APPENDIX A

Draft

Geophysical Survey Report
Fill Area Northwest of Reilly Airfield
Parcel 229(7)
Fort McClellan, Calhoun County, Alabama

August 2001

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The findings of the report are limited to those specifically expressed in the report and no other representations or warranties are given by IT and no additional conclusions should be reached or representations relied on other than those expressly stated in the report and as limited by IT Terms and Conditions.

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List of Acronyms

EBS	Environmental Baseline Study
EM	electromagnetic induction
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
FTMC	Fort McClellan
G-856AX	Geometrics, Inc. G-856AX magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
GPS	global positioning system
IT	IT Corporation
mS/m	milliSiemens per meter
mV	milliVolts
NAD	North American Datum
NOAA	National Oceanographic and Atmospheric Administration
N-S	north to south
NWR	Fill Area Northwest of Reilly Field
nT	nanoTeslas
ppt	parts per thousand
RTK	real-time kinematic
SSFSP	Site-Specific Field Sampling Plan
TERC	Total Environmental Restoration Contract
USACE	U.S. Army Corps of Engineers

A.1.0 Introduction

IT Corporation (IT) conducted a surface geophysical survey at the Fill Area Northwest of Reilly Airfield (NWR) [Parcel 229(7)], at Fort McClellan (FTMC) in Calhoun County, Alabama, December 9 through 15, 1998, April 28, 1999, and May 10, 1999. The survey was conducted for the U.S. Army Corps of Engineers (USACE)-Mobile District, under Total Environmental Restoration Contract (TERC) No. DACA21-96-D-0018, Delivery Order CK005. The geophysical survey objectives were to determine the boundaries of the fill area and to stake proposed sampling locations in accordance with the Site-Specific Sampling and Analysis Plan (SSFSP). The total area surveyed was approximately 409,700 square feet (9.4 acres). The Vicinity Map (Figure A229-1) shows the approximate location of the NWR survey area.

To accomplish the objectives of the investigation, magnetic and frequency-domain electromagnetic induction (EM) methods were used to conduct the survey. All geophysical data were processed and color-enhanced to aid in interpreting subtle anomalies. Following geophysics fieldwork, a survey-grade global positioning system (GPS) and a total station laser theodolite system were used to document the location of the NWR site.

The NWR survey area has varying topography. As shown on the geophysical interpretation map (Figure A229-2), the southern portion of the survey area, south of the asphalt road, consists of a flat grass and dirt covered field. The central portion of the survey area has a gently rolling topography and is primarily covered with trees and dense brush. In addition, linear surface mounds were also observed within the central portion of the site that may be indicative of landfill trench activities. The northeastern portion of the survey area is located in a low-lying, swampy area. There is also a steep slope trending west to east across the site, located between 250N and 420N and a steep ravine occurs along the eastern boundary of the site.

Field procedures used during the investigation are described in Chapter A.2.0. The data processing methods used during the investigation are presented in Chapter A.3.0. Data interpretation and the criteria used to interpret geophysical anomalies are presented in Chapter A.4.0. Conclusions and recommendations derived from the geophysical surveys are presented in Chapter A.5.0. A description of the equipment and a theoretical discussion of the geophysical methods are presented in the Attachment.

A.2.0 Field Procedures

This chapter describes the field procedures and instruments used to conduct the investigation, including survey control, data acquisition, and field verification of geophysical anomalies.

A.2.1 Survey Control

The geophysical survey area to be investigated was identified in the site specific work plan based on historical site information compiled by IT and the Environmental Baseline Study (EBS), (Environmental Science and Engineering, Inc., 1998). The geophysics crew established a base grid on 100-foot centers throughout the site. Where encountered, thick brush and vegetation were cleared to provide reasonable access to the survey lines. Using the base grid as a reference, the crew marked control points on 20-foot centers with surveyor's paint to provide the spatial control required of the investigation. Due to the uncertainty of true field positions inherent when establishing a survey area using 300-foot fiberglass tapes in the presence of wind and surface obstructions (e.g., trees, brush, and varying topography), the lateral precision for the survey areas and anomalies is estimated to be within +/- 5 feet which is within a reasonable tolerance for this type of investigation. Following geophysics field work, GPS and laser theodolite surveying was conducted at the site referencing the U.S. State Plane Coordinate System (Alabama East Zone, North American Datum [NAD] 1983). The GPS survey was performed in the real-time kinematic (RTK) mode, which provided nominal subcentimeter resolution in XY coordinates for the site. A nominal resolution of 0.1 foot was achieved when using the total station theodolite system.

A detailed site map was hand-drawn in the field. The map included any surface cultural features within the survey area, or near the perimeter, that could potentially affect the geophysical data (e.g., mounds and depressions, metal signs, and metal debris). The map also shows reference features, such as roads, asphalt patches and survey monuments that could later aid in reconstructing the site boundaries. All pertinent reference information documented on the hand-drawn site map was placed on the site interpretation map (Figure A229-2). Also included on the site map are civil survey coordinates to help relocate the survey area.

A.2.2 Geophysical Survey

Field Instruments. The magnetic instruments used during the investigation consisted of a Geometrics Inc. G-858G magnetic gradiometer (G-858G) for collecting survey data and a

Geometrics G-856AX magnetometer (G-856AX) used as a magnetic base station. Time-domain EM induction equipment consisted of a Geonics EM61 High-Resolution Metal Detector (EM61) coupled to an Omnidata DL720 digital data logger. Frequency-domain EM induction equipment consisted of a Geonics EM31 Terrain Conductivity Meter (EM31) coupled to an Omnidata DL720 digital data logger. Where required, a Metrotech 9860-BRL EM utility locator was used to verify that linear anomalies seen in the EM31/EM61 data were caused by subsurface pipelines or utilities. A Trimble 4000SSI Total Station GPS and a Sokkia SET5F Total Station instrument were used to conduct the civil survey work.

All geophysical data were collected using the following IT standard operating procedures:

- ITGP-001 Surface Magnetic Surveys
- ITGP-002 Surface Frequency-Domain Electromagnetic Surveys
- ITGP-004 Surface Time-Domain Electromagnetic Surveys
- ITGP-005 Global Positioning System Surveys
- ITGP-011 Total Station Land Surveying
- ITGP-012 Geophysical Data Management.

Field Instrument Base Station. A field instrument base station was established at the NWR site to provide quality control for the geophysical survey data collected. The base station location was chosen to be free of surface and subsurface cultural features that could affect the geophysical data. Standard field procedures were to occupy the base station and collect readings with the survey instruments (magnetic, EM61, and EM31) before and after each data collection session. These base station data were then reviewed to assess instrument operation. Opening and closing base station file names and average data values were recorded on base station summary forms.

A.2.2.1 Magnetic Survey

Magnetic Base Station. A magnetic base station was established at Fort McClellan to record the background fluctuation (diurnal drift) of the Earth's magnetic field. The magnetic base station was located in a field of small pine trees on the south side of Sixth Avenue (near Parcel 151), a location which was determined to be free of surface and subsurface cultural interference (e.g., fences, utilities, and surface/buried metal objects) that could affect the data. A G-856AX base station magnetometer was time-synchronized with the G-858G survey instrument and programmed to record the Earth's background magnetic field at 10-second intervals during the magnetic survey. Instrument problems were later identified that precluded its use in "drift

correcting" the G-858G survey data. National Oceanographic and Atmospheric Administration (NOAA) regional magnetic field data for the time period of the magnetic survey were later reviewed, and it was determined that the survey was conducted during a time of quiescence in the Earth's magnetic field. The variation of the regional geomagnetic field during data collection was less than 50 nanoTeslas (nT), which is considered negligible for obscuring anomalies caused by landfill trenches.

G-858G Data Collection. Magnetic field measurements were made with the two sensors of the G-858G spaced 2.5 feet (0.76 meters) apart; the lower sensor was 2.0 feet above the ground surface and the upper sensor was 4.5 feet above the ground surface. At the start and end of each data collection session, approximately 60 readings were recorded with the G-858G at the field instrument base station to verify that the instrument was operating properly, and to provide a quantitative record of instrument variation, or drift, during the survey period. A review of these base station files indicated the instrument was operating properly and instrument drift was within acceptable limits. Magnetic survey data were collected at 0.5-second intervals (approximately 2.0- to 2.5-foot intervals) along north to south (N-S) oriented survey lines spaced 20 feet apart, for a total of approximately 21,100 linear feet of survey coverage.

The magnetic data were stored in the internal memory of the G-858G along with corresponding line and station numbers and the time of acquisition. Magnetic survey data were screened in the field to assess data quality prior to completing the investigation. All magnetic survey and base station data were downloaded to a personal computer, backed up on IOMEGA® compatible zip disks, and are retained in project files.

A.2.2.2 Time-Domain EM Survey

EM61 Data Collection. The EM61 survey was conducted over a small area along the northern boundary of the site to delineate one perimeter anomaly seen in the magnetic and EM31 data. Prior to conducting the EM61 survey, the instrument was calibrated to read zero at the field instrument base station. The EM61 was operated in the wheel mode with manual triggering, and measurements were collected of the potential difference in the top and bottom coils. At the start and end of each data collection session approximately 20 readings were recorded at the field instrument base to verify that the instrument was operating properly and to provide a quantitative record of instrument variation during the survey period. A review of these base station files indicated the instrument was operating properly and instrument drift was within acceptable

limits. Survey data were collected at 2.5-foot intervals along N-S oriented survey lines spaced 20 feet apart, for a total of approximately 1,100 linear feet of survey coverage.

The EM61 data were stored in the digital data logger along with corresponding line and station numbers. EM61 line profiles were reviewed in the field using the DAT61® program to verify data quality prior to completing the survey. All EM61 survey and base station data were downloaded to a personal computer, backed up on IOMEGA® compatible zip disks, and are retained in project files.

A.2.2.3 Frequency-Domain EM Survey

EM31 Data Collection. Prior to conducting the EM31 survey, the instrument was calibrated and the in-phase component zeroed at the field instrument base station. The instrument was operated in the vertical dipole mode measuring the in-phase and out-of-phase components of the secondary EM field. At the start and end of each data collection session approximately 20 readings were recorded at the field instrument base station to verify that the instrument was operating properly, and to provide a quantitative record of instrument variation, or drift, during the survey period. A review of these base station files indicated the instrument was operating properly and instrument drift was within acceptable limits. Survey data were collected at 5-foot intervals along N-S oriented survey lines spaced 20 feet apart, for a total of approximately 21,100 linear feet of survey coverage.

The EM31 data were stored in the digital data logger along with corresponding line and station numbers. EM31 line profiles were reviewed in the field using the DAT31® program to verify data quality prior to completing the survey. All EM31 survey and base station data were downloaded to a personal computer, backed up on IOMEGA® compatible zip disks, and are retained in project files.

A.2.2.4 Anomaly Verification and Sampling Locations

Anomaly Verification. Preliminary color-contour maps of the magnetic and EM31 data were generated and field-checked to differentiate between anomalies caused by surface and subsurface sources. During initial anomaly verification work, it was determined that several perimeter anomalies caused by buried landfill materials had not been delineated in the original survey data. Based on these results, the survey area was expanded, where necessary, to encompass buried source areas.

Geophysical anomalies verified as being caused by surface features were labeled as such on the field data maps. Anomalies suspected to be caused by underground utilities were verified with an EM utility locator. Anomalies caused by buried metal objects were carefully located in the field and marked on the site map.

Sampling Locations. After the geophysical data interpretation was complete all anomalies interpreted to represent fill were marked on data maps and provided to the site manager. The site geophysicist and site manager then determined the sample locations that would meet the criteria established in sampling rationale and ensure the safety of the drilling/sampling team.

A.3.0 Data Processing

Color Contour Maps. Contour maps of magnetic, EM31, and EM61 data were generated using the OASIS Montaj® geophysical mapping system from Geosoft, Inc. These maps were color-enhanced to aid with interpreting subtle anomalies. Select contour maps from this site are presented as Figures A229-3 through A229-6.

A series of data processing steps were required to generate the contour maps. Magnetic gradiometer data was downloaded from the field instrument and converted to an ASCII file using Geometrics, Inc. MAGMAP® program. EM31 and EM61 data were downloaded from the data logger and converted to ASCII files using DAT31® and DAT61® software from Geonics, Inc. The ASCII data files were then reviewed to assess line numbers, station ranges, and overall data quality. Field data file names and corresponding base station data files were recorded on the data file tracking form. Data screening results were then recorded on the base station summary form. Following data quality assessment, geometry corrections to field data files were made, if necessary, using a text editor and recorded on the geophysical data editing form.

Final, corrected magnetic and EM data files containing local geophysical station coordinates (X,Y) and the geophysical measurement (Z) were converted to OASIS Montaj® format and imported into the geophysical mapping software. All data files within the Geosoft database were reviewed in profile form to verify completeness of data editing. The data were then gridded with the bi-directional gridding module using an Akima spline. The data were then gridded using bi-directional gridding with an Akima spline. The grid cell size for the magnetic, EM31, and EM61 data was chosen to be 2.5, 2.5, and 1.25 feet, respectively. A color contouring scale was selected to enhance data anomalies of interest to this investigation. The names of files generated and processing parameters used were recorded on data processing forms. Final processed map names are shown in the data processing box found in the lower left corner of each contour map presented. All completed forms of magnetic and EM data collected during the investigation are retained in project files.

A.4.0 Interpretation of Geophysical Data

The methods by which the geophysical data were interpreted, and the results of that interpretation are described in this chapter.

Figure A229-2 presents the site map with geophysical interpretation. The interpreted color-contour map of G-858G total magnetic field for the upper sensor is presented as Figure A229-3. Interpreted color-contour maps of EM31 conductivity and in-phase component data collected along N-S survey lines are presented as Figures A229-4 and A229-5, respectively. The interpreted color-contour map of EM61 bottom coil data acquired to delineate a perimeter anomaly seen in the magnetic and EM31 data is presented as Figure A229-6. A theoretical background is presented as an Attachment to this report. This attachment discusses the factors influencing the observed geophysical response for the various methods and equipment used to conduct the NWR survey.

In addition to the geophysical interpretation, the site map (Figure A229-2) contains detailed information on reference features (e.g., mounds and depressions, asphalt roads, and topographic features), so that the survey area and the geophysical anomaly locations can be relocated in the future. Anomalies shown on the site interpretation map correspond to those seen in the magnetic and EM data. Surface reference features shown on the site interpretation map were translated from the hand-drawn site map made in the field. The site interpretation map also references the Alabama East State Plane, NAD 1983 Coordinate System.

A.4.1 Data Interpretation Criteria

Color Contour Map Anomalies. Anomalies shown on the magnetic and EM contour maps range from high to low values and from negative to positive, depending on the type of data displayed. The observed anomalies in the contour map of G-858G total magnetic field for the upper sensor have values above and below the average magnetic field intensity of 50,800 nT for Anniston, Alabama. The typical magnetic data response to near-surface ferrous metallic debris is an asymmetric south high/north low signature. The upper sensor magnetic data are more useful than the lower sensor data for locating large buried metal objects, such as USTs because the lower sensor is more sensitive to small near-surface objects; hence the upper sensor magnetic data are presented. The

characteristic EM31 anomaly over a near-surface metallic conductor consists of a narrow zone having strong negative amplitude centered over the target and a broader lobe of weaker, positive amplitude on either side of the target. As the depth of the target feature increases, the characteristic EM31 response changes to a positive amplitude centered over the target. The characteristic EM61 response over a buried metal object shows a positive-amplitude signal, with signal strength dependent upon the size of the object, distance from the transmitter/receiver coils, and the type of material. Upper and lower receiver coil readings are processed to determine a differential value that can be used to approximate the depth of source objects in the data. Although all EM61 data were evaluated during interpretation, only the bottom coil EM61 data is presented in the report since these data are most sensitive to buried metal objects.

Individual anomalies that occur along survey lines are interpreted as landfill pits, rather than individual buried metal objects as might be interpreted from higher density data sets (i.e., 5- or 10-foot line spacing data). This designation has been given since the nearest cross line survey stations (i.e., east or west) relative to the observed anomalies are approximately 20 feet away. Each landfill pit identified in the site data could conceivably have east to west dimension of 30 to 35 feet.

Anomalies present on the contour maps of magnetic and EM31 data first field-checked and correlated with known metallic surface objects and other cultural surface features so that anomalies caused by subsurface sources could be determined. Anomalies caused by surface metal are labeled as such on the data contour maps, and the locations of these features are indicated on the geophysical interpretation map. Although not discussed in the text, anomalies interpreted to represent isolated buried metal objects are labeled on the data contour maps and geophysical interpretation map.

A.4.2 Fill Area Northwest of Reilly Field Data Interpretation

Seven (7) geophysical anomalies caused by subsurface sources are labeled on the contour maps and are discussed in the following text. The geophysical interpretation map (Figure A229-2) shows the locations of the landfill pits, fill areas, anomalous high conductivity areas, buried metal objects and surface metal that were observed in the data. Small anomalies that are interpreted to represent discrete, buried metal objects are not discussed in the text but are labeled on all data maps.

Geophysical data analysis indicates that two fill areas containing low to high concentration of buried metal, several landfill pits with low to moderate concentrations of buried metal, and numerous isolated buried metal objects/debris exist within site boundaries. The interpretation map also shows the locations of individual surface metal objects and areas of low to moderate concentrations of surface metal.

Three large areas of anomalously high conductivity readings occur at the site. The conductivity anomaly that occurs along the northern boundary of the site is most likely related to natural variations in near-surface materials related to a low-lying swampy area. The broad conductivity anomalies that occur along the southern and western perimeter of the site are thought to be caused by one or more of the following: 1) surface or near-surface disposal of conductive fill materials, 2) a local increase in the volume of fine-grained soils at the surface associated with construction activities at the landfill and/or the landfill cover materials, or 3) near-surface soil contamination caused by leachate migrating away from the landfill source areas.

Anomaly A-1. Anomaly A-1 is located in the northern portion of the site and occurs in all three methods of investigation. The anomaly is characterized by a broad area of moderate-amplitude response in all magnetic and EM data sets (Figures A229-3 though A229-6). The southeastern portion of Anomaly A-1 is interpreted to represent a landfill trench containing generally low concentrations of buried metal. An isolated area of a moderate concentration of buried metal is interpreted at approximately (520N, 118E). Based on the EM31 response, source materials responsible for Anomaly A-1 may be located below the upper few feet of subsurface. EM61 data (Figure A229-6) shows a peak value greater than 600 milliVolts (mV). Anomaly A-1 is interpreted to be caused by a landfill pit containing generally low concentrations of buried metal with a few larger, isolated buried metal objects.

Anomaly A-2. Anomaly A-2 is located in the northern portion of the survey area along a topographic slope and is encompassed by a large area of low concentration surface/partially buried metal debris. Anomaly A-2 occurs most prominently in the magnetic data. Anomaly A-2 occurs as two moderate-amplitude dipoles in the magnetic data (Figure A229-3), the largest of which exceeds 2,000 nT above background. In the EM31 in-phase component data (Figure A229-5), the anomaly occurs as a low-amplitude negative deflection, indicating shallow burial. It appears as a 5-6 milliSiemens per meter (mS/m), low on the conductivity data. Anomaly A-2 is interpreted to be caused by a

landfill pits containing a low to moderate concentration of buried metal located within the upper few feet of subsurface.

Anomaly A-3. Anomaly A-3 is located in the central portion of the survey area and is the most prominent site anomaly. The anomaly is clearly evident in both the magnetic and EM31 data sets as a series of large magnitude features that trend northwest across the site. In the upper sensor total magnetic field data (Figure A229-3), Anomaly A-3 exhibits broad and diffuse dipolar signatures, typical of scattered ferrous metal. The amplitudes of the magnetic anomalies comprising A-3 are generally less than 1,000 nT, typical of a low to moderate volumes of buried metal. The anomaly has a moderate to high amplitude response in the EM31 conductivity data peaking at over 35 mS/m (Figure A229-4), particularly in the northeastern portion of the anomaly (approximately 250N, 390E). The in-phase data show the response at this location may indicate the presence of surface or near-surface disposal of conductive fill materials, fine-grained soils used as cover materials, or conductive leachate generated from nearby metallic source areas. The combined magnetic and EM31 response of Anomaly A-3 throughout the central and eastern portions of the site is typical of widely scattered buried metal. Anomaly A-3 is interpreted to represent a series of landfill pits/trenches containing generally low concentrations of buried metal, with isolated pits containing moderate and high concentrations of buried metal (Figure A229-2).

Anomaly A-4. Anomaly A-4 is located in the west-central portion of the site, and occurs in the magnetic and EM31 data as several isolated areas of generally low-amplitude responses as well the area has a slightly elevated conductivity (Figures A229-3 through A229-5). Anomaly A-4 is interpreted to represent scattered landfill pits containing a low concentration of diffuse buried metal.

Anomaly A-5. Anomaly A-5 is located in the south-central portion of the survey area and is most prominent in the magnetic data, although also clearly evident in both EM31 data sets. The geometry and trend of the anomaly is similar to Anomaly A-3 to the east. Both anomalies trend northwest and are separated by an approximately 25- to 50-foot zone in which the geophysical response is small or not observed. This feature, most evident in the EM31 data (Figures A229-4 and A229-5), may represent an historic haul road.

In the upper sensor total magnetic field data (Figure A229-3), Anomaly A-3 exhibits a dipolar signature with a magnetic field strength exceeding 2,500 nT in one location (approximately 100N, 300E). In other portions of the anomaly complex, the magnetic response occurs as a more broad and diffuse signature, typical of scattered ferrous metal. The anomaly is characterized in the EM31 data as a moderate-amplitude response with peak conductivity values exceeding 25 mS/m that occurs over a broad area in the central and southern portions of the site. As with the magnetic data, this response is typical of widely scattered buried metal. Anomaly A-5 is interpreted to represent a series of landfill pits/trenches containing a generally low concentration of buried metal, with one large landfill pit area containing a high concentration of buried metal (Figure A229-2).

Anomaly A-6. Anomaly A-6 occurs exclusively in the EM31 conductivity data (Figure A229-4). The anomaly is observed as an area of slightly elevated conductivity readings that occur in the northern portion of the site. The anomaly corresponds quite well to a low-lying swampy area containing mud and standing water. Anomaly A-6 is interpreted to be caused by an increase in fine-grained soils and/or wet surface conditions associated with the swampy area.

Anomaly A-7. Anomaly A-7 occurs exclusively in the EM31 conductivity data (Figure A229-4). The anomaly is observed as an area of slightly elevated conductivity readings that occur along the western and southern perimeter of the site. Anomaly A-7 is thought to be caused by one or more of the following: 1) surface or near-surface disposal of conductive fill materials, 2) a local increase in the volume of fine-grained soils at the surface associated with construction activities at the landfill and/or the landfill cover materials, or 3) near-surface soil contamination caused by leachate migrating away from the landfill source areas.

After the geophysical data interpretation was complete, all anomalies interpreted to represent fill were marked on data maps and provided to project personnel. Based on the geophysical survey results, soil and groundwater sampling locations were selected in accordance with the SSFSP sampling rationale.

A.5.0 Conclusions and Recommendations

A surface geophysical survey using magnetic and EM methods was conducted December 9 through 15, 1998, April 28, 1999, and May 10, 1999 at the Fill Area Northwest of Reilly Field (Parcel 229[7]). The objectives of the survey were to determine the boundaries of the fill area and to select proposed sampling locations in accordance within the SSFSP.

Geophysical data analysis indicates that two fill areas containing low to high concentration of buried metal, several landfill pits/trenches with low to moderate concentrations of buried metal, and numerous isolated buried metal objects/debris exist within site boundaries. The interpretation map also shows the locations of individual surface metal objects and areas of low to moderate concentrations of surface metal.

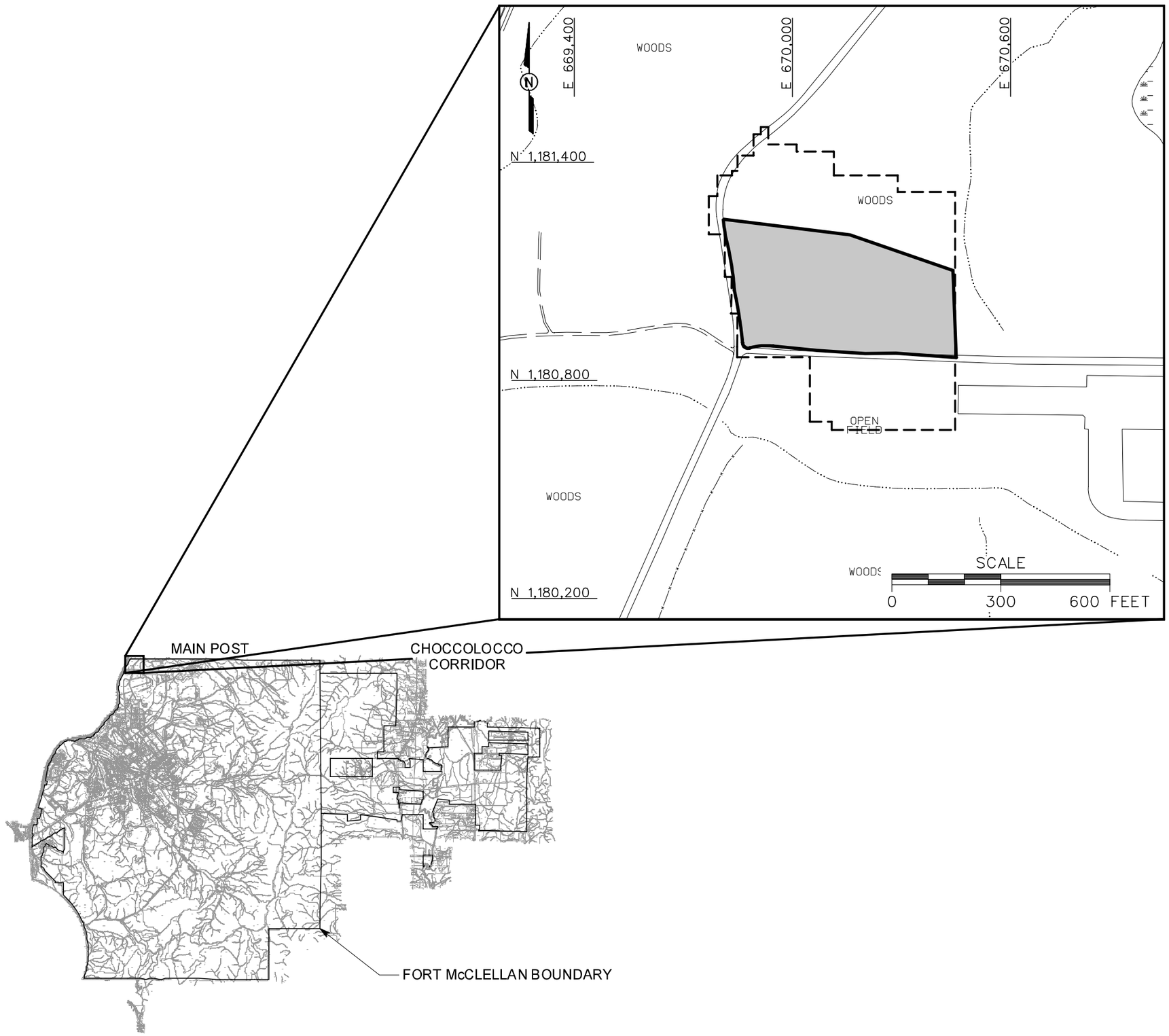
Three large areas of anomalously high conductivity readings occur at the site. The conductivity anomaly that occurs along the northern boundary of the site is most likely related to natural variations in near-surface materials related to a low-lying swampy area. The broad conductivity anomalies that occur along the southern and western perimeter of the site are thought to be caused by one or more of the following: 1) surface or near-surface disposal of conductive fill materials, 2) a local increase in the volume of fine-grained soils at the surface associated with construction activities at the landfill and/or the landfill cover materials, or 3) near-surface soil contamination caused by leachate migrating away from the landfill source areas.

After the geophysical data interpretation was complete, all anomalies interpreted to represent fill were marked on data maps and provided to project personnel. Based on the geophysical survey results, soil and groundwater sampling locations were selected in accordance with the SSFSP sampling rationale.

A hand sketched site map and civil surveying of site features provided a permanent record of the survey boundaries and anomalies located. Positions on the geophysical interpretation map (Figures A229-2) are conservatively estimated to be accurate to within +/- 5 feet.

The interpretation map should not be considered clearance for exploratory trenching or other invasive investigations. Should such clearance be necessary, IT recommends proper geophysical clearance using available utility maps, an EM utility locator, and ground penetrating radar.

Beyond the recommendation above, and based on the objectives and results of the geophysical survey presented in this report, no further geophysical work is recommended at the Fill Area Northwest of Reilly Airfield site.



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- MARSH / WETLANDS
- PARCEL 229(7) BOUNDARY
- GEOPHYSICAL SURVEY AREA
- SURFACE DRAINAGE / CREEK
- FENCE

FIGURE A229-1
VICINITY MAP
FILL AREA NORTHWEST OF REILLY AIRFIELD
PARCEL 229(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
A Member of The IT Group

DWG. NO.: ...\796886ES.090
PROJ. NO.: 796886
INITIATOR: C. SCHMALZ
PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY:
ENGR. CHCK. BY: C. SCHMALZ
DATE LAST REV.:
DRAWN BY:
STARTING DATE: 04/03/01
DRAWN BY: D. BOMAR
04/03/01 09:55:53 AM
DBILLING c:\cadd\design\796886ES.090

LEGEND

- GEOPHYSICAL SURVEY BOUNDARY
- CIVIL SURVEY STAKE LOCATION
- LOW CONCENTRATION OF BURIED METAL
- MODERATE CONCENTRATION OF BURIED METAL
- HIGH CONCENTRATION OF BURIED METAL
- BURIED METAL OBJECT
- ELEVATED CONDUCTIVITY ANOMALY
- MODERATE CONCENTRATION OF SURFACE AND/OR PARTIALLY BURIED DEBRIS
- SURFACE METAL OBJECT
- MOUND
- DEPRESSION
- MARSH / WETLANDS
- TREES / TREELINE

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10N,100E	1180866.354N	669940.596E
100N,300E	1180955.400N	670140.504E
100N,400E	1180955.737N	670240.140E
200N,300E	1181055.862N	670141.546E
200N,400E	1181055.474N	670240.592E
300N,100E	1181155.752N	669942.563E
300N,200E	1181155.663N	670042.438E

NAD 83 SPHEROID, ALABAMA EAST STATE PLANE DATUM		
LOCAL GRID COORDINATES	STATE PLANE COORDINATES	
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500N,340E	1181346.740N	670178.200E
450N,600E	1181317.360N	670439.180E
300N,40W	1181152.740N	669799.030E
200N,20W	1181057.040N	669823.030E
100N,0E	1180955.140N	669841.970E
20N,0E	1180879.420N	669839.440E

SCALE

0 100 200 FEET

FIGURE A229-2
FILL AREA NORTHWEST OF REILLY FIELD SITE MAP WITH GEOPHYSICAL INTERPRETATION PARCEL 229(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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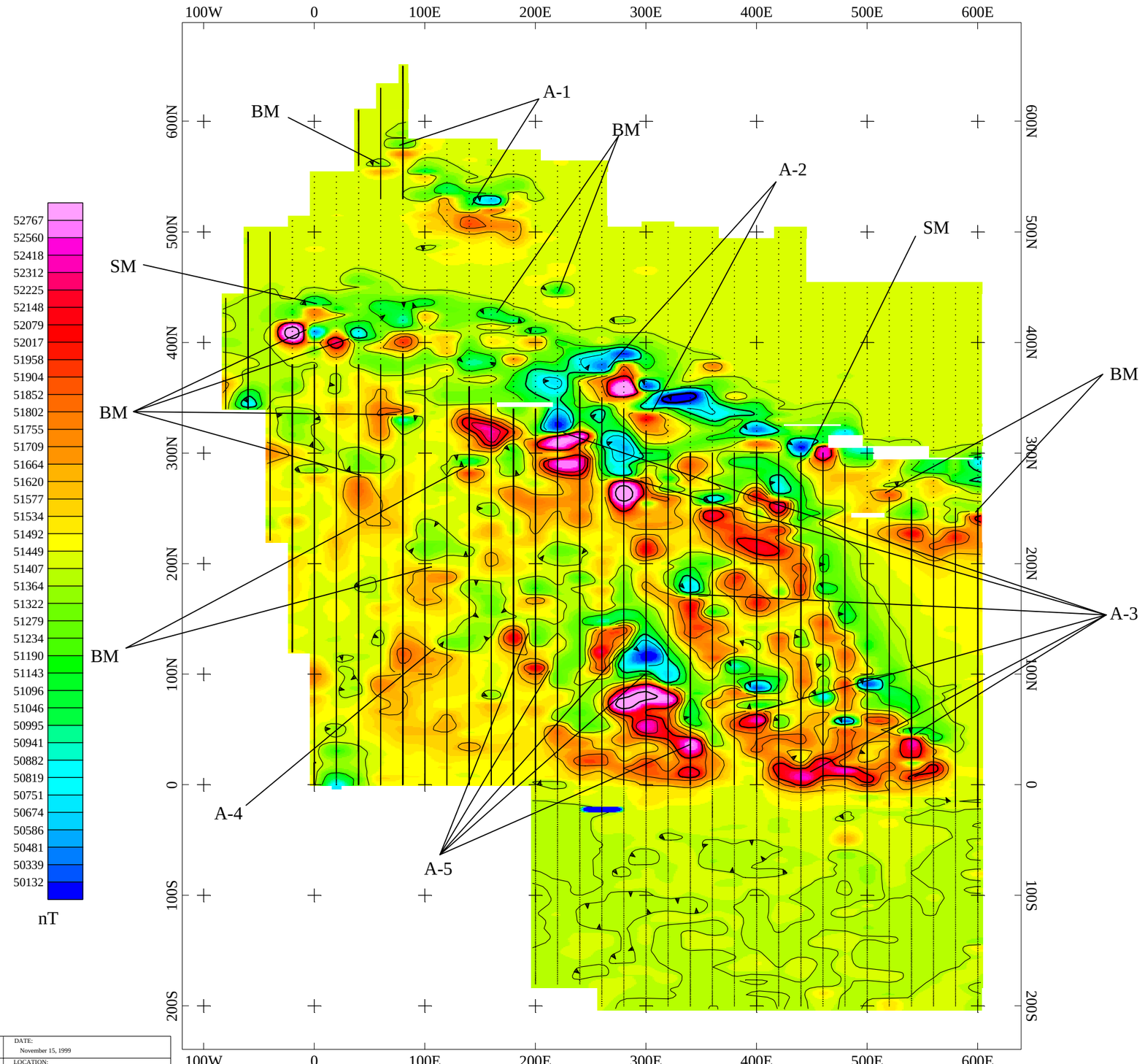
DRAFT. CHCK. BY:
ENGR. CHCK. BY: C. SCHMALZ
PROJ. MGR.: J. YACOUB
INITIATOR: C. SCHMALZ
PROJ. NO.: 796886
DWG. NO.: ...\796886ES.091
DATE LAST REV.:
DRAWN BY:
STARTING DATE: 04/03/01
DRAWN BY: D. BOMAR
04/03/01 09:59:52 AM
DBILLING
c:\cadd\design\796886ES.091



LEGEND:

....	GEOPHYSICAL SURVEY LINES
A-1	GEOPHYSICAL ANOMALY DISCUSSED IN TEXT
SM	ANOMALY CAUSED BY SURFACE METAL
BM	ANOMALY CAUSED BY BURIED METAL

Scale 1:1200

50 0 50 100 150 200 250

feet

Minimum Contour Interval: 200 nanoTeslas

NAME: Micki Maki	DATE: November 15, 1999
PROJECT NUMBER: 774645	LOCATION: C:Projects\Fort McClellan\mwr\magfield\MUP.map

FIGURE A229-3

FILL AREA NORTHWEST OF REILLY AIRFIELD
PARCEL 229(7)
FORT McCLELLAN

G-858G TOTAL MAGNETIC FIELD
UPPER SENSOR (4.5 FT ABOVE GROUND SURFACE)
NORTH-SOUTH SURVEY LINES

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MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
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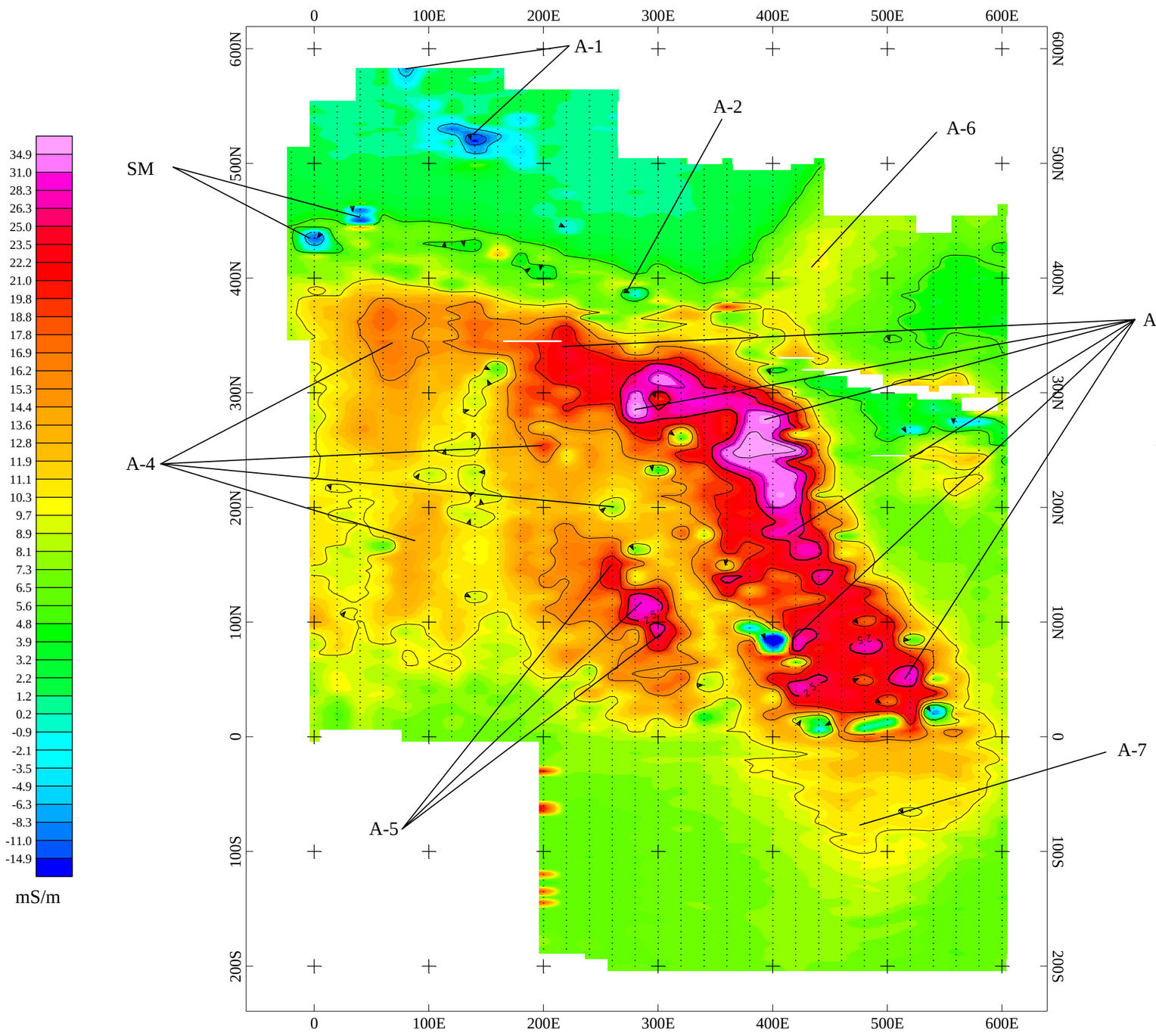

LEGEND:

....	GEOPHYSICAL SURVEY LINES
A-1	GEOPHYSICAL ANOMALY DISCUSSED IN TEXT
SM	ANOMALY CAUSED BY SURFACE METAL

Scale 1:1200

50 0 50 100 150 200 250

feet

Minimum Contour Interval: 5 milliSiemens per meter

NAME: Micki Maki	DATE: November 15, 1999
PROJECT NUMBER: 774645	LOCATION: C:Projects\Fort McClellan\nwr\EMFIELD\c.map

FIGURE A229-4

FILL AREA NORTHWEST OF REILLY AIRFIELD
PARCEL 229(7)
FORT McCLELLAN

EM31 CONDUCTIVITY
VERTICAL DIPOLE (3.0 FT ABOVE GROUND SURFACE)
NORTH-SOUTH SURVEY LINES

U.S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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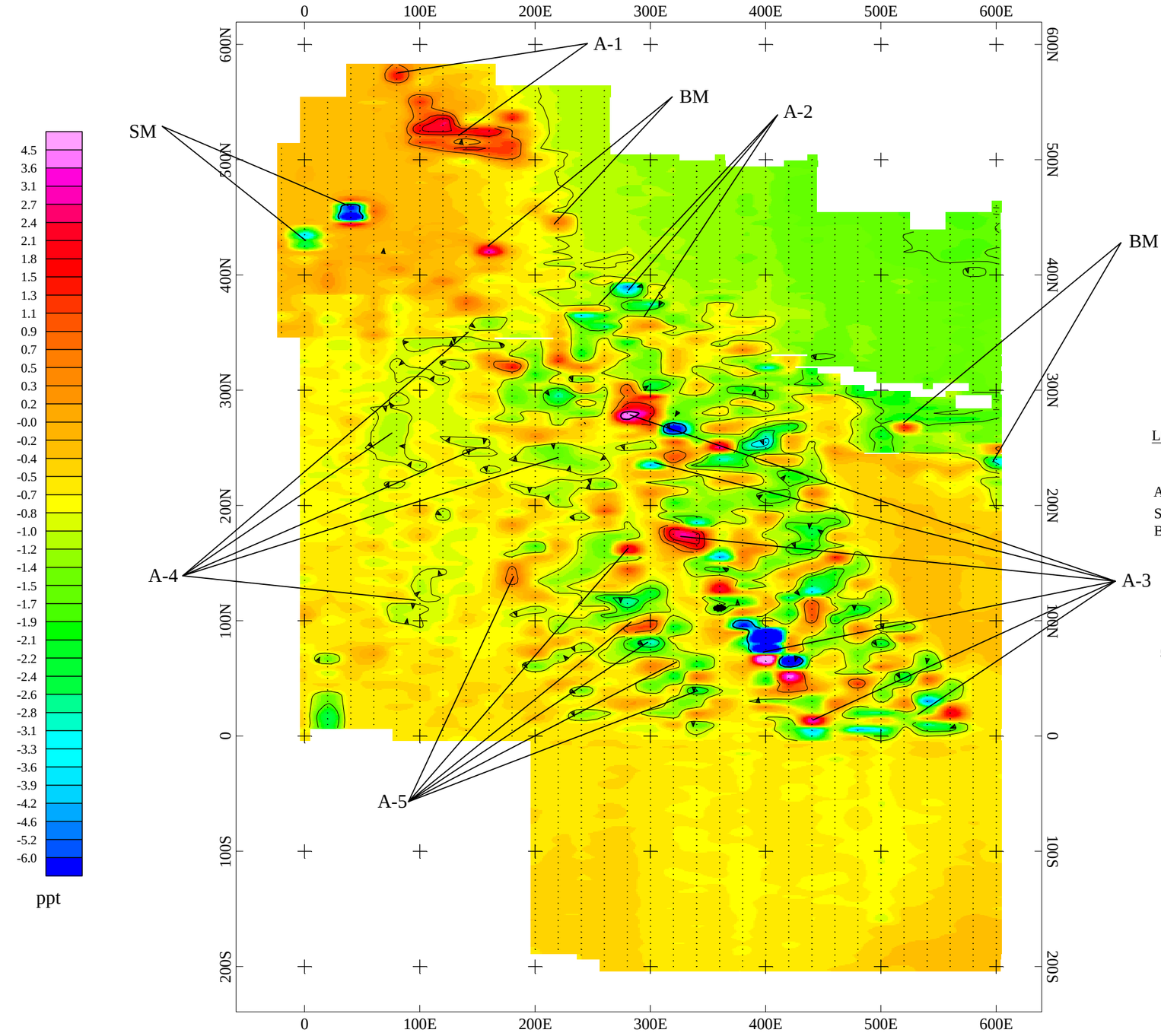

LEGEND:

....	GEOPHYSICAL SURVEY LINES
A-1	GEOPHYSICAL ANOMALY DISCUSSED IN TEXT
SM	ANOMALY CAUSED BY SURFACE METAL
BM	ANOMALY CAUSED BY BURIED METAL

Scale 1:1200

50 0 50 100 150 200 250

feet

Minimum Contour Interval: 1 ppt Secondary to Primary Field

NAME: Micki Maki	DATE: November 15, 1999
PROJECT NUMBER: 774645	LOCATION: C:\Projects\Fort McClellan\nwr\EMFIELD\i.map

FIGURE A229-5

FILL AREA NORTHWEST OF REILLY AIRFIELD
PARCEL 229(7)
FORT McCLELLAN

EM31 IN-PHASE COMPONENT
VERTICAL DIPOLE (3.0 FT ABOVE GROUND SURFACE)
NORTH-SOUTH SURVEY LINES

U.S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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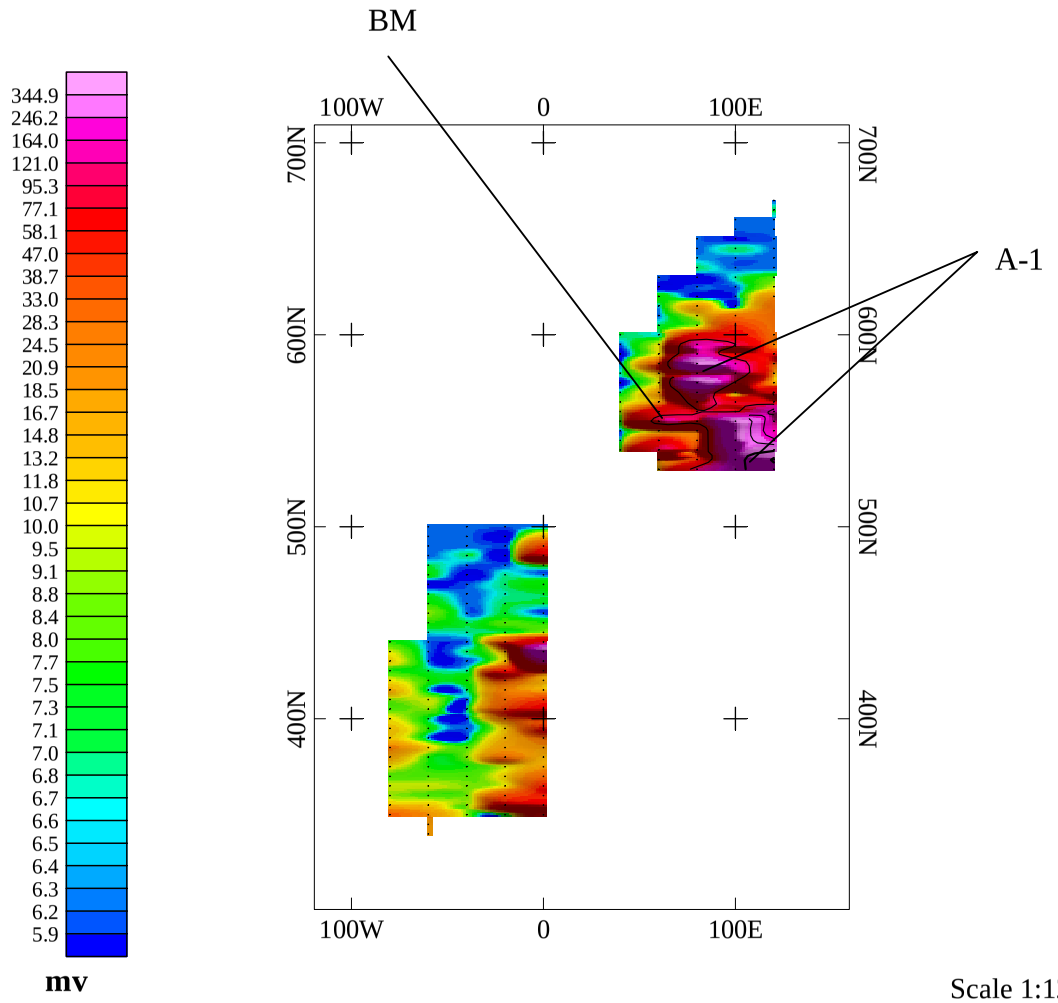

Scale 1:1200

50 0 50

feet

Minimum Contour Interval: 100 milliVolts

LEGEND:

....	GEOPHYSICAL SURVEY LINES
A-1	GEOPHYSICAL ANOMALY DISCUSSED IN TEXT
BM	ANOMALY CAUSED BY BURIED METAL

FIGURE A229-6

FILL AREA NORTHWEST OF REILLY AIRFIELD
PARCEL 229(7)
FORT McCLELLAN

EM61 POTENTIAL DIFFERENCE
BOTTOM COIL (1.5 FT ABOVE GROUND SURFACE)
NORTH-SOUTH SURVEY LINES

U.S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
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CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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NAME:	DATE:
Micki Maki	November 15, 1999
PROJECT NUMBER:	LOCATION:
774645	C:Projects\Fort McClellan\ReillyNW\EM31\l.map