Appendix B-2e

Geophysical Prove-Out Documentation

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Geophysical Prove-Out Work Plan

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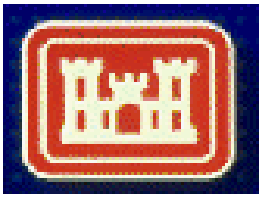
FINAL
Geophysical Prove-Out Work Plan

for

Eastern Bypass "Y" Junction
Fort McClellan, Alabama

Task Order 0019

Contract Number:
DACA87-99-D-0010



Prepared For:
U.S. Army Engineering and Support Center
Huntsville, Alabama

Prepared By:
Foster Wheeler Environmental Corporation

April 2003

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LIST OF ACRONYMS

CEHNC	United States Army Engineering and Support Center, Huntsville
EM	Electromagnetic
ft	Feet
DGPS	Differential Global Positioning System
DID	Data Item Description
GPO	Geophysical Prove-Out
mV	Millivolts
OE	Ordnance and Explosives
PCMCIA	P.C. Memory Card International Association
PLS	Professional land surveyor
QA	Quality Assurance
QC	Quality Control
RTS	Robotic Total Station
TDEM	Time Domain Electromagnetic
UXO	Unexploded Ordnance

1.0 INTRODUCTION

The The United States Army Engineering and Support Center Huntsville (CEHNC) has contracted Foster Wheeler Environmental Corporation (Foster Wheeler Environmental), under Contract DACA87-99-D-0010, to perform a Geophysical Prove-Out (GPO) at Fort McClellan located in Anniston, Alabama. The task will be performed in the summer of 2003 in support of the Eastern Bypass "Y" Junction Removal Action.

1.0.1 In addition to performing the GPO in the existing test grid area, changes in equipment, significant field personnel and/or operational procedures will warrant evaluation by acquiring data in the test grid. A senior geophysicist will evaluate this data. Any actions performed in the test grid area following the GPO will be documented.

2.0 OBJECTIVE

The objective of the GPO is to demonstrate and document the performance of the data acquisition methodology and spatial sampling protocols, sensor(s) and positioning equipment, data analysis and management systems, data transfer procedures, and the geophysical Quality Control (QC) system. The following components of the geophysical system will be evaluated during the GPO field program to ensure the program objectives will be met:

- Spatial sample density (i.e., line and station spacing)
- Navigation and positioning methodologies
- Sensor and positioning system platform (stability, noise characteristics and ergonomics)
- Data processing, analysis and interpretation, management and transfer system
- Quality Assurance (QA) Control, documentation protocol for data acquisition, processing and analysis and data management and transfer

2.0.1 In addition to evaluating our present methodology, the GPO test grid has been designed and placed in a location where it can be maintained for ongoing usage. It is the intention of Foster Wheeler Environmental to validate our geophysical systems throughout the duration of the present contract as well as any subsequent removal actions. These validations will occur based on any change in significant personnel and/or equipment. Similar to other technology driven industries, geophysical sensor technology improves over time. Foster Wheeler Environmental has and will continue to utilize advancements in technology where applicable. Should technology dictate redesigning the layout of the test grid (i.e., placement of deeper items), CEHNC will be notified.

3.0 TEST GRID LOCATION AND DESIGN

3.1 LOCATION

The GPO area is located near the scrap yard off Bains Gap Road (Figure B-1). It is an excellent representation of the environment to be encountered during geophysical operations during the Y Junction removal. A number of the areas to be investigated consist of wooded areas, cultural features such as power lines and fences, as well as some open areas.

3.1.1 The trees, some with continuous foliage, are similar to those to be found in the Y Junction. A smaller grid (test grid #2 in Figure B-1) is positioned in a heavily wooded area. This grid is designed for internal testing of new technology. It will not be used for this GPO, however CEHNC is welcome to utilize this grid at any time.

3.1.2 A fence is located approximately 30 feet from the northern side of the GPO test plot, as seen in the picture to the left. This will allow our geophysicist to determine if signal interference from the cultural features may present a problem.

3.1.3 A background geophysical survey of the test plot was performed prior to seeding the existing items. Qualified UXO technicians removed the detected anomalies from the subsurface.

3.2 DESIGN

Foster Wheeler Environmental began construction of a 165ft x 70ft test grid at the site in August of 2002 to meet the requirements of Data Item Description (DID) OE-005-05A.01. Grid corners were predetermined and surveyed using a high resolution Leica Total Station. The control points were calculated from pre-existing monuments, which had been established through a Differential Global Positioning System (DGPS) operated by a professional land surveyor (PLS). For the GPO to be performed in support of the Y Junction, a PLS will calculate the position of all corner points and seeded items. Measurements of the seeded items will be performed in accordance with DID OE-005-05A.01. These points will be calculated to an accuracy of no less then 3cm in the horizontal plane and 5cm in the vertical plane. Coordinates of the test grid corners are presented in Table A-2 (These values may change based on the results of the PLS determination).

3.2.1 Anomaly avoidance techniques were used prior to placing wooden stakes at each corner and mid point of the grid. A metallic nail was driven into the ground at the grid corners and mid points to facilitate relocation of the corner points for future use. Anomaly avoidance techniques will be used when applicable where any objects are to be place in the ground.

3.2.2 The items presently located in the grid are specified in Table A-1. These items were provided by CEHNC and were buried by Foster Wheeler Environmental. However, an additional 27 items will be included in the test grid for this specific project. These items are also listed in Table A-1. The exact location of the additional items is not known at this time, however the proposed location of the items can be found on Figure B-4. All of the additional seeded items will be inert Unexploded Ordnance (UXO) painted blue and tagged with a non-biodegradable label identifying the item as inert and providing a contact reference. The following procedures were used in seeding the items for the existing test grid and will also be used to seed the additional items:

1. Inert seeded items were be labeled and photographed before burial.
2. Holes were dug with a shovel and backhoe.
3. The seeded item was placed in the hole and the depth measured to the top of the item using a bar placed across the hole at ground level for reference. For larger items (e.g., 2.36 inch rocket), the center point and both ends of the item were measured (all additional 27 items will be measured at the nose, tail and center point).
4. The items were buried with one end of a bar on the item. The dirt was then replaced in the hole; the bar was replaced with the pin flag noting the item number.

5. The location of the item was then determined using a high-resolution positioning system (Constellation) based on the center of mass of each item while it resided in the excavation. The location and depth of each item was recorded in an Excel Table.

4.0 EQUIPMENT

Based on our previous experience at numerous UXO sites including Ft. McClellan, the EM61 MK2 TDEM instrument exhibits the greatest potential to meet the program objectives. Foster Wheeler Environmental will evaluate the following equipment in the GPO test grid.

4.1 EM61 MK2

In general, the EM61 MK2 utilizes two coaxial receiver coils to measure the residual magnetic field generated by conductive and/or magnetic materials. The EM61 MK2's employed by Foster Wheeler Environmental are designed to measure the residual magnetic field at a time when the response from conductive and/or magnetic objects is maximized, compared to the response from most earth materials. The use of two receiver coils also makes it possible to differentiate, in a simplistic fashion, shallow versus deep objects. An additional benefit of the specific design of the EM61 MK2 system is that it permits a more focused observation of the subsurface in areas of cultural interference as well as areas characterized by a high spatial density of subsurface objects. This is due to the mechanical design and operational parameters of the instrument, as well as the inherent nature of active electro-magnetic (EM) fields, which diminish in magnitude at a much higher rate than other sensor technologies such as magnetometry.

4.1.1 A modified version of the standard EM61 the EM61 MK2, utilizes multiple time-gates centered at 216, 366, 660, and 1,266 μs. The signal intensity for a given ferrous target recorded by the earlier time-gates is generally a factor of 2 to 4 times that recorded by the standard (660μs) EM61 MK2 time-gate for the top and bottom Coil. This feature facilitates a more efficient and repeatable interpretation of smaller targets such as 37mm projectiles.

4.2 VALLON VMX2

The VMX2 is a handheld mine and UXO detector. This unit will be used for target reacquisition, and may be used in small areas where the EM61 MK2 system is unable to acquire data due to terrain or vegetation. The VMX2 utilizes a 60-cm search coil and has a search depth of up to two (2) meters.

4.3 CONSTELLATION POSITIONING SYSTEM

This system consists of four (4) transmitters, each with a unique signature of light pulses, optical sensors and signal processing. The positioning is based on line-of-sight triangulation. The Constellation system remotely transmits data from a handheld computer to a stationary laptop. The picture at right shows a typical Constellation positioning system being used in the field.

4.4 ROBOTIC TOTAL STATION (RTS) POSITIONING SYSTEM

The Leica TCM1105plus motorized Robotic Total Station (RTS) allows the geophysical team to continuously collect the positional data of the team members carrying an EM-61 one-meter coil. The RTS continuously records the position of the center of the coil by tracking the location of the 360° prism centered over the top of the coil. Positional data is recorded several times per second to give an accurate position to correlate with the geophysical data collected by the EM-61. The positional data from the RTS and the geophysical data from the EM-61 will both be collected on PCMCIA cards and submitted to the on-site geophysicist for merging and initial processing.

5.0 PROCEDURES

5.1 INSTRUMENT CONFIGURATIONS

Two (2) instrument configurations will be tested at the GPO to determine which combination of instruments and positioning would be most appropriate for the pending removal action.

5.1.1 The specific system configurations and surveys to be performed at the GPO grid include:

GPO Instrument Configurations

Instrument	Coils	Time Gates	Positioning	Line Spacing (ft.)
EM61 MK2	1m by 1m	216 μs, 366 μs, 660 μs	Constellation	~2.5
EM61 MK2	1m by 1m	216 μs, 366 μs, 660 μs	RTS	~2.5

5.1.2 For each of the above instrument configurations, the geophysical data will be collected over 100% of the test area with the EM61 MK2 logging at 12-15 times per second and a line spacing of ~ 2.5 feet. The EM61 MK2 instrument height will be set at 16 inches above ground. The instrument height will be measured prior to each data acquisition session.

5.2 MAN-PORTABLE SURVEY METHOD

The man-portable acquisition method will be applied during the GPO. In the man-portable configuration, two (2) operators will be used to collect the data. One (1) person transports the EM61 MK2 coils and positioning system detector while the other person, walking approximately seven to eight feet behind, carries the EM61 MK2 electronics and the positioning system logging device. The positioning system detector will be centered above the EM61 MK2 coils for both instrument configurations

5.3 DATA PROCESSING AND MANAGEMENT

Data will be stored on PCMCIA cards during data acquisition. After acquisition over the test grid is complete, data will be transferred from the PCMCIA cards to the site PC for processing. A Foster Wheeler Environmental geophysicist will perform preliminary geophysical and navigation data processing and QC checks. The final analysis and interpretation of the data will be performed at a centralized processing center located at the Foster Wheeler Environmental Huntsville, Alabama or Lakewood, Colorado office or at the on-site Foster Wheeler field office. Processing, QC, analysis and interpretation of the data will be performed with internally developed software that has been specifically produced to integrate and interpret digital geophysical data acquired with the above-mentioned positioning systems. Geosoft Oasis Montaj Mapping software will also be used to graphically display data.

5.3.1 Several steps will be performed to process the geophysical data prior to analysis. All data will be processed and transformed into the requested coordinate system (State plane zone Alabama North, NAD83). If data is acquired using a relative coordinate system, the x-y locations will also be included in the file output. EM61 MK2instrument bias will be removed, signal drift corrected and minor instrument positioning (lag) corrections applied.

5.3.2 The data will be interpreted using one of two independent modes of target prediction (profile data and color-coded image data) to provide x, y and z location information for each target. Data transfer will be tested during the GPO, including the transfer of raw EM and positioning data.

6.0 RESULTS

The results of the GPO will be submitted in the GPO letter report in tabular and graphical form. The Foster Wheeler Environmental seeded targets will be labeled "**a**" and will be indicated with a cross (+). The interpreted target locations will be labeled with a red circle (•).

6.0.1 Target selection criteria will include anomaly size, shape, amplitude and background noise. In general, anomalies that extended across at least two adjacent acquisition lines with amplitudes of at least 2 millivolts (mV) above background will be selected as potential targets. In some cases, if background noise levels are sufficiently low, anomalies with lower amplitudes will be selected if size and shape characteristics indicated potential buried metal.

6.1 TARGET REACQUISITION

Target reacquisition accuracy will be evaluated using the Foster Wheeler Environmental seed items. A UXO Technician will be given a digsheet and will reacquire the anomalies listed on the digsheet using the previously mentioned positioning systems. The Technician will then use a Vallon VMX2 to pinpoint the target location. The position of the actual item will be compared to the position determined by the technician. We will meet the requirement as per DID OE-005-005A.01, which states that 95% of the reacquired items shall fall within 1 meter of the target location.

6.2 QUALITY CONTROL

Instrument and functional checks will be performed at the beginning and end of every data acquisition session. Independent QC tests to be performed include static tests, line tests and positioning (cloverleaf) tests. As mentioned in the introduction, the GPO test grid will be used to validate operation procedures based on any changes in equipment, personnal or objectives. These tests will be documented and delivered to CEHNC.

6.2.1 Equipment Warm-up

The geophysical equipment will be turned on and allowed to run for a period of time sufficient to allow the system to reach operating temperature.

6.2.2 Distance Between Sensors

The distance between the top and bottom sensors as well as the height above ground will be measured and recorded.

6.2.3 Personnel Test

All personnel involved in data collection during the removal action will be involved with data collection during the GPO.

6.2.4 Shake Test

All Cables and connections will be shook in a manner simulating walking in rough terrain. Any noise induced from this test will be recorded and the appropriate corrective action will be implemented.

6.2.5 Static Tests

The static test involves locating the instrument over a magnetically quiet area and recording data for a minimum of three (3) minutes, then placing a steel ball under the instrument and recording an additional three (3) minutes of data. The photograph at the right depicts the testing scenario.

6.2.6 Six Line Tests

The line test involves collecting data along an 80-foot line six times. The purpose of the line test is to determine noise due to system movement/motion as well as location error caused by temporal time lag or spatial correction due to waypoint placement. For the first two (2) line tests, data will be collected along the line in each direction at a normal pace with no object on the

ground (Lines 1 and 2). A steel ball will then be placed near the middle of the line and data will be collected along the line in each direction at a slow pace and a fast pace. (Lines 3 and 4). For lines five and six the fast and slow pace directions will be reversed.

6.2.7 Positioning Tests

To test the positioning, the navigation unit will record data in a clover-leaf pattern around three (3) known points, with the operator crossing over the known points from three (3) different directions. The line path will then be plotted over the known points.

6.2.8 Repeat Lines

A minimum of 2% of the lines collected during the GPO will be recollected and analyzed for repeatability determination.

APPENDIX A

TABLES

TABLE A-1: GEOPHYSICAL PROVE-OUT ANOMALIES

X	Y	Target ID	Item	Depth(in)	Orientation
677699.94	1167164.58	a1	37mm	4.00	Horizontal
677708.37	1167173.14	a2	37mm	4.00	Vertical
677719.73	1167188.12	a3	81mm	34.00	Horizontal
677721.10	1167175.99	a4	2.36" rocket	26.00	Horizontal
677730.10	1167179.32	a5	rocket motor	12.00	Horizontal
677723.37	1167167.69	a6	37mm	16.00	Horizontal
677735.00	1167169.03	a7	60mm	12.00	Vertical
677735.62	1167156.66	a8	MKII HG	8.00	Vertical
677745.30	1167155.03	a9	2.36" rocket	6.00	Vertical
677743.41	1167136.92	a10	Anti Tank Mine	6.00	Horizontal
677726.67	1167132.67	a11	60mm	6.00	Vertical
677718.25	1167118.37	a12	MKII HG	4.00	Horizontal
677719.58	1167146.36	a13	37mm	0.00	Horizontal
677688.23	1167097.99	a14	3 "stokes	20.00	Horizontal
677704.27	1167108.58	a15	3 "stokes	32.00	Horizontal
677694.61	1167113.24	a16	75mm	30.00	Horizontal
677709.18	1167133.61	a17	60mm	25.00	45 degrees
677691.87	1167128.25	a18	75mm	12.00	Vertical
677681.35	1167118.85	a19	MKII HG	14.00	Horizontal
677673.49	1167132.86	a20	75mm	18.00	45 degrees
677666.45	1167141.88	a21	37mm	4.00	45 degrees
677680.90	1167152.03	a22	slap flare	4.00	45 degrees
677706.20	1167151.98	a23	105mm	45.00	45 degrees
TBD	TBD	a24	37mm	4.00	Horizontal
TBD	TBD	a25	37mm	4.00	Vertical
TBD	TBD	a26	81mm	17.00	Horizontal
TBD	TBD	a27	2.36" rocket	26.00	Horizontal
TBD	TBD	a28	rocket motor	12.00	Horizontal
TBD	TBD	a29	37mm	16.00	Horizontal
TBD	TBD	a30	60mm	12.00	Vertical
TBD	TBD	a31	MKII HG	8.00	Vertical
TBD	TBD	a32	2.36" rocket	6.00	Vertical
TBD	TBD	a33	60mm	6.00	Horizontal
TBD	TBD	a34	60mm	6.00	Vertical
TBD	TBD	a35	MKII HG	4.00	Horizontal
TBD	TBD	a36	37mm	0.00	Horizontal
TBD	TBD	a37	3 "stokes	20.00	Horizontal
TBD	TBD	a38	3 "stokes	32.00	Horizontal
TBD	TBD	a39	75mm	30.00	Horizontal
TBD	TBD	a40	81mm	25.00	45 degrees
TBD	TBD	a41	75mm	12.00	Vertical
TBD	TBD	a42	MKII HG	0.00	Horizontal
TBD	TBD	a43	75mm	18.00	45 degrees
TBD	TBD	a44	37mm	4.00	45 degrees
TBD	TBD	a45	slap flare	4.00	Vertical

Table A-1: Geophysical Prove-Out Anomalies (Continued)					
X	**Y**	**Target ID**	**Item**	**Depth (in)**	**Orientation**
TBD	TBD	a46	105mm	10.00	Vertical
TBD	TBD	a47	81mm	34.00	Vertical
TBD	TBD	a48	rocket motor	12.00	Vertical
TBD	TBD	a49	3 "stokes	20.00	Vertical
TBD	TBD	a50	37mm	2.00	Horizontal
677753.19	1167226.71	NE	corner point		
677651.45	1167138.05	NW	corner point		
677762.26	1167147.30	M1	mid point		
677728.18	1167117.92	M2	mid point		
677685.25	1167167.49	M3	mid point		
677719.52	1167196.53	M4	mid point		

TABLE A-2: CORNER POINTS

Corner Point	X	Y
SW	677693.96	1167088.76
SE	677796.54	1167176.86
NE	677753.19	1167226.71
NW	677651.45	1167138.05
M1	677762.26	1167147.30
M2	677728.18	1167117.92
M3	677685.25	1167167.49
M4	677719.52	1167196.53

APPENDIX B

FIGURES

FIGURE B-1: TEST GRID LOCATION

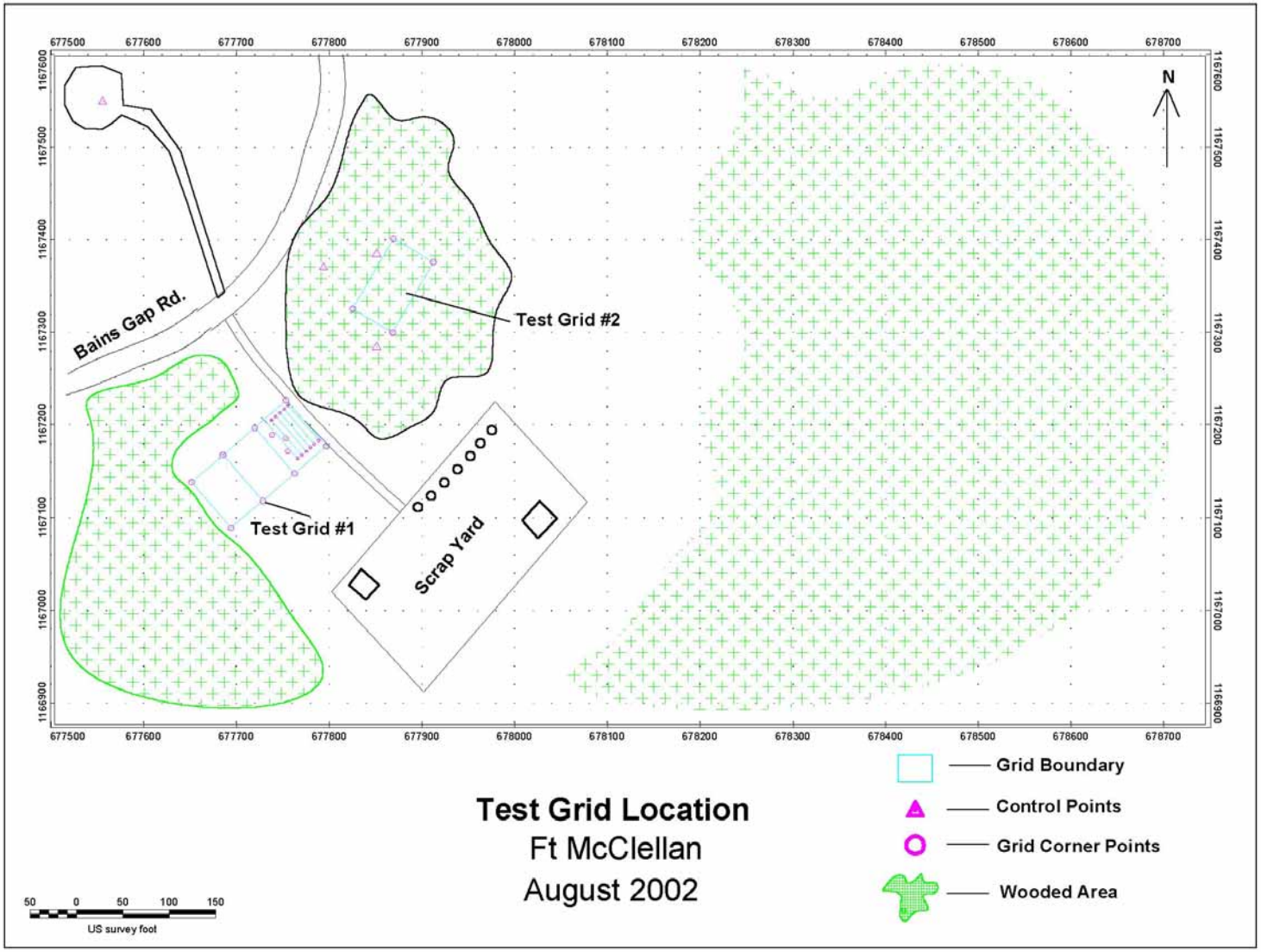


FIGURE B-2: BACKGROUND TEST

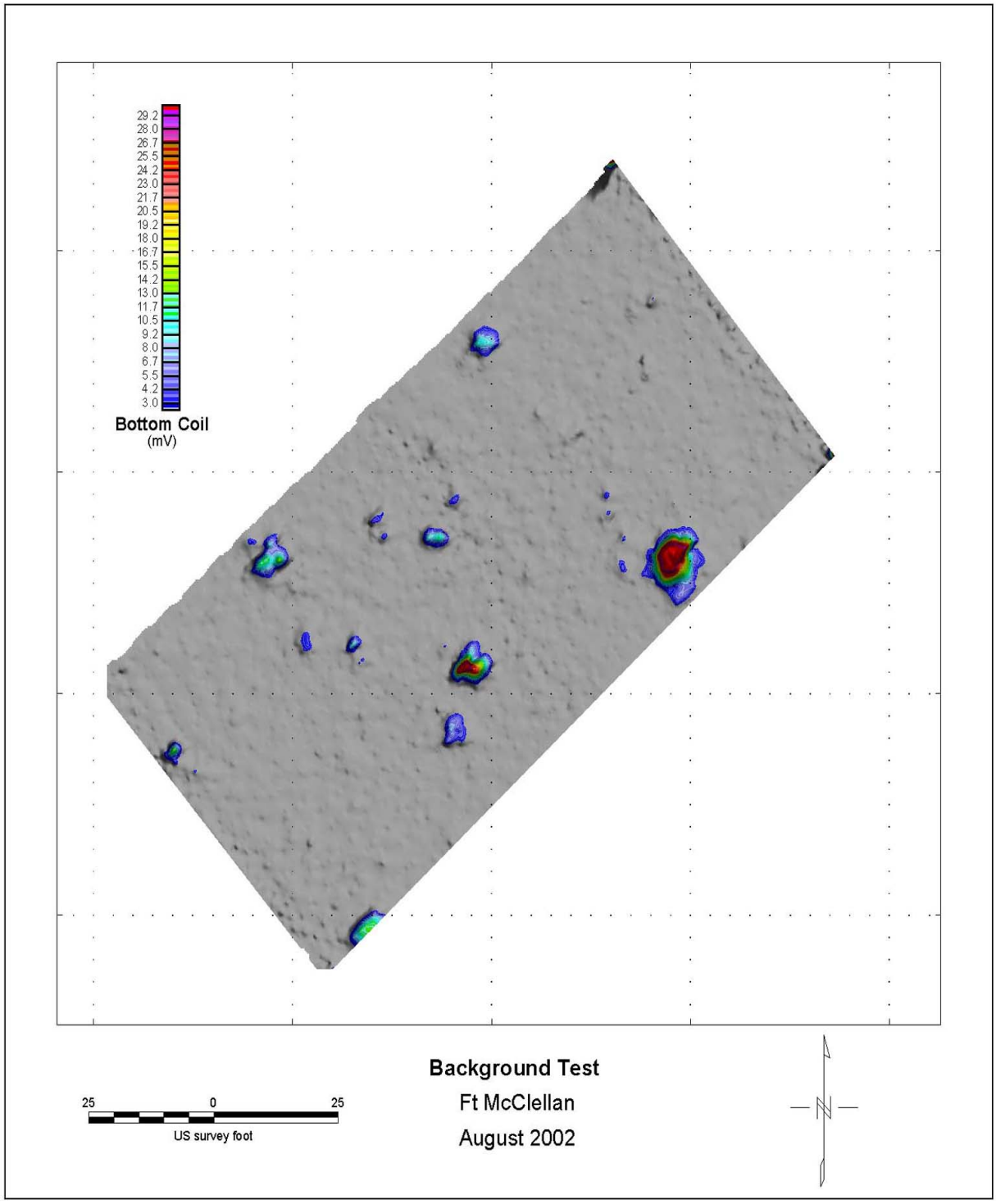


FIGURE B-3: CONSTELLATION TEST

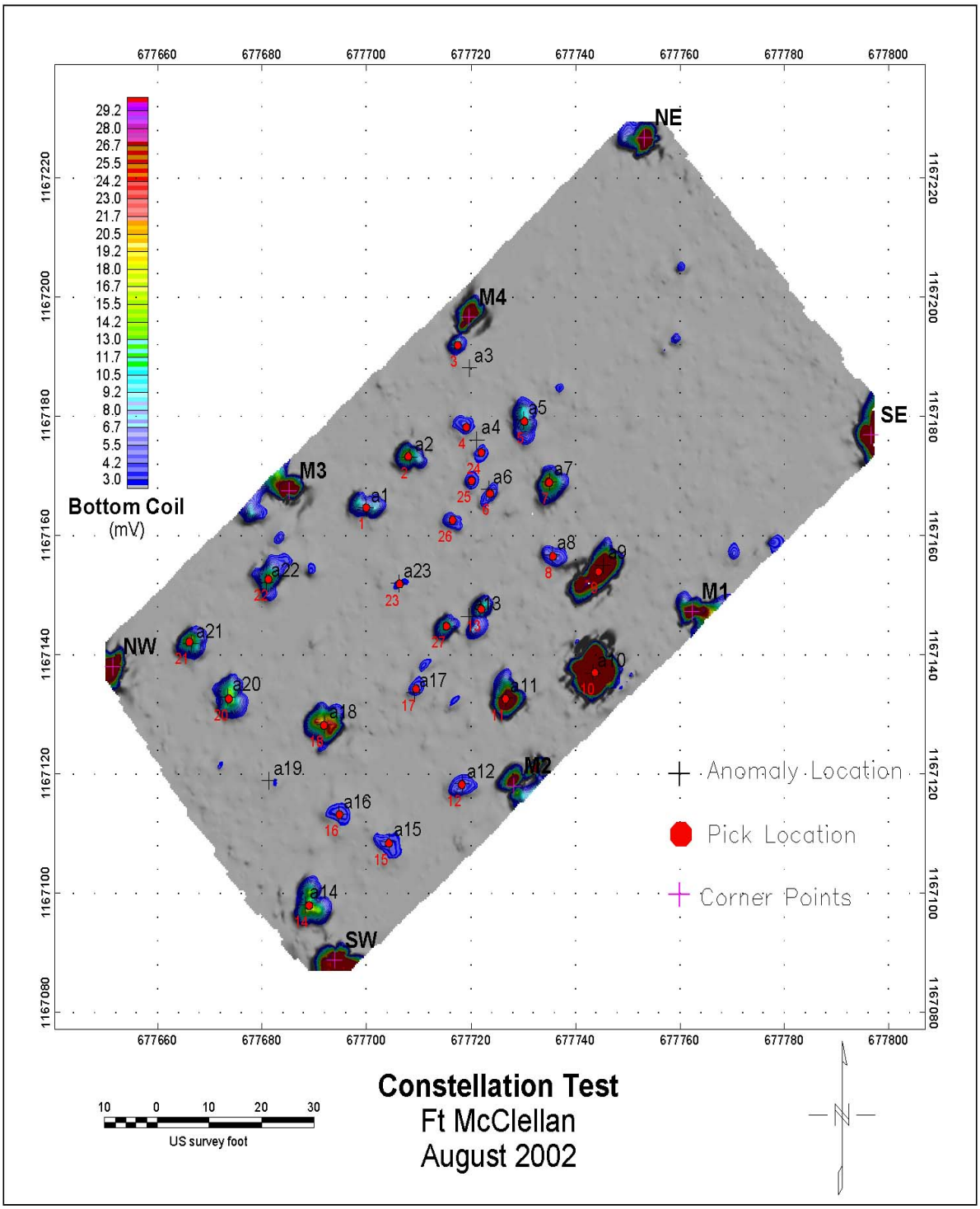
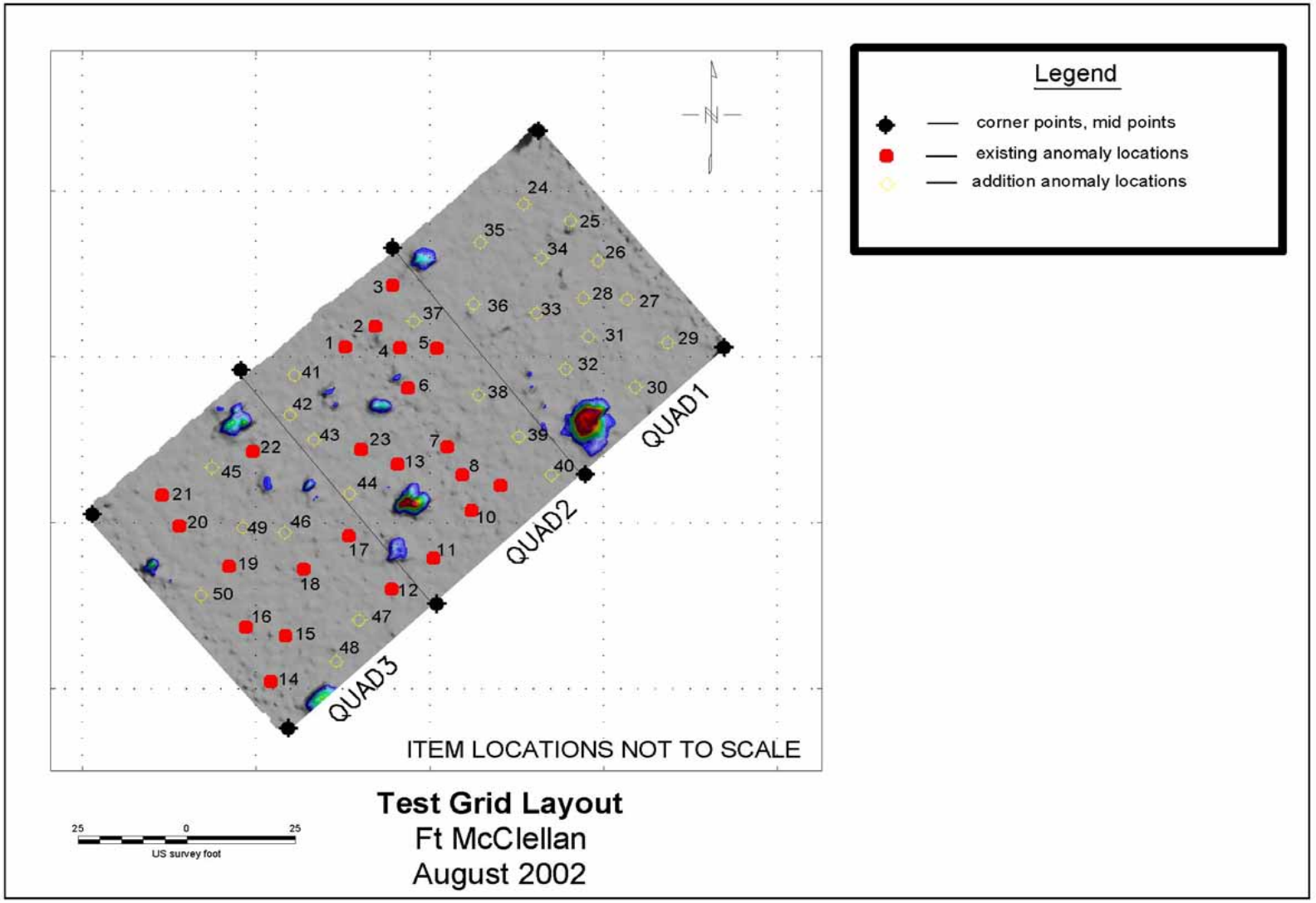


FIGURE B-4: TEST GRID LAYOUT



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Geophysical Prove-Out Letter Report

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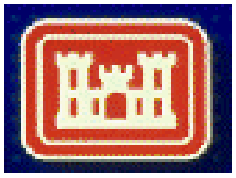
Geophysical Prove-Out
Letter Report
Fort McClellan, Alabama

Task Order 0019
Contract Number DACA87-99-D-0010



U.S. Army Corps of Engineers
Engineering and Support Center
Huntsville, Alabama

Prepared by
Foster Wheeler Environmental Corporation
Huntsville, Alabama

August 2003

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LIST OF APPENDICIES

1.0 INTRODUCTION

The United States Army Engineering and Support Center, Huntsville (USAESCH) has contracted Foster Wheeler Environmental Corporation under Contract DACA87-99-D-0010, to perform a Geophysical Prove-Out (GPO) at Fort McClellan located in Anniston, Alabama. The GPO was performed during the week of May 12th, 2003. Foster Wheeler Environmental Corporation (FWENC) utilized two (2) three (3) man teams to acquire geophysical data in the Eastern Bypass Y Area. Essential aspects of the GPO will be discussed in the following report with additional information, to include all digital data, provided on the CD-ROM submitted as a supplement to this report.

2.0 OBJECTIVE

The objective of the GPO was to demonstrate and document the performance of the data acquisition methodology and spatial sampling protocols, sensor(s) and positioning equipment, data analysis and management systems, data transfer procedures, and the geophysical Quality Control (QC) system. In addition, the GPO test was used to validate each team member's ability to perform his or her required task. Each team member received internal certification stating that their performance met the project requirements as outlined in the Amendment 1 to the Eastern Bypass Work Plan. The following components of the geophysical system were evaluated during the GPO field program to ensure the program objectives were met:

- Spatial sample density (i.e., line and station spacing)
- Navigation and positioning methodologies
- Sensor and positioning system platform (stability, noise characteristics, and ergonomics)
- Data processing, analysis and interpretation, management, and transfer system
- Quality Assurance (QA) Control, documentation protocol for data acquisition, processing and analysis, and data management and transfer

The GPO test grid was designed and placed in a location were it can be maintained for ongoing usage. It is the intention of FWENC to validate the geophysical systems throughout the duration of the present contract as well as any subsequent removal actions. These validations will occur based on modifications to the geophysical sensors, positioning equipment, or acquisition/reacquisition procedures that affect the accuracy and/or repeatability of the data and cannot be assessed in real-time during normal field operations.

3.0 LOCATION

The GPO area is located near the scrap yard off of Bains Gap Road (see Appendix A). The GPO area is representative of the environment encountered during geophysical operations at Fort McClellan. Two test grids were constructed in this area. Test grid #1 was used for this GPO.

4.0 EQUIPMENT

Based on FWENC previous experience at numerous UXO sites, the EM61 MK2 instrument was selected because it has exhibited the best potential to meet the similar program objectives. Foster Wheeler Environmental has evaluated the following equipment in the GPO test grid.

4.1 EM61 MK2

The EM61 MK2 version of the Geonics EM61 will be used in the differential mode for this project, which utilizes multiple time-gates centered at 216, 366, 660 (bottom coil) and 660 (top coil) μs. The signal intensity for a given ferrous target recorded by the earlier time-gates is generally a factor of 2 to 4 times that recorded by the standard (660μs) EM61 MK2 time-gate. This feature facilitates a more efficient and repeatable interpretation of smaller targets such as 37mm projectiles.

4.2 CONSTELLATION POSITIONING SYSTEM

The Constellation Positioning System was selected for the system's ability to acquire data in heavily wooded areas. This system consists of four (4) laser transmitters, each with a unique signature of light pulses, optical sensors, and signal processing. The positioning is based on line-of-sight triangulation. The Constellation system remotely transmits data from a handheld computer to a stationary laptop. The resulting positioning file is then merged with the sensor data to produce a .xyz file.

4.3 SEEDED ITEMS

All seeded items were buried by qualified UXO personnel following a background survey of the test grid (see Appendix B). All items detected during the background survey, were removed from the ground. Photographs of the seeded items can be found in the attached CD-ROM. Locations of the items can be found in Appendix C.

5.0 PROCEDURES

5.1 DATA ACQUISITION

Data was acquired at a line spacing of 2.5 ft. Prior to starting the acquisition session, the coil height was measured to 16 inches above ground level. Shake tests were performed to verify that all cables were secure in position. All three time-gates were electronically nulled to zero in a magnetically "quiet" area using the Geonics MKII acquisition software. Following these procedures, static and dynamic data were recorded to facilitate shift and drift corrections.

5.2 DATA PROCESSING

Data were stored on PCMCIA cards during data acquisition. After acquisition on the test grid was completed, data was transferred from the PCMCIA cards to the site laptop PC for processing. A Foster Wheeler Environmental geophysicist performed preliminary geophysical and navigation data processing and Quality Control (QC) checks. The final analysis and interpretation of the data was performed at the Foster Wheeler Environmental processing center

at Fort McClellan, Alabama. Processing, QC, analysis, and interpretation of the data was performed with internally developed software that has been specifically produced to integrate and interpret digital geophysical data acquired with the Constellation Positioning System. Geosoft Oasis Montaj Mapping software was also used to graphically display data and select targets. Data transfer was fully tested during the GPO. This included the transfer of raw EM and positioning data. Corrected and leveled processed data were converted to column delimited ASCII format.

5.3 REACQUISITION

Target reacquisition accuracy was evaluated using Vulcan II Laser System to locate the Foster Wheeler Environmental seed items. A UXO Technician used a Vallon VMX2 to pinpoint the target location as indicated by the Vulcan II System. The combination of the Vulcan II and Vallon was able to locate all the seeded items within the required distance specified under DID OE-005-05A.01. An audible response was used to pinpoint the location of the seeded items and the response was noted in the operator's logbook. The reacquired point locations were determined using a Leica Total Station. The results can be found in Table 4 of Appendix C. The xy "offset" indicates the distance between the known location of the item and the reacquired location.

5.4 QUALITY CONTROL

Instrument and function checks were performed at the beginning and end of every data acquisition session. Independent QC tests performed included static test, line test, and positioning (cloverleaf) test. The digital QC data has been included on the CD-ROM submitted with this report.

5.5 STATIC TESTS

The static test involved locating the instrument over a quiet area and recording data for a minimum of 3 minutes, then placing a spherical item under the instrument and recording an additional 3 minutes of data. Each of the instrument configuration static tests showed normal background noise levels (0 to 2 mV for the bottom coil and 0 to 4 mV for the upper coil. Slight variations were due to normal instrument noise. The figures located in Appendix D, representing the static calibration and static response, were generated using the Geosoft Department of Defense UXO Quality Control System. The static calibration dialog automatically generates a profile view of the channel data in the database and flags data residing outside 2 standard deviations. The data used for the static calibration is recorded with every file that is collected in the field for one minute in the beginning (labeled BEG) of the file and one minute at the end (labeled END) of the file. The test performed for the static response involves placing a known calibration object with a known amplitude response beneath the sensor. The purpose is to inspect the consistency of the instrument response throughout the course of the project. The figures contain graphical views (EM values vs. record number) that provide a visual display of the selected data. The data used for the static response is recorded with every file that is collected in the field for one minute in the beginning (labeled BEG) of the file and one minute at the end (labeled END) of the file.

The MK2 backpacks have been observed to have more drift than the standard MK1, for which the processing software was designed. Foster Wheeler is working with Geosoft on developing software more suitable for the MK2 system. The instrument drift displayed in these figures is removed from the data through internally developed software.

5.6 SIX-LINE TESTS

The six-line test (see Appendix E) involved collecting data along a 60-foot line six times (80-foot was not possible due to area size limitations). The purpose of this line test was to determine noise due to system movement/motion as well as location error caused by temporal time lag or spatial correction due to waypoint placement. For the first two line tests, data was collected along the line in each direction (Lines 1 and 2) at a normal pace. An item was then placed near the middle of the line and data was collected along the line in each direction (Lines 3 and 4) at a normal pace. Line 5 was collected (with the item in place) at a fast pace followed by line 6 collected at a slow pace. There was no appreciable noise increase from the tests nor was there appreciable position lag errors.

5.7 POSITIONING TESTS

To test the positioning, the navigation unit recorded data in a clover-leaf pattern around a known point (see Appendix F), with the operator crossing over the known points from 4 different directions. The line path was then plotted over the known point. The results showed an offset of less then 2 inches between the known points and the operators "cross-over" intersection. There was no loss of signal during the test and the overall quality of the line path was good.

5.8 SUMMARY

All members of both Team #1 and Team #2 demonstrated the ability to successfully meet the project objectives. Utilizing the EM61 MK2, both teams confidentially detected all of the seeded items with zero false positives. Figures located in Appendix G show each of the three time-gates for the bottom coil. The interpretation of this data was based on all the time-gates as well as the top coil for Team#2. The pick location can be found on the figure on page G-5 in Appendix G. The noise level on the Bottom Coil in both cases was in the order of 0.25mV. The Constellation demonstrated accuracy well within the project requirements. The Setup time was approximately 30 minutes for the 90ft X 70ft grid.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The GPO was conducted to demonstrate and document the performance of the proposed data acquisition methodology (including personnel) and spatial sampling protocols, sensor(s) and positioning equipment, data analysis and management systems, data transfer procedures, and the geophysical Quality Control (QC) system.

Based on the results described previously in this report, the EM61 MK2 demonstrated the ability to meet the program objectives and should be approved for continual work. The Constellation system was straightforward to setup and provided highly accurate positioning data.

6.2 RECOMMENDATIONS

The GPO test grid at Fort McClellan is a very good indication of the types of areas that will be surveyed during the Eastern Bypass Y Area Removal Project. It is anticipated that buildings, trees, cultural features, and open areas will all be encountered on a daily basis. The items seeded in the prove-out are also representative of the items to be encountered during the investigation and have accurate depth and location calculations.

6.3 DETECTION METHOD

Using the early time-gate on the EM61 MK2 will allow for the detection of smaller, deeper items, however, the late time gates should be used to aid in discrimination

6.4 POSITIONING

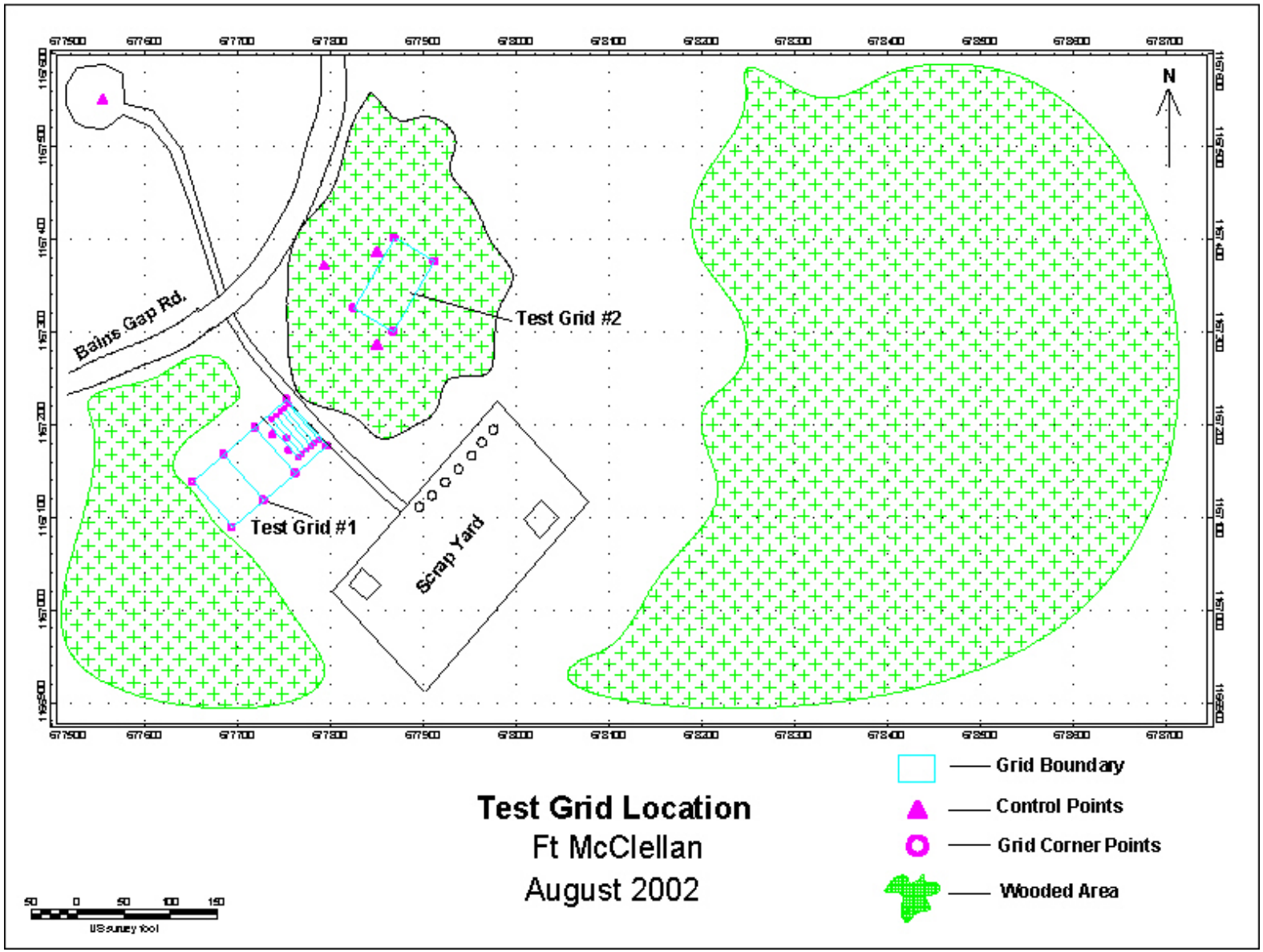
The Constellation Positioning System is recommended as the primary positioning system in wooded areas and is well suited for the conditions to be encountered during the upcoming investigation. The setup is very straightforward and the accuracy is well within the project requirements.

6.5 LINE SPACING

A line spacing of 2.5 ft is recommended. This spacing allows for overlap (1m by 1m coil) while reducing acquisition time.

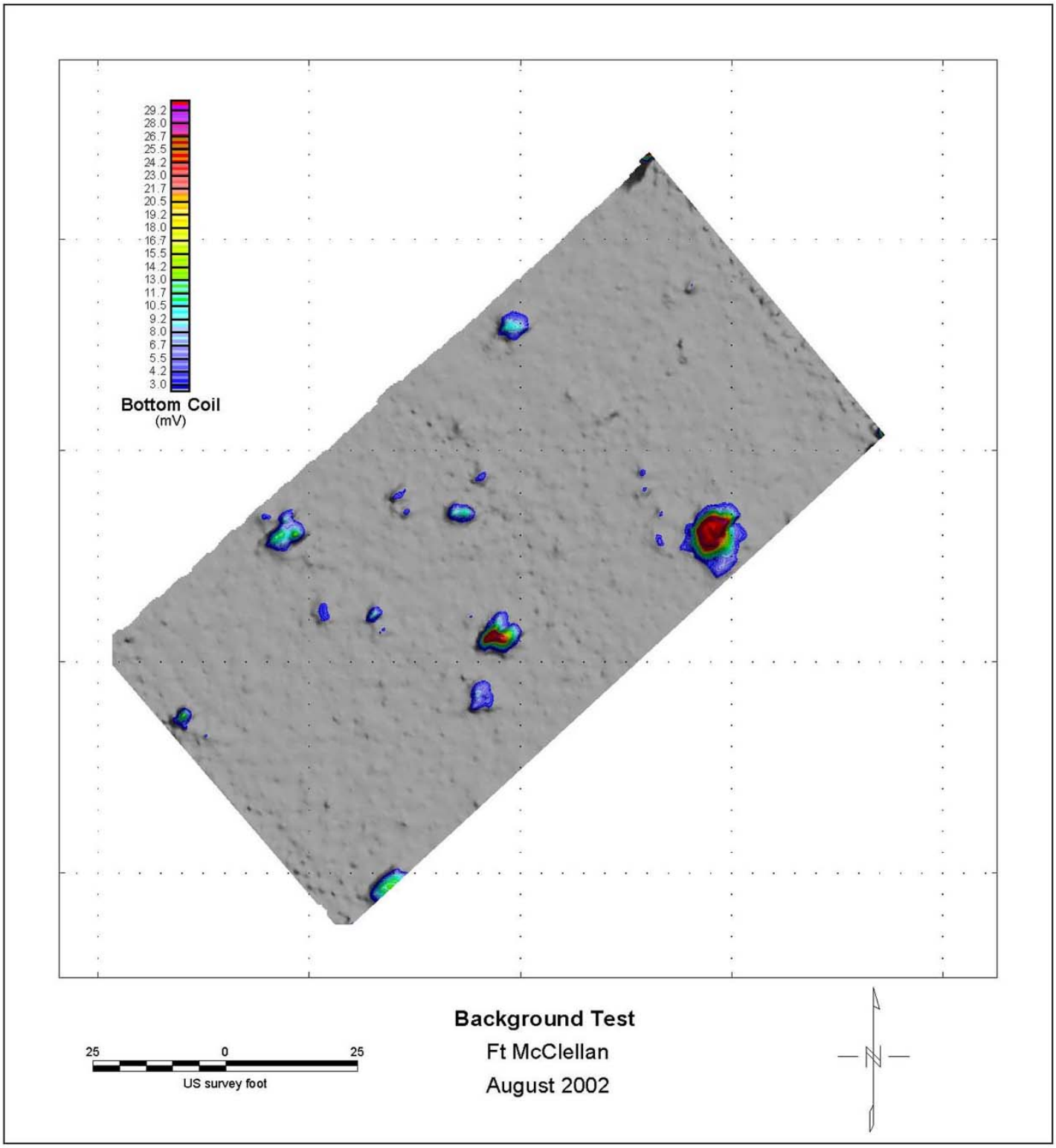
APPENDIX A

TEST GRID LOCATION


N
Bains Gap Rd.
Test Grid #2
Test Grid #1
Scrap Yard
Test Grid Location
Ft McClellan
August 2002
Grid Boundary
Control Points
Grid Corner Points
Wooded Area

APPENDIX B

BACKGROUND TEST GRID


29.2
28.0
26.7
25.5
24.2
23.0
21.7
20.5
19.2
18.0
16.7
15.5
14.2
13.0
11.7
10.5
9.2
8.0
6.7
5.5
4.2
3.0
Bottom Coil
(mV)
25
0
25
US survey foot
Background Test
Ft McClellan
August 2002

APPENDIX C

TABLES

TABLE 1

ANOMALY TABLE

X	Y	TARGET ID	ITEM	DEPTH(IN)	ORIENTATION
677699.94	1167164.58	a1	37mm	4.00	Horizontal
677708.37	1167173.14	a2	37mm	4.00	Vertical
677719.73	1167188.12	a3	81mm	34.00	Horizontal
677721.10	1167175.99	a4	2.36" rocket	26.00	Horizontal
677730.10	1167179.32	a5	rocket motor	12.00	Horizontal
677723.37	1167167.69	a6	37mm	16.00	Horizontal
677735.00	1167169.03	a7	60mm	12.00	Vertical
677735.62	1167156.66	a8	MKII HG	8.00	Vertical
677745.30	1167155.03	a9	2.36" rocket	6.00	Vertical
677743.41	1167136.92	a10	Anti Tank Mine	6.00	Horizontal
677726.67	1167132.67	a11	60mm	6.00	Vertical
677718.25	1167118.37	a12	MKII HG	4.00	Horizontal
677719.58	1167146.36	a13	37mm	0.00	Horizontal
677688.23	1167097.99	a14	3 "stokes	20.00	Horizontal
677704.27	1167108.58	a15	3 "stokes	32.00	Horizontal
677694.61	1167113.24	a16	75mm	30.00	Horizontal
677709.18	1167133.61	a17	60mm	25.00	45 degrees
677691.87	1167128.25	a18	75mm	12.00	Vertical
677681.35	1167118.85	a19	MKII HG	14.00	Horizontal
677673.49	1167132.86	a20	75mm	18.00	45 degrees
677666.45	1167141.88	a21	37mm	4.00	45 degrees
677680.90	1167152.03	a22	slap flare	4.00	45 degrees
677706.20	1167151.98	a23	105mm	45.00	45 degrees
677753.84	1167216.57	a24	37mm	4.00	Horizontal
677765.13	1167208.06	a25	37mm	4.00	Vertical
677771.70	1167196.19	a26	81mm	17.00	Horizontal
677771.95	1167190.79	a27	2.36" rocket	26.00	Horizontal
677781.41	1167187.60	a28	rocket motor	12.00	Horizontal
677794.28	1167178.14	a29	37mm	16.00	Horizontal
677775.16	1167162.11	a30	60mm	12.00	Vertical
677767.82	1167173.71	a31	MKII HG	8.00	Vertical
677763.33	1167167.94	a32	2.36" rocket	6.00	Vertical
677750.42	1167179.97	a33	60mm	6.00	Horizontal
677756.51	1167195.77	a34	60mm	6.00	Vertical
677740.94	1167197.48	a35	MKII HG	4.00	Horizontal
677741.04	1167180.67	a36	37mm	0.00	Horizontal
677728.58	1167178.52	a37	3 "stokes	20.00	Horizontal
677733.40	1167171.79	a38	3 "stokes	32.00	Horizontal

TABLE 1

ANOMALY TABLE

X	Y	TARGET ID	ITEM	DEPTH(IN)	ORIENTATION
677743.27	1167161.79	a39	75mm	30.00	Horizontal
677758.76	1167148.27	a40	81mm	25.00	45 degrees
677697.46	1167163.21	a41	75mm	12.00	Vertical
677699.23	1167155.70	a42	MKII HG	0.00	Horizontal
677700.11	1167144.91	a43	75mm	18.00	45 degrees
677715.77	1167137.08	a44	37mm	4.00	45 degrees
677715.85	1167112.69	a45	slap flare	4.00	Vertical
677706.94	1167104.36	a46	105mm	10.00	Vertical
677693.62	1167134.69	a47	81mm	34.00	Vertical
677683.47	1167133.54	a48	rocket motor	12.00	Vertical
677680.56	1167145.54	a49	3 "stokes	20.00	Vertical
677674.37	1167119.69	a50	37mm	2.00	Horizontal
677753.19	1167226.71	NE	corner point		
677651.45	1167138.05	NW	corner point		
677762.26	1167147.30	M1	mid point		
677728.18	1167117.92	M2	mid point		
677685.25	1167167.49	M3	mid point		
677719.52	1167196.53	M4	mid point		

TABLE 2

CORNER POINTS

CORNER POINT	X	Y
SW	677693.96	1167088.76
SE	677796.54	1167176.86
NE	677753.19	1167226.71
NW	677651.45	1167138.05
M1	677762.26	1167147.30
M2	677728.18	1167117.92
M3	677685.25	1167167.49
M4	677719.52	1167196.53

TABLE 3

TEAM 2 DIG SHEETS

TARGET ID	X	Y	EST. SIZE CM	TOP	BOTTOM	C1C2 RATIO	PRIORITY	COMMENTS	DATE	REACQUIRED
1	677753.25	1167217.71	7.95	22.19	32.84	0.68	dig	ok	05/15/2003	yes
2	677765.42	1167207.73	8.98	27.72	44.03	0.63	dig	ok	05/15/2003	yes
3	677771.67	1167195.91	7.44	13.11	28.38	0.46	dig	ok	05/15/2003	yes
4	677771.67	1167189.98	6.39	19.69	21.05	0.94	dig	ok	05/15/2003	yes
5	677781.64	1167187.79	2.16	5.18	6.29	0.82	dig	ok	05/15/2003	yes
6	677775.05	1167161.25	6.69	7.14	22.91	0.31	dig	ok	05/15/2003	yes
7	677767.78	1167173.59	6.67	10.83	22.79	0.48	dig	ok	05/15/2003	yes
8	677762.71	1167168.02	12.79	88.35	130.7	0.68	dig	ok	05/15/2003	yes
9	677750.37	1167179.68	10.39	28.22	65.8	0.43	dig	ok	05/15/2003	yes
10	677741.25	1167180.69	8.59	12.81	39.35	0.33	dig	ok	05/15/2003	yes
11	677756.8	1167195.91	10.49	42.82	67.83	0.63	dig	ok	05/15/2003	yes
12	677740.74	1167197.77	4.88	7.13	13.65	0.52	dig	ok	05/15/2003	yes
13	677718.94	1167187.79	13.66	10.78	8.88	1.21	dig	ok	05/15/2003	yes
14	677727.72	1167178.33	10.24	34.83	63.03	0.55	dig	ok	05/15/2003	yes
15	677730.77	1167180.35	10.14	33.43	61.24	0.55	dig	ok	05/15/2003	yes
16	677733.47	1167171.9	6.41	13.7	21.15	0.65	dig	ok	05/15/2003	yes
17	677735.16	1167169.03	9.93	33.23	57.71	0.58	dig	ok	05/15/2003	yes
18	677743.27	1167161.76	43.31	8.51	4.54	1.87	dig	ok	05/15/2003	yes
19	677745.3	1167155.67	12.11	69.7	107.46	0.65	dig	ok	05/15/2003	yes
20	677758.82	1167148.23	6.59	18.55	22.23	0.83	dig	ok	05/15/2003	yes
21	677743.52	1167137.01	21.45	858.55	1547.85	0.55	dig	ok	05/15/2003	yes
22	677726.78	1167132.78	11.55	49.78	91.73	0.54	dig	ok	05/15/2003	yes
23	677719.51	1167146.48	7.19	17.73	26.4	0.67	dig	ok	05/15/2003	yes
24	677735.58	1167156.96	5.31	11.8	15.43	0.76	dig	ok	05/15/2003	yes
25	677723.4	1167167.11	2.75	-0.09	7.43	-0.01	dig	ok	05/15/2003	yes
26	677720.19	1167174.72	2.73	5.7	7.39	0.77	dig	ok	05/15/2003	yes

TABLE 3

TEAM 2 DIG SHEETS

TARGET ID	X	Y	EST. SIZE CM	TOP	BOTTOM	C1C2 RATIO	PRIORITY	COMMENTS	DATE	REACQUIRED
27	677708.36	1167173.02	7.26	17.8	26.94	0.66	dig	ok	05/15/2003	yes
28	677696.86	1167163.9	8.27	28.19	35.92	0.78	dig	ok	05/15/2003	yes
29	677701.25	1167164.74	5.92	10.5	18.4	0.57	dig	ok	05/15/2003	yes
30	677699.39	1167155.45	6.98	9.73	24.88	0.39	dig	ok	05/15/2003	yes
31	677706.5	1167151.89	1.54	0.83	5.26	0.16	dig	ok	05/15/2003	yes
32	677699.9	1167145.3	6.87	14.17	24.14	0.59	dig	ok	05/15/2003	yes
33	677714.78	1167136.67	7.22	17.71	26.63	0.67	dig	ok	05/15/2003	yes
34	677709.03	1167135.49	18.76	9.01	6.47	1.39	dig	ok	05/15/2003	yes
35	677717.99	1167118.41	1.82	-4.64	5.7	-0.81	dig	ok	05/15/2003	yes
36	677714.95	1167112.66	2.06	5.41	6.1	0.89	dig	ok	05/15/2003	yes
37	677706.16	1167104.72	6.49	14.34	21.64	0.66	dig	ok	05/15/2003	yes
38	677703.28	1167108.44	2.17	-2.55	6.3	-0.4	dig	ok	05/15/2003	yes
39	677694.32	1167113.34	2.76	3.21	7.46	0.43	dig	ok	05/15/2003	yes
40	677692.46	1167128.05	9.56	45.44	51.91	0.88	dig	ok	05/15/2003	yes
41	677693.82	1167134.98	13.51	104.69	160.29	0.65	dig	ok	05/15/2003	yes
42	677681.18	1167118.98	95.09	10.43	4.04	2.58	dig	ok	05/15/2003	yes
43	677674.42	1167119.82	8.86	14.38	42.53	0.34	dig	ok	05/15/2003	yes
44	677682.87	1167133.69	9.8	39.82	55.56	0.72	dig	ok	05/15/2003	yes
45	677673.57	1167133.01	7.27	15.94	27.01	0.59	dig	ok	05/15/2003	yes
46	677666.3	1167141.8	7.64	20.93	30.05	0.7	dig	ok	05/15/2003	yes
47	677680.33	1167145.86	6.7	7.28	22.97	0.32	dig	ok	05/15/2003	yes
48	677681.35	1167152.8	7.95	15.33	32.84	0.47	dig	ok	05/15/2003	yes
49	677688.52	1167097.7	7.63	11.65	29.94	0.39	dig	ok	05/15/2003	yes
50	677688.85	1167154.17	1.75	3.35	5.59	0.6	no dig	ok	05/15/2003	NA
51	677716.08	1167162.29	4.05	1.45	10.77	0.13	dig	ok	05/15/2003	yes
52	677710.95	1167189.5	94.77	9.65	3.69	2.62	dig	ok	05/15/2003	yes
53	677759.31	1167204.05	2.2	2.6	6.36	0.41	no dig	ok	05/15/2003	NA

TABLE 4

REAQUIRE RESULTS

X	Y	TARGET ID	ITEM	DEPTH (IN)	ORIENTATION	REAQUIRE X	REAQUIRE Y	OFFSET X (IN)	OFFSET Y (IN)
677699.94	1167164.58	a1	37mm	4.00	Horizontal	677700.26	1167164.97	-3.84	-4.63
677708.37	1167173.14	a2	37mm	4.00	Vertical	677708.69	1167173.31	-3.86	-1.97
677719.73	1167188.12	a3	81mm	34.00	Horizontal	677719.99	1167188.70	-3.14	-6.95
677721.10	1167175.99	a4	2.36" rocket	26.00	Horizontal	677720.89	1167176.01	2.55	-0.22
677730.10	1167179.32	a5	rocket motor	12.00	Horizontal	677730.07	1167179.30	0.41	0.27
677723.37	1167167.69	a6	37mm	16.00	Horizontal	677723.64	1167167.99	-3.23	-3.68
677735.00	1167169.03	a7	60mm	12.00	Vertical	677735.04	1167169.19	-0.48	-2.01
677735.62	1167156.66	a8	MKII HG	8.00	Vertical	677735.58	1167156.83	0.52	-1.94
677745.30	1167155.03	a9	2.36" rocket	6.00	Vertical	677745.30	1167155.17	0.09	-1.61
677743.41	1167136.92	a10	Anti Tank Mine	6.00	Horizontal	677743.74	1167136.91	-3.92	0.07
677726.67	1167132.67	a11	60mm	6.00	Vertical	677727.03	1167133.21	-4.22	-6.41
677718.25	1167118.37	a12	MKII HG	4.00	Horizontal	677718.39	1167118.51	-1.66	-1.70
677719.58	1167146.36	a13	37mm	0.00	Horizontal	677719.26	1167146.39	3.85	-0.44
677688.23	1167097.99	a14	3 "stokes	20.00	Horizontal	677688.23	1167097.99	-0.04	-0.02
677704.27	1167108.58	a15	3 "stokes	32.00	Horizontal	677704.11	1167108.74	1.86	-1.95
677694.61	1167113.24	a16	75mm	30.00	Horizontal	677694.73	1167113.44	-1.46	-2.44
677709.18	1167133.61	a17	60mm	25.00	45 degrees	677709.33	1167133.75	-1.82	-1.76
677691.87	1167128.25	a18	75mm	12.00	Vertical	677691.98	1167128.45	-1.26	-2.43
677681.35	1167118.85	a19	MKII HG	14.00	Horizontal	677681.46	1167118.96	-1.35	-1.39
677673.49	1167132.86	a20	75mm	18.00	45 degrees	677673.59	1167133.00	-1.20	-1.76
677666.45	1167141.88	a21	37mm	4.00	45 degrees	677666.58	1167141.98	-1.63	-1.18
677680.90	1167152.03	a22	slap flare	4.00	45 degrees	677681.05	1167152.11	-1.89	-0.85
677706.20	1167151.98	a23	105mm	45.00	45 degrees	677706.21	1167151.95	-0.15	0.32
677753.84	1167216.57	a24	37mm	4.00	Horizontal	677753.93	1167216.69	-1.07	-1.37
677765.13	1167208.06	a25	37mm	4.00	Vertical	677765.16	1167208.15	-0.43	-0.98
677771.70	1167196.19	a26	81mm	17.00	Horizontal	677771.76	1167196.28	-0.67	-0.99

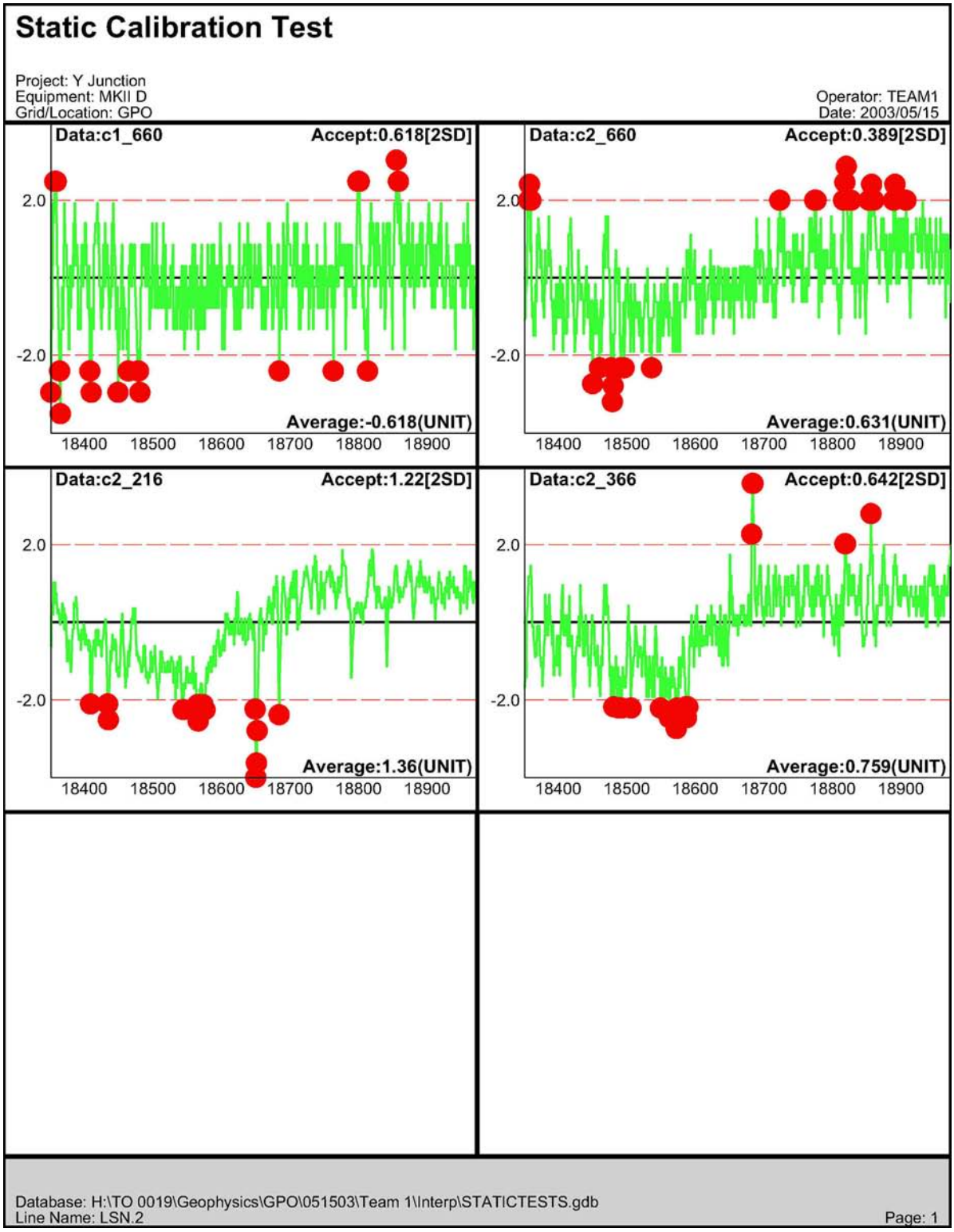
TABLE 4

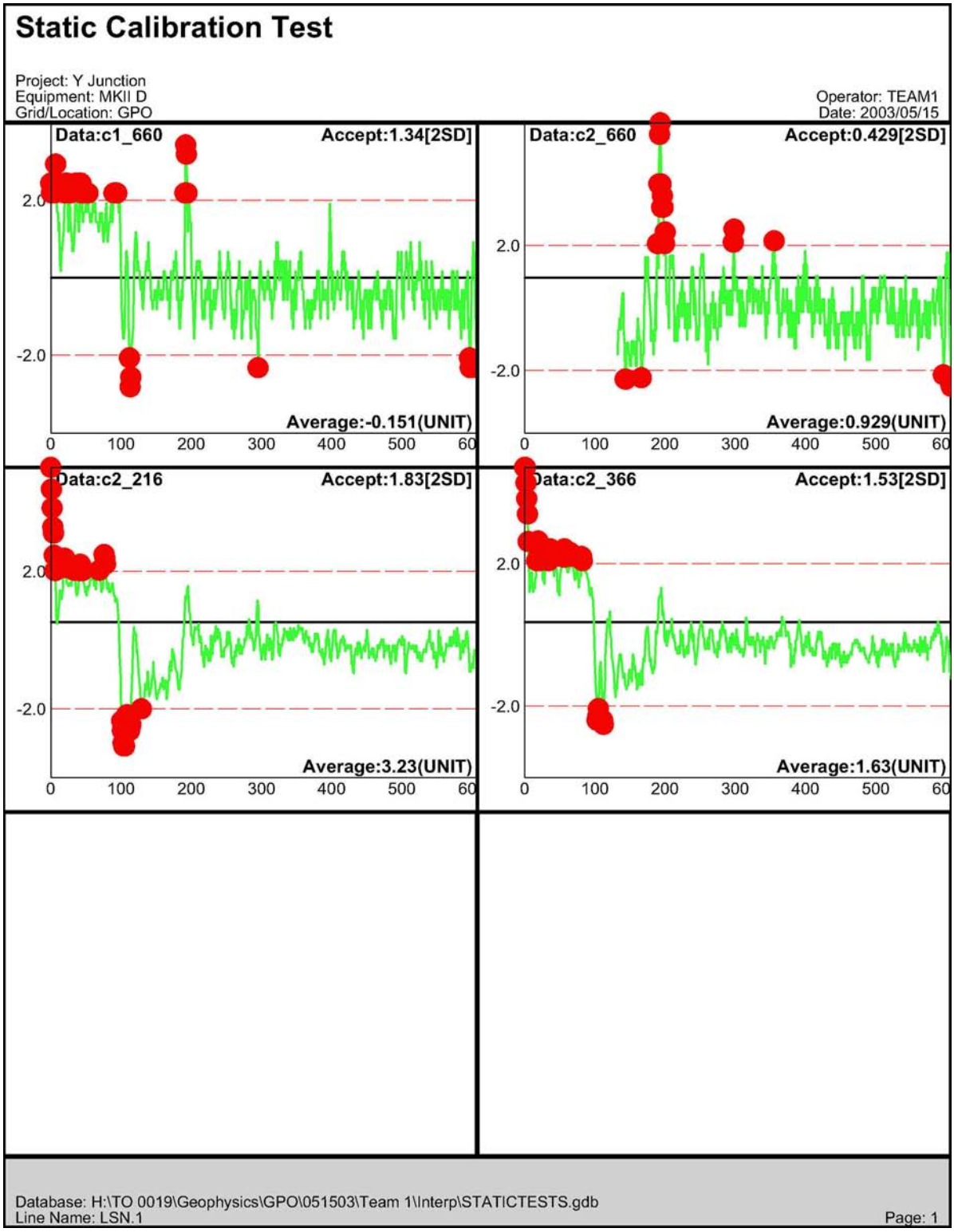
REAQUIRE RESULTS

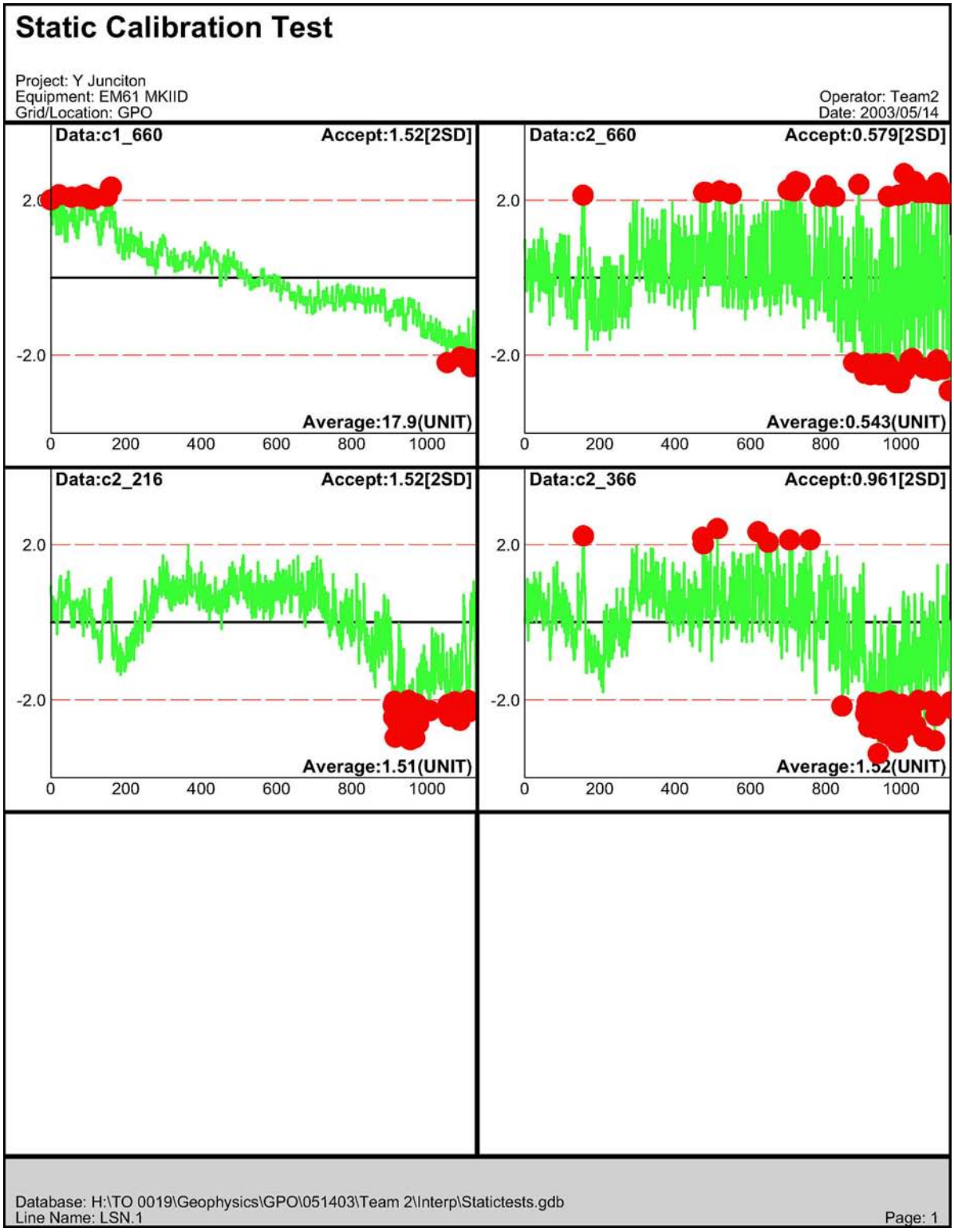
X	Y	TARGET ID	ITEM	DEPTH (IN)	ORIENTATION	REAQUIRE X	REAQUIRE Y	OFFSET X (IN)	OFFSET Y (IN)
677771.95	1167190.79	a27	2.36" rocket	26.00	Horizontal	677771.99	1167190.97	-0.52	-2.17
677781.41	1167187.60	a28	rocket motor	12.00	Horizontal	677781.47	1167187.74	-0.72	-1.70
677794.28	1167178.14	a29	37mm	16.00	Horizontal	677794.30	1167178.20	-0.22	-0.69
677775.16	1167162.11	a30	60mm	12.00	Vertical	677775.18	1167162.32	-0.15	-2.45
677767.82	1167173.71	a31	MKII HG	8.00	Vertical	677767.86	1167173.90	-0.57	-2.31
677763.33	1167167.94	a32	2.36" rocket	6.00	Vertical	677763.30	1167168.05	0.41	-1.29
677750.42	1167179.97	a33	60mm	6.00	Horizontal	677750.43	1167180.12	-0.11	-1.69
677756.51	1167195.77	a34	60mm	6.00	Vertical	677756.53	1167195.89	-0.25	-1.42
677740.94	1167197.48	a35	MKII HG	4.00	Horizontal	677740.98	1167197.62	-0.55	-1.61
677741.04	1167180.67	a36	37mm	0.00	Horizontal	677741.11	1167180.82	-0.73	-1.87
677728.58	1167178.52	a37	3 "stokes	20.00	Horizontal	677728.55	1167178.68	0.35	-1.85
677733.40	1167171.79	a38	3 "stokes	32.00	Horizontal	677733.29	1167172.05	1.26	-3.06
677743.27	1167161.79	a39	75mm	30.00	Horizontal	677743.09	1167162.09	2.19	-3.60
677758.76	1167148.27	a40	81mm	25.00	45 degrees	677759.11	1167148.27	-4.20	0.02
677697.46	1167163.21	a41	75mm	12.00	Vertical	677697.65	1167163.38	-2.19	-2.12
677699.23	1167155.70	a42	MKII HG	0.00	Horizontal	677699.34	1167155.76	-1.37	-0.69
677700.11	1167144.91	a43	75mm	18.00	45 degrees	677700.27	1167145.07	-1.91	-1.85
677715.77	1167137.08	a44	37mm	4.00	45 degrees	677715.90	1167137.20	-1.51	-1.43
677715.85	1167112.69	a45	slap flare	4.00	Vertical	677715.88	1167112.86	-0.43	-2.03
677706.94	1167104.36	a46	105mm	10.00	Vertical	677707.08	1167104.53	-1.61	-2.03
677693.62	1167134.69	a47	81mm	34.00	Vertical	677693.73	1167134.87	-1.23	-2.18
677683.47	1167133.54	a48	rocket motor	12.00	Vertical	677683.65	1167133.64	-2.22	-1.28
677680.56	1167145.54	a49	3 "stokes	20.00	Vertical	677680.65	1167145.68	-1.10	-1.74
677674.37	1167119.69	a50	37mm	2.00	Horizontal	677674.52	1167119.84	-1.76	-1.73

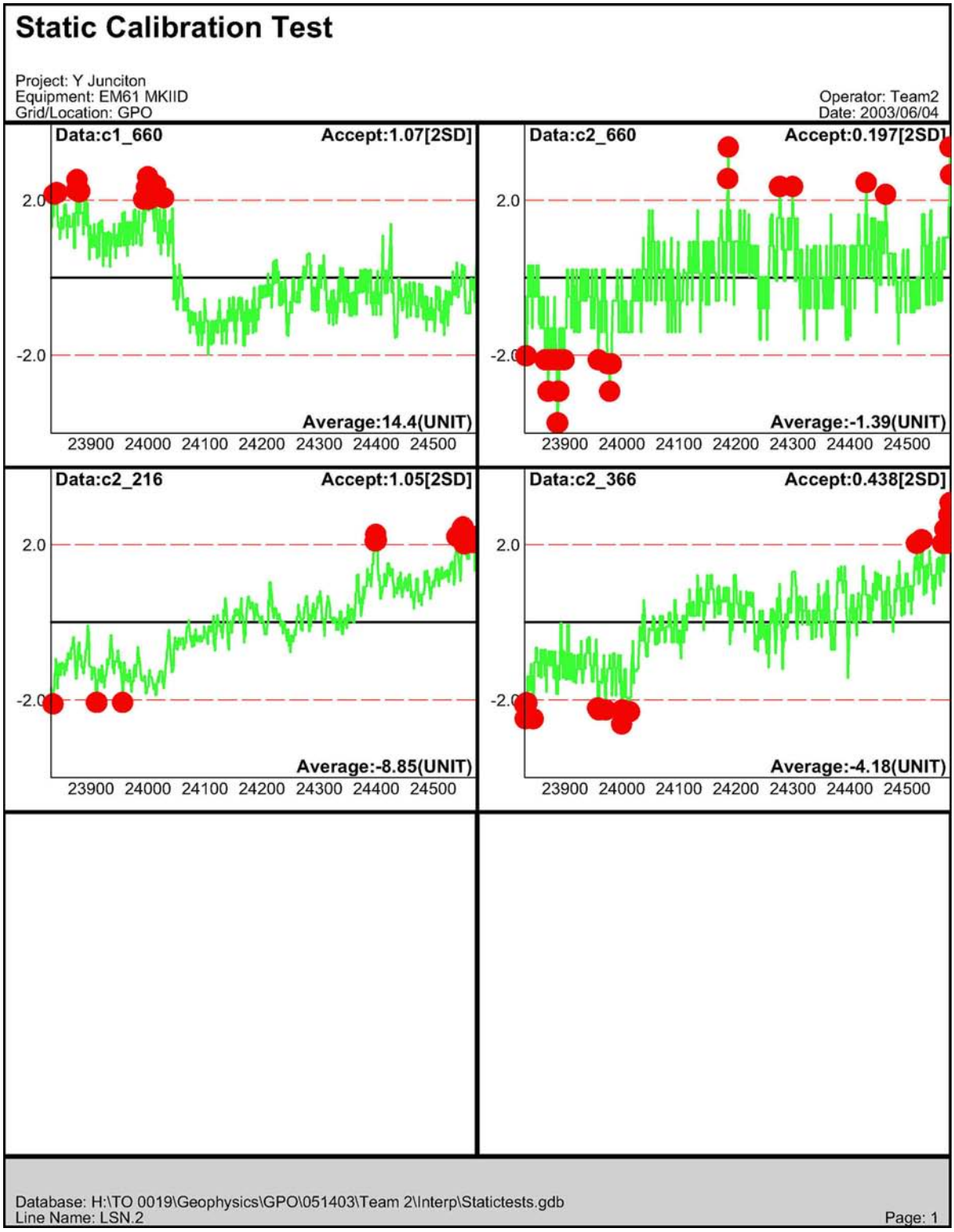
APPENDIX D

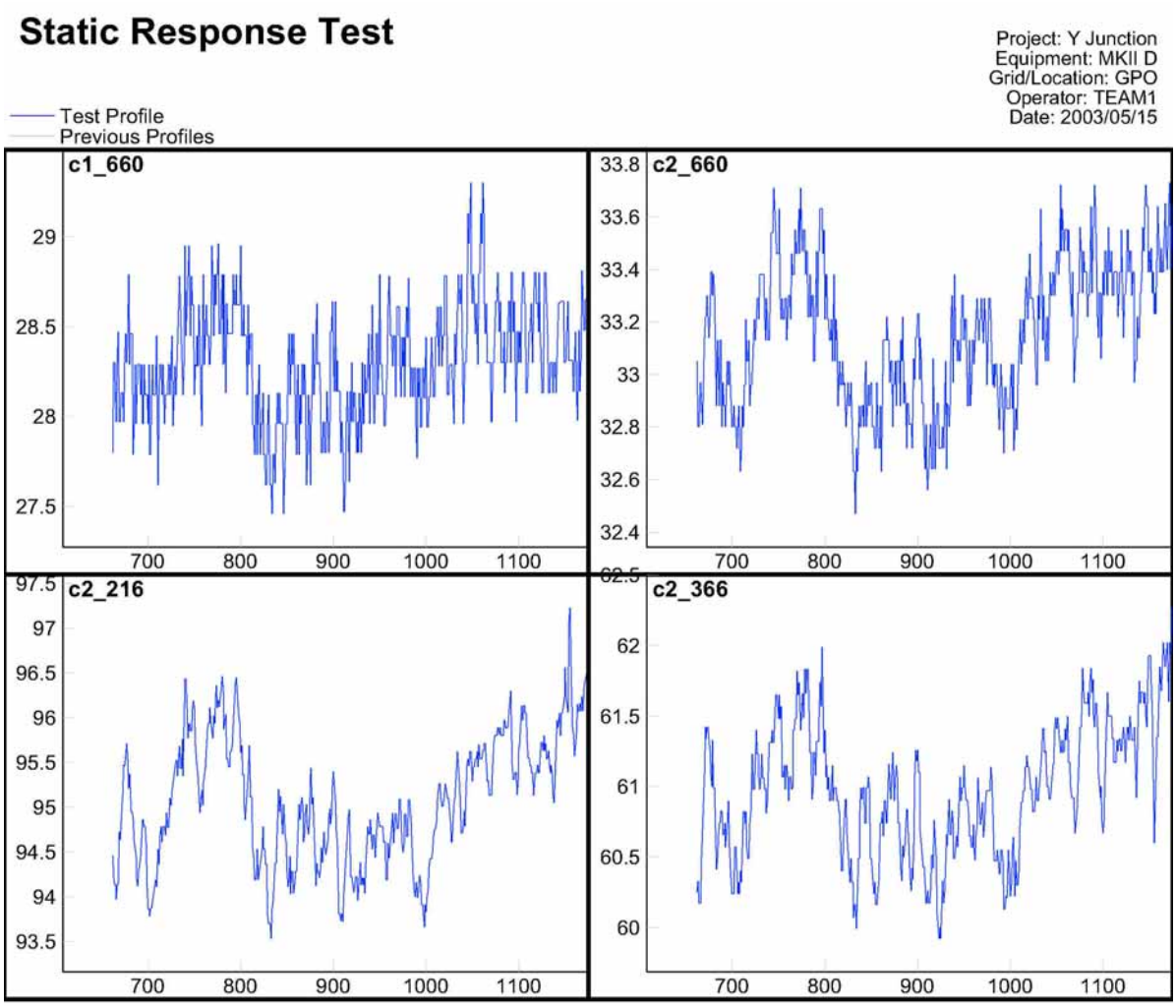
STATIC CALIBRATION AND STATIC RESPONSE TEST

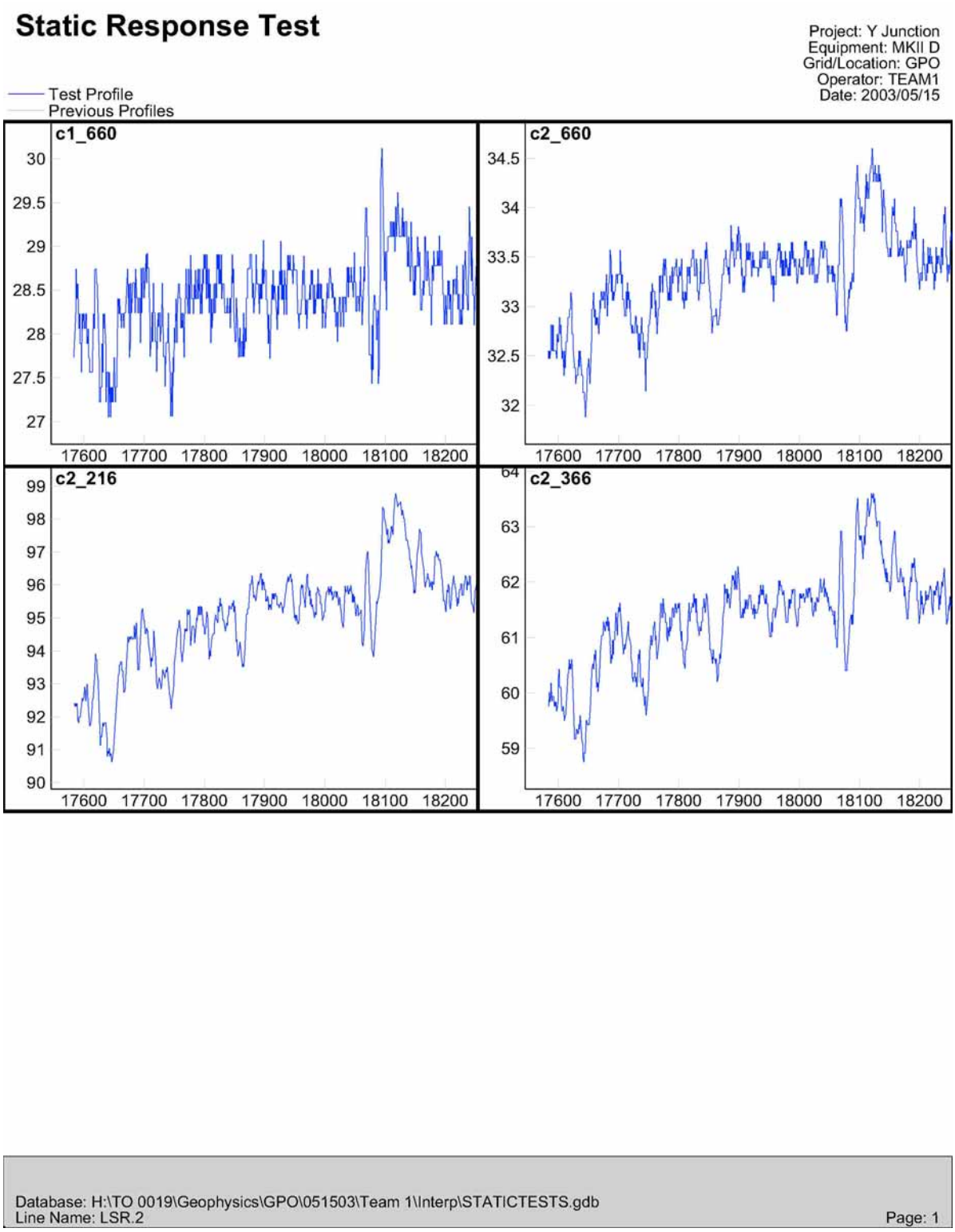

Static Calibration Test
Project: Y Junction
Equipment: MKII D
Grid/Location: GPO
Operator: TEAM1
Date: 2003/05/15
Data:c1_660
Accept:0.618[2SD]
Average:-0.618(UNIT)
Data:c2_660
Accept:0.389[2SD]
Average:0.631(UNIT)
Data:c2_216
Accept:1.22[2SD]
Average:1.36(UNIT)
Data:c2_366
Accept:0.642[2SD]
Average:0.759(UNIT)
2.0
-2.0
18400 18500 18600 18700 18800 18900
Database: H:\TO 0019\Geophysics\GPO\051503\Team 1\Interp\STATICTESTS.gdb
Line Name: LSN.2
Page: 1

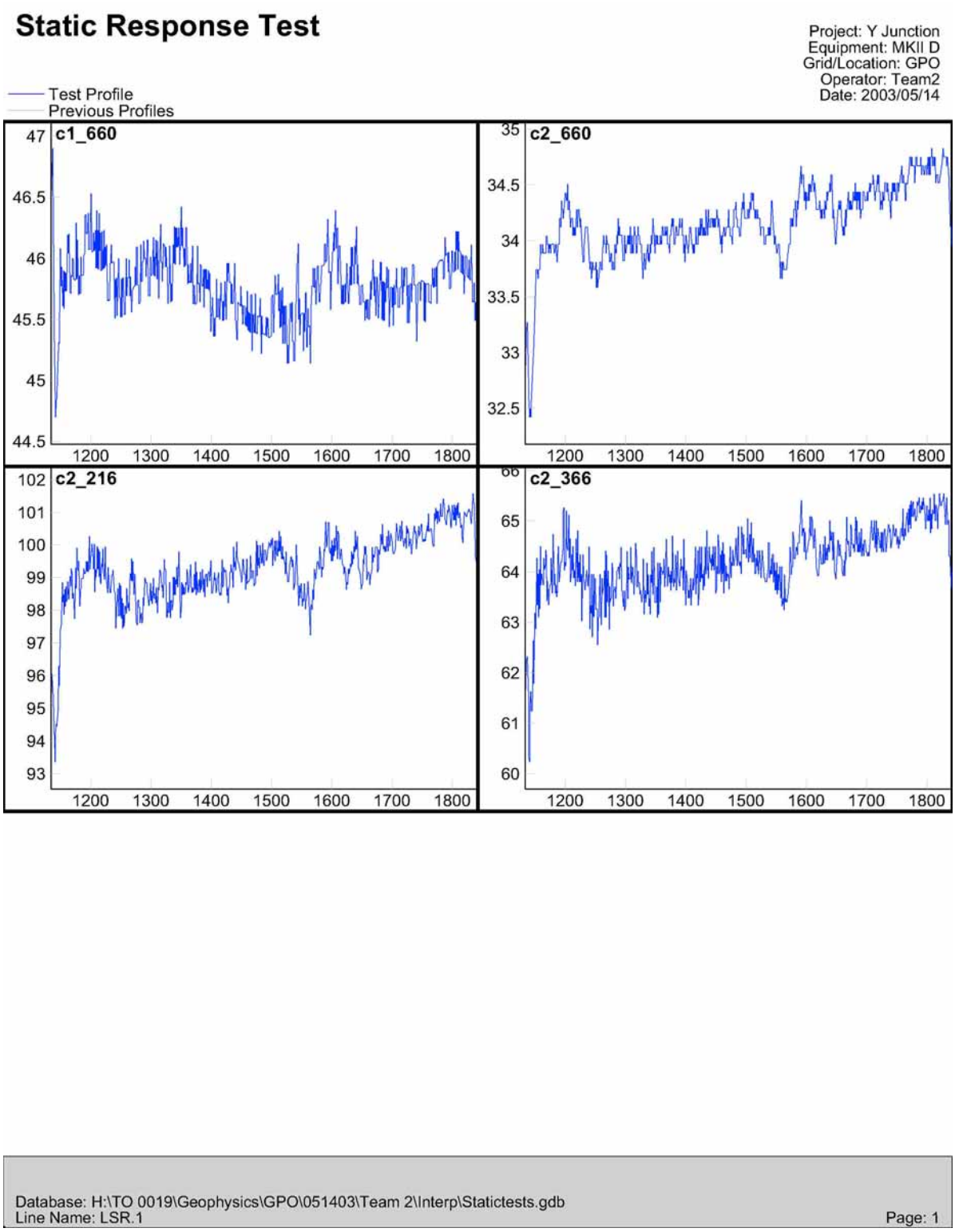

Static Calibration Test
Project: Y Junction
Equipment: MKII D
Grid/Location: GPO
Operator: TEAM1
Date: 2003/05/15
Data:c1_660
Accept:1.34[2SD]
Average:-0.151(UNIT)
Data:c2_660
Accept:0.429[2SD]
Average:0.929(UNIT)
Data:c2_216
Accept:1.83[2SD]
Average:3.23(UNIT)
Data:c2_366
Accept:1.53[2SD]
Average:1.63(UNIT)
2.0
-2.0
0
100
200
300
400
500
Database: H:\TO 0019\Geophysics\GPO\051503\Team 1\Interp\STATICTESTS.gdb
Line Name: LSN.1
Page: 1

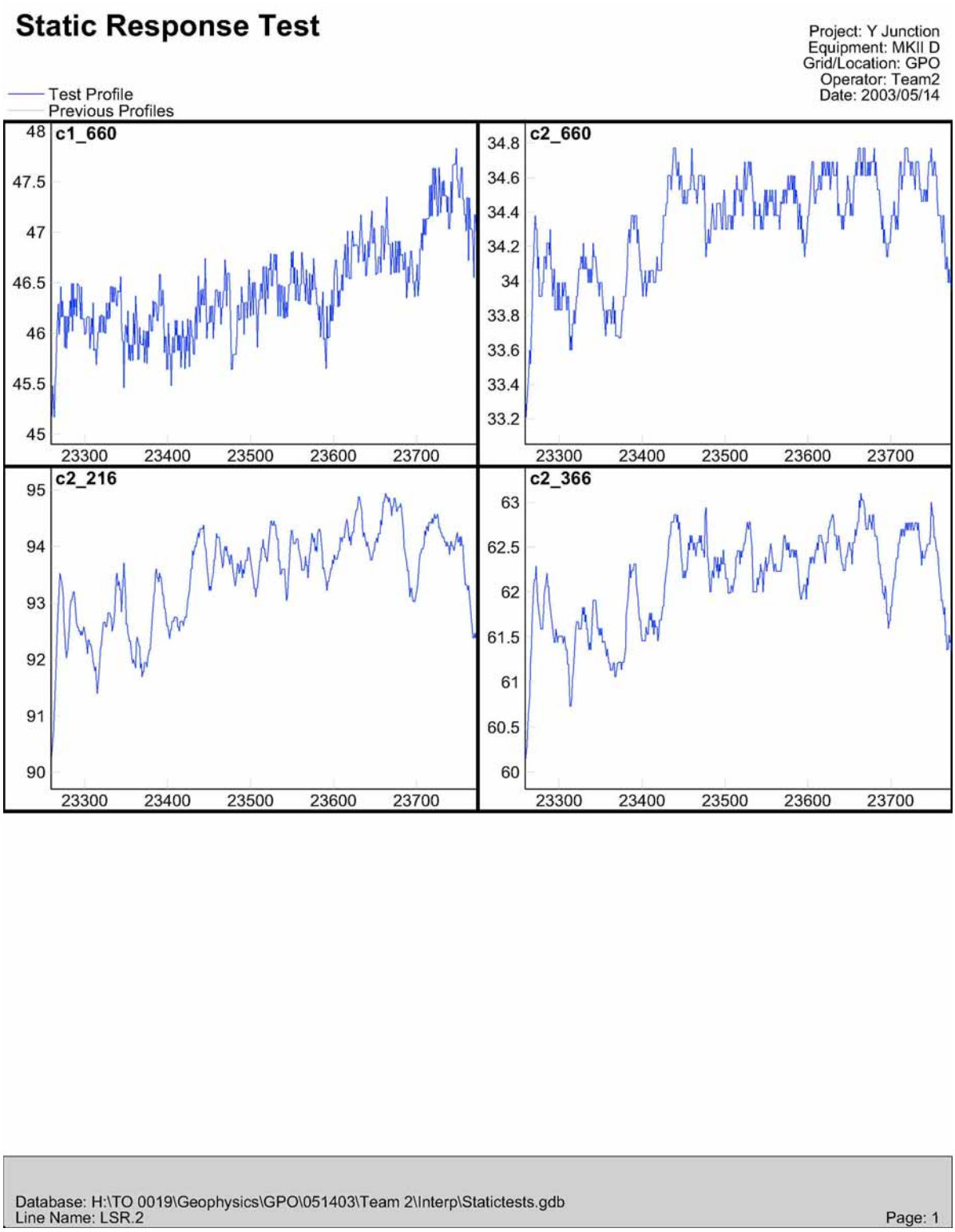

Static Calibration Test
Project: Y Junciton
Equipment: EM61 MKIID
Grid/Location: GPO
Operator: Team2
Date: 2003/05/14
Data:c1_660
Accept:1.52[2SD]
Average:17.9(UNIT)
Data:c2_660
Accept:0.579[2SD]
Average:0.543(UNIT)
Data:c2_216
Accept:1.52[2SD]
Average:1.51(UNIT)
Data:c2_366
Accept:0.961[2SD]
Average:1.52(UNIT)
2.0
-2.0
0
200
400
600
800
1000
Database: H:\TO 0019\Geophysics\GPO\051403\Team 2\Interp\Statictests.gdb
Line Name: LSN.1
Page: 1


Static Calibration Test
Project: Y Junciton
Equipment: EM61 MKIID
Grid/Location: GPO
Operator: Team2
Date: 2003/06/04
Data:c1_660
Accept:1.07[2SD]
Average:14.4(UNIT)
Data:c2_660
Accept:0.197[2SD]
Average:-1.39(UNIT)
Data:c2_216
Accept:1.05[2SD]
Average:-8.85(UNIT)
Data:c2_366
Accept:0.438[2SD]
Average:-4.18(UNIT)
2.0
-2.0
23900 24000 24100 24200 24300 24400 24500
Database: H:\TO 0019\Geophysics\GPO\051403\Team 2\Interp\Statictests.gdb
Line Name: LSN.2
Page: 1


Static Response Test
Project: Y Junction
Equipment: MKII D
Grid/Location: GPO
Operator: TEAM1
Date: 2003/05/15
Test Profile
Previous Profiles
c1_660
c2_660
c2_216
c2_366
Database: H:\TO 0019\Geophysics\GPO\051503\Team 1\Interp\STATICTESTS.gdb
Line Name: LSR.1
Page: 1

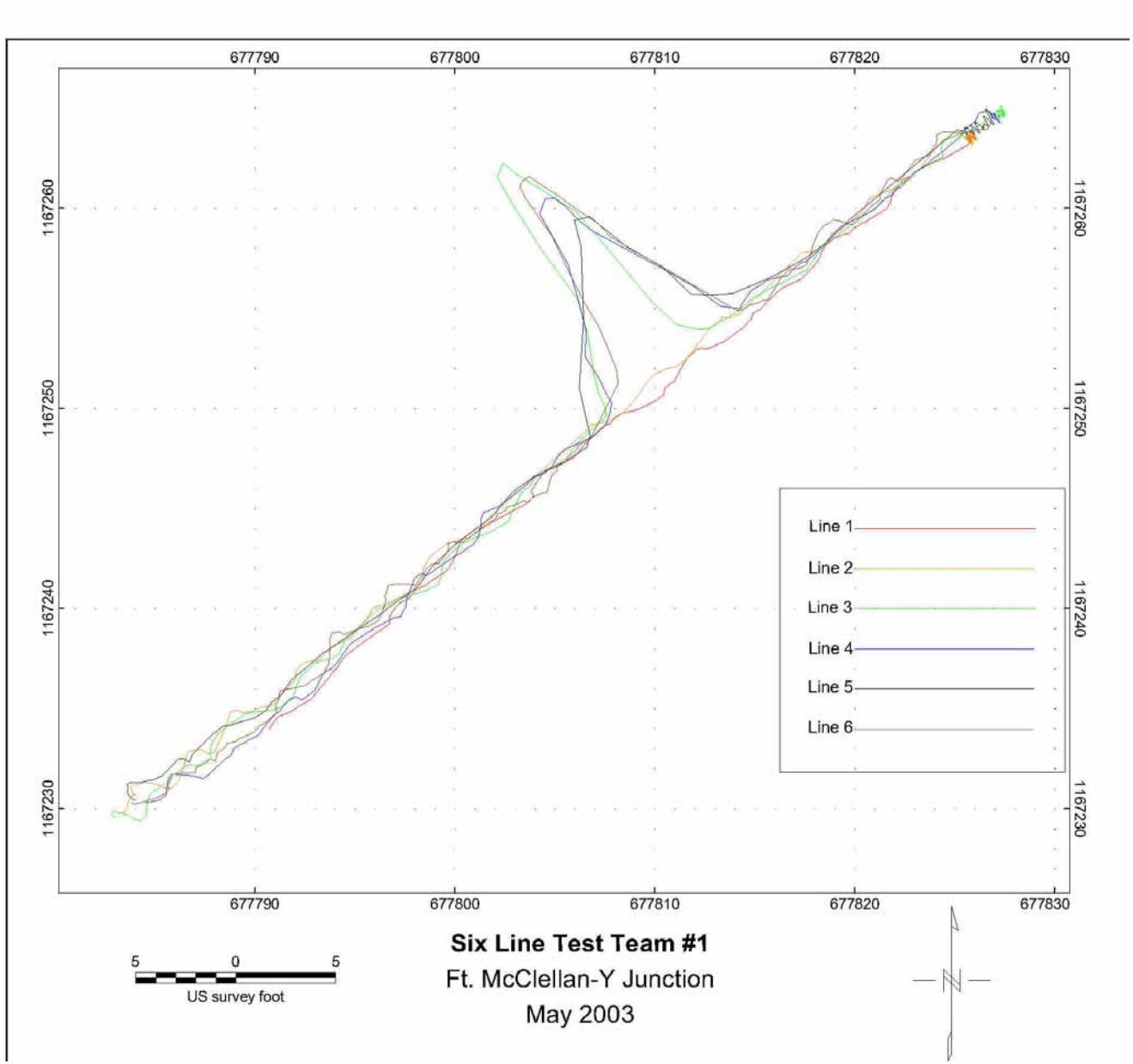

Static Response Test
Project: Y Junction
Equipment: MKII D
Grid/Location: GPO
Operator: TEAM1
Date: 2003/05/15
Test Profile
Previous Profiles
c1_660
30
29.5
29
28.5
28
27.5
27
17600 17700 17800 17900 18000 18100 18200
c2_660
34.5
34
33.5
33
32.5
32
17600 17700 17800 17900 18000 18100 18200
c2_216
99
98
97
96
95
94
93
92
91
90
17600 17700 17800 17900 18000 18100 18200
c2_366
64
63
62
61
60
59
17600 17700 17800 17900 18000 18100 18200
Database: H:\TO 0019\Geophysics\GPO\051503\Team 1\Interp\STATICTESTS.gdb
Line Name: LSR.2
Page: 1

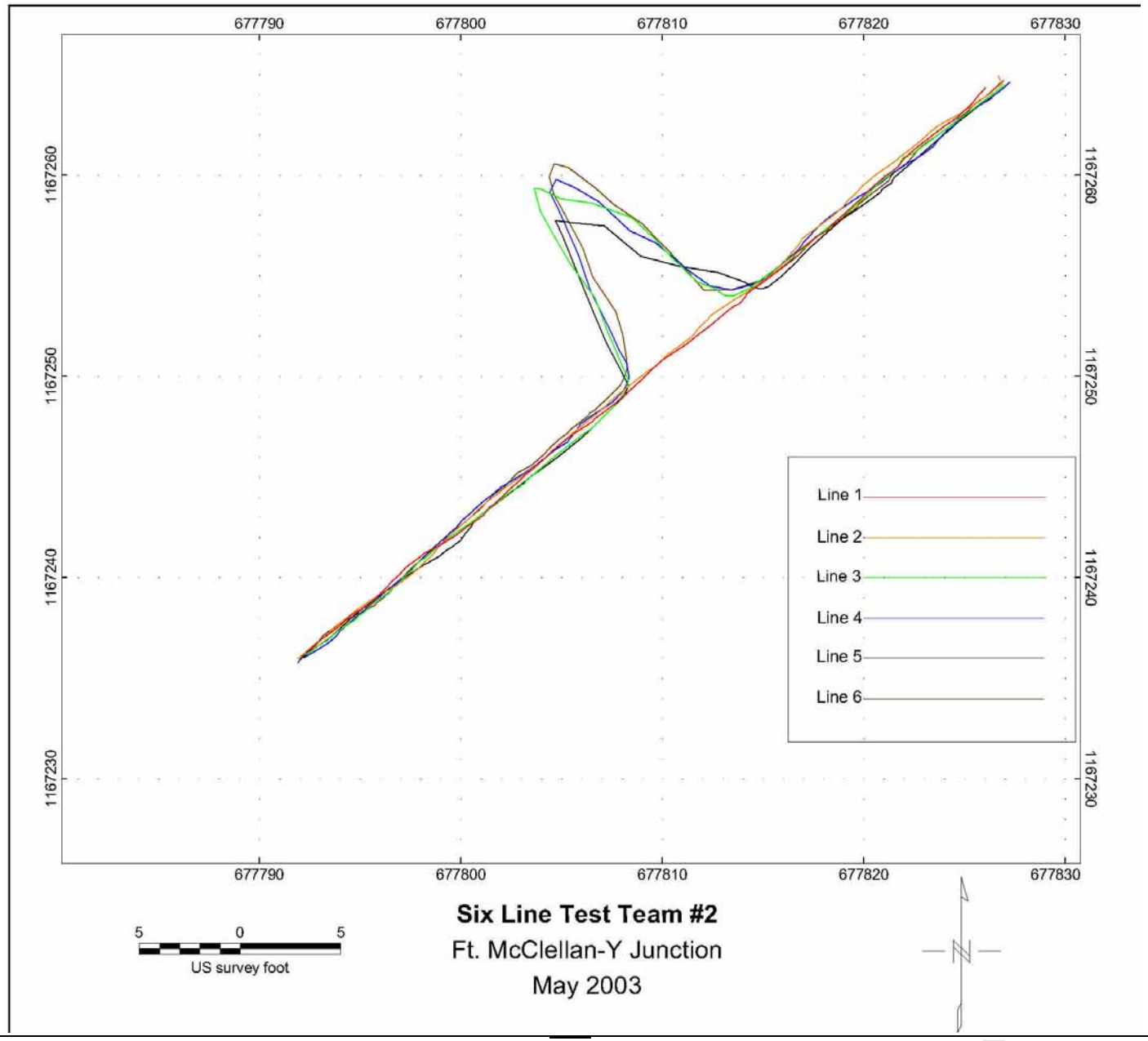

Static Response Test
Project: Y Junction
Equipment: MKII D
Grid/Location: GPO
Operator: Team2
Date: 2003/05/14
Test Profile
Previous Profiles
c1_660
c2_660
c2_216
c2_366
Database: H:\TO 0019\Geophysics\GPO\051403\Team 2\Interp\Statictests.gdb
Line Name: LSR.1
Page: 1


Static Response Test
Project: Y Junction
Equipment: MKII D
Grid/Location: GPO
Operator: Team2
Date: 2003/05/14
Test Profile
Previous Profiles
c1_660
c2_660
c2_216
c2_366
23300
23400
23500
23600
23700
Database: H:\TO 0019\Geophysics\GPO\051403\Team 2\Interp\Statictests.gdb
Line Name: LSR.2
Page: 1

APPENDIX E

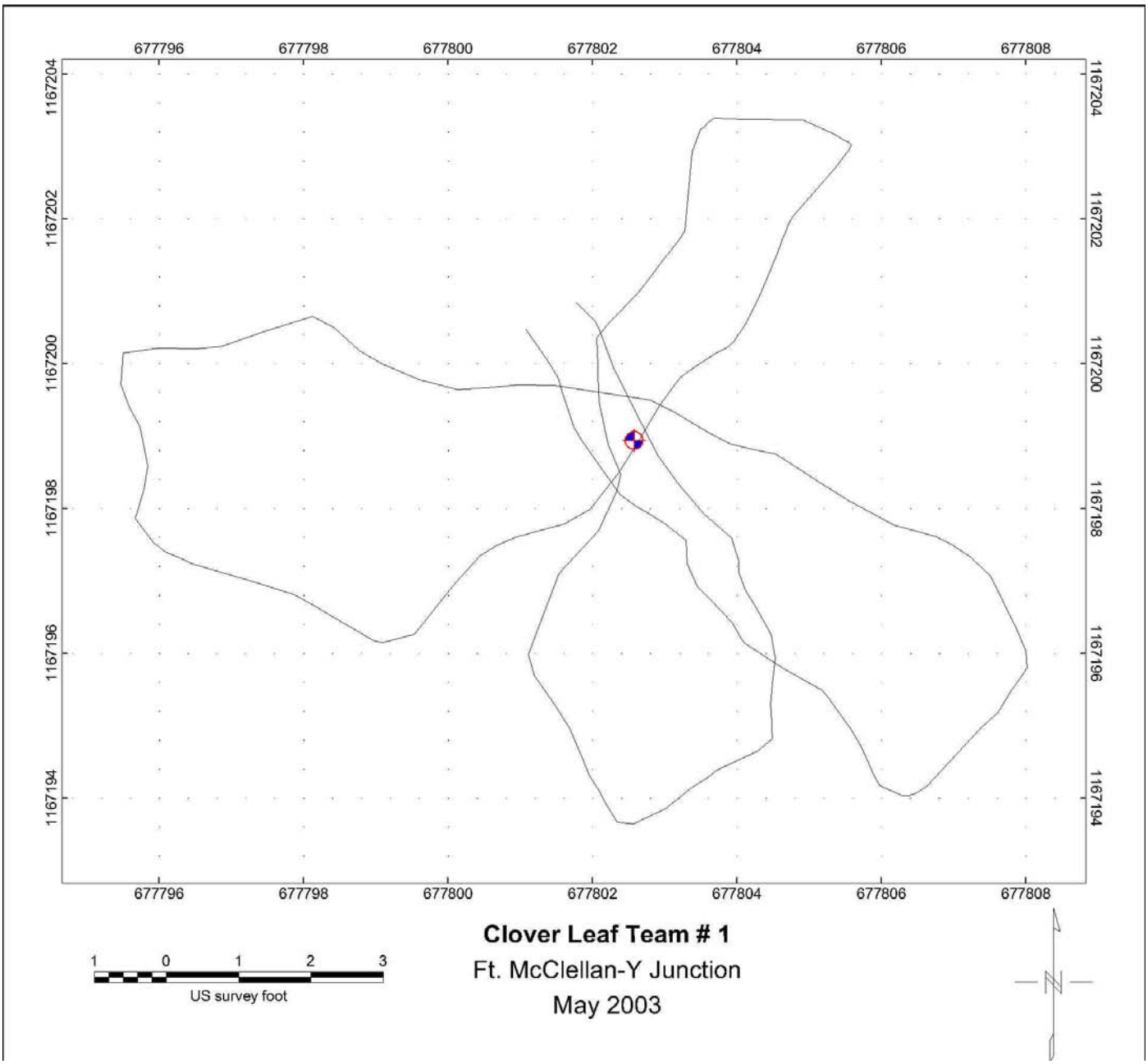
SIX LINE TEST

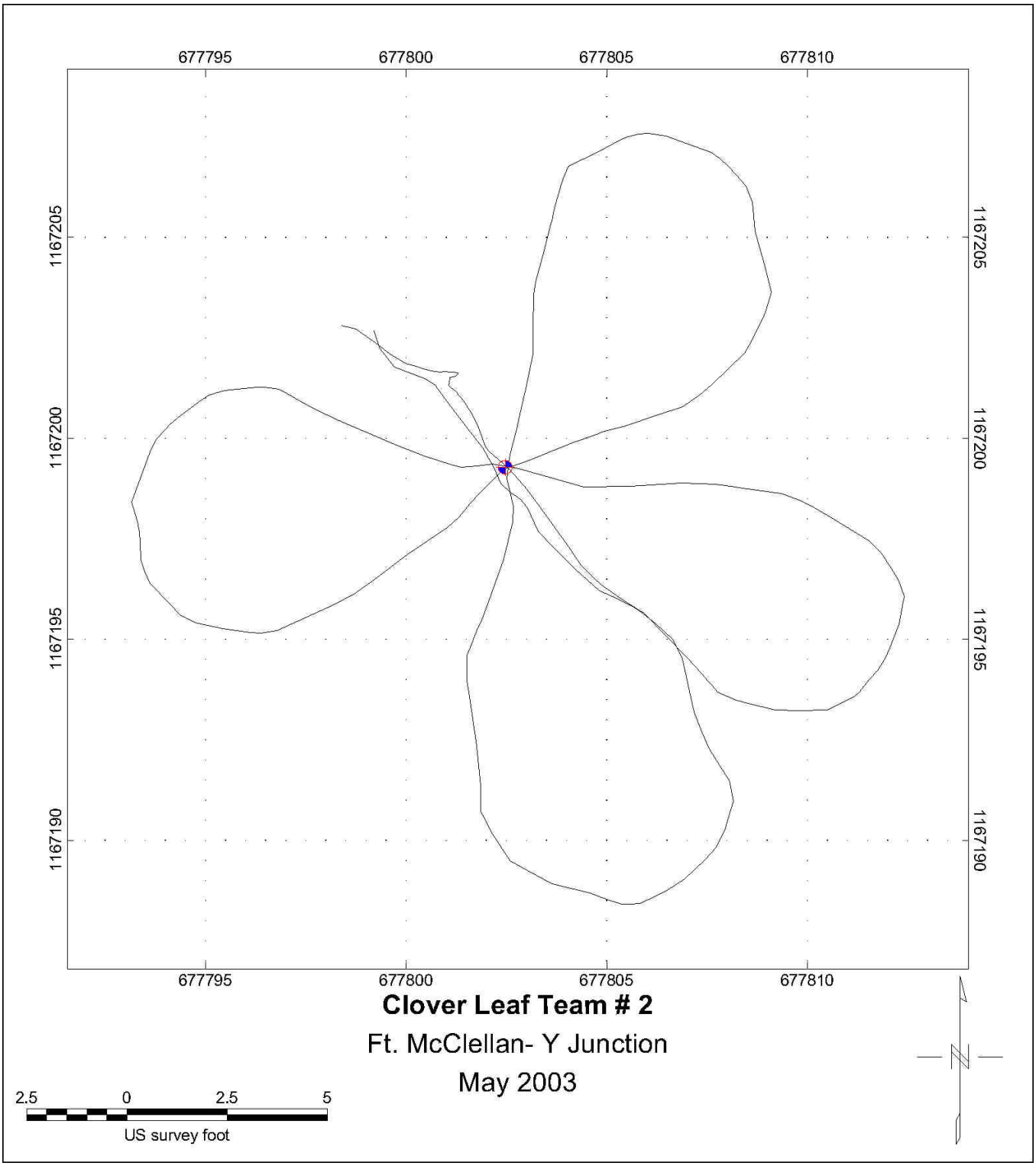

677790
677800
677810
677820
677830
1167260
1167250
1167240
1167230
Line 1
Line 2
Line 3
Line 4
Line 5
Line 6
5 0 5
US survey foot
Six Line Test Team #1
Ft. McClellan-Y Junction
May 2003


677790
677800
677810
677820
677830
1167260
1167250
1167240
1167230
Line 1
Line 2
Line 3
Line 4
Line 5
Line 6
5 0 5
US survey foot
Six Line Test Team #2
Ft. McClellan-Y Junction
May 2003

APPENDIX F

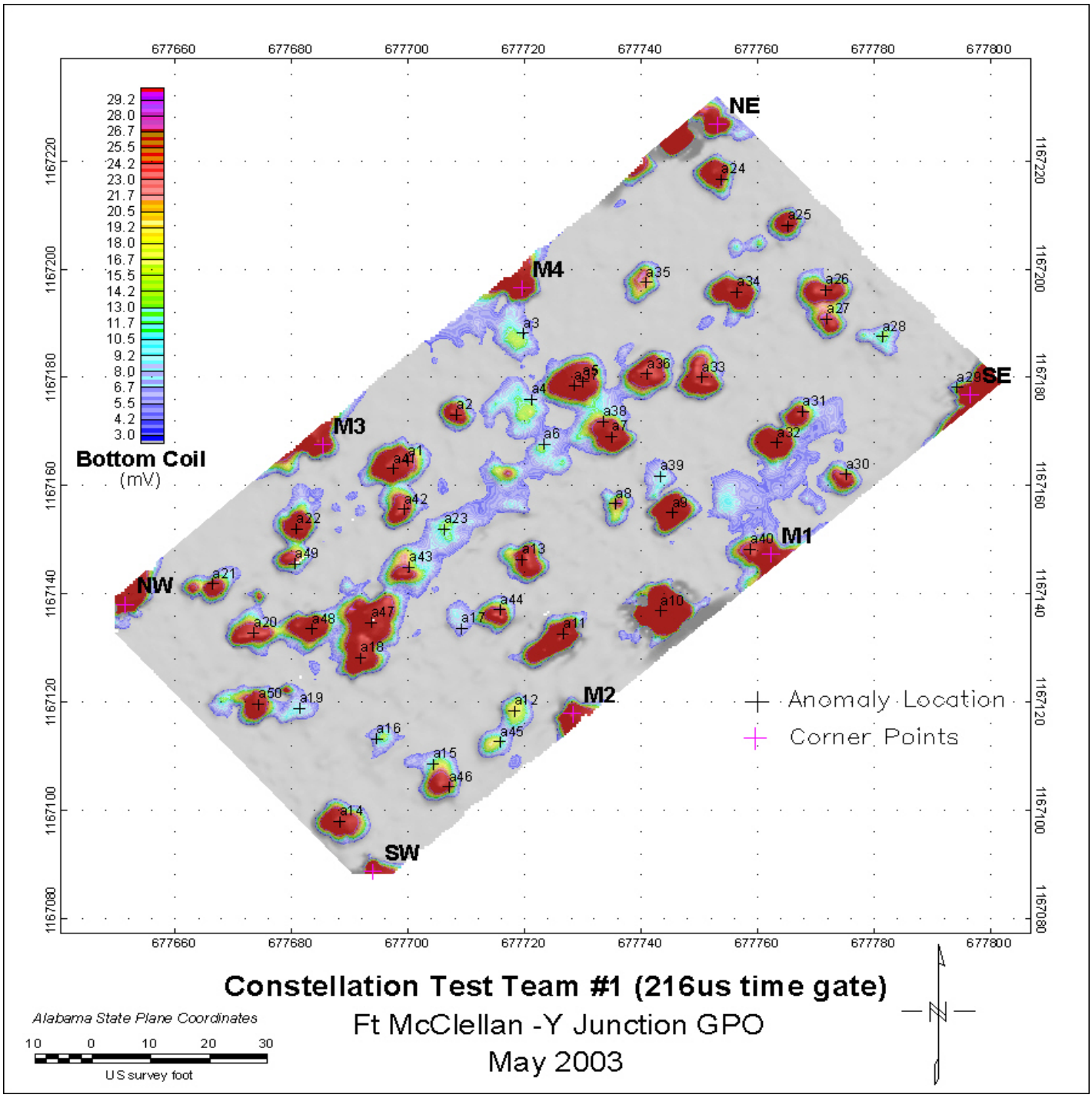
CLOVER LEAF


677796
677798
677800
677802
677804
677806
677808
1167204
1167202
1167200
1167198
1167196
1167194
1 0 1 2 3
US survey foot
Clover Leaf Team # 1
Ft. McClellan-Y Junction
May 2003


677795
677800
677805
677810
1167205
1167200
1167195
1167190
Clover Leaf Team # 2
Ft. McClellan- Y Junction
May 2003
2.5
0
2.5
5
US survey foot

APPENDIX G

CONSTELLATION TEST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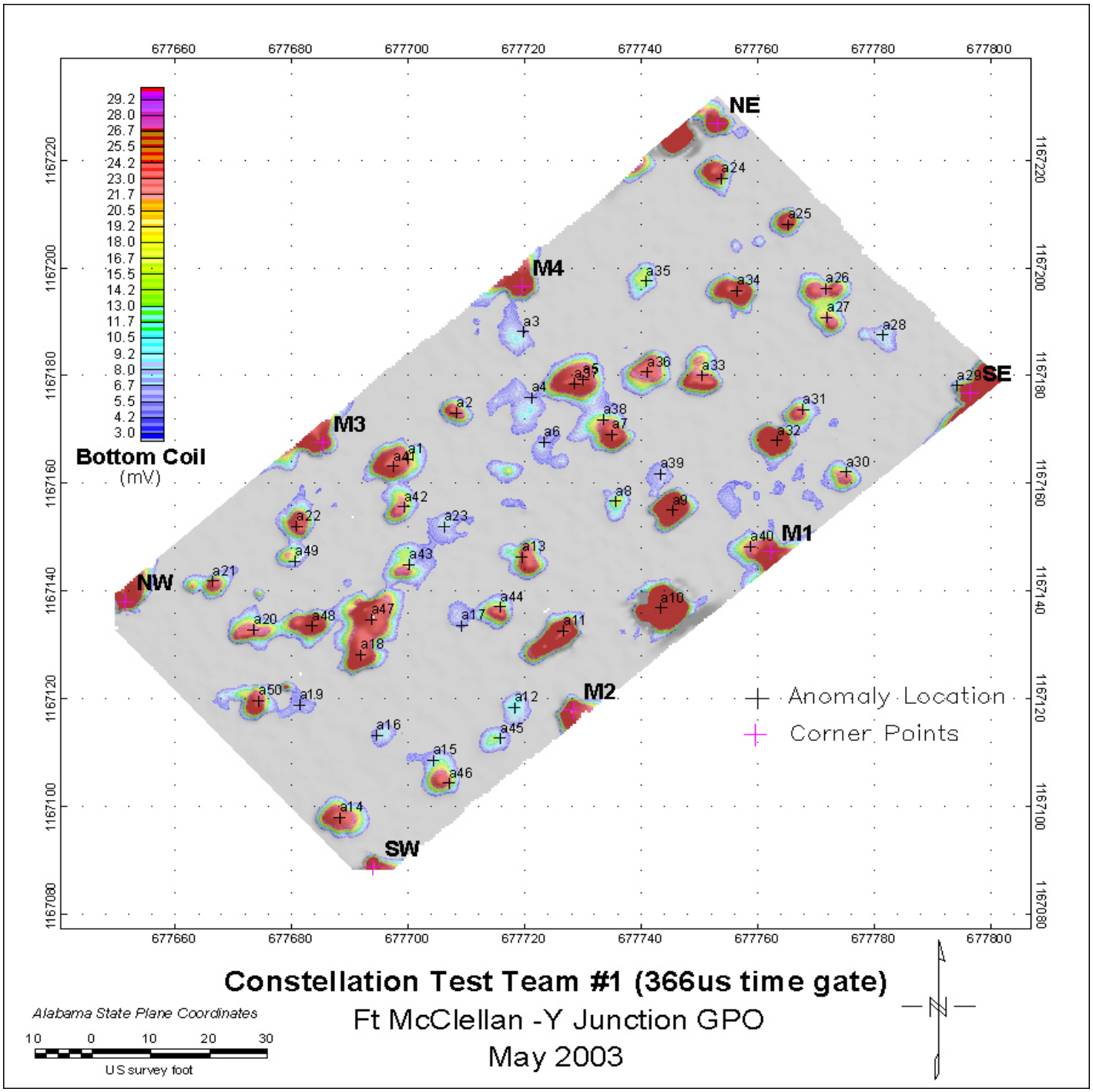
677680
677700
677720
677740
677760
677780
677800
1167220
1167200
1167180
1167160
1167140
1167120
1167100
1167080
29.2
28.0
26.7
25.5
24.2
23.0
21.7
20.5
19.2
18.0
16.7
15.5
14.2
13.0
11.7
10.5
9.2
8.0
6.7
5.5
4.2
3.0
Bottom Coil
(mV)
NE
SE
SW
NW
M1
M2
M3
M4
Anomaly Location
Corner Points
Constellation Test Team #1 (216us time gate)
Ft McClellan -Y Junction GPO
May 2003
Alabama State Plane Coordinates
10 0 10 20 30
US survey foot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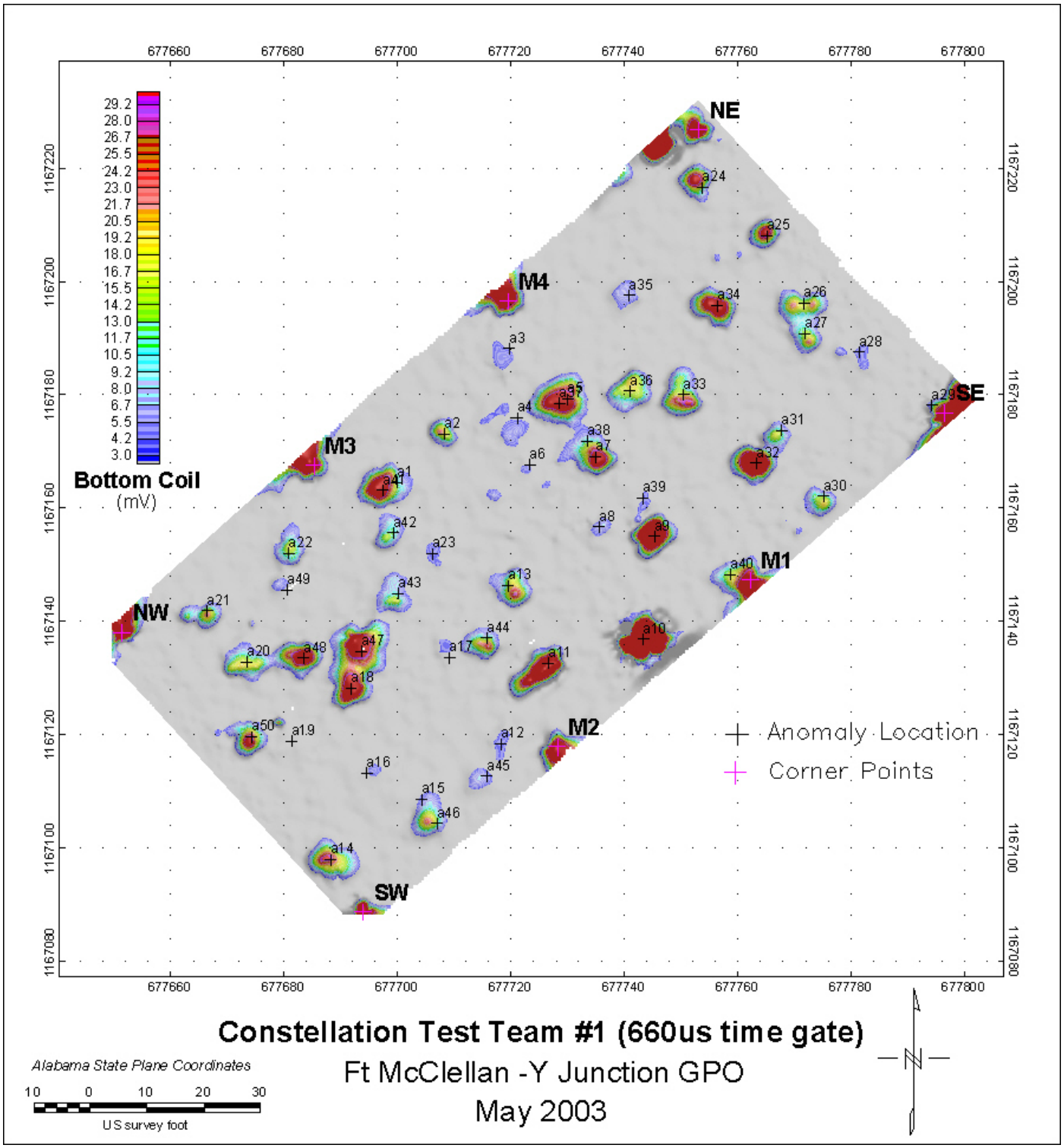
677680
677700
677720
677740
677760
677780
677800
1167220
1167200
1167180
1167160
1167140
1167120
1167100
1167080
29.2
28.0
26.7
25.5
24.2
23.0
21.7
20.5
19.2
18.0
16.7
15.5
14.2
13.0
11.7
10.5
9.2
8.0
6.7
5.5
4.2
3.0
Bottom Coil
(mV)
NE
SE
SW
NW
M1
M2
M3
M4
Anomaly Location
Corner Points
Constellation Test Team #1 (366us time gate)
Ft McClellan -Y Junction GPO
May 2003
Alabama State Plane Coordinates
10 0 10 20 30
US survey foot
N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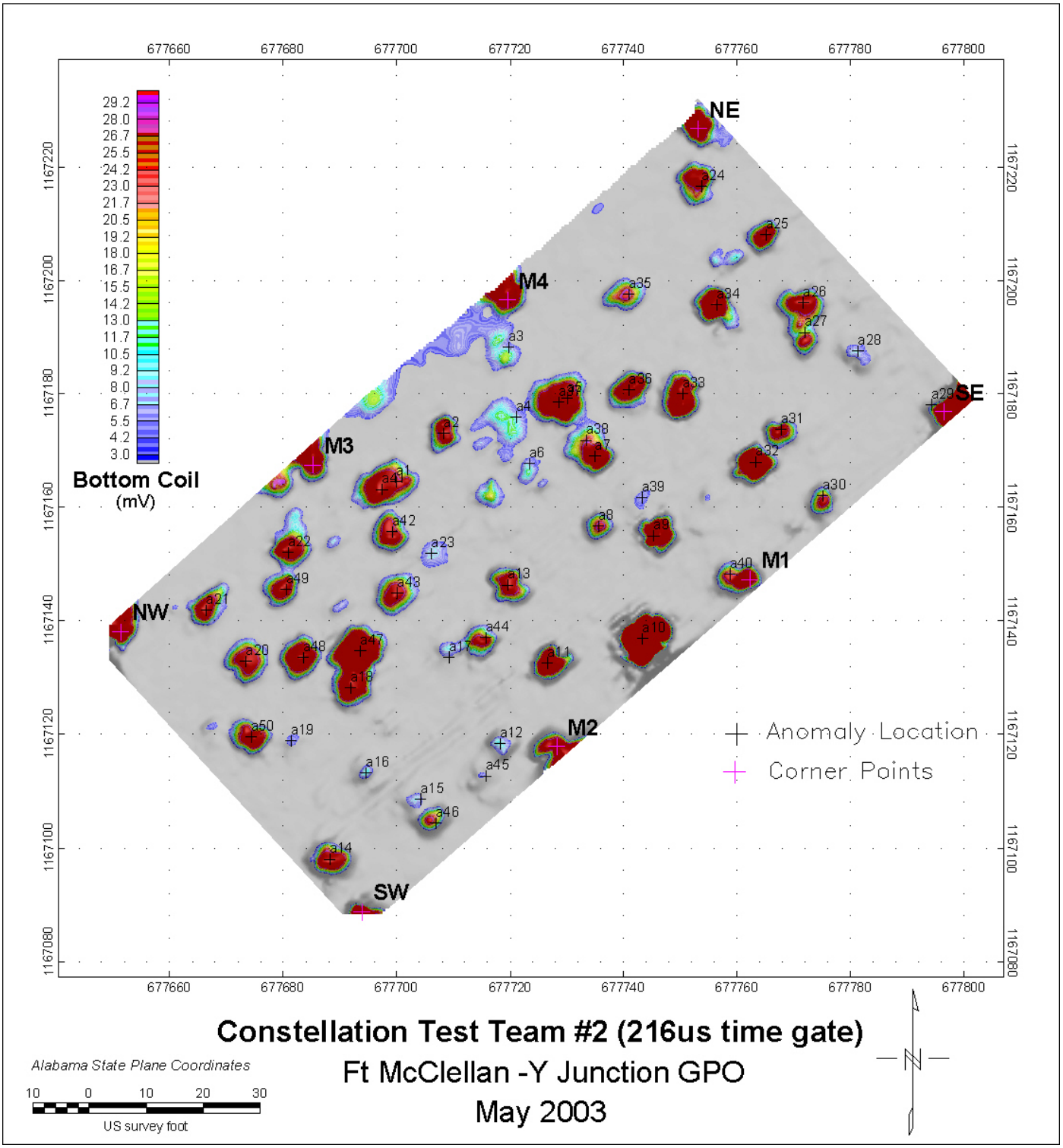
677680
677700
677720
677740
677760
677780
677800
1167220
1167200
1167180
1167160
1167140
1167120
1167100
1167080
29.2
28.0
26.7
25.5
24.2
23.0
21.7
20.5
19.2
18.0
16.7
15.5
14.2
13.0
11.7
10.5
9.2
8.0
6.7
5.5
4.2
3.0
Bottom Coil
(mV)
NE
SE
SW
NW
M1
M2
M3
M4
Anomaly Location
Corner Points
Constellation Test Team #1 (660us time gate)
Ft McClellan -Y Junction GPO
May 2003
Alabama State Plane Coordinates
10 0 10 20 30
US survey foot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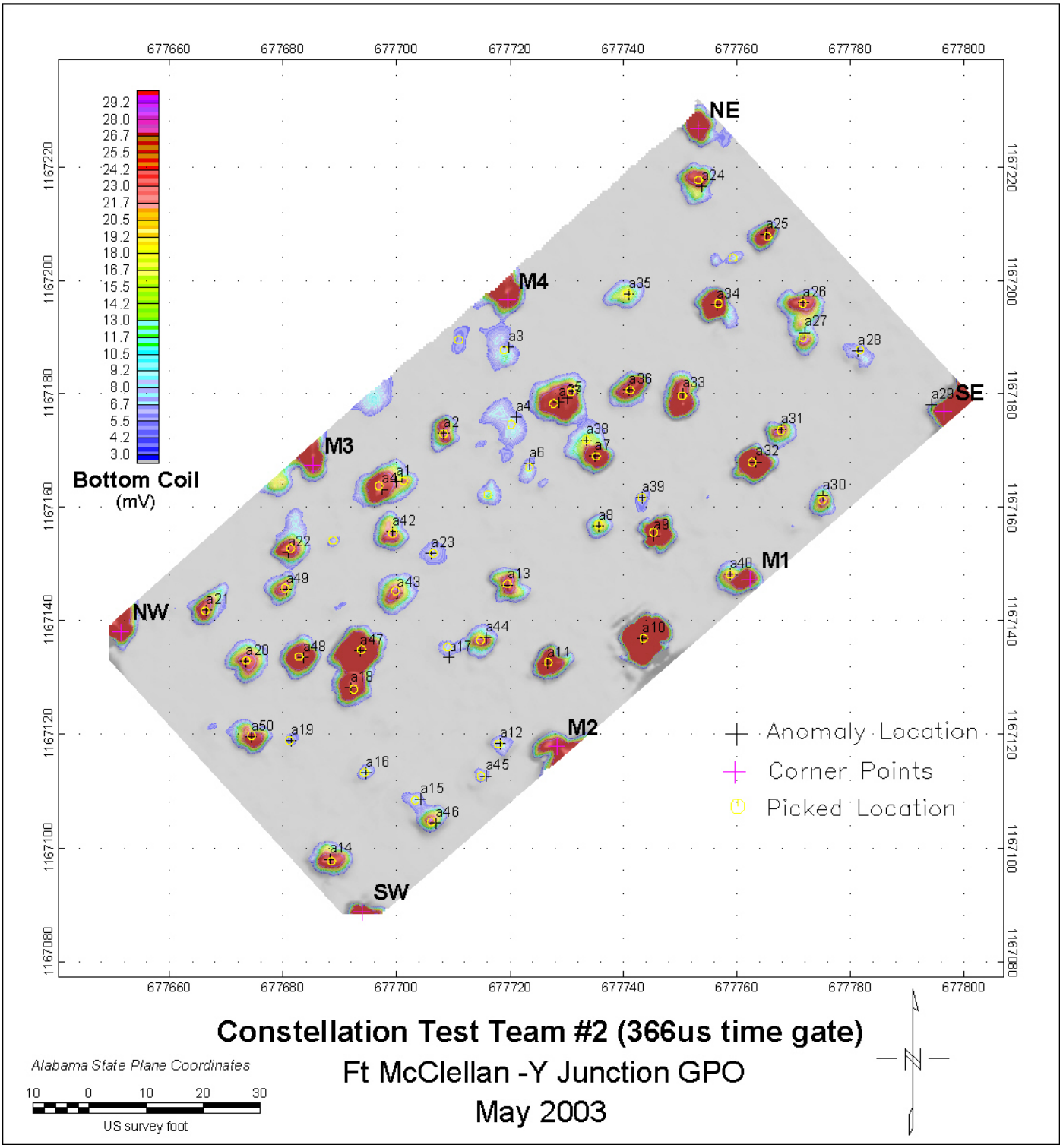
677680
677700
677720
677740
677760
677780
677800
1167220
1167200
1167180
1167160
1167140
1167120
1167100
1167080
29.2
28.0
26.7
25.5
24.2
23.0
21.7
20.5
19.2
18.0
16.7
15.5
14.2
13.0
11.7
10.5
9.2
8.0
6.7
5.5
4.2
3.0
Bottom Coil
(mV)
NE
SE
SW
NW
M1
M2
M3
M4
Anomaly Location
Corner Points
Constellation Test Team #2 (216us time gate)
Ft McClellan -Y Junction GPO
May 2003
Alabama State Plane Coordinates
10 0 10 20 30
US survey foot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677700
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677780
677800
1167220
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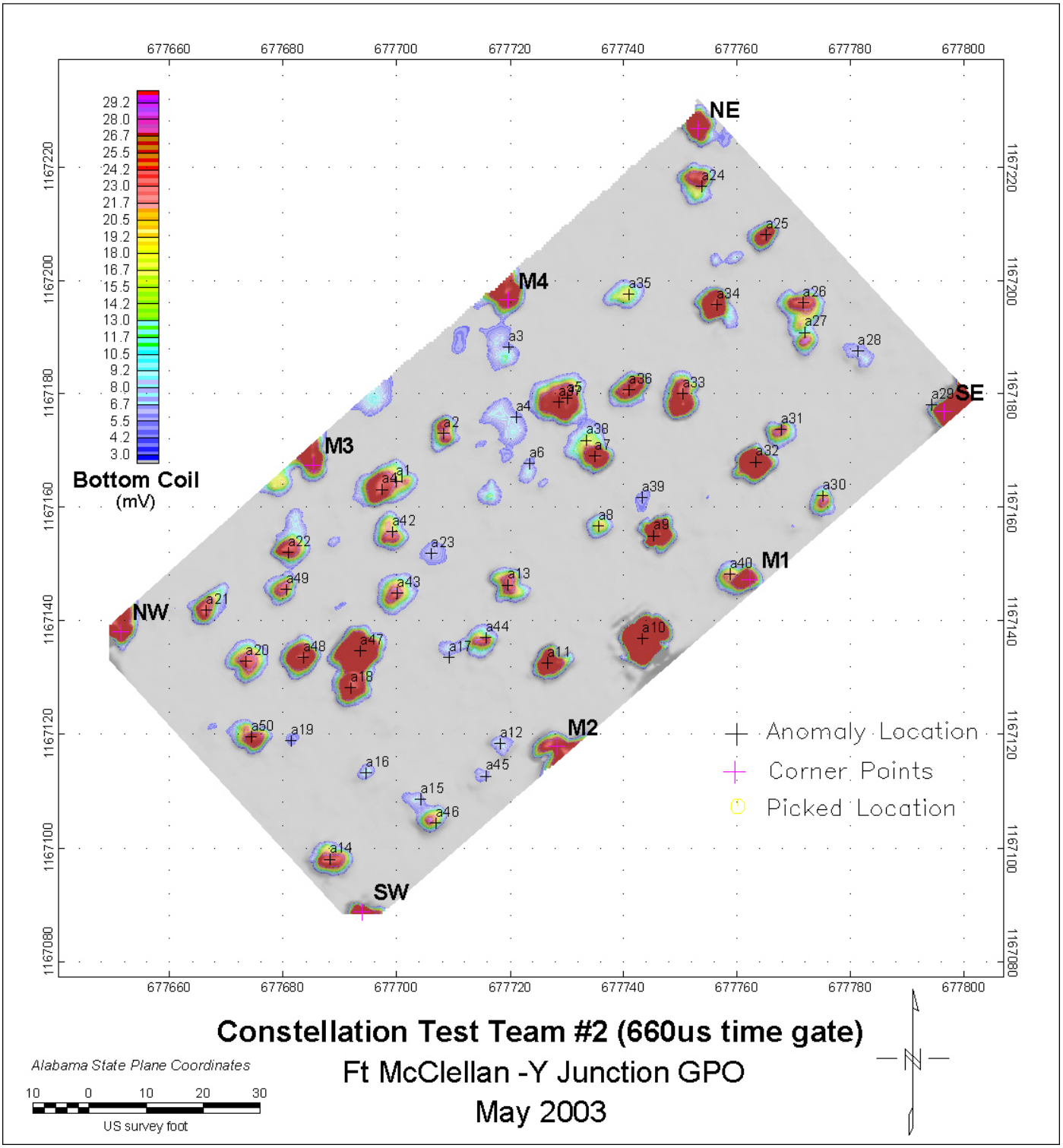
1167160
1167140
1167120
1167100
1167080
29.2
28.0
26.7
25.5
24.2
23.0
21.7
20.5
19.2
18.0
16.7
15.5
14.2
13.0
11.7
10.5
9.2
8.0
6.7
5.5
4.2
3.0
Bottom Coil
(mV)
NE
SE
SW
NW
M1
M2
M3
M4
Anomaly Location
Corner Points
Picked Location
Constellation Test Team #2 (366us time gate)
Ft McClellan -Y Junction GPO
May 2003
Alabama State Plane Coordinates
10 0 10 20 30
US survey foot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677680
677700
677720
677740
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677780
677800
1167220
1167200
1167180
1167160
1167140
1167120
1167100
1167080
29.2
28.0
26.7
25.5
24.2
23.0
21.7
20.5
19.2
18.0
16.7
15.5
14.2
13.0
11.7
10.5
9.2
8.0
6.7
5.5
4.2
3.0
Bottom Coil
(mV)
NE
SE
SW
NW
M1
M2
M3
M4
Anomaly Location
Corner Points
Picked Location
Constellation Test Team #2 (660us time gate)
Ft McClellan -Y Junction GPO
May 2003
Alabama State Plane Coordinates
10 0 10 20 30
US survey foot