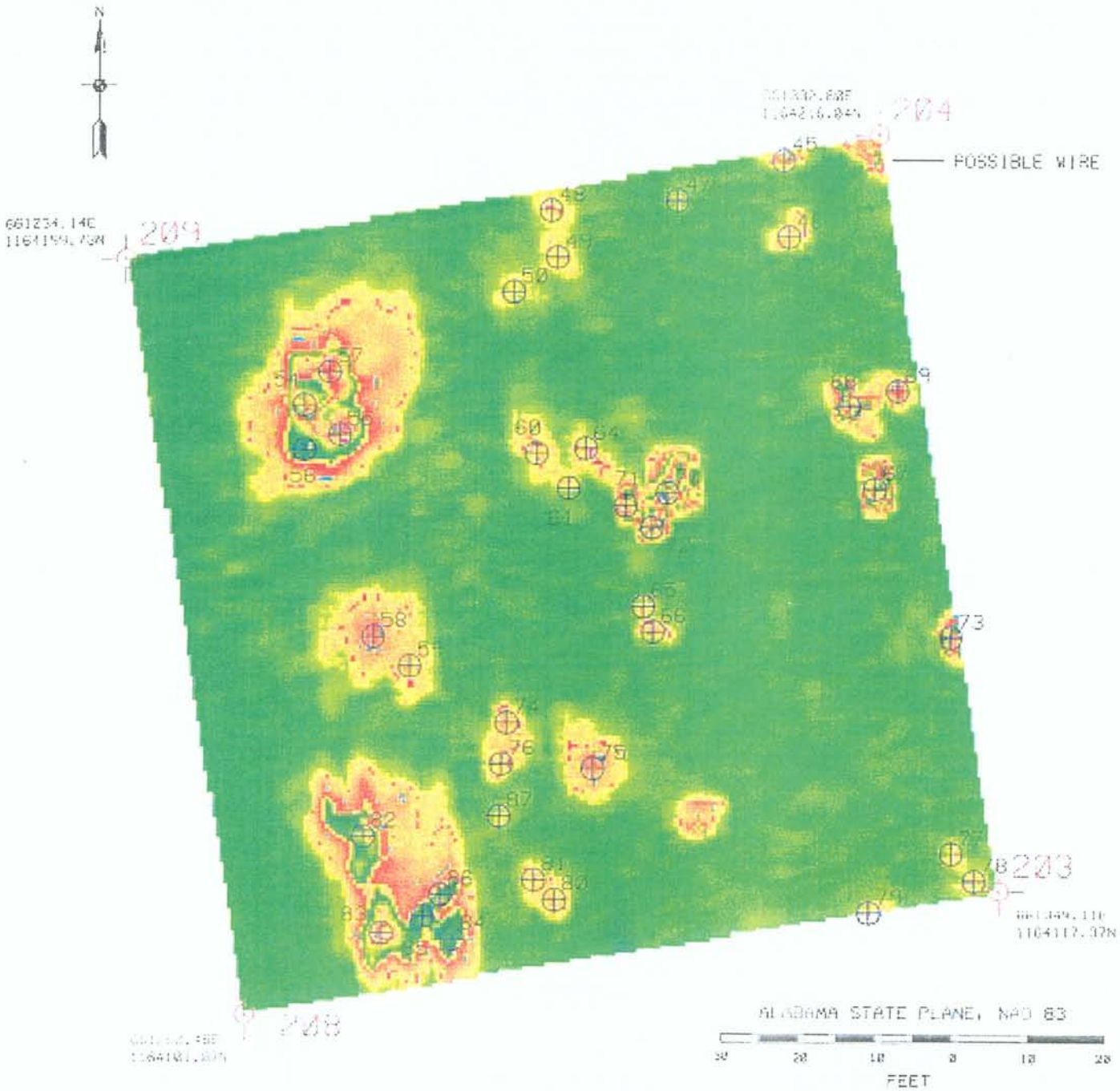
MARCH 11, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

68 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

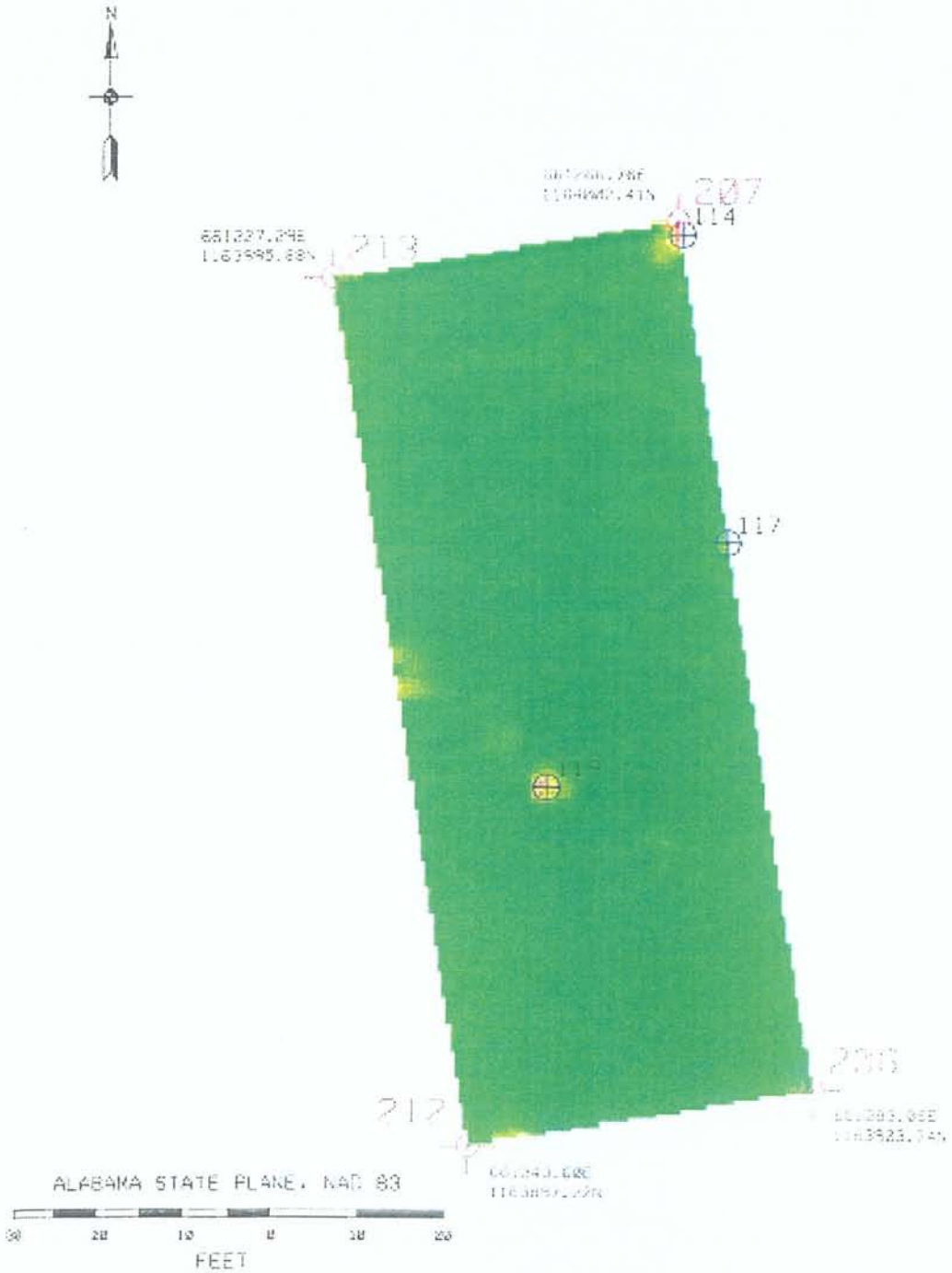
AREA 2
EM 61 DATA
MARCH 11, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER



LEGEND

SURVEY MARKER

SEEDED ITEM

117 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

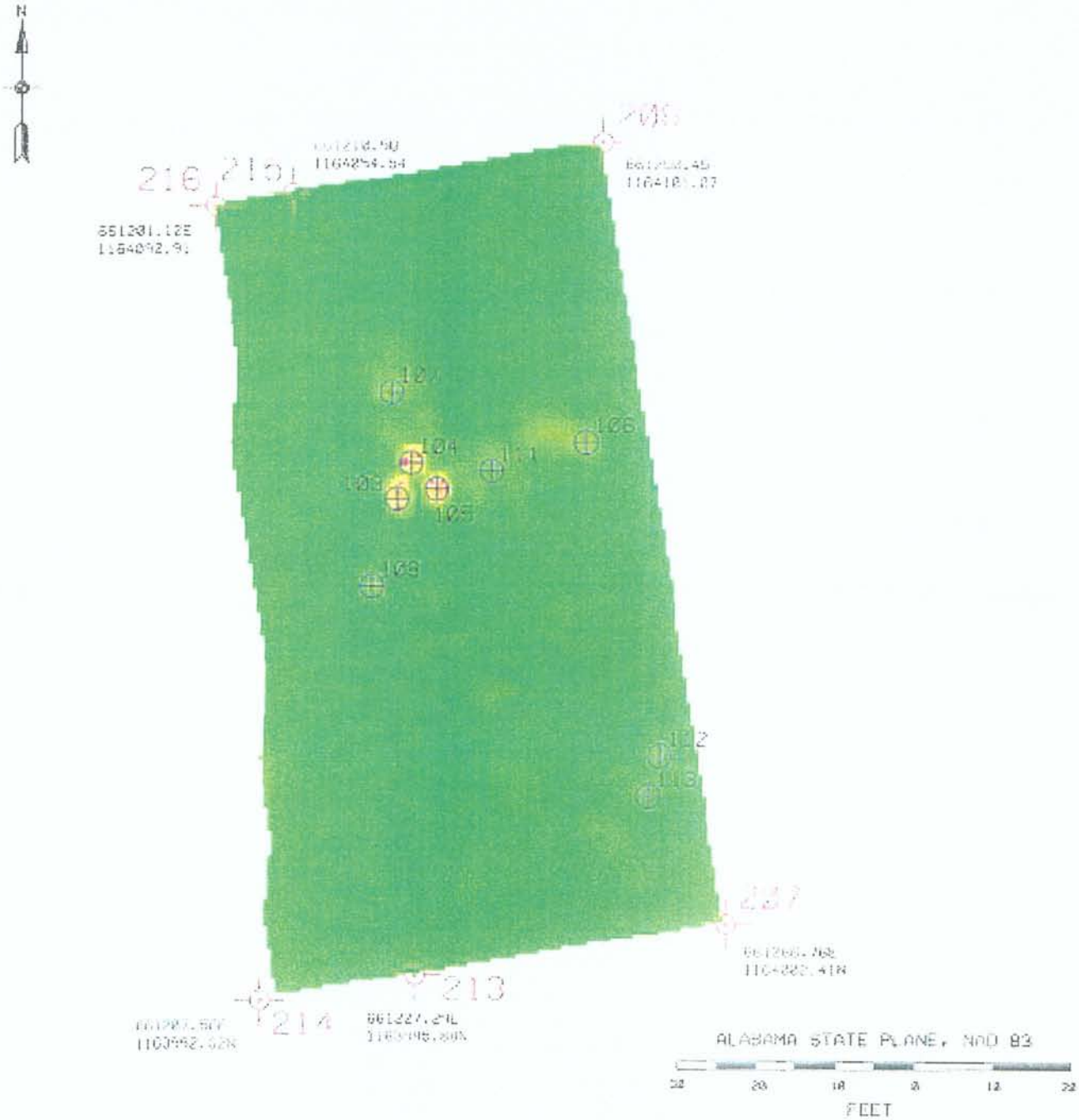
AREA 2
EM 61 DATA
MARCH 11, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER



LEGEND

SURVEY MARKER

SEEDED ITEM

106 TARGET ID NUMBER

0 MV 12E

FORT MCCLELLAN
ALABAMA

AREA 2

FM 61 DATA

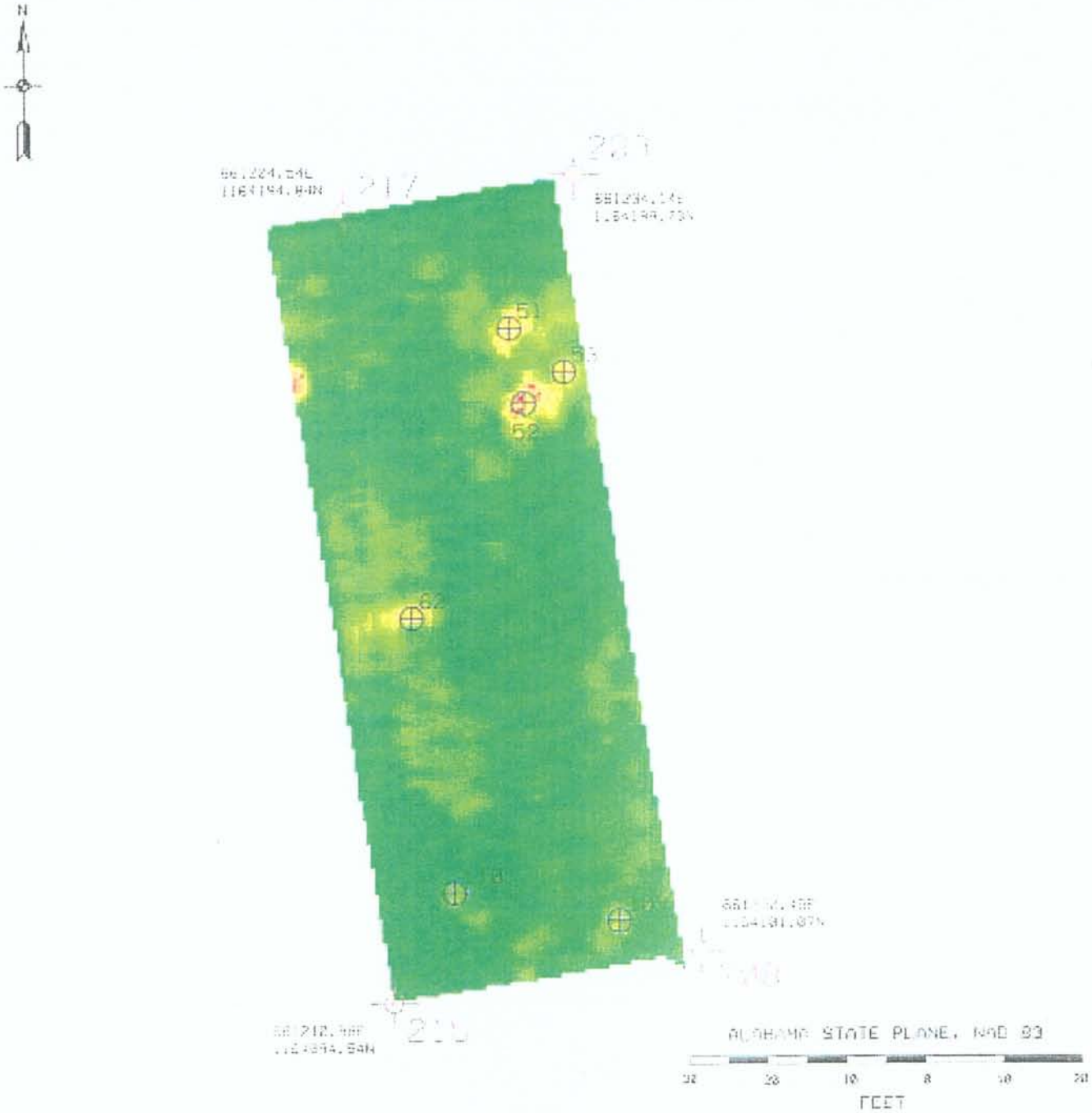
MARCH 11, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

53 TARGET ID NUMBER

0 MV 136

FORT MCCLELLAN
ALABAMA

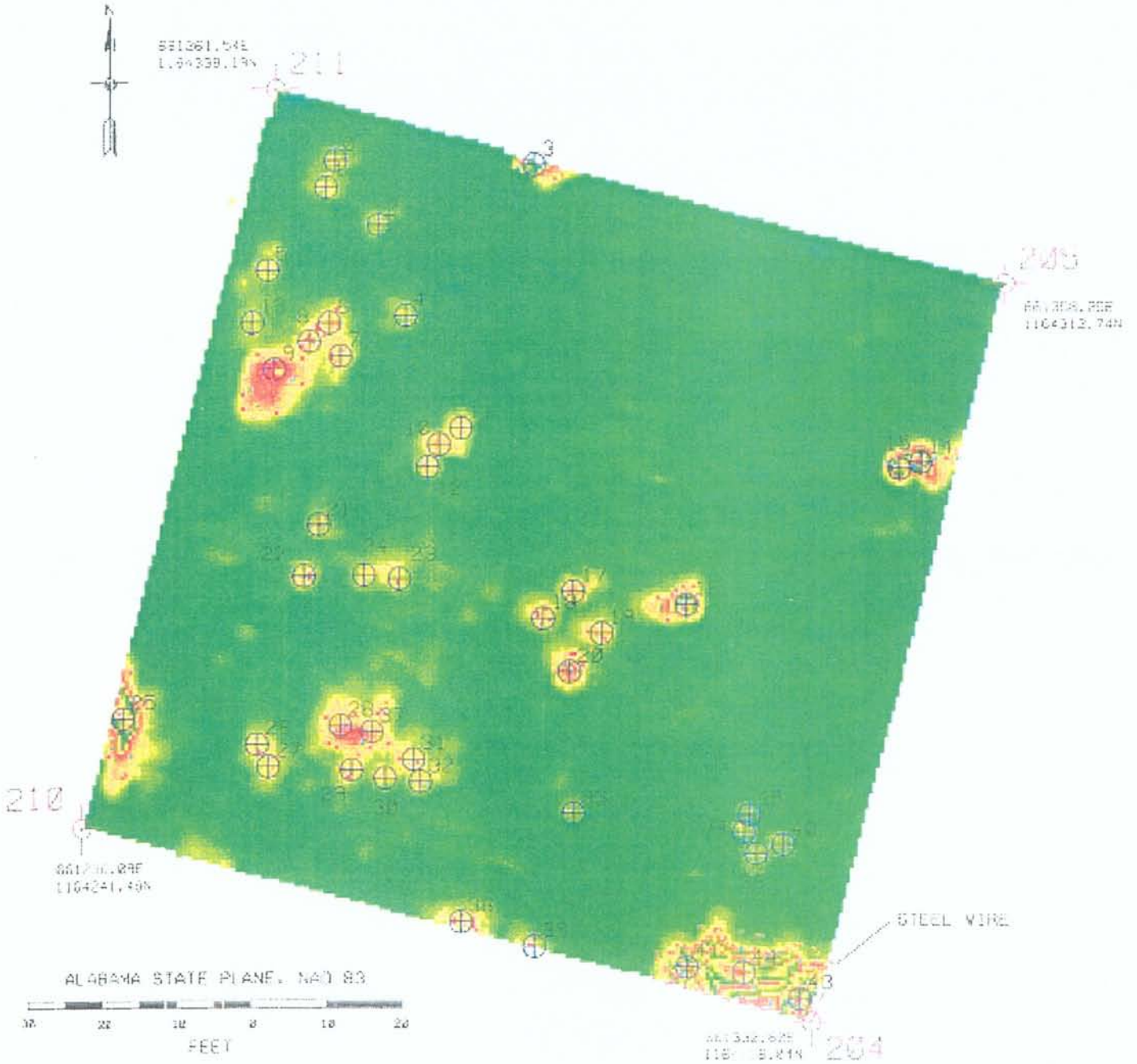
AREA 2
EM 61 DATA
MARCH 11, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

14 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 2
EM 61 DATA
MARCH 11, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER

AREA 3

NOM	NORTHING	EASTING
301	[illegible]	[illegible]
302	[illegible]	[illegible]
303	[illegible]	[illegible]
304	[illegible]	[illegible]
305	[illegible]	[illegible]
306	[illegible]	[illegible]
307	[illegible]	[illegible]
308	[illegible]	[illegible]
309	[illegible]	[illegible]
310	[illegible]	[illegible]
311	[illegible]	[illegible]
312	[illegible]	[illegible]
313	[illegible]	[illegible]
314	[illegible]	[illegible]
315	[illegible]	[illegible]
316	[illegible]	[illegible]
317	[illegible]	[illegible]
318	[illegible]	[illegible]
319	[illegible]	[illegible]
320	[illegible]	[illegible]
321	[illegible]	[illegible]
322	[illegible]	[illegible]
323	[illegible]	[illegible]
324	[illegible]	[illegible]
325	[illegible]	[illegible]
326	[illegible]	[illegible]
327	[illegible]	[illegible]
328	[illegible]	[illegible]
329	[illegible]	[illegible]
330	[illegible]	[illegible]
331	[illegible]	[illegible]
332	[illegible]	[illegible]

LEGEND

SURVEY MARKER

TARGET PICK

0 MV 126

GEOPHYSICAL SURVEY

FORT MCCLELLAN
ALABAMA

AREA 3
MARCH 1999

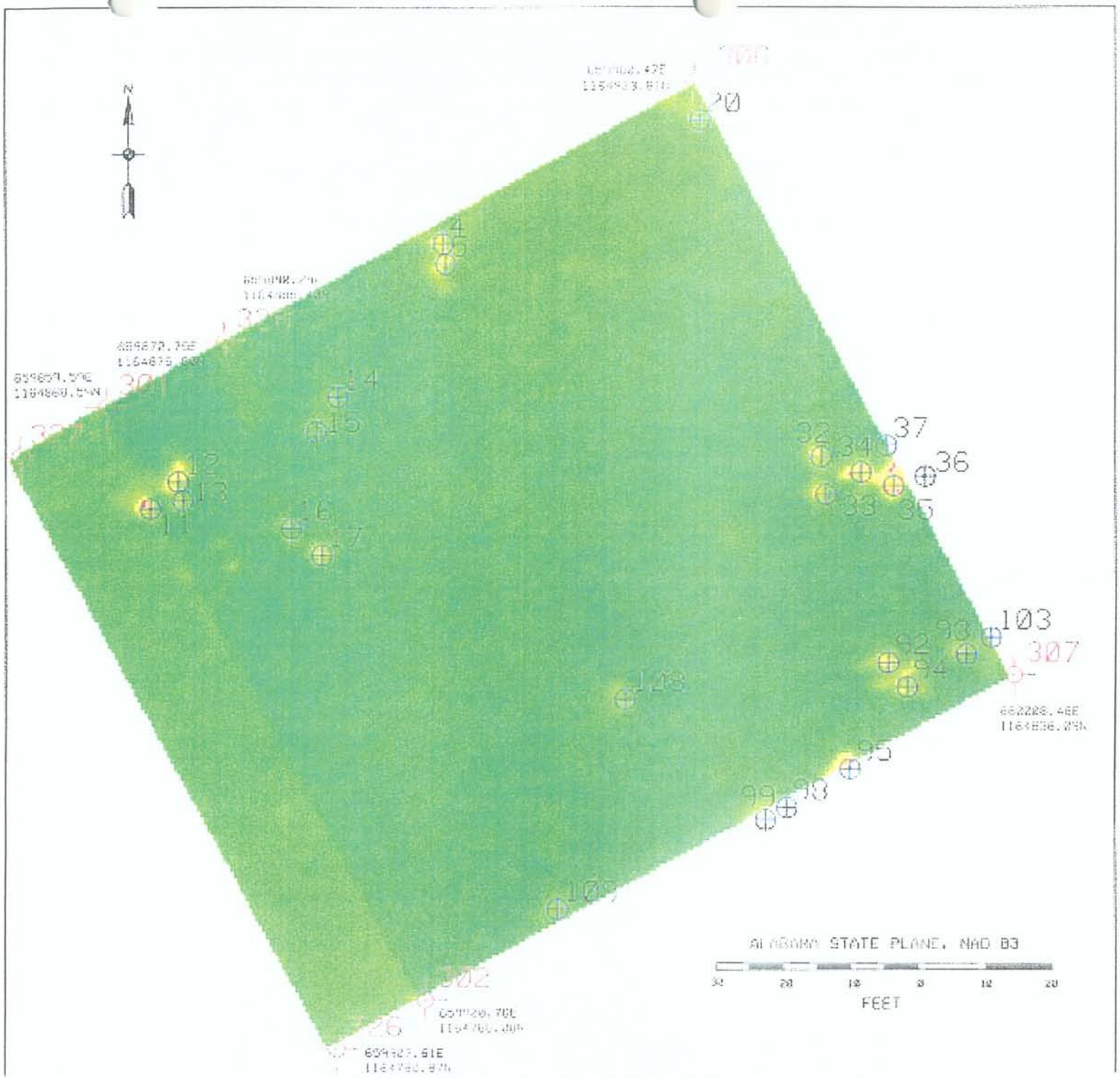
EM31 BOTTOM COIL

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

108 TARGET ID NUMBER

0 MV 125

FORT MCCLELLAN
ALABAMA

AREA 3

EM 61 DATA

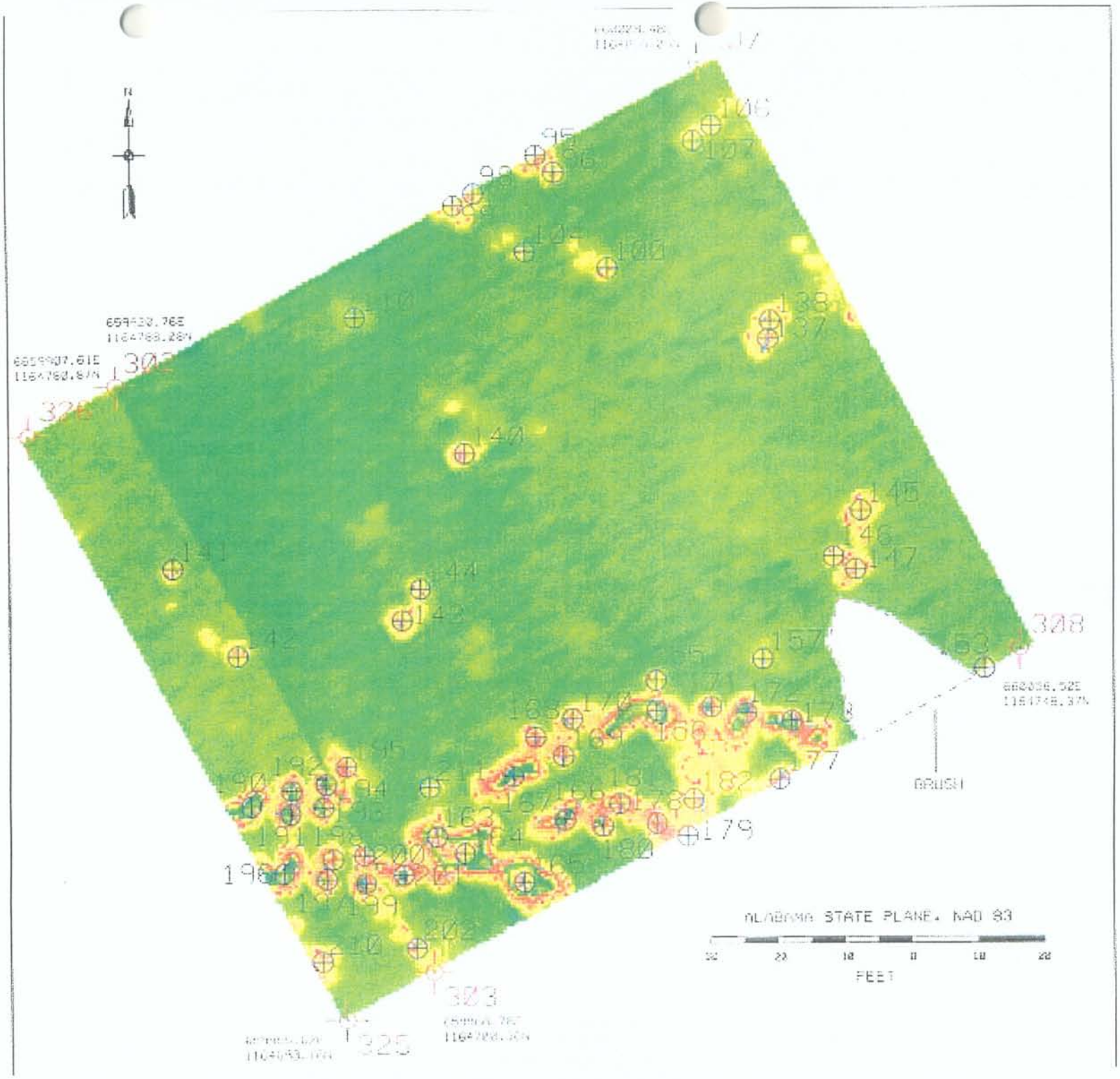
MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

140 TARGET ID NUMBER

0 MV 120

FORT MCCLELLAN
ALABAMA

AREA 3

EM 61 DATA

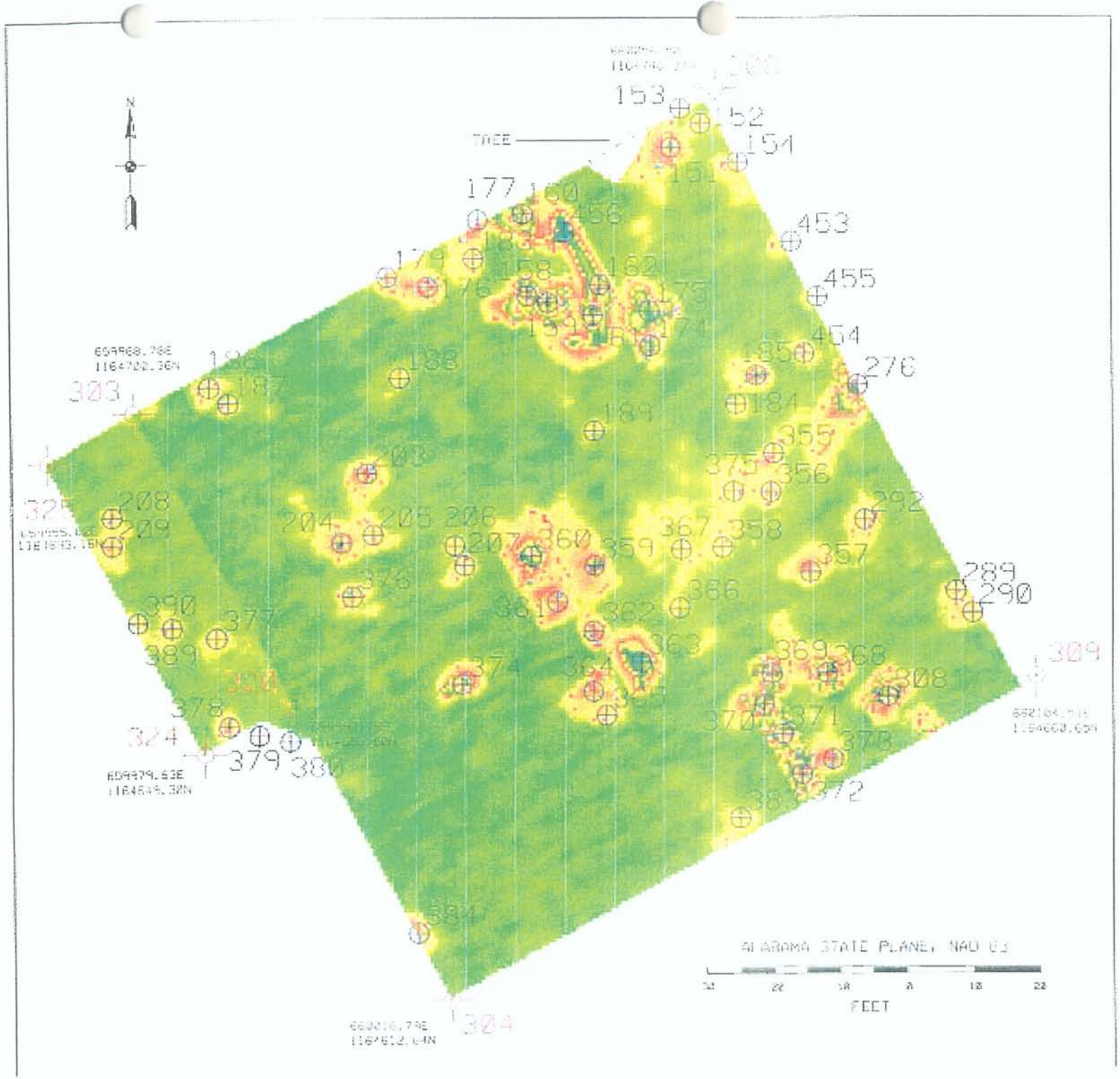
MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

163 TARGET ID NUMBER

2 MV 126

FORT MCCLELLAN
ALABAMA

AREA 3

EM 61 DATA

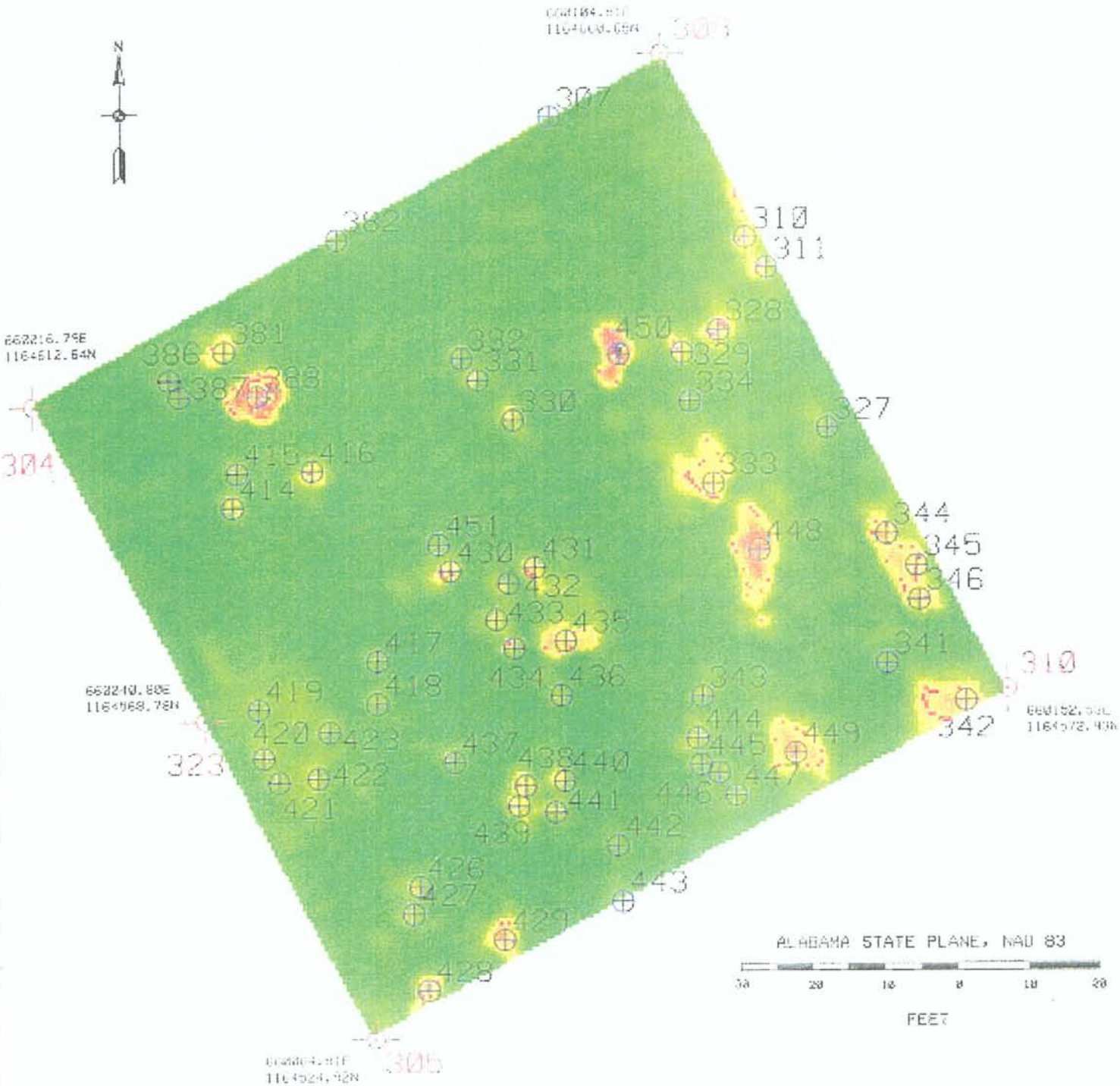
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

312 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

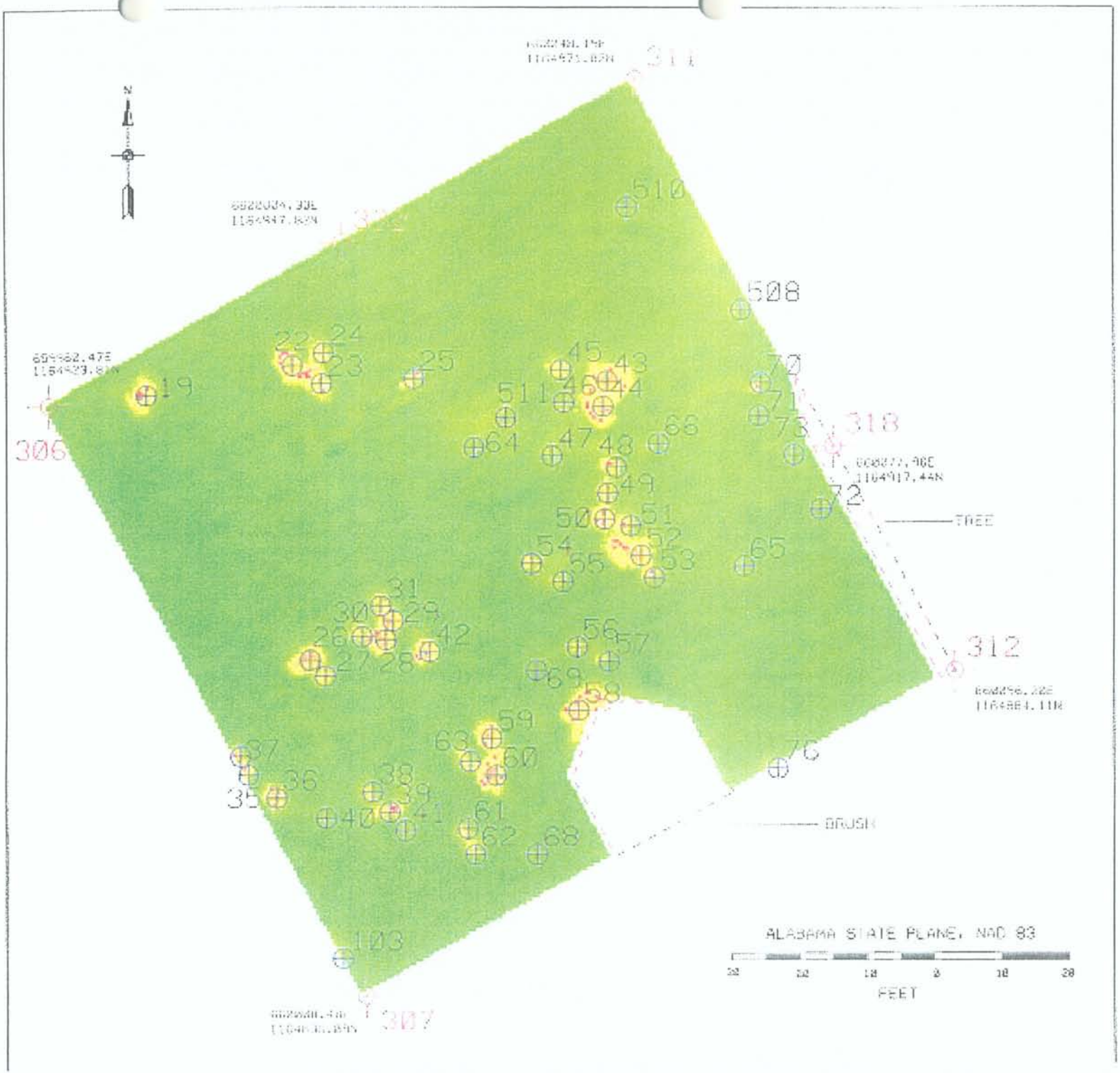
AREA 3
EM 61 DATA
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

508 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

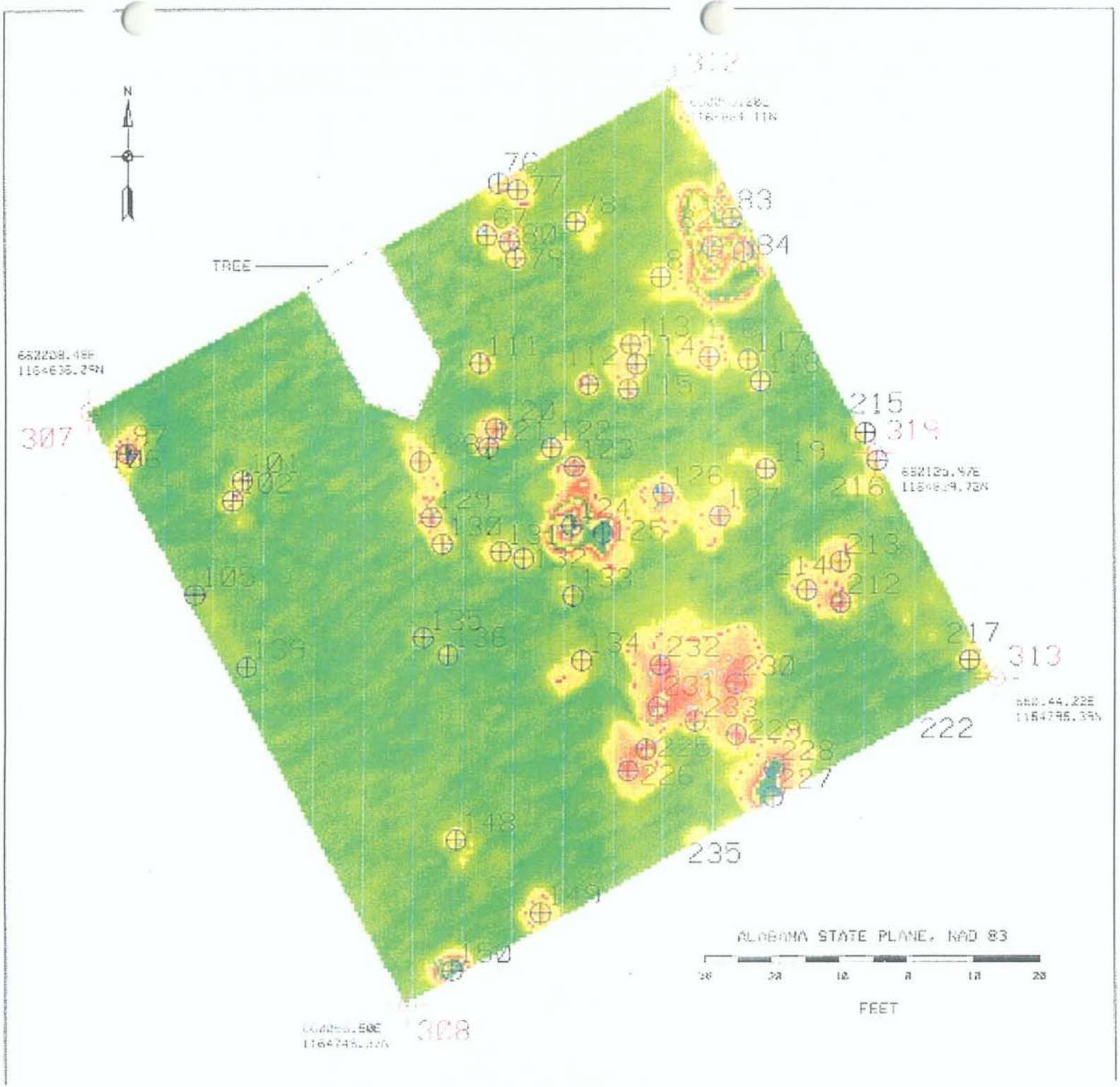
AREA 3
EM 61 DATA
MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

83 TARGET ID NUMBER

0 MV 120

FORT MCCLELLAN
ALABAMA

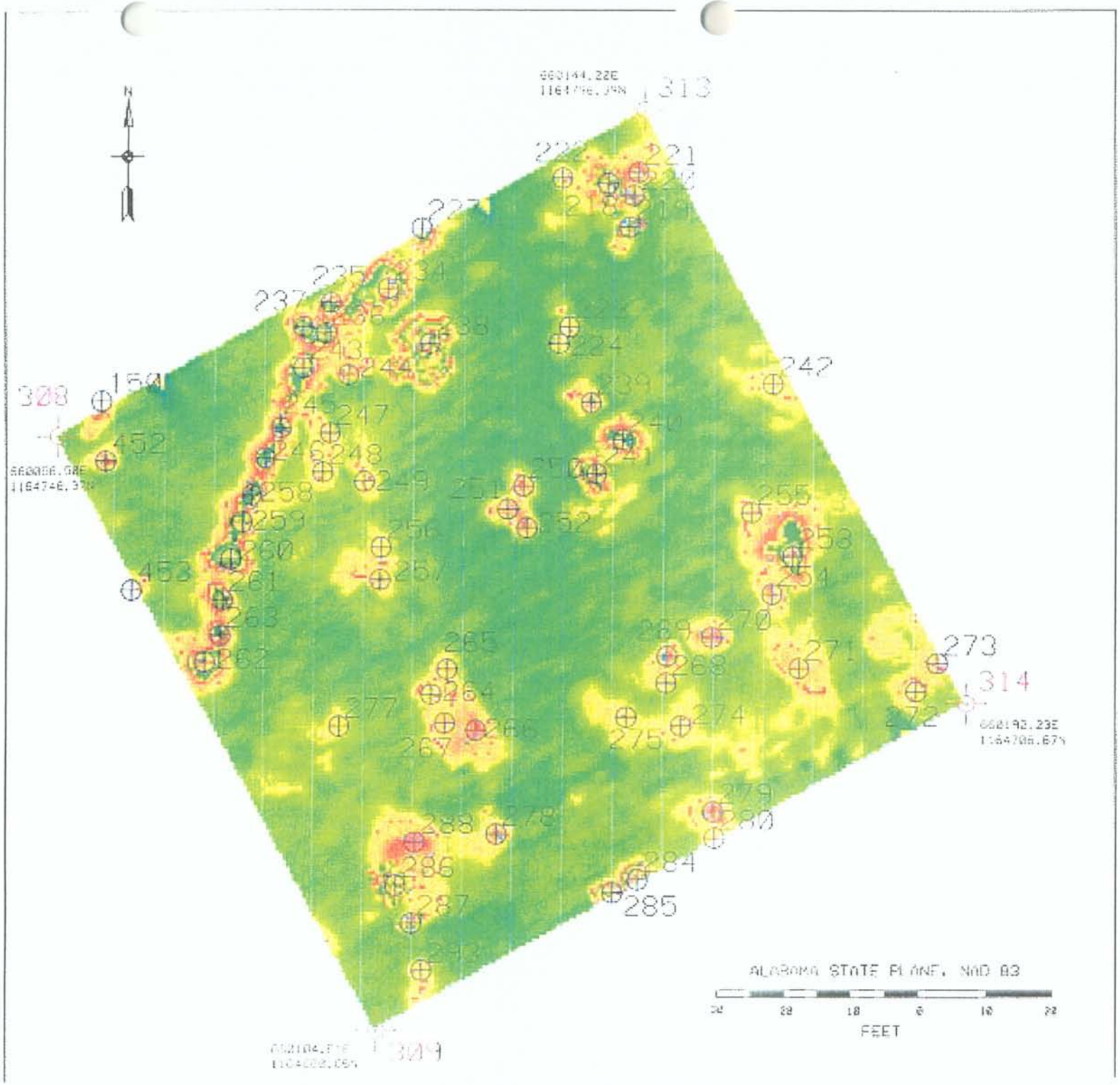
AREA 3
EM 61 DATA
MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

242 TARGET ID NUMBER

2 MV 126

FORT MCCLELLAN
ALABAMA

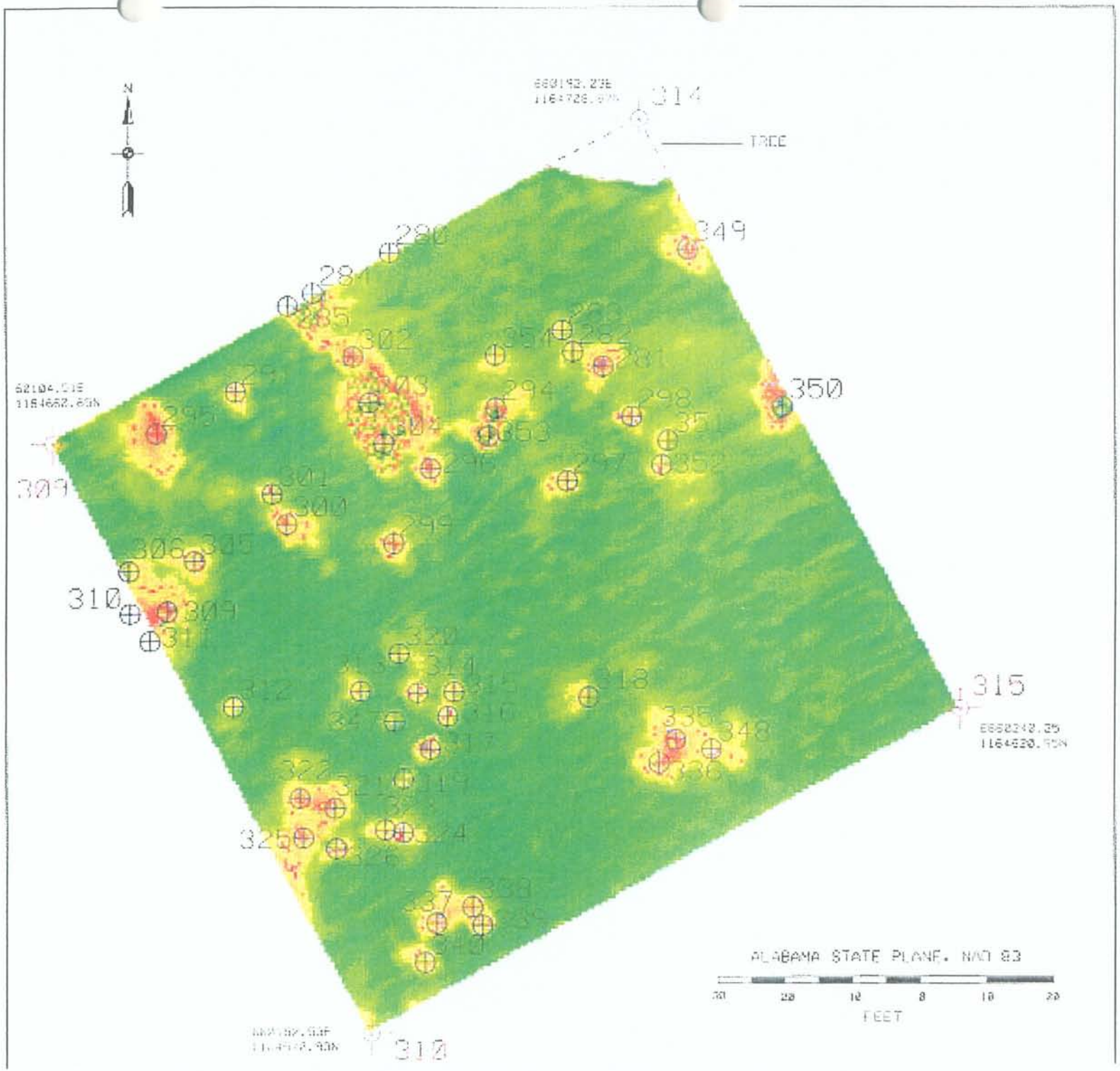
AREA 3
EM 61 DATA
MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SECOLD ITEM

349 TARGET ID NUMBER

2 89 120

FORT MCCLELLAN
ALABAMA

AREA 3

EM 61 DATA

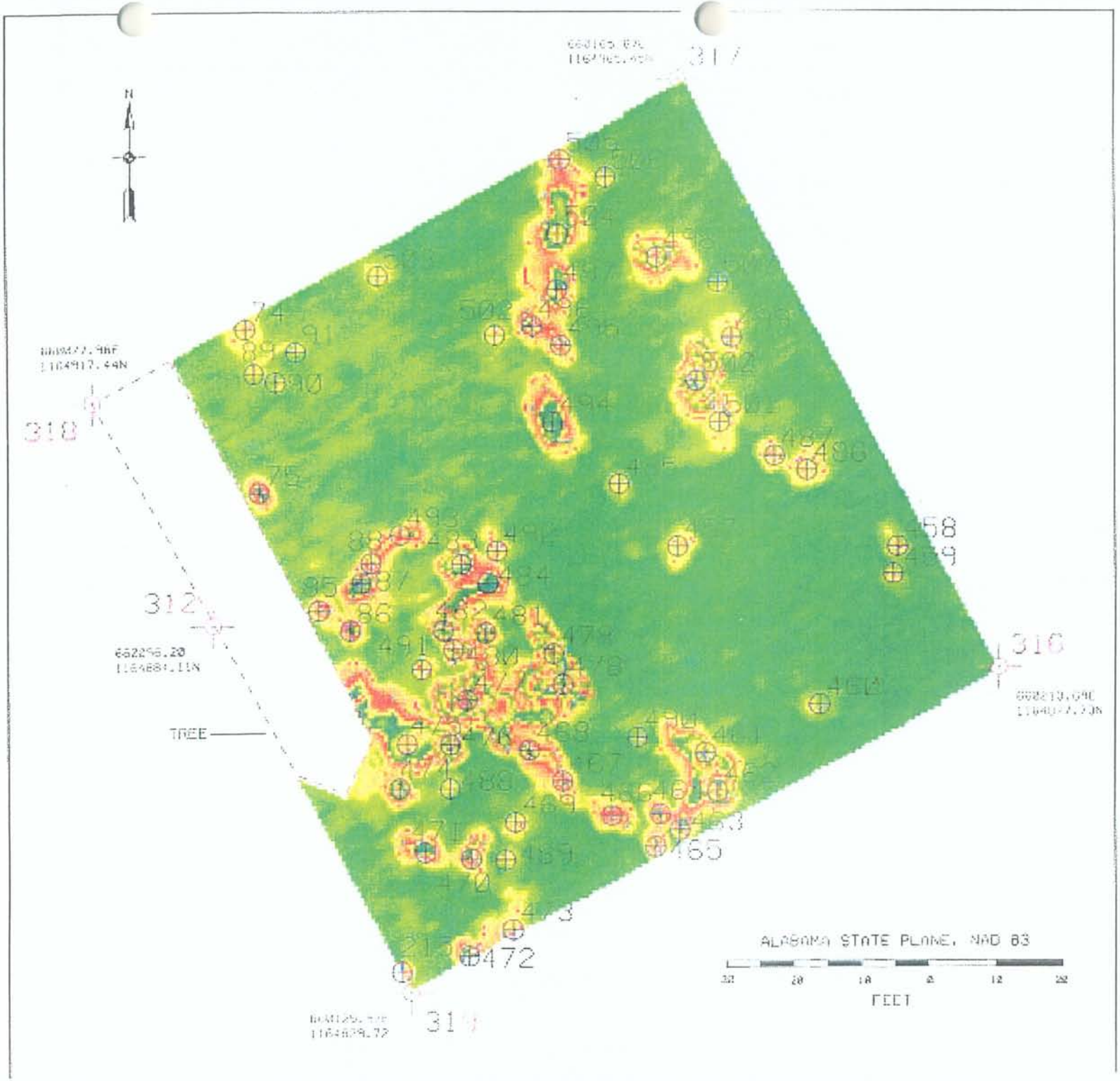
MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

486 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 3

EM 61 DATA

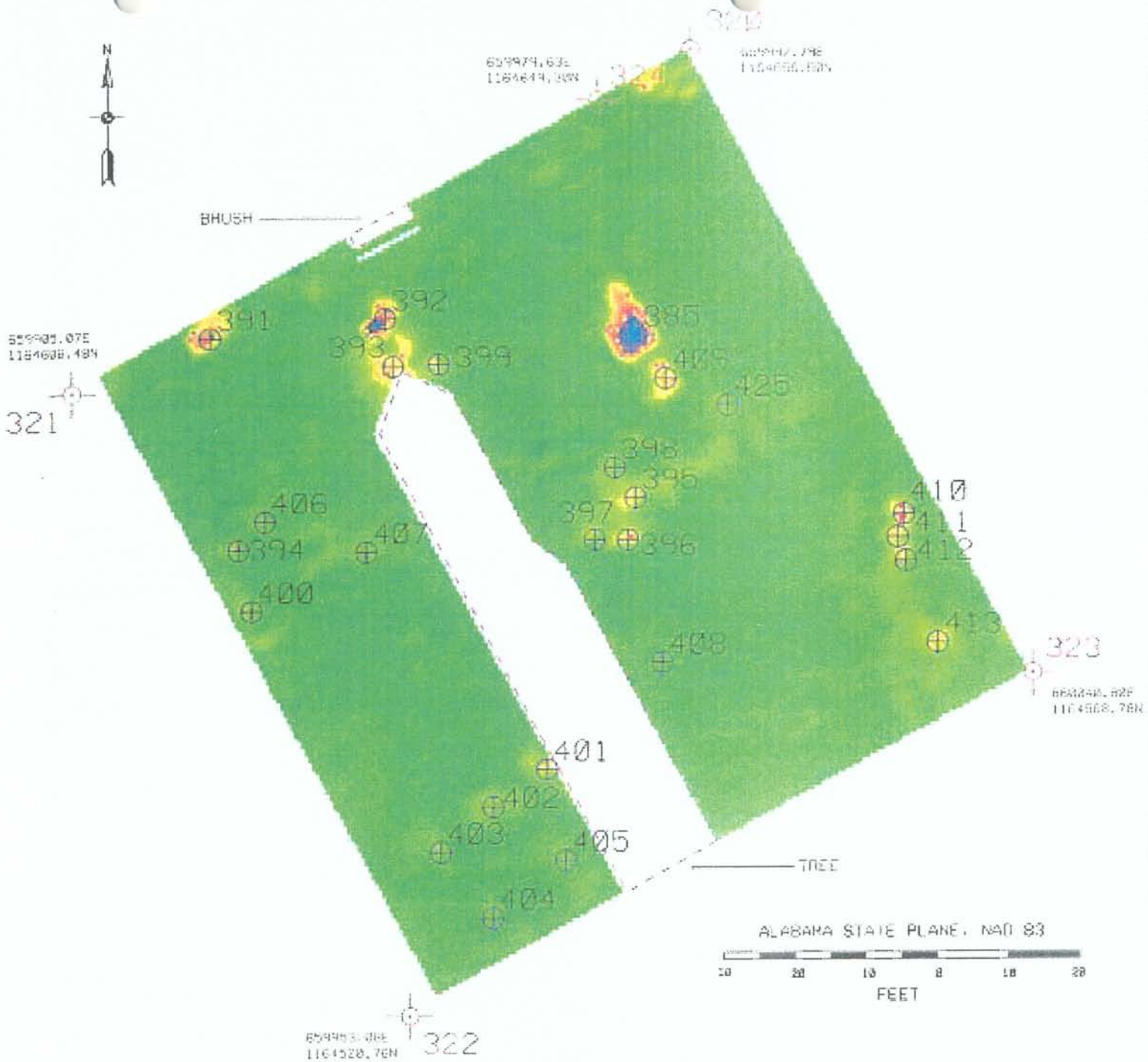
MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

411 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 3

EM 61 DATA

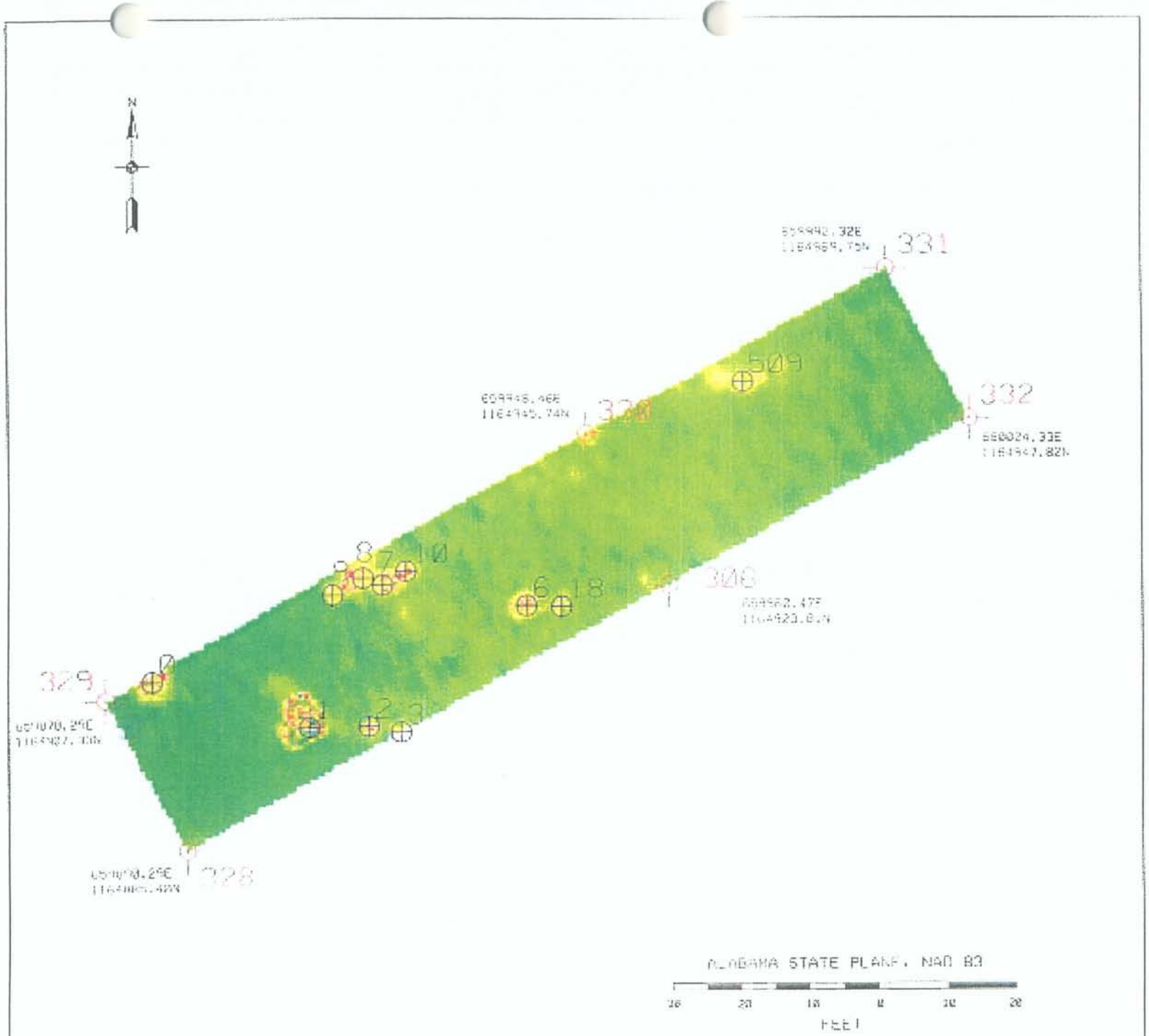
MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

509 TARGET ID NUMBER

0 80 120

FORT MCCLELLAN
ALABAMA

AREA 3

EM 61 DATA

MARCH 16, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA

AREA 4

POINT	EASTING	NORTHING
401	668314.80	1169419.93
402	668702.15	1166213.42
403	668391.61	1166637.38
404	668164.97	1166395.43
405	668422.32	1166215.47
406	668481.66	1166310.52
407	668473.78	1166285.39
408	668490.46	1166251.41
409	668411.36	1167097.85
410	668438.00	1165935.20
411	668472.02	1166897.07
412	668618.37	1166176.12
413	668554.73	1166364.17
414	668527.41	1166281.57
415	668546.29	1166287.10
416	668476.18	1165470.39
417	668417.16	1165926.74
418	668531.20	1166850.19
419	668517.54	1166866.39
420	668520.98	1166157.44
421	668593.03	1166265.83

ALABAMA STATE PLANE, NAD 83

FEET

LEGEND

SURVEY MARKER

TARGET PICK

0 MV 120

GEOPHYSICAL SURVEY

FORT MCCLELLAN
ALABAMA

AREA 4
MARCH 1999

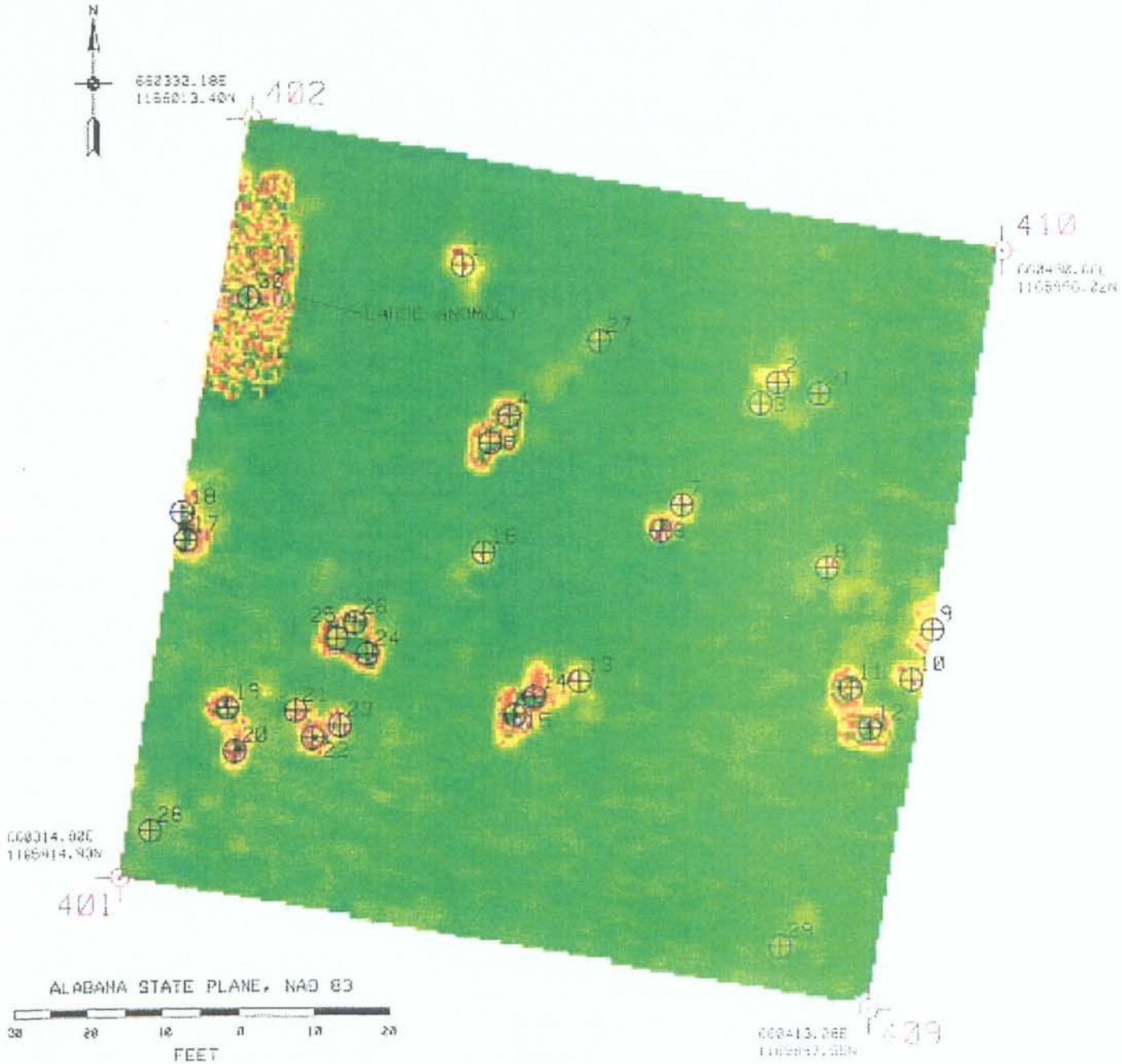
EM61 BOTTOM COIL

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

8 TARGET ID NUMBER

8 MV 135

FORT MCCLELLAN
ALABAMA

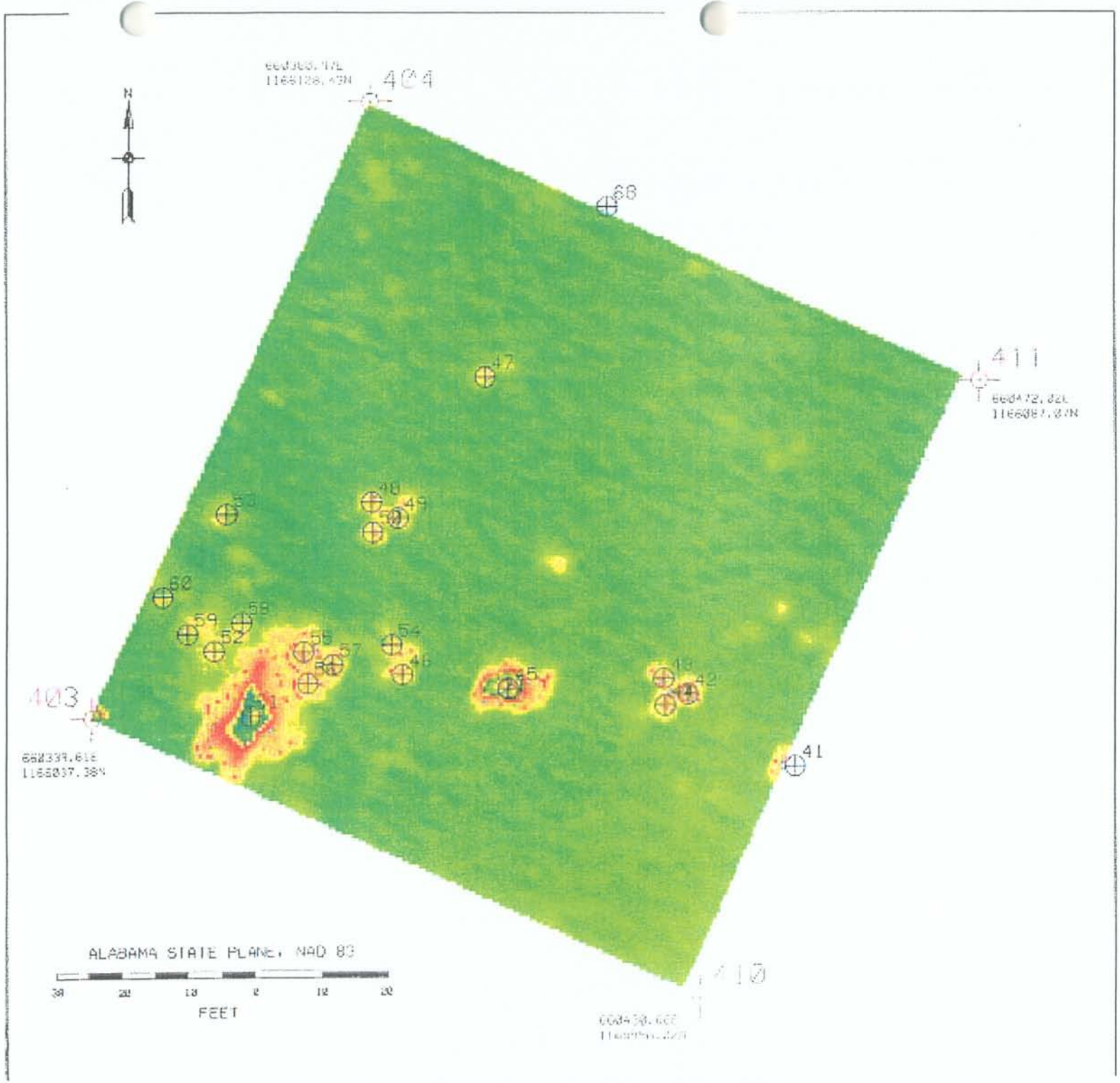
AREA 4
EM 61 DATA
MARCH 12, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

68 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

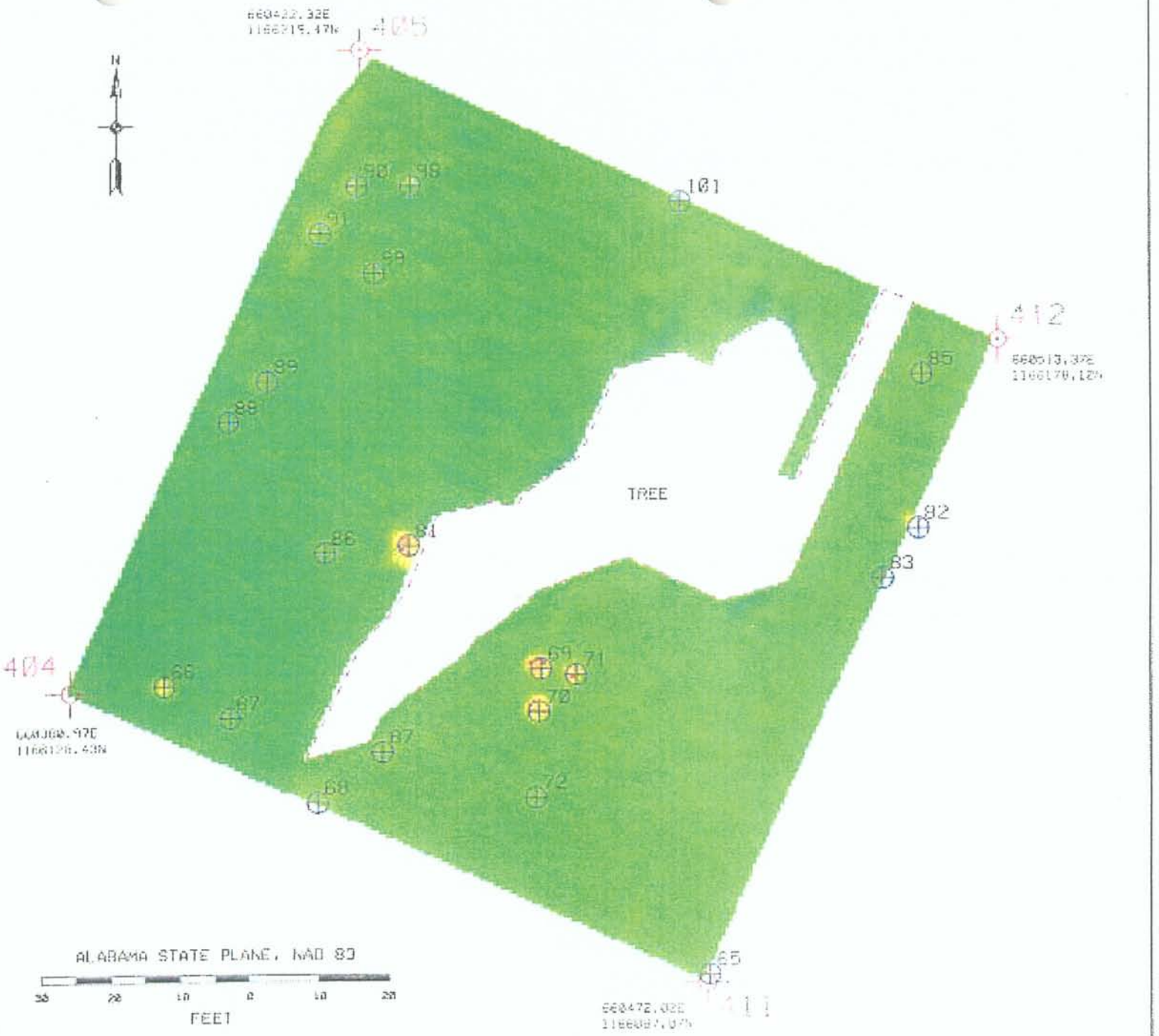
AREA 4
EM 61 DATA
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

85 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

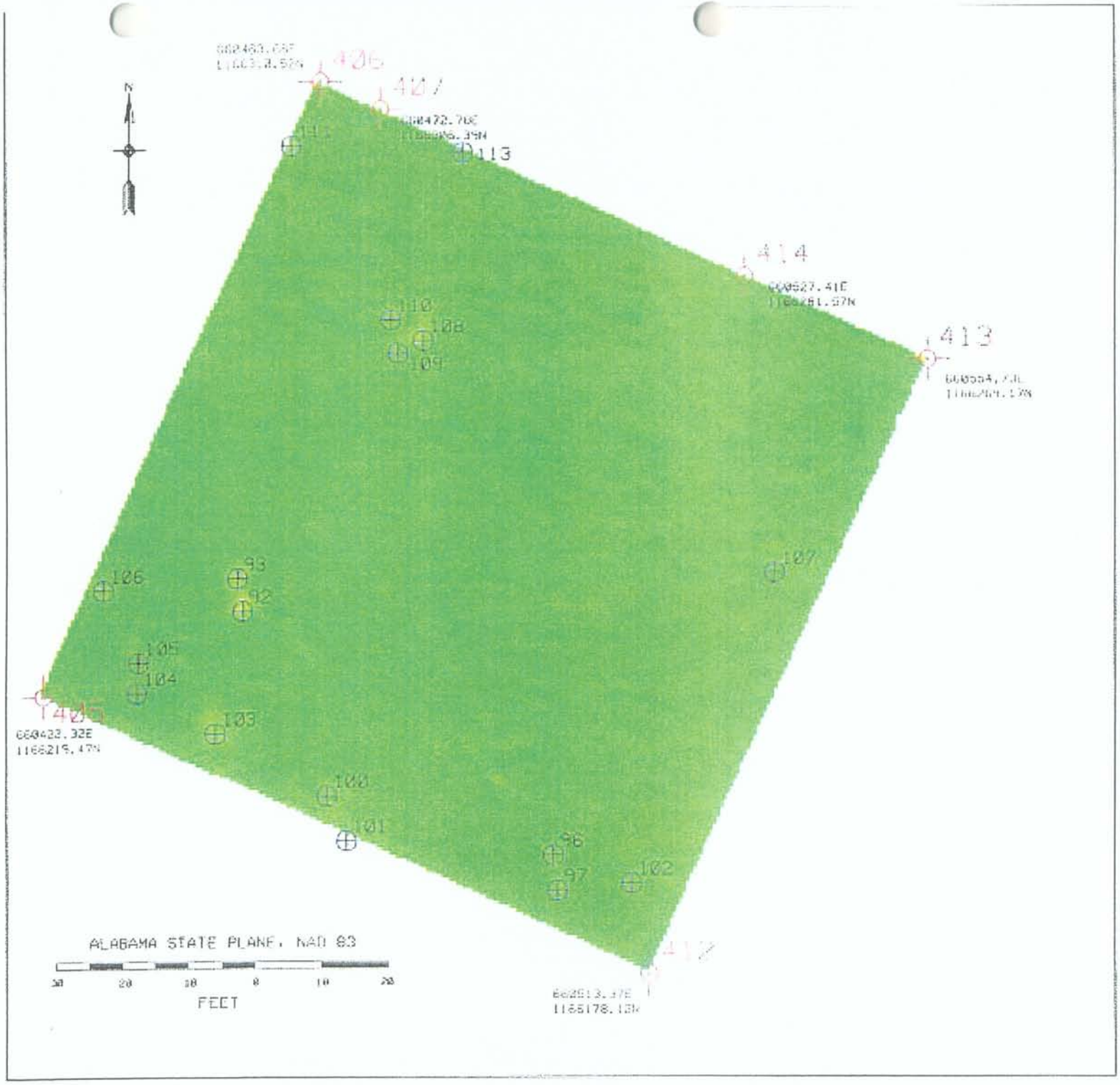
AREA 4
EM 61 DATA
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

107 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 4

EM 61 DATA

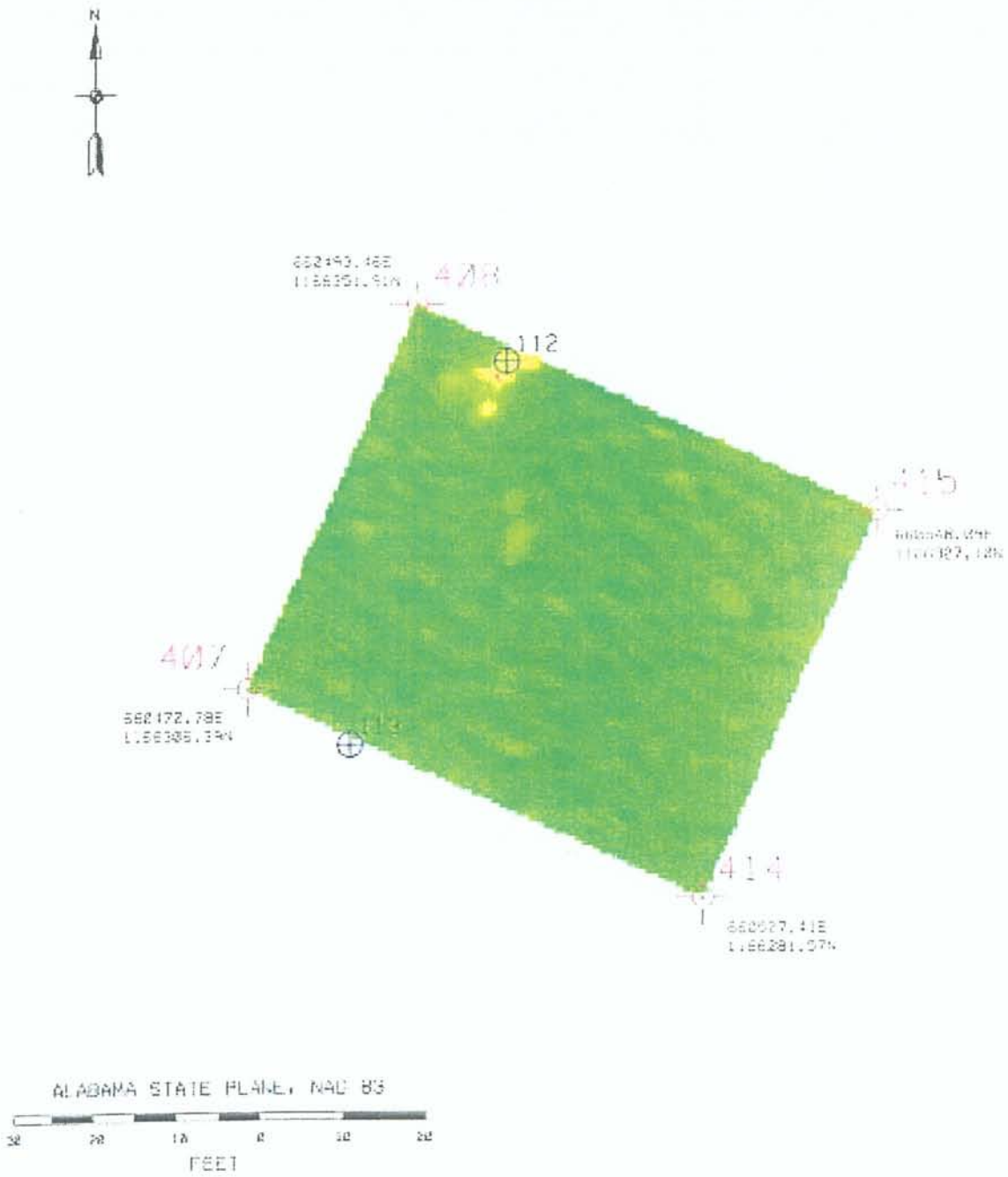
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

112 TARGET ID NUMBER

0 90 126

FORT MCCLELLAN
ALABAMA

AREA 4
EM 61 DATA
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

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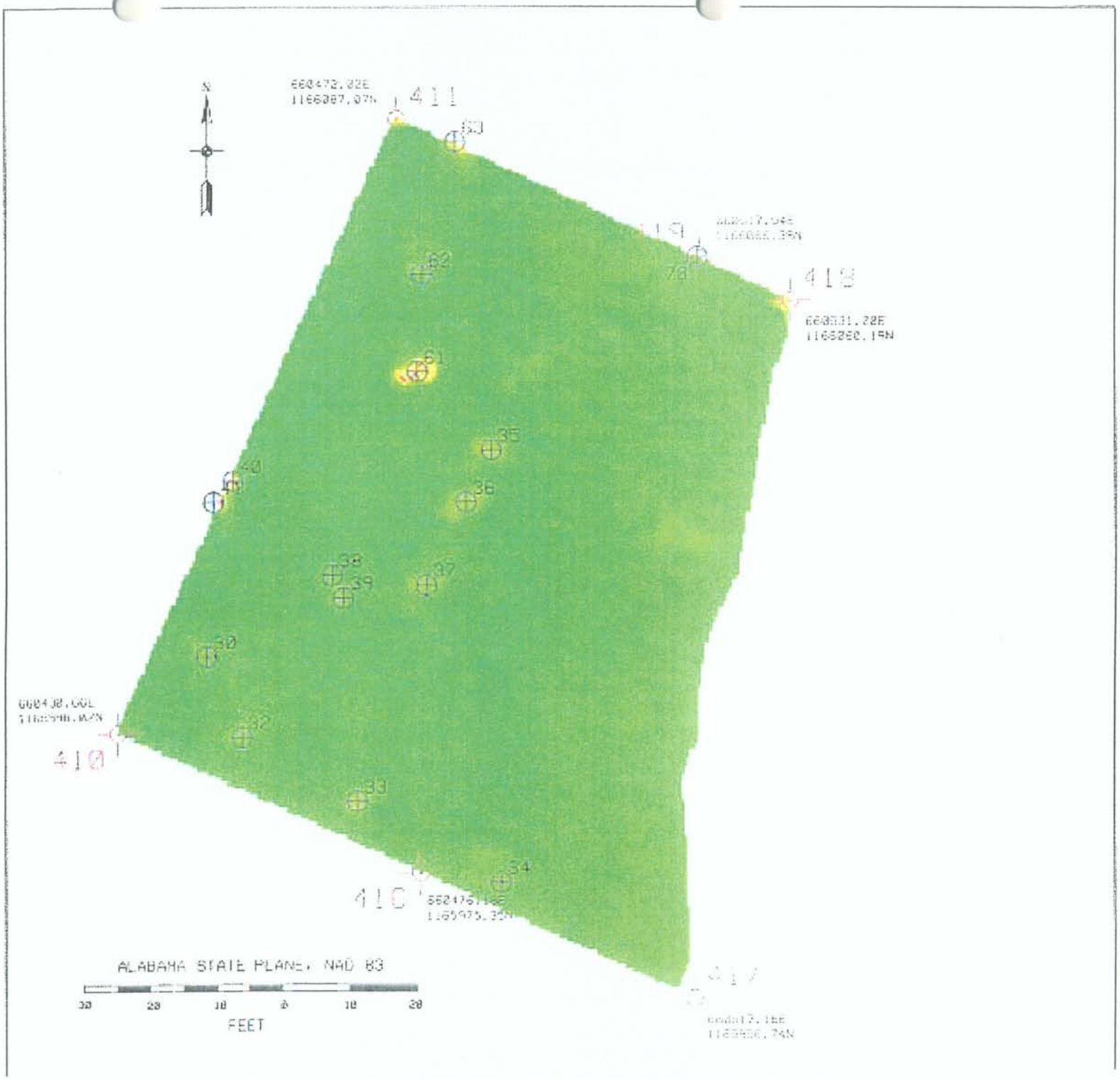
DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

62 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 4
EM 61 DATA
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
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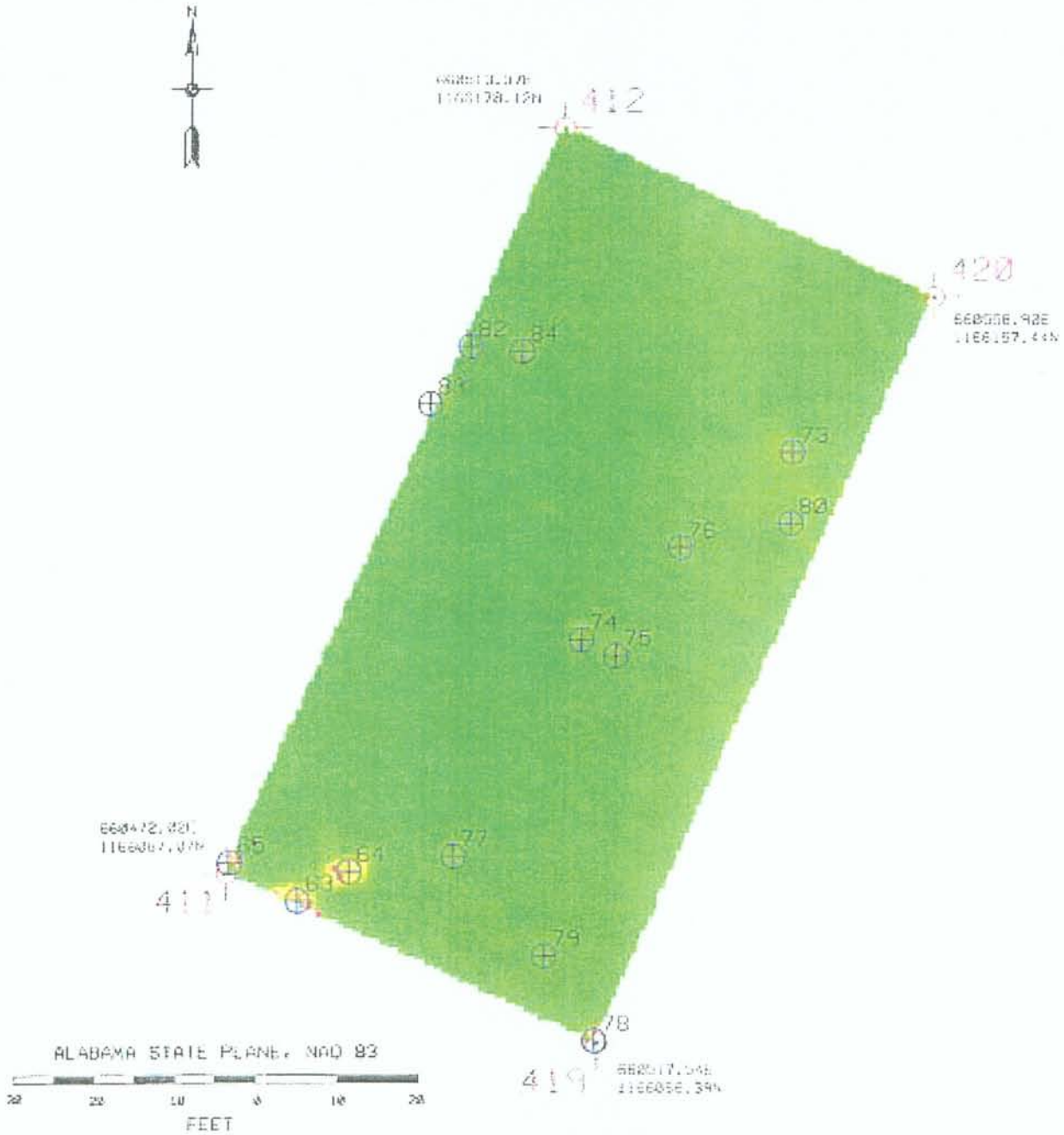
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

73 TARGET ID NUMBER

8 126

FORT MCCLELLAN
ALABAMA

AREA 4
EM 61 DATA
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
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DATA ANALYSIS:
S. COHEN & ASSOCIATES

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SUPPORT CENTER
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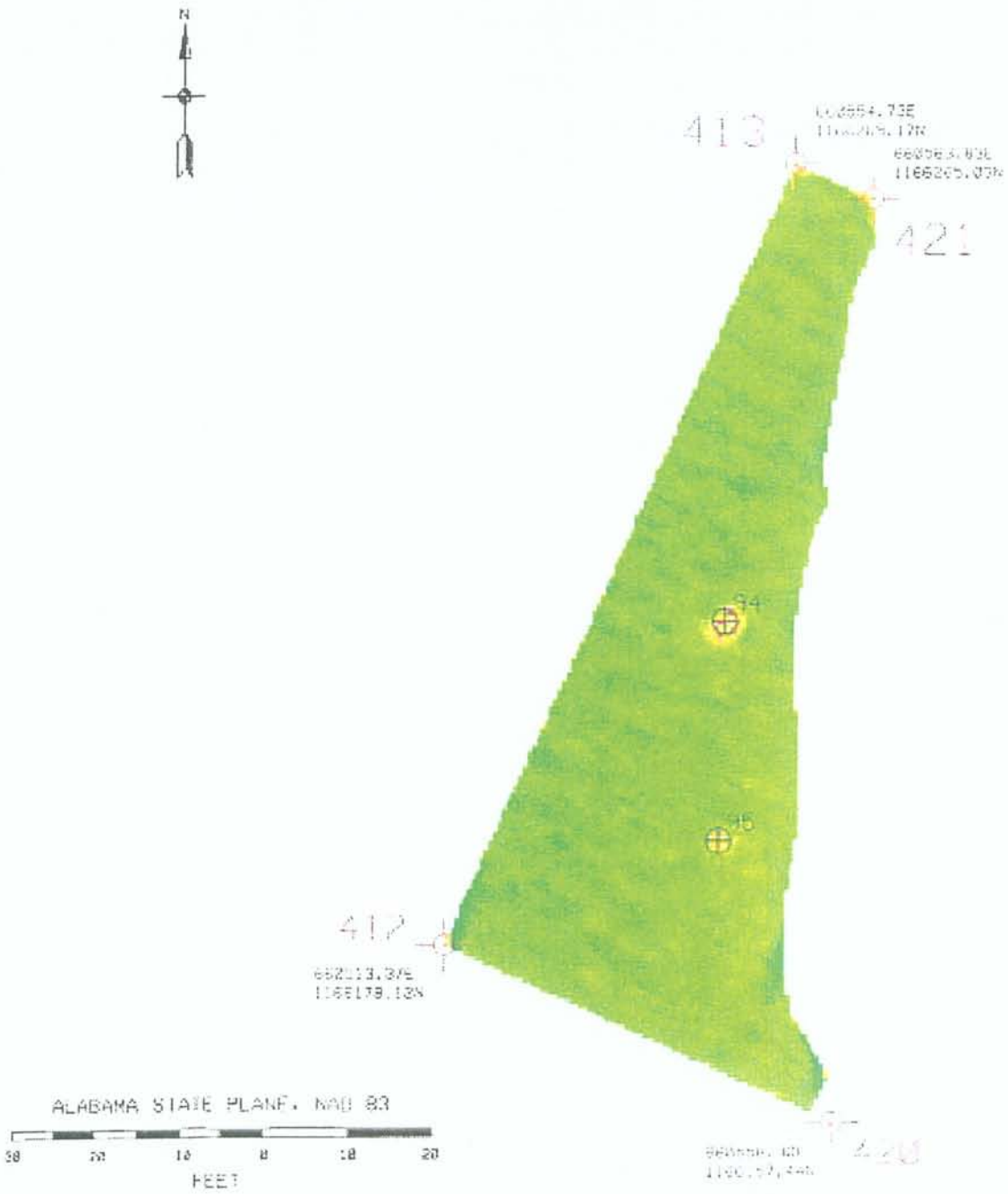

LEGEND

SURVEY MARKER

SEEDED ITEM

6 TARGET ID NUMBER

0 NV 125

FORT MCCLELLAN
ALABAMA

AREA 4
EM 61 DATA
MARCH 15, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

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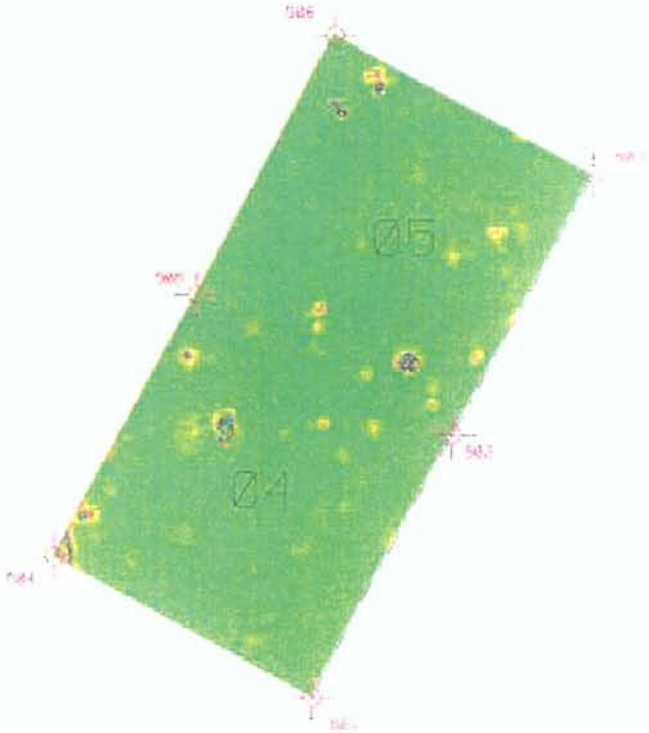
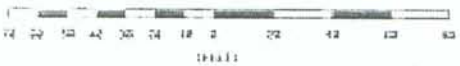
HUNTSVILLE, ALABAMA

AREA 5

POINT	EASTING	NORTHING
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]



ALABAMA STATE PLANE, NAD 83



LEGEND

SURVEY MARKER

GEOPHYSICAL SURVEY

FORT MCCLELLAN
ALABAMA

AREA 5
MARCH 1999

GRID NUMBERING

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
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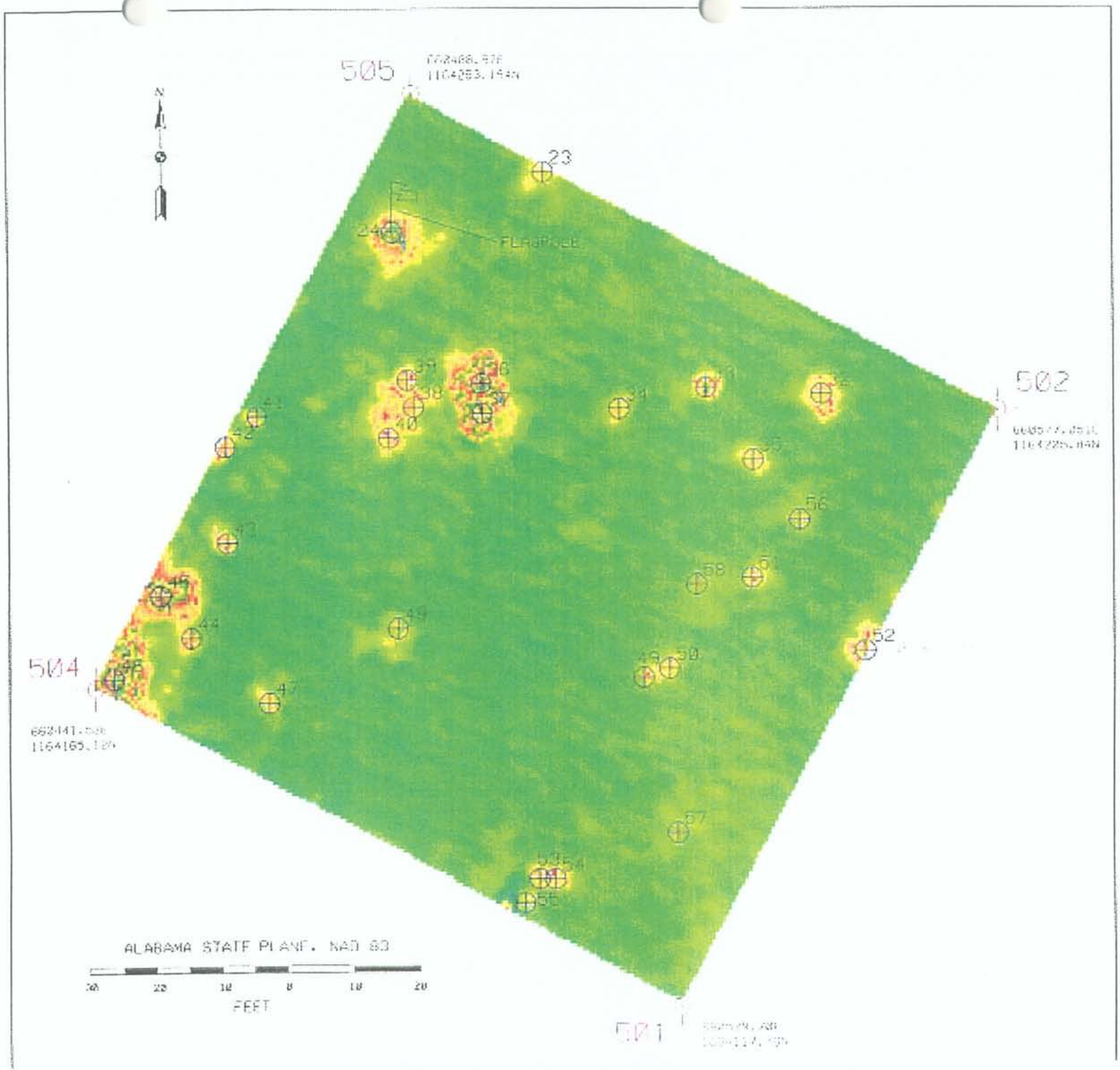


LEGEND

SURVEY MARKER

SEEDED ITEM

33 TARGET ID NUMBER

0 MV 120

FORT MCCLELLAN
ALABAMA

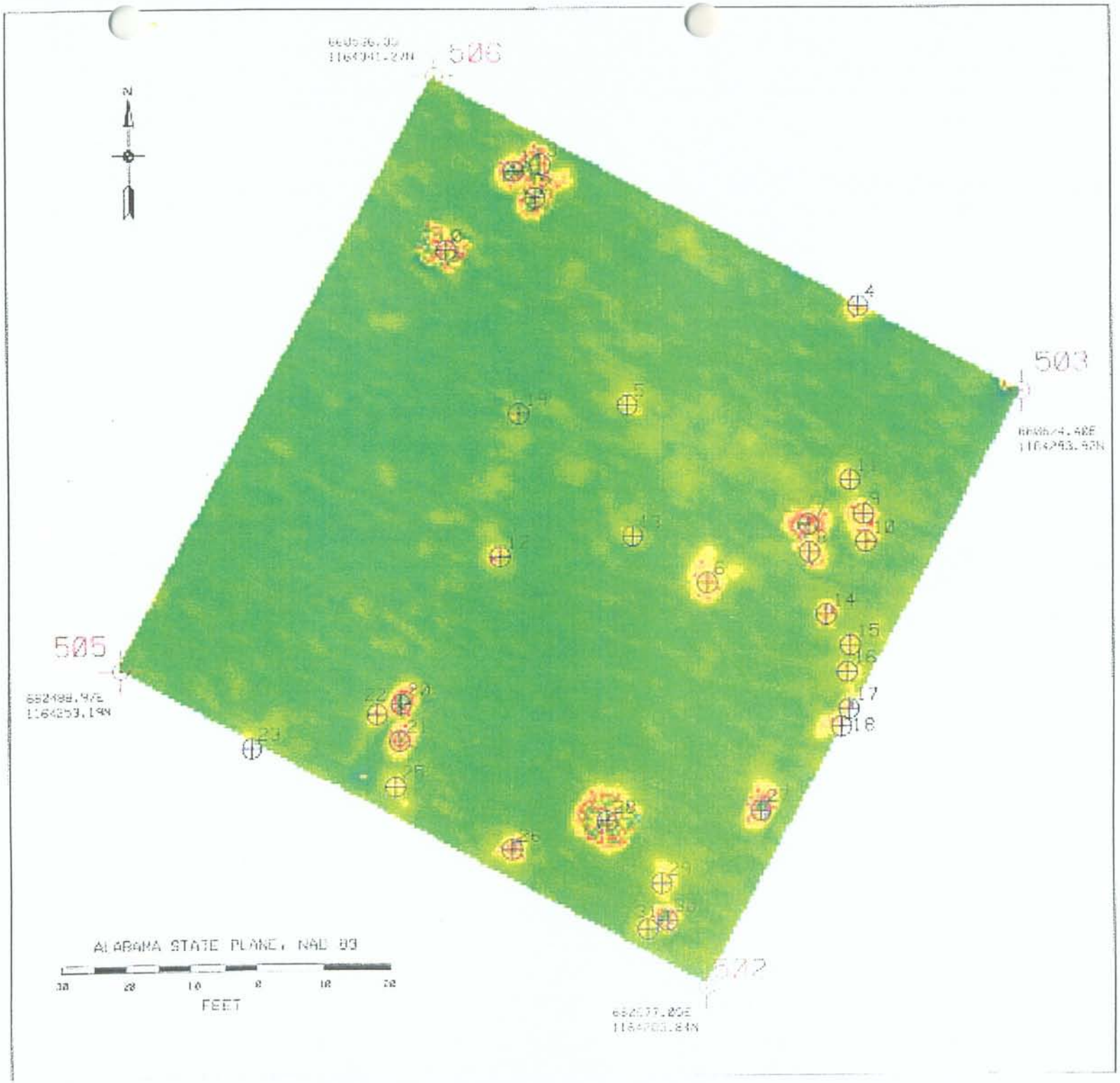
AREA 5
EM 61 DATA
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

4 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 5

EM 61 DATA

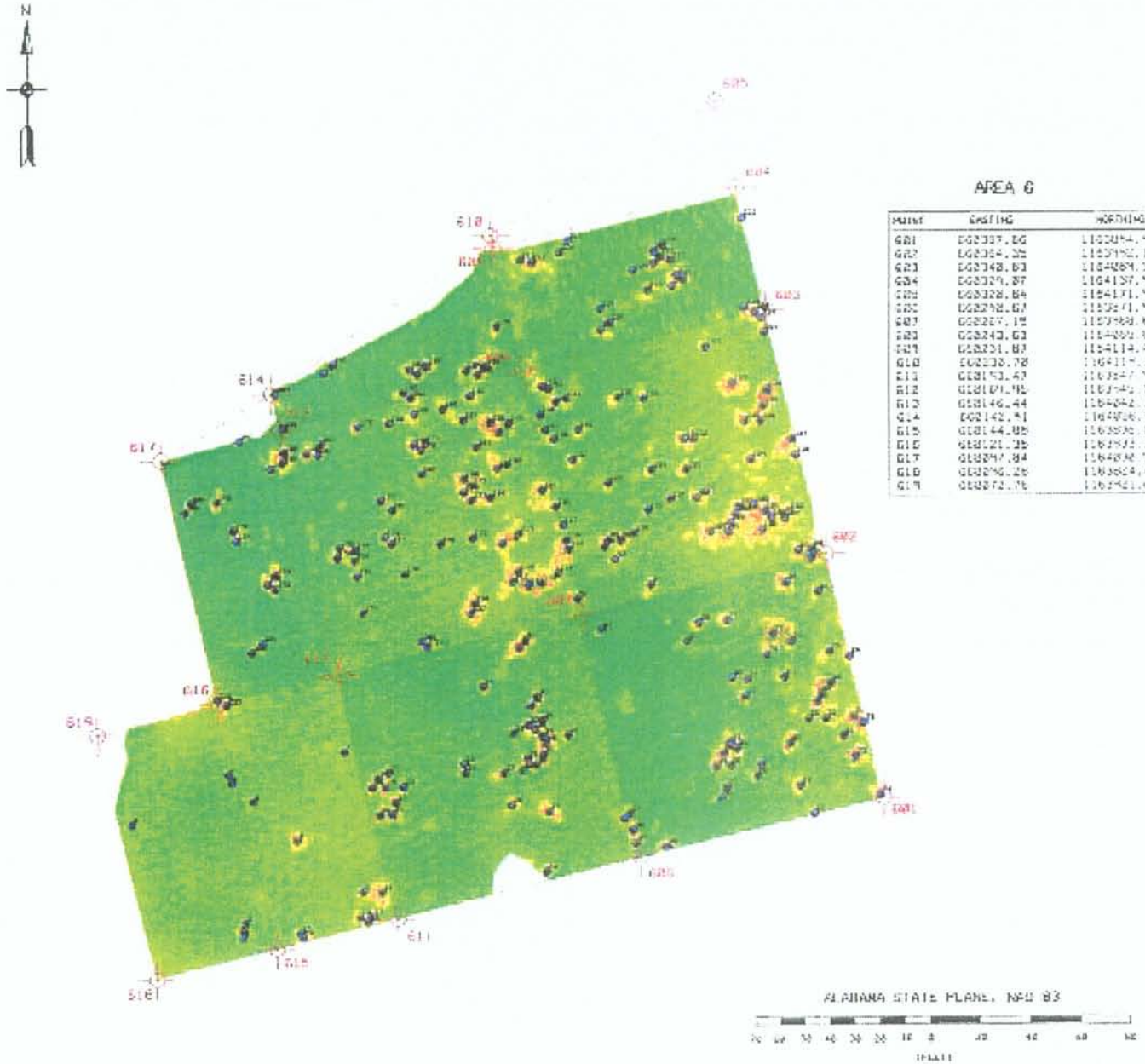
MARCH 10, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



AREA 6

POINT	EASTING	NORTHING
G01	602337.06	1163054.48
G02	602364.35	1163152.17
G03	602348.83	1164089.97
G04	602329.87	1164197.96
G05	602328.84	1164171.96
G06	602298.67	1163571.96
G07	602287.19	1163388.63
G08	602243.63	1164002.85
G09	602231.83	1164114.40
G10	602208.78	1164117.21
G11	602153.43	1163547.94
G12	602101.96	1163445.14
G13	602146.44	1164042.33
G14	602142.91	1164046.91
G15	602144.05	1163936.18
G16	602121.35	1163933.38
G17	602097.84	1164038.97
G18	602096.26	1163824.42
G19	602071.76	1163461.62

LEGEND

SURVEY MARKER

TARGET PICK

0 MV 126

GEOPHYSICAL SURVEY

FORT MCCLELLAN
ALABAMA

AREA 6
MARCH 1999

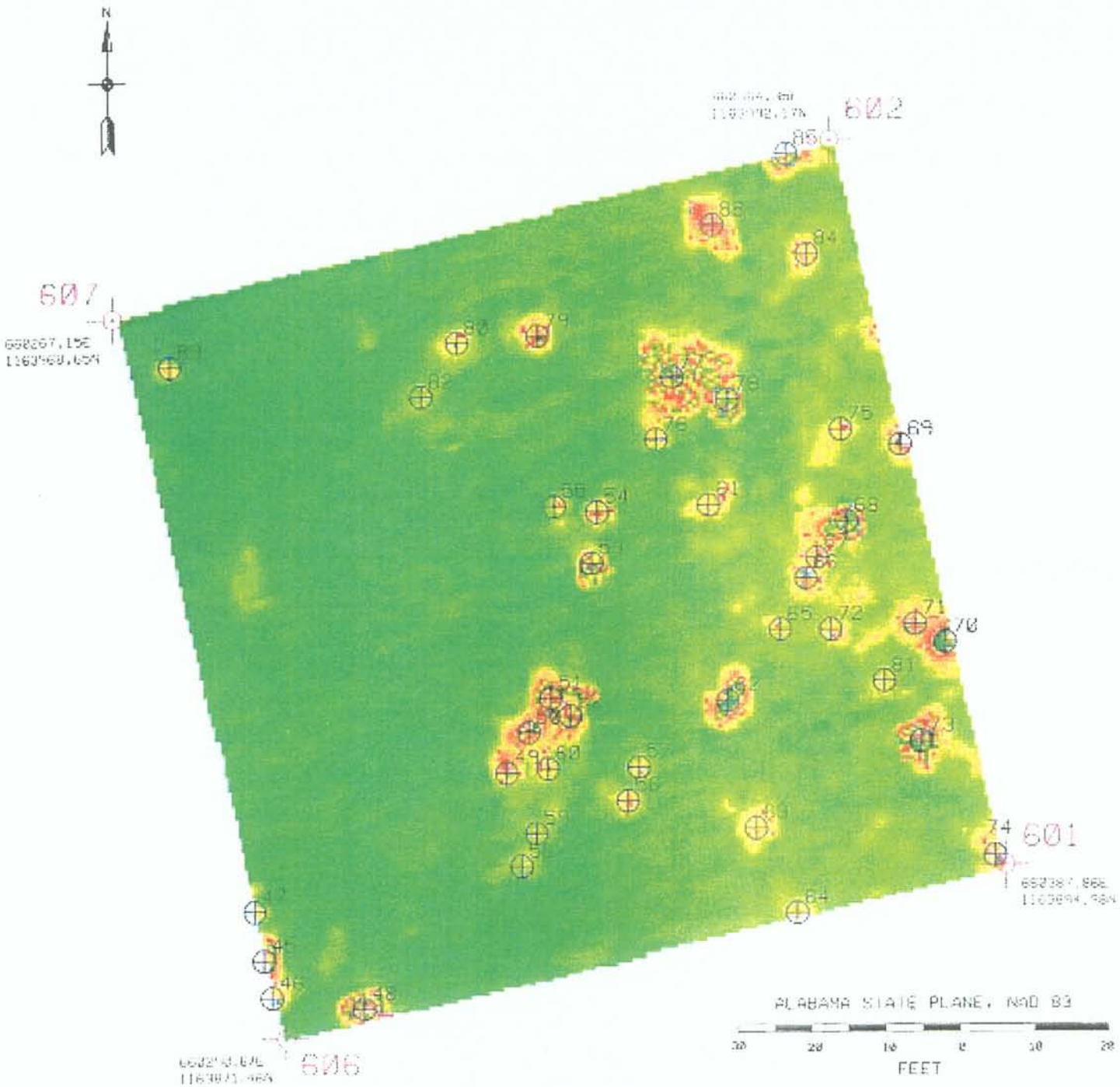
EM61 BOTTOM COIL

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SEEDED ITEM

84 TARGET ID NUMBER

FORT MCCLELLAN
ALABAMA

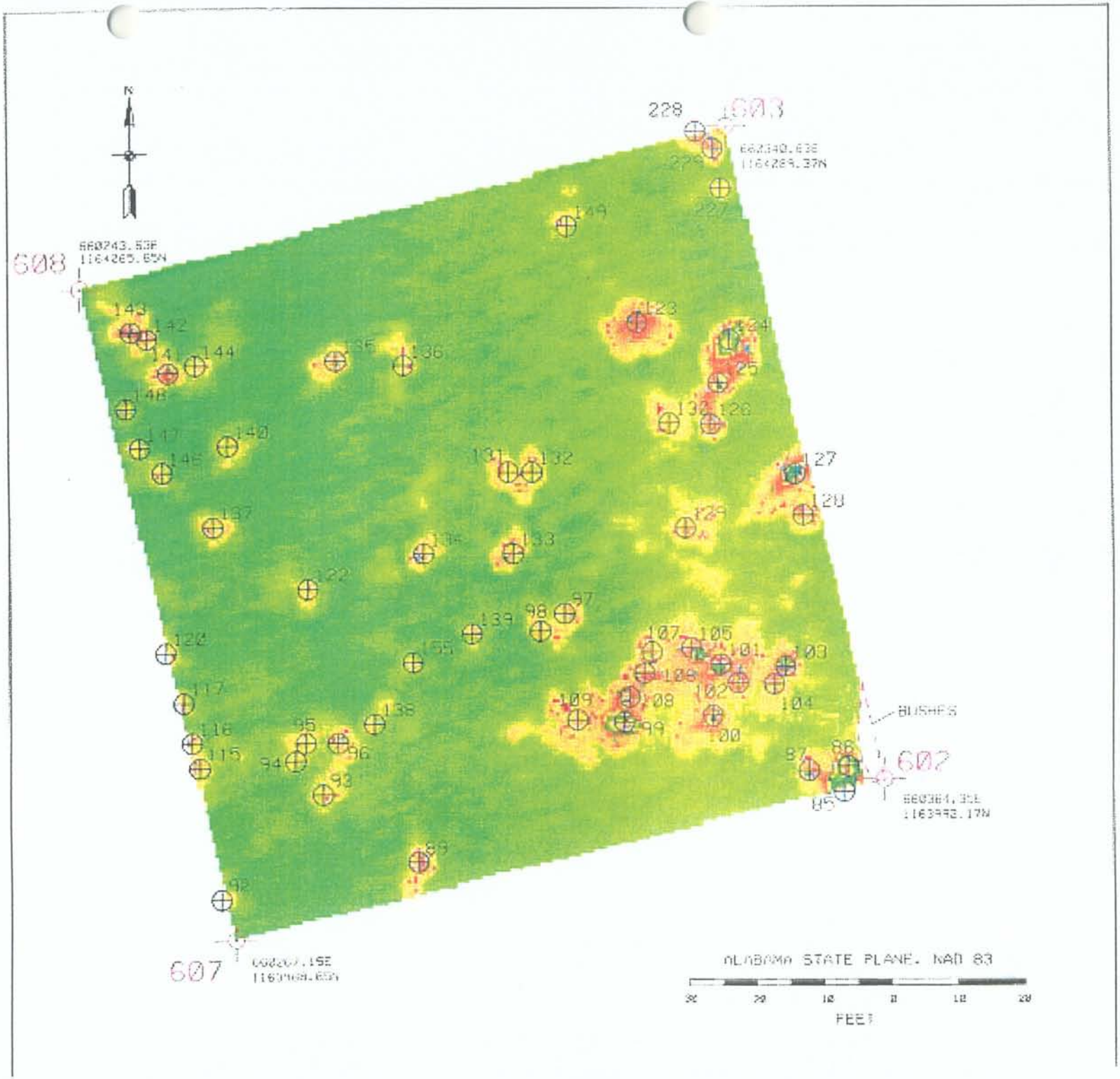
AREA 6
EM 61 DATA
MARCH 12, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
USA ENGINEERING INC.

DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA



LEGEND

SURVEY MARKER

SECDED ITEM

127 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 6
EM 61 DATA
MARCH 12, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
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DATA ANALYSIS:
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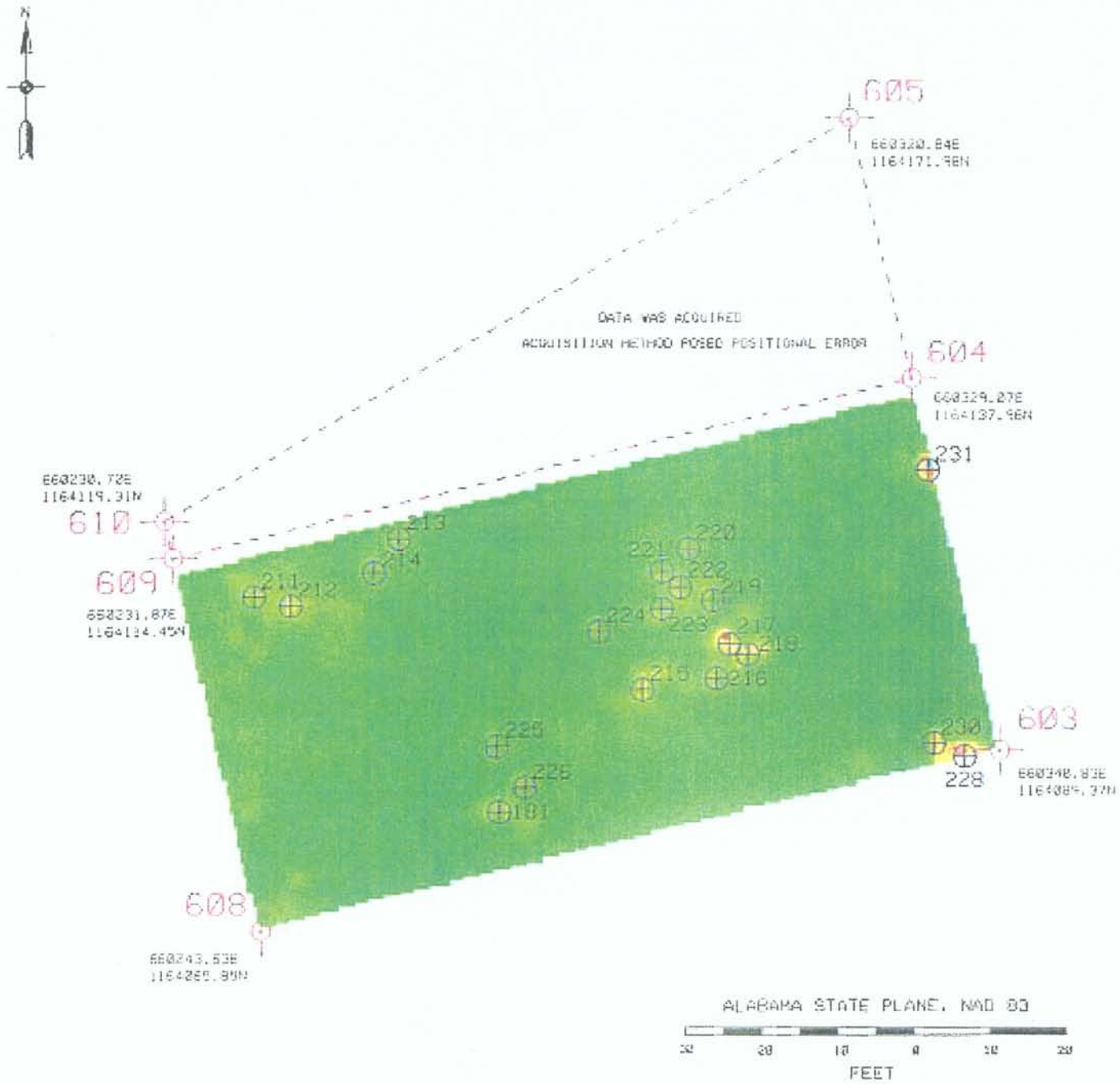

LEGEND

SURVEY MARKER

SEEDED ITEM

231 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 6
EM 61 DATA
MARCH 12, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
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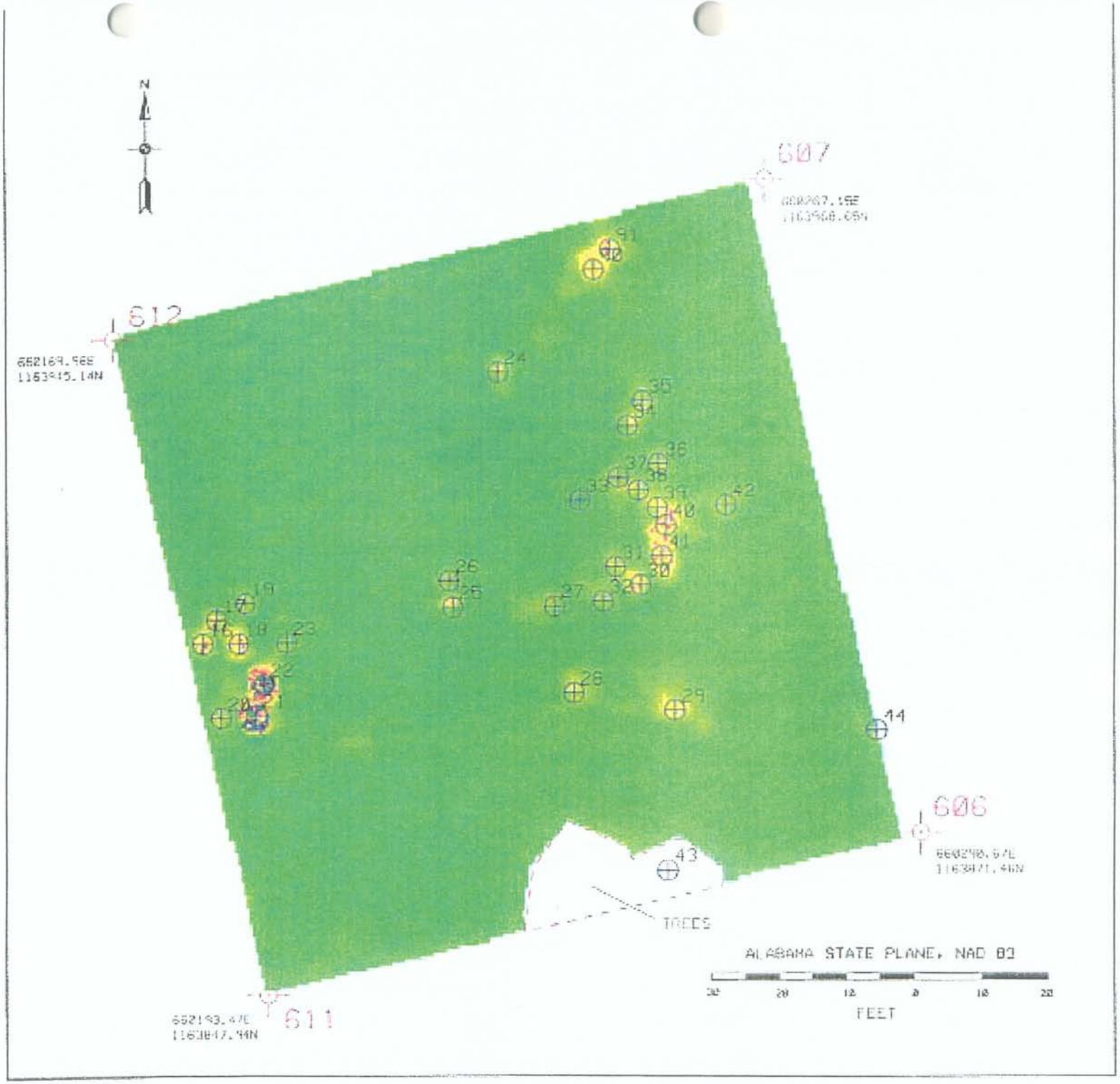

LEGEND

SURVEY MARKER

SEEDED ITEM

43 TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 6
EM 61 DATA
MARCH 12, 1999

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DATA ACQUISITION:
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DATA ANALYSIS:
S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING & SUPPORT CENTER
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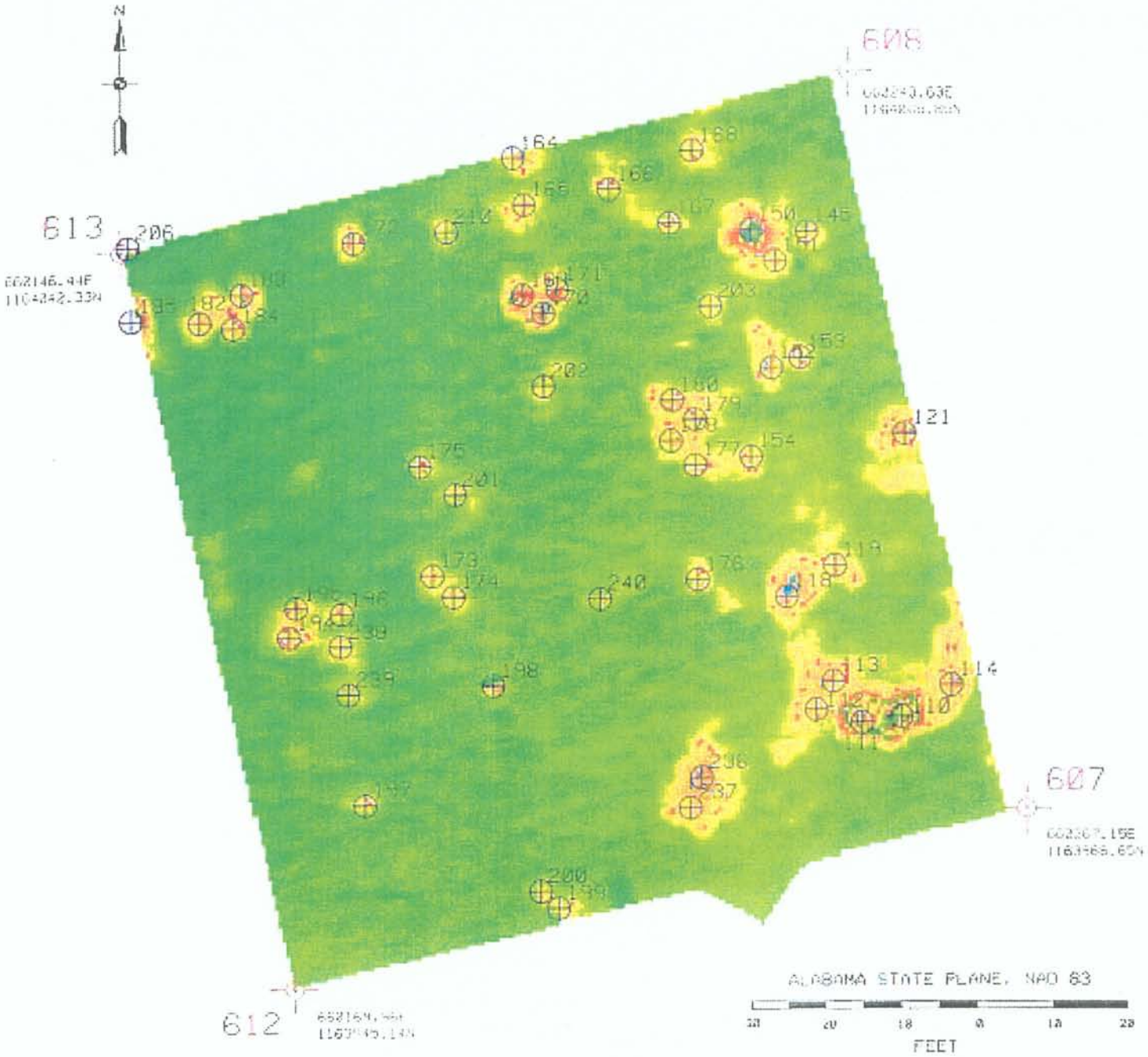

LEGEND

SURVEY MARKER

SEEDED ITEM

199 TARGET ID NUMBER

0 99 198

FORT MCCLELLAN
ALABAMA

AREA 6
EM 61 DATA
MARCH 12, 1999

PROJECT MANAGEMENT:
ZAPATA ENGINEERING, P.A.

DATA ACQUISITION:
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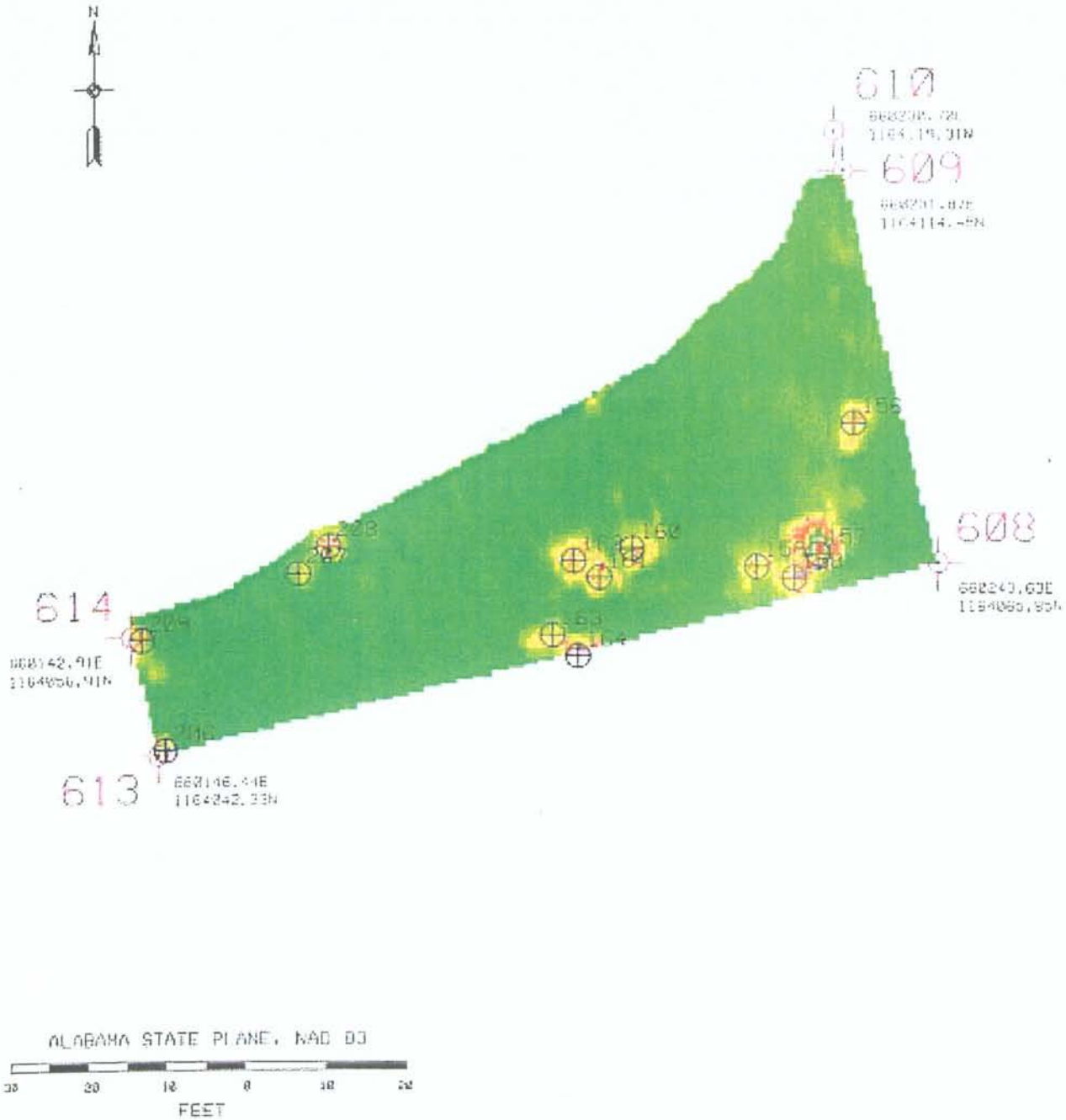

LEGEND

SURVEY MARKER

SEEDED ITEM

TARGET ID NUMBER

0 MV 126

FORT MCCLELLAN
ALABAMA

AREA 6
EM 61 DATA
MARCH 16, 1999

PROJECT MANAGEMENT:
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DATA ACQUISITION:
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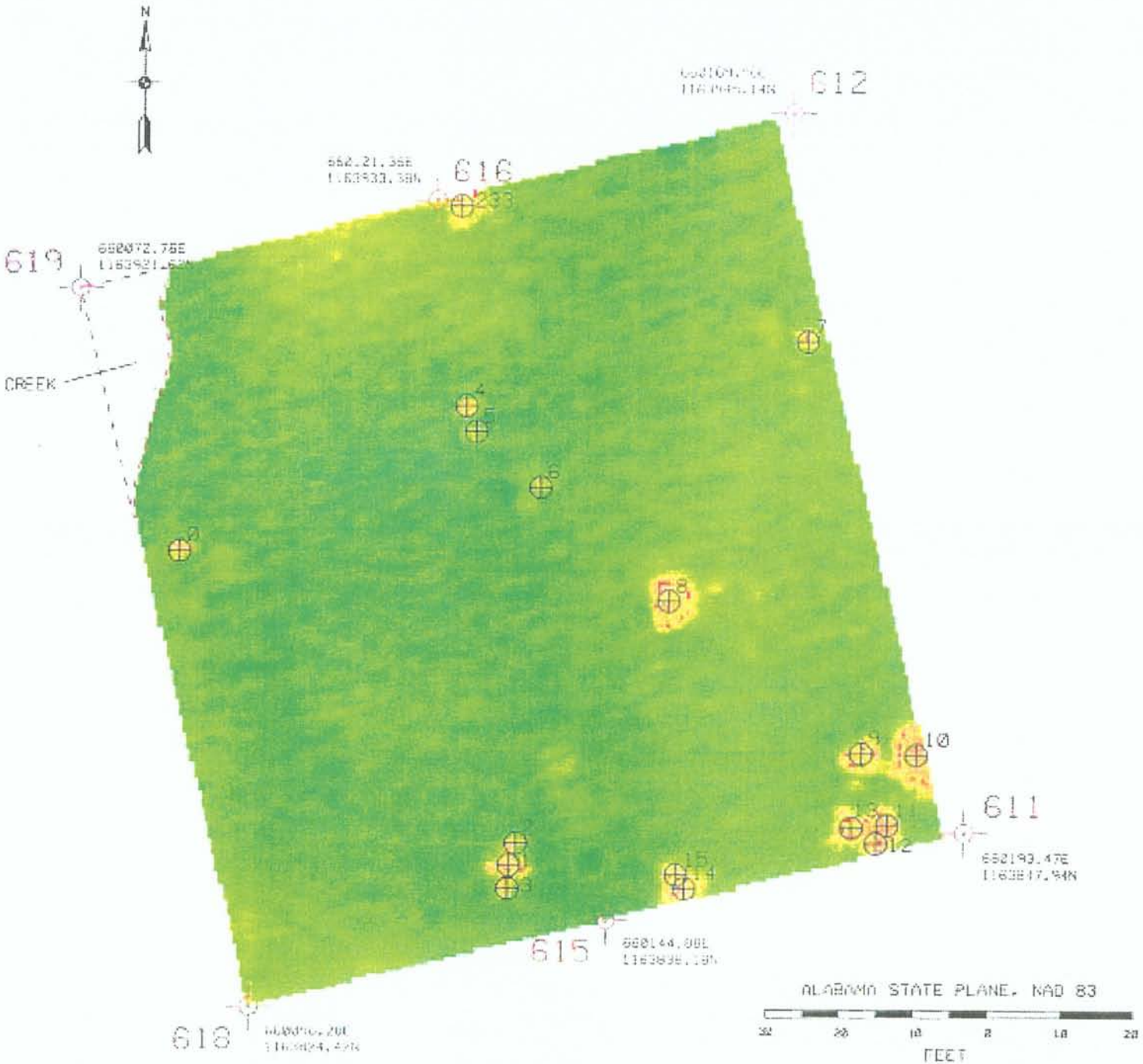

LEGEND

SURVEY MARKER

SEEDED ITEM

0 TARGET ID NUMBER

0 MV 125

FORT MCCLELLAN
ALABAMA

AREA 6
EM 61 DATA
MARCH 12, 1999

PROJECT MANAGEMENT:
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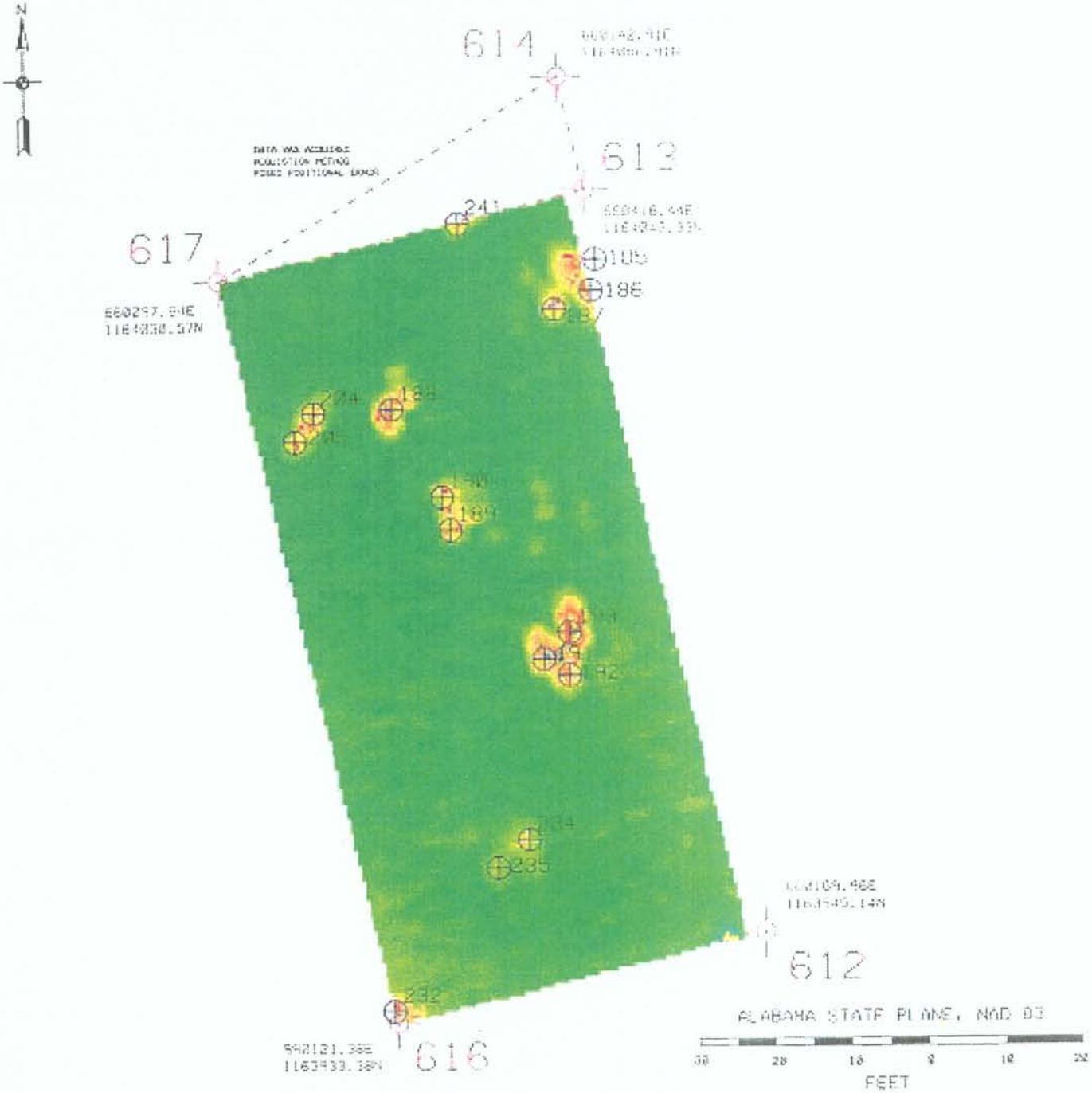

LEGEND

SURVEY MARKER

SEEDED ITEM

6 TARGET ID NUMBER

0 MV 120

FORT MCCLELLAN
ALABAMA

AREA 6
EM 61 DATA
MARCH 16, 1999

PROJECT MANAGEMENT:
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S. COHEN & ASSOCIATES

SUBMITTED TO:
US ARMY ENGINEERING &
SUPPORT CENTER
HUNTSVILLE, ALABAMA

Appendix 2: Geophysical Prove-out Report

Geophysical Proveout
Fort McClellan, Alabama

Submitted to:

ZAPATAENGINEERING, P.A.

Submitted by:

Sanford Cohen & Associates
97 Central Street; Suite 302
Lowell, MA 01852

(978) 459-4411 (phone)
(978) 459-4488 (fax)

March 9, 1999

Table of Contents

Table of Contents i
1.0 Executive Summary 1
2.0 Test Site Description 2
3.0 Technology Used 2
4.0 Survey Operations and Procedures 3
5.0 Data Analysis Procedures 3
6.0 Results and Conclusions 5

List of Figures

Figure 1. EM_61, lower-coil, data with target picks and seeded items annotated. Cross-line spacing is 3 feet 6
Figure 2. EM_61, upper-coil, data with target picks and seeded items annotated. Cross-line spacing is 3 feet. 7
Figure 3. EM_61, lower-coil, data with target picks and seeded items annotated. Cross-line spacing is 2.5 feet 8
Figure 4. EM_61, upper-coil, data with target picks and seeded items annotated. Cross-line spacing is 2.5 feet 9
Figure 5. Magmetometer data with target picks and seeded items annotated. Cross-line spacing is 3 feet and in-line sampling is at 1second 10
Figure 6. Quality control lines collected to evaluate reproducibility of sensor measurements 11
Figure 7. Azimuthal dependence of sensor reading (nT) as a function of sensor angle, for sensor angles of 45, 60, 75, and 90° 12

List of Tables

Table 1. Target picks for EM-61 data using a 2.5-foot cross-line spacing, at the McLellan Geophysical Proveout 13

1.0 Executive Summary

Sanford Cohen and Associates (SC&A), under contract to Zapata Engineering, P.A., analyzed data from a geophysical prove-out conducted by USA Environmental Inc. to locate simulated UXO items at Fort McClellan, Alabama. The goal of this activity was to determine the most feasible geophysical method for a geophysical survey to delineate the locations of possible buried UXO items, within the Eastern Bypass construction zone.

A 100 foot by 100 foot test plot was seeded with UXO simulants by Zapata Engineering on March 8th and 9th, 1999. USA Environmental Inc. conducted several passes over the test plot utilizing a Geonics EM61 induction instrument and a Geometrics 858 Cesium magnetometer. Two positioning methods were utilized with each geophysical method. The first integrated real-time GPS with each sensor and the second utilized the standardized "wheel" mode and fiducial marking on the EM61 and 858 mag unit respectively. SC&A analyzed the proveout data and assessed the instruments' feasibility for use at Fort McClellan.

The personnel involved in this proveout were Suzy McKinney, Neil Gilbert and Jay Shiflet from Zapata Inc; Jae Yun and Brian Thompson from USA Environmental, Bob Selfridge from the Army Corps of Engineers; and John Dolynchuk from SC&A.

This report describes the technology employed, survey methodology utilized, analysis of the acquired data, and the results. the most appropriate technology and methods to use for further geophysical mapping at Fort McClellan are recommended.

2.0 Test Site Description

A 100 by 100 foot survey grid was established for the proveout south of the Summeral Gate Road, near the entrance gate. Prior to the survey, a sweep of the site was conducted to assess and clear targets that could influence the geophysical measurements. The grid was seeded with targets: pipes and rebar were buried at varying depths and orientations at known points in order to simulate UXO items which may be encountered during the geophysical mapping.

3.0 Technology Used

The field technologies utilized during this proveout were a Geonics EM61 electro-magnetic induction system, a Geometrics 858 cesium vapor magnetometer, two (2) Trimble Pro-XL global positioning systems (GPS), and two (2) 2 Watt Pacific Crest Radios. The decision to use this technology was based on previous successes using this equipment for UXO detection at other sites.

The EM61 is an inductive electromagnetic system that produces a magnetic field capable of penetrating the ground surface and inducing secondary magnetic fields from conductive materials at depth. The secondary field is measured in millivolts (mV), from the current induced in the measurement coil by the secondary field. The 858 magnetometer is a passive system capable of characterizing items that are comprised ferrous material. Readings from this unit are measured in nanoTeslas (nT). Both of these systems are considered standard geophysical instruments, in UXO detection work. The Pacific Crest Radios were used in conjunction with the Trimble Pro-XL GPS to provide real-time positioning during the surveys.

4.0 Survey Operations and Procedures

Over the course of the two-day geophysical proveout several passes over the survey grid were performed using both geophysical instruments. On March 8th, four (4) surveys were collected, two with each instrument to test position location capabilities. The EM61 was used in the tick-wheel mode and 858 magnetometer was used with 10 foot fiducial markings. In addition, the GPS system was used with each system to evaluate the feasibility of obtaining real-time data positions at the site. All of the surveys utilized 3 foot cross-line offsets.

Additional geophysical tests were performed on March 9th. Six (6) EM61 profiles and two (2) 858 magnetometer profiles were taken along the first line of the test plot, to assess the most appropriate sampling rate and line offsets to use in the surveying. Four tests were performed to evaluate the proper angle (90°, 75°, 60°, 45°) to position the Cesium vapor sensors on the 858 magnetometer, for optimum sensitivity. A third EM61 survey over the grid was completed utilizing 2.5 foot cross-line offsets, to test the efficacy of a more dense data set.

5.0 Data Analysis Procedures

USA Engineering Inc provided all data acquired during proveout to SC&A, in Geosoft XYZ format. SC&A reformatted this data into *.adf files and gridded it, producing *.grd files. Analysis of the Fort McClellan Geophysical Proveout data was performed on the grid files.

SC&A used software integrated within Intergraph's Modular GIS Environment, combined with Bentley's Microstation platform, to maneuver efficiently through standardized post-processing procedures. This integrated package of software tools allowed SC&A to quickly process and analyze all data collected from the site. Target locations and the evaluation of the instruments is based upon the results of this analysis. Specifically, SC&A transformed the local coordinate grid to Alabama State Plane

6.0 Results and Conclusions

The geophysical proveout tested the EM61 and G858 magnetometer using different navigation methods. Different data densities were also tested. As a result of these tests, the following conclusions and recommendations are made:

1. The EM-61 performed best in the proveout when data was acquired using a 2.5-foot cross-line spacing and in the tick-wheel mode. This is the recommended configuration for the site survey.
2. Ferrous rocks represent a component of the local geology and contribute to an increased false alarm in the magnetometer data as compared to the false alarm rate from the EM-61. As a result, the magnetometer is not recommended for use at this site.
3. Foliage limits the robustness of real-time GPS positioning in conjunction with either instrument and is therefore not recommended.
4. The 60° sensor angle is the optimum orientation for the G858 magnetometer at Fort McClellan.

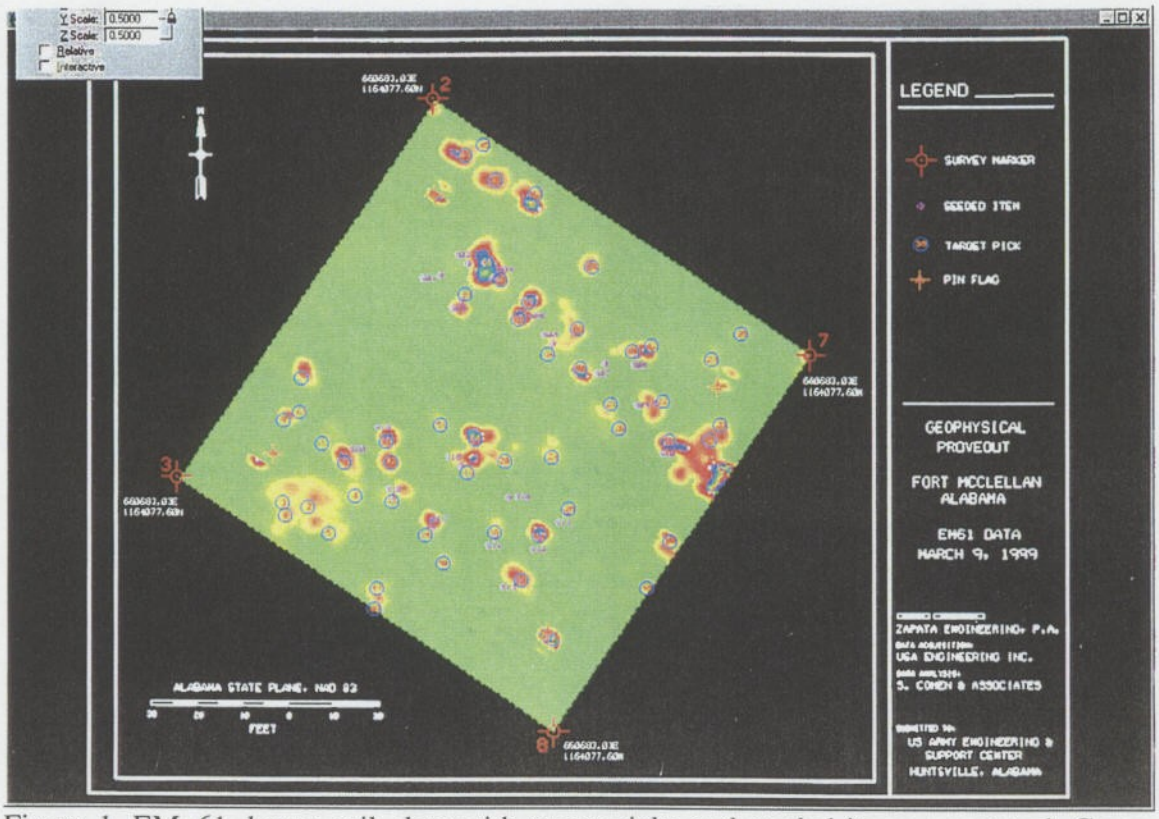

Figure 1. EM_61, lower-coil, data with target picks and seeded items annotated. Cross-line spacing is 3 feet. Blue circles, 3-feet in diameter, surround each target pick to provide an indication of proximity to the seeded target.

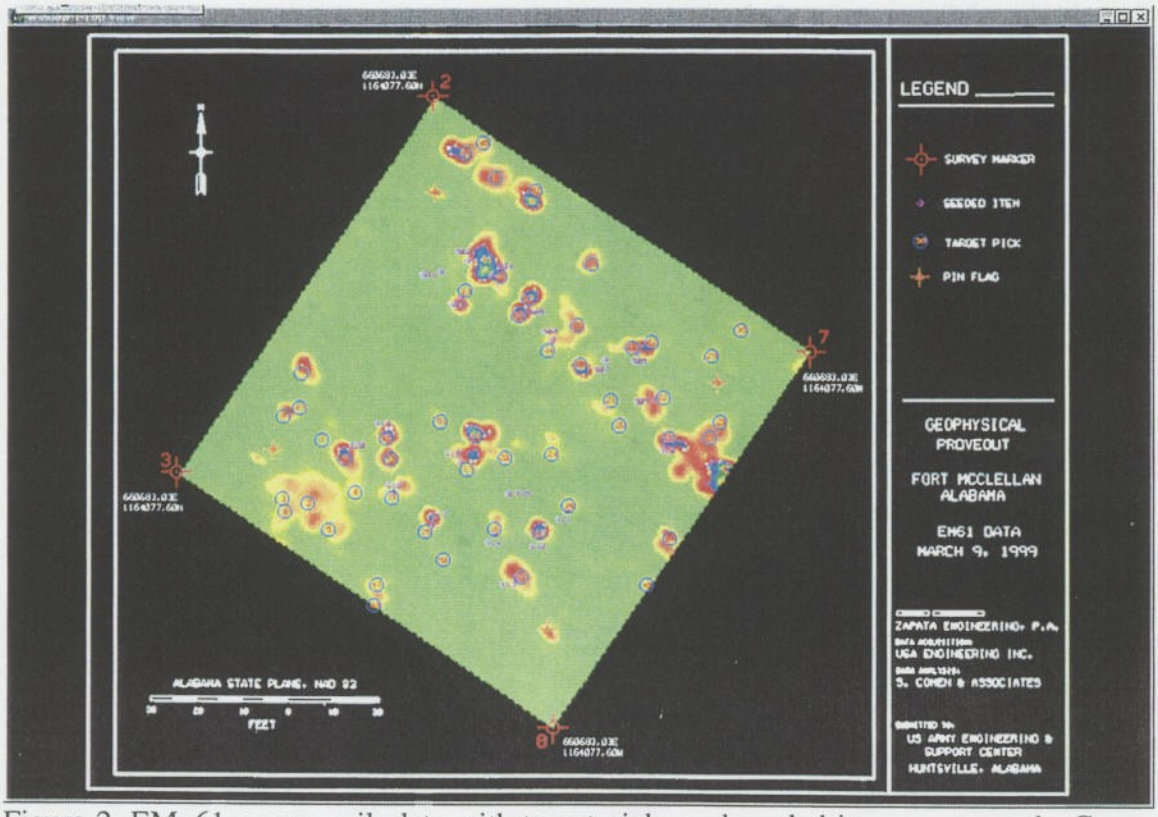

Figure 2. EM_61, upper-coil, data with target picks and seeded items annotated. Cross-line spacing is 3 feet. Blue circles, 3-feet in diameter, surround each target pick to provide an indication of proximity to the seeded target.

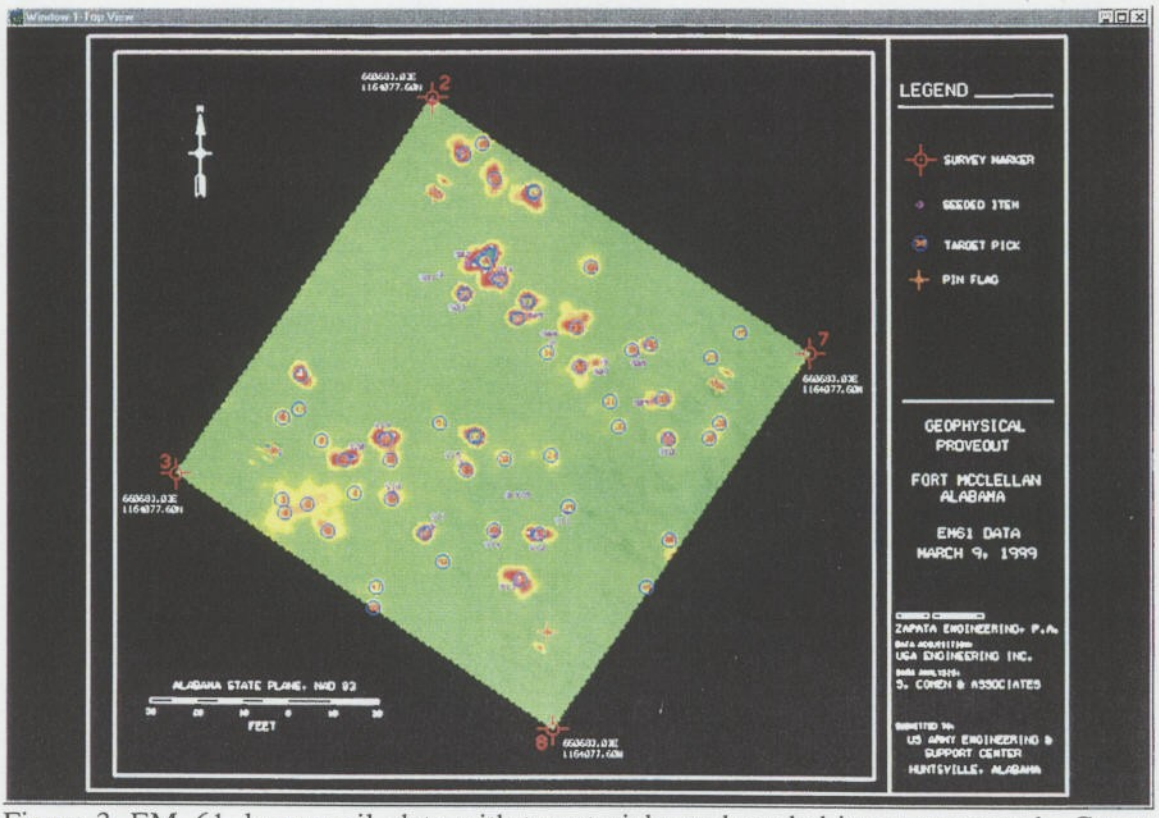

Figure 3. EM_61, lower-coil, data with target picks and seeded items annotated. Cross-line spacing is 2.5 feet. Blue circles, 3-feet in diameter, surround each target pick to provide an indication of proximity to the seeded target. Note that targets are resolved better in this image than in the 3-foot cross-line data.

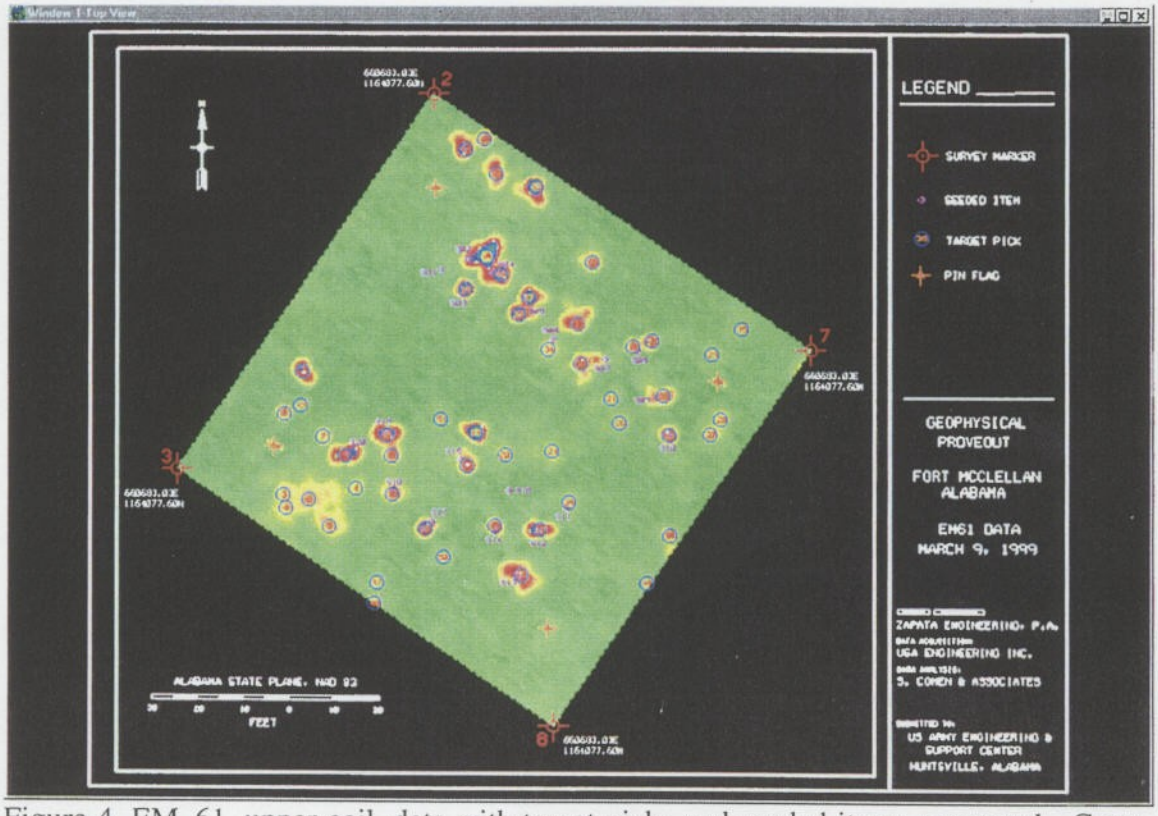

Figure 4. EM_61, upper-coil, data with target picks and seeded items annotated. Cross-line spacing is 2.5 feet. Blue circles, 3-feet in diameter, surround each target pick to provide an indication of proximity to the seeded target. Note that targets are resolved better in this image than in the 3-foot cross-line data.

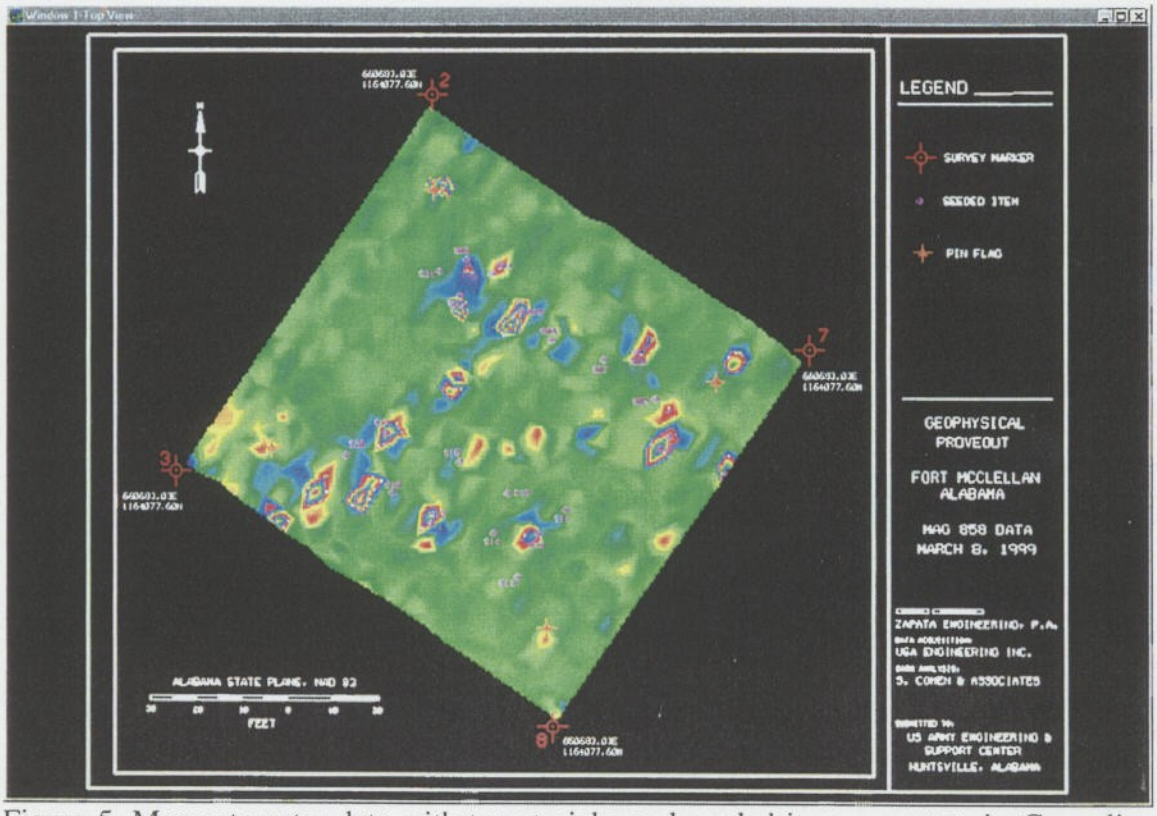

Figure 5. Magmetometer data with target picks and seeded items annotated. Cross-line spacing is 3 feet and in-line sampling is at 1second. Blue circles, 3-feet in diameter, surround each target pick to provide an indication of proximity to the seeded target. Targets are undersampled in-line, leading to a low resolution image and poor detection.

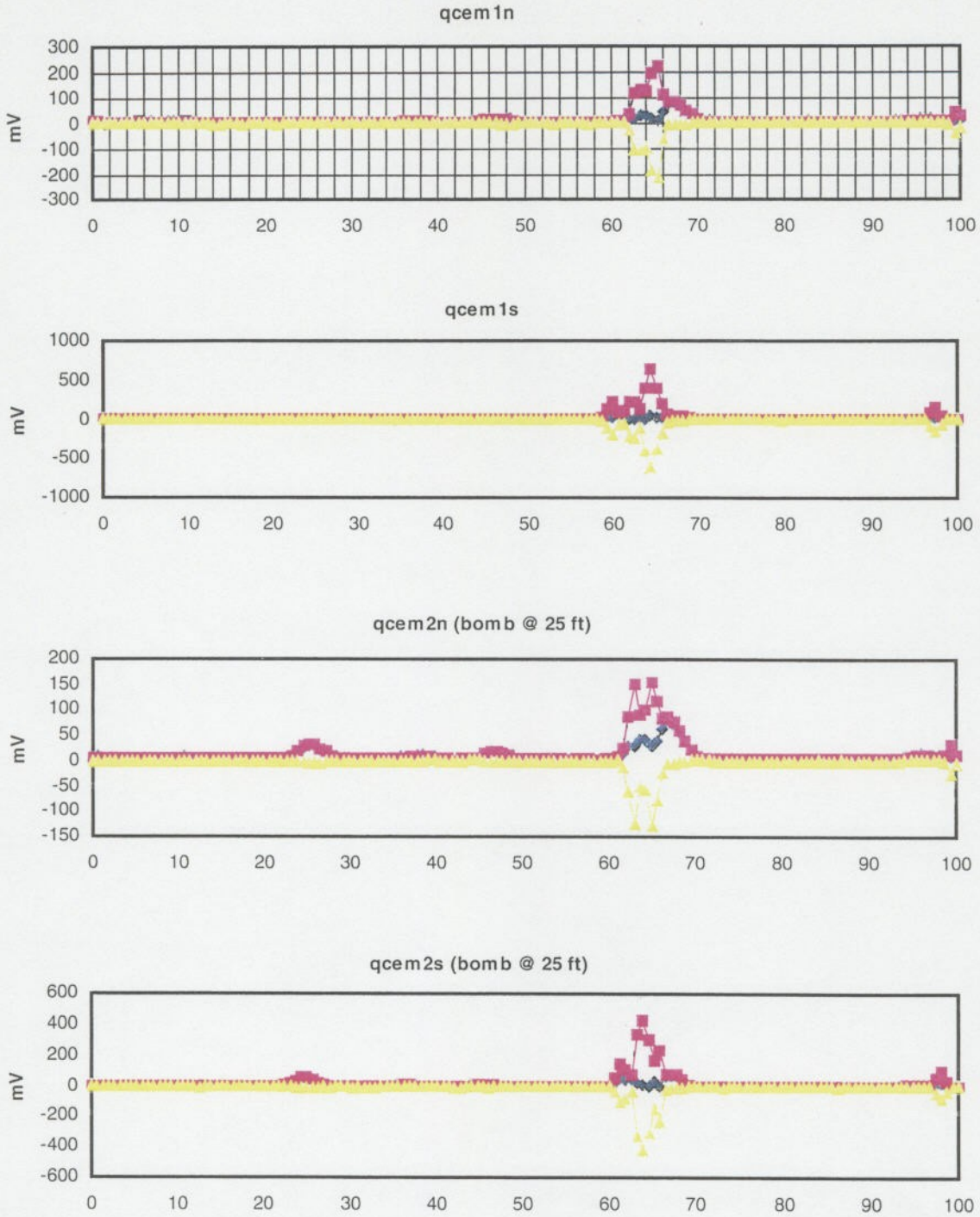

Figure 6. Quality control lines collected to evaluate reproducibility of sensor measurements. Lines 1n and 1s and 2n and 2s are reversals of direction (north and south). A target was placed 25 ft from the grid corner (0 on the x-axis) during the 2n and 2s traverses. Magenta denotes the top coil, blue the bottom coil, and yellow the difference.

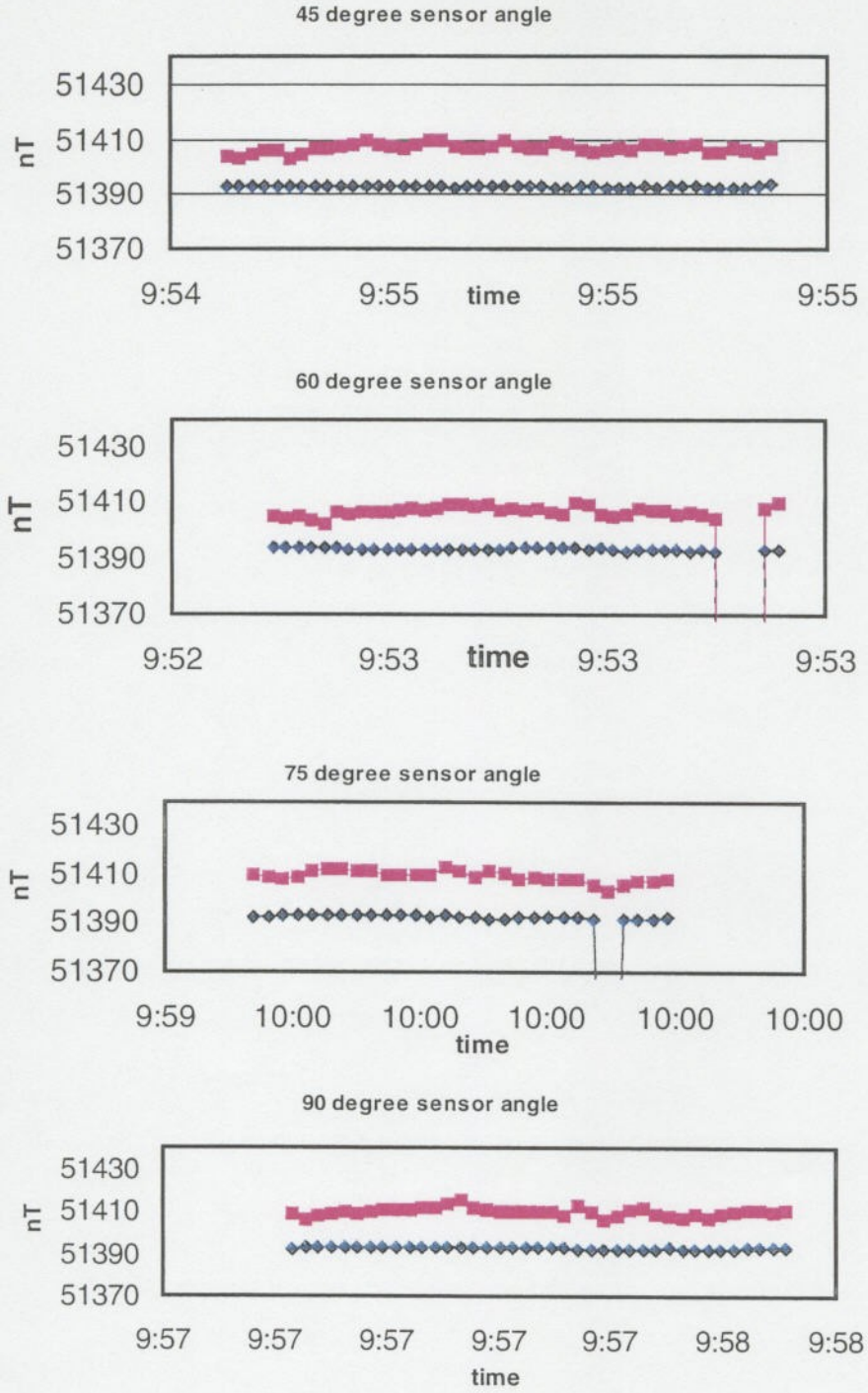

Figure 7. Azimuthal dependence of sensor reading (nT) as a function of sensor angle, for sensor angles of 45, 60, 75, and 90°. The horizontal axis is in time and corresponds to rotation of the sensor in a complete circle. The 45 and 90° sensor angles show the most stable measurements over the entire range of azimuths.

Table 1. Target picks for EM-61 data using a 2.5-foot cross-line spacing, at the McLellan Geophysical Proveout. Target picks outside a 3-foot circle around a seed item are considered misses.

Target #	Easting	Northing	Seed item
1	660627.77	1164155.4	
2	660629.23	1164127	
3	660623.58	1164128	
4	660624.21	1164125.1	
5	660633.63	1164121.3	
6	660639.49	1164129.5	
7	660632.37	1164141	
8	660623.79	1164146	
9	660637.18	1164136.9	s20
10	660646.41	1164141.5	s19
11	660647.65	1164128.3	s18
12	660647.44	1164136.9	
13	660664.18	1164134.6	s15
14	660665.86	1164141.9	
15	660654.97	1164120.8	s17
16	660670.12	1164121.5	s14
17	660679.98	1164120.6	s12
18	660675.95	1164110.7	s13
19	660708.44	1164119.5	
20	660672.36	1164137.1	
21	660695.44	1164149.5	
22	660706.87	1164150.1	s09
23	660708.22	1164141.4	s10
24	660682.67	1164137.9	
25	660686.26	1164126.6	
26	660697.46	1164144.1	

Target #	Easting	Northing	Seed item
27	660717.18	1164141.6	
28	660719.42	1164145	
29	660717.63	1164159.3	
30	660688.94	1164157.3	
31	660700.37	1164161.1	s08
32	660704.41	1164162.2	
33	660688.27	1164166	
34	660681.77	1164160.4	s06
35	660723.91	1164164.9	
36	660691.4	1164179.4	
37	660677.51	1164171.8	
38	660675.27	1164168	s05
39	660663.61	1164173.6	s03
40	660671.46	1164176.7	s04
41	660668.32	1164180.8	
42	660679.08	1164196	
43	660670.34	1164198.9	
44	660663.62	1164204.3	
45	660667.65	1164206.5	
46	660703.42	1164108.9	
47	660644.26	1164108.9	
48	660643.7	1164104.4	
49	660627.36	1164147.8	
50	660658.91	1164114.6	
51	660658.35	1164145	