SITE SPECIFIC FINAL REPORT

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

Prepared for:

United States Army Engineering and Support Center, Huntsville
Attn: CEHNC-OE-DC (Roger Young)
P.O. Box 1600
Huntsville, Alabama 35807-4301

Contract: W912DY-04-D-0018
Task Order: 0009

Prepared by:

EODT
EOD TECHNOLOGY, INC.
2229 Old Highway 95
Lenoir City, TN 37771

July 2008

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for the

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July 2008

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFRL	Air Force Research Library
cm	centimeter
DGM	digital geophysical mapping
DID	Data Item Description
DQO	Data Quality Objective
EM	Electromagnetic
EM	Engineering Manual
EODT	EOD Technology, Inc.
ERDC	USAESCH Engineering Research and Development Center
F	Fahrenheit
FL	Florida
‘	Foot
GPS	Global Positioning System
Hz	Hertz
m	meter
mph	miles per hour
mV	milli-Volt
nT	nanoteslas
pm	After Noon
%	Percent
PM	Project Manager
QC	Quality Control
SOW	Scope of Work
SUXOS	Senior UXO Supervisor
TN	Tennessee
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

EOD Technology, Inc. (EODT) was contracted by the U.S. Army Engineering and Support Center, Huntsville (USAESCH), under contract W912DY-04-D-0018, Task Order 0009, to conduct total field magnetometry and electromagnetic induction pre and post operational geophysical surveys at Tyndall Air Force Base (Tyndall AFB) Site #3, Bay County, Florida. The geophysical surveys were conducted from 18 to 22 September 2006, and on 12 July 2007. Mr. Roger Young was the government's point of contact for this project.

1.1 OBJECTIVE

The objective of the project was to measure the geophysical effects on the soil and seed items caused by the operation of a magnetic scrap collection system. The scrap collection system has been jointly developed by the Air Force Research Lab (AFRL) Robotics Division and USAESCH. It was developed to assist with the surface clearance of metallic scrap at munitions sites. In order to investigate the possible geophysical effects of the system, metallic seed items were buried throughout the site and geophysical data was collected before and after the scrap collection system. Electromagnetic (EM) and total field magnetic surveys were conducted for each set of surveys.

The first geophysical surveys were conducted with the seed items in place but prior to the scrap collection system. This established a baseline soil and seed item response. Following the first geophysical surveys, the scrap collection system was run over the site. The second series of geophysical surveys were then conducted one day after the scrap collection system to look at short-term effects. The third series of geophysical surveys were conducted six months after the scrap collection system to look at the long-term effects, if any, the scrap collector had on the soil and on the seed items.

1.2 SITE DESCRIPTION

The project was carried out at Test Site #3, located near the AFRL facility on Tyndall Air Force Base, Bay County, Florida. The area is flat, sandy, and occupies approximately 2 acres. Figure 1 is an illustration of the site while the scrap collection system was being operated. Depth to the water table is approximately 18–24 inches. Weather conditions ranged from 85°F with rain for the first two sets of geophysical surveys to 100°F+ and sunny for the third series of surveys.

FIGURE 1: MAGNETIC SCRAP COLLECTOR IN USE

2.0 TECHNICAL APPROACH

2.1 EQUIPMENT

2.1.1 Positioning Equipment

All positioning work done on the project was carried out using the Trimble 5800 Global Positioning System (GPS) rover unit supported with real-time corrections provided by the 5700 GPS Base Station unit. This system allowed for static positional accuracy on the order of 5 cm and dynamic accuracies on the order of 30 cm. This GPS updated at a rate of 1Hz. EODT's professional land surveyor used the system for project area perimeter mapping and the establishment of seed item locations. The GPS rover unit was incorporated with the geophysical equipment to provide positional information for the collected datasets.

2.1.2 EM Survey Equipment

The EM surveys were carried out using three Geonics EM61 MK2 metal detectors. The detector coils were mounted on EODT's non-conducting trailer which was pulled by a John Deere Gator. The EM coils were arrayed such that the center of each coil set was offset (horizontally) 60 cm from its neighbor. The Trimble 5800 GPS antenna was mounted on a tripod and centered over the middle coil. The positional offsets between the GPS antenna and all EM sensors were recorded. The EM data was recorded at 10 Hz, while

the positional information was recorded at 1 second intervals. All the data was recorded by a Panasonic Toughbook laptop computer running Geometrics MAGLOG NT software. This software provided a real-time display of both positional and geophysical data.

FIGURE 2: EM61 MK2 TOWED ARRAY WORKING THROUGH A SQUALL

2.1.3 Magnetic Survey Equipment

The magnetic surveys were carried out using three Geometrics Model G-858 Cesium Vapor Total Field magnetometers. The units were mounted, with the long axis of the sensors oriented vertically, on a non-magnetic Geometrics Magnetometer Cart—a man-pulled system. The G-858 magnetometers were arrayed such that lines of magnetic data were collected at 60 cm intervals. The Trimble 5800 antenna was mounted on a tripod attached to the magnetometer cart and positional offsets between the GPS antenna and all magnetometers were recorded. The magnetic data was recorded at 10 Hz. The GPS data was recorded at 1 second intervals. All data was recorded by the Geometrics digital data recorder. Throughout the magnetic mapping, the earth's magnetic field was monitored and recorded by a Geometrics Model G-858 proton precession magnetometer collecting data at 1-second intervals.

FIGURE 3: G-858 MAPPING AFTER USE OF THE MAGNETIC SCRAP COLLECTOR

2.2 POSITIONAL SURVEY WORK

The Universal Transverse Mercator (UTM) coordinate system (WGS84, Zone 16N) was used for all positioning work on the project. Positional control was achieved by having the GPS base station set up on Control Point #2 (coordinates: N3316384.270, E646893.051 as provided by AFRL) located immediately adjacent to the project area. The Trimble GPS rover unit was used to establish a rectangular 41.4 m × 200 m work area. After the seed items were buried, the GPS recorded the horizontal coordinates of each item.

2.3 SEED EMPLACEMENT

Twenty identical seed items were buried at Test Site #3. Each item was a piece of steel pipe, 12" long and with a diameter of 2". All of the items were buried horizontally at a depth of 18" with the long axis of each pipe oriented east-west. Seed item, S-2, was inadvertently placed just outside the boundary of the grid. The grid corners were being installed by the surveyor at the same time as the seed placement was being performed. The grid alignment was adjusted to avoid a pre-existing anomaly causing S-2 to be outside the grid. Given schedule requirements of the

magnetic scrap collection team, S-2 was not moved. The project geophysicist determined that the 19 seed were adequately distributed within the grid and would be sufficient for the current study. The seed items were left in the ground so that they will be available for further post scrap collection geophysical studies.

2.4 GEOPHYSICAL DATA QUALITY OBJECTIVES

Prior to the commencement of the field activities, the following Data Quality Objectives (DQOs) were established and documented in the Work Plan:

a) All geophysical data will be collected using a 60 cm line separation.
b) All positioning data will be accurate to within 30 cm.
c) 100% of the test site will be geophysically mapped. Minor data gaps, totaling no more than 1% of the survey area, are acceptable.
d) Separation between data points, along data collection lines, shall be no more than 20 cm.
e) EM61 MK2 data will be collected using the four bottom coil channels.
f) The EM towed array will be driven at a constant 2–3 mph.
g) Geophysical surveys will be used to locate seed items to within 30 cm of their true positions.

Analysis of the data reveals the following information regarding how well the DQOs were met:

a) All the geophysical data was collected using a nominal 60 cm line separation. During the first and the second series of surveys, some of the lines wandered somewhat since navigation was carried out using dead reckoning between traffic cones and/or paint markings on the ground. For the baseline survey, these marks were 50 m apart. For the second series of surveys, additional marking was carried out such that the guide marks were 25 m apart. Also negatively affecting the ability to maintain straight lines during the second series of surveys were the ruts created by the scrap collection system. This especially hampered the EM towed array survey. See Table 1 below for the percent coverage attained, based on assigning different footprint sizes to the geophysical sensors.
b) All positioning equipment checks were accurate to within 5 cm.
c) 100% of the test site was geophysically mapped during the first and second series of geophysical surveys. Between the second and third series of surveys, trenches were dug in the northeastern section of the survey area (Figure 4). Because of these trenches, 0.8% of the survey area was not surveyed (66 square meters). This area was excluded from the footprint and data point separation analysis. Depending on the footprint size assigned to each sensor

(Table 1), some gaps in coverage do exist; however, it is judged that the coverage attained is adequate to meet the project goals.

d) Separation between data points, along data collection lines, was much closer than the 20 cm called for by the DQO. This result is based on the speed of collection and the sampling rate of the geophysical sensors. See Table 2 on the next page for the percent of data points collected based on different data point separation distances.

e) All the EM61 MK2 data were collected using the four bottom coil channels.

f) The EM towed array was driven at a walking speed, approximately 2–3 mph, during the data collection.

g) 19 of 19 seed items in the grid were located.

FIGURE 4: IRREGULAR TERRAIN ENCOUNTERED 12 JULY 2007

TABLE 1: FOOTPRINT COVERAGE

Survey	60 cm Sensor Footprint	80 cm Sensor Footprint	100 cm Sensor Footprint
1st Electromagnetic Survey	90%	100%	100%
2nd Electromagnetic Survey	70%	95%	100%
3rd Electromagnetic Survey	97%	99%	100%
1st Magnetic Survey	88%	98%	100%
2nd Magnetic Survey	84%	96%	99%
3rd Magnetic Survey	96%	99%	100%

TABLE 2: DATA POINT SEPARATION

Survey	5 cm Data Point Separation	10 cm Data Point Separation	20 cm Data Point Separation
1st Electromagnetic Survey	94%	100%	100%
2nd Electromagnetic Survey	43% (90%@6cm)	100%	100%
3rd Electromagnetic Survey	99%	100%	100%
1st Magnetic Survey	99%	100%	100%
2nd Magnetic Survey	96%	100%	100%
3rd Magnetic Survey	80%	99%	100%

2.5 QUALITY CONTROL

Quality Control (QC) was maintained by following the guidance of DID MR-005-05, Attachment B. On a daily basis, pre-mapping and post-mapping static tests were carried out for both the EM and magnetic survey equipment. All of these tests were successful. In order to quantify any latency effects, 6-line tests were carried out for both the EM and magnetic data collection systems. In addition, for both the EM and magnetic work, a line of collected data was re-surveyed after each mapping event was completed. These repeat tests, included in Appendix A, confirm that the collected data was repeatable and of good quality.

In order to determine the heading effect to be corrected for, in the case of the magnetic datasets, the octant test was carried out as described in the Work Plan. During the magnetic surveys, a base station was set up just outside the grid to monitor and record the earth's magnetic field. This data was used to correct the collected data for the effects of diurnal variations in the field. This base station also recorded data during the baseline EM survey to check for the presence of man-made signals that may have been generated by activities at Tyndall AFB. No such signals were noted. The magnetic base station was not run (inadvertently) during the 22 September follow-up EM survey.

The positioning equipment was checked on a daily basis by re-occupying a known point to confirm the repeatability of its coordinates. All such tests were successful and the coordinates were repeatable to within 5 cm.

2.6 DATA PROCESSING

2.6.1 EM Data

During collection of the EM data, information was recorded and monitored on a laptop computer running Geometrics MagLog NT software. The data was exported from there to the Geosoft Oasis Montaj environment for processing and presentation.

The first data processing step was a linear data shift. Due to the inability of MagLog NT to initialize the EM61 MK2 units, the recorded data values were negative instead of positive. At the same time, anomalous readings in a given channel were more positive with respect to the background readings in that channel, as opposed to being more negative. In order to preserve the relationship between channels (the decay curve) while at the same time preserving the magnitude and sign of the anomalies, the data values were shifted upwards. This was done by locating a region of quiet background data within a given channel. This value (-250mv in Time Gate 1, for example) was multiplied by -2 to come up with a constant value (+500 in this example) that was added to each data point within the channel. This process was carried out for each channel, in turn.

The second processing step was to level the data. This was carried out, on a channel-by-channel basis, by visually inspecting the data for each of the 3 sensors to determine the background value. The average of these three values was then calculated. The difference between each sensor's background value and the mean value was added (or subtracted, if necessary) to each reading generated by a given sensor. The net result was that, for each channel, the data from all three EM61 MK2 units was brought to a common datum such that the datasets could be viewed and evaluated in a meaningful way.

The third and final processing step was to correct for the latency effects that occur due to the finite processing times that are required by the data collection equipment's electronics. These values (slightly different for each EM61 MK2) were determined through the use of a somewhat modified 6-line test. Data was collected in 2 opposite directions over metallic items (3 screwdrivers – 1 for each EM61 MK2) placed vertically in the ground. Whatever time-based correction was necessary to have the resultant anomalies be located at the same position was then applied to the entire dataset generated by each EM61 MK2.

2.6.2 Magnetic Data

During collection of the total field magnetic data, information was recorded and monitored on Geometrics data loggers. After collection was complete, both the magnetic base station logger and the magnetic rover units (2) were downloaded to a laptop computer running Geometrics Magmapper2000 software. Within this environment, any spikes or dropouts were removed and the data was corrected for diurnal variations of the earth's magnetic field. The data was then exported and brought into the Geosoft Oasis Montaj environment for further processing and presentation.

In order to correct for latency effects, the data from the repeat line collected on the project grid were analyzed to arrive at the latency correction that was applied to the overall dataset. While a modified 6-line test had been conducted for the magnetic equipment, its result did not minimize the chevron effect in the plotted data as well as the repeat line information.

In order to quantify heading effects, an octant test was performed in which magnetic data was collected in the 4 cardinal directions, as well as the 4 intermediate directions. This data was compiled in a heading table and used to correct for heading effect (differences in observed values due solely to the direction of travel of the data collection team).

The data were then converted to analytic signal using the Oasis Montaj processing program. The purpose of using analytic signal is to convert magnetic dipole anomalies into positive monopole anomalies to aid in processing and evaluation of magnetic data. The Oasis Montaj program is able to incorporate both negative and positive values from a dipole into a positive monopole.

3.0 SECOND MOBILIZATION SEQUENCE OF EVENTS

EODT personnel mobilized from Lenoir City, TN, to Panama City, FL, on 11 July 2007.

EODT personnel proceeded to the project site at Tyndall AFB on 12 July 2007. EODT personnel checked in at the Visitor Center inside the base. EODT personnel proceeded to the research laboratory site and met with Air Force personnel at the Robotic Research Lab facility.

EODT personnel then proceeded to the test area. A tailgate safety brief was conducted prior to work being conducted. The Trimble GPS base station was set up on a control point established during the last work conducted at Tyndall AFB in September of 2006. During the GPS base station setup, a G-858G was set up as a magnetometer base station. Prior to setting up the grid, EODT personnel had to remove several blue drums from the southwestern portion of the grid area. The test area grid was then set up using the Trimble GPS rover and a series of alternating

colored flags that were set up every 30 meters to identify collection lanes. Numerous materials from small arms and other metallic debris were noticed on the surface of the test area. The largest item seen was a piece of rebar that was located on the southeastern edge of the grid. EODT personnel then proceeded to unload gear related to the EM61 towed array and assembled the magnetometer cart.

During the course of these activities, USAESCH Engineering Research and Development Center (ERDC) personnel Janet Simms and Jay Bennett arrived and introductions were exchanged. Following the magnetometer survey, ERDC personnel directed EODT to conduct digital geophysical mapping (DGM) of "quiet" areas, areas free of magnetic and EM noise caused by metallic debris, geology, or outside sources in order for ERDC to perform a magnetic susceptibility study of sand.

EODT personnel conducted QC tests for the magnetometer cart prior to beginning collection of the magnetometer survey. The tests conducted included the octant test, am static test, and latency test. The survey of the test area using the magnetometer cart was then conducted. The spacing of the sensors on the magnetometer cart were slightly adjusted after the first four lines of collection. The sensors were repositioned to a slightly more efficient spacing and this spacing was used during the remainder of the grid. This change in spacing had no negative effects on the grid data. Once the survey collection was complete, the pm static test was conducted.

Upon completion of the magnetometer survey, EODT personnel broke for lunch. Following lunch, EODT personnel began processing of the magnetometer data. Meanwhile, other EODT personnel proceeded to conduct quality control tests with the EM61 towed array. These tests included am static test and a latency test. Following these tests, the survey utilizing the EM61 towed array commenced. The last three lanes of data were 30m short in the northeast section of the test area due to irregular terrain where numerous depressions approximately 4' wide and 2-3' deep were located. Meanwhile, processing of the data was completed and EODT and USACE personnel began identifying "quiet" areas for USACE to conduct DGM operations.

Once the survey with the EM61 towed array was complete, a pm static test was conducted. EODT personnel then began to break down the magnetometer cart and the EM61 towed array was loaded back onto the trailer. All flags identifying grid boundaries and collection lanes were also removed. Also occurring during this period, EODT and ERDC personnel finished identifying "quiet" areas and the ERDC personnel began to setup equipment to perform the magnetic susceptibility of sand study. The results of this study are presented in Appendix H. Meanwhile, EODT personnel finished loading up gear, checked out with Air Force personnel,

and left the site. EODT personnel shipped magnetometer equipment back to the vendor and then demobilized back to Lenoir City, TN on 13 July 2007.

4.0 RESULTS

The survey results are presented in Appendix B Maps. Figure B-1 (Field Instrument Operations Plan) depicts the general path of the magnetic collection system and the path of both the EM and magnetic collection systems. Figure B-2 (Time Domain Electromagnetics, Geonics EM61 MK2, Channel 1) depicts the Sept. 2006 EM baseline survey pre-magnet operation, Sept. 2006 EM survey post-magnet operation and July 2007 EM survey post-magnet operation from channel 1 as color-contoured plan maps. Channel 1 was selected as it best represented the effects of the latent magnetic influence. Figure B-3 (Magnetics, Geometrics G-858 Magnetometer, Analytic Signal (nT)) depicts the magnetometer baseline – September 2006 survey pre-magnet operation, magnetometer - September 2006 survey post-magnet operation and magnetometer - July 2007 survey post-magnet operation. The locations of the buried seed items are also annotated on the maps.

5.0 OBSERVATIONS

Upon evaluation of the data processed, several observations are noted. First, there appears to be magnetic gradient evident in both the EM and magnetic post-survey datasets. The EM has decreasing signal intensity from south to north. The analytic signal magnetics have an increasing signal from south to north. It should be noted that the survey area is located on the northern side of a peninsula and the land becomes a salt-water marsh just to the north before reaching an inlet. Second, there is significant striping introduced into the EM post-survey data. It appears to coincide with the alternating east-west, west-east collection paths; however, the seed item anomalies remained clearly visible in the data.

On average, the EM background values were the highest during the EM survey conducted right after the scrap collection system. Comparing the EM post-survey conducted on 22 September 2006, to the EM time lapse survey conducted on 12 July 2007, the overall background response is 20 to 30 mV less than when the post-survey was conducted. The amplitude response from the seed items has a small difference comparing the two surveys; however, excluding the seed items, the larger amplitude anomalies appear to be at least 20 mV greater than when the post-survey was conducted.

The average EM background values were the lowest for the EM survey conducted six months after the scrap collection. Comparing the EM pre-survey conducted 19 September 2006 and the EM time lapse survey conducted 12 July 2007, the background values of the data from the time

lapse survey is of a similar magnitude to the pre-survey except for in the northern third of the grid where the time lapse values are 20 to 30 mV smaller than the pre-survey values.

Looking at the magnetic pre-survey conducted on 22 September 2007 versus the magnetic time lapse conducted 12 July 2007, the background response is mostly 20 nT or more greater since the pre-survey was conducted; however, nearly all of the seed items had a response of at least 20 nT less than when the pre-survey occurred. There are several large pre-existing anomalies, particularly in the southeastern portion of the grid, that are greater in magnitude and area compared to the pre-survey.

There is little difference of background response between the magnetics post-survey conducted on 22 September 2007 versus the magnetics time lapse survey conducted 12 July 2007; however, there are several areas of elevated background response, especially in the southeastern portion of the grid, of at least 30 nT since the original post-survey was conducted. With the exception of the areas of elevated background response, nearly all pre-existing anomalies and seed items are 20 to 30 nT less than when the post-survey was conducted.

APPENDIX A
SCOPE OF WORK

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

Prepared for:

United States Army Engineering and Support Center, Huntsville
Attn: CEHNC-OE-DC (Roger Young)
P.O. Box 1600
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Contract: W912DY-04-D-0018
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Prepared By:

EODT
EOD TECHNOLOGY, INC.
2229 Old Highway 95
Lenoir City, Tennessee 37771

July 2008

SOW

STATEMENT OF WORK

MAGNETIC INFLUENCE EVALUATION

PROJECT NO. [tbd)
21 July 2006

1.0 BACKGROUND AND GENERAL STATEMENT OF WORK.

The US Army Corps of Engineers manages Munitions and Explosives of Concern (MEC) detection, evaluation, recovery, and disposal operations at current and former military sites across the U.S. The US Army Engineering and Support Center, Huntsville (USAESCH) and the Air Force Research Lab Robotics Division (AFRL) have been jointly developing a magnetic scrap collection system to assist surface clearance of scrap at munitions sites. Some of the effects of the system on subsequent geophysical investigations will be evaluated under this task order.

2.0 OBJECTIVE.

The objective of this task order is for the contractor to perform total field magnetometry and electromagnetic induction pre-operational and post-operations geophysical surveys on a two-acre site where an electromagnetic scrap collection system is operated, in order to evaluate site-specific effects of the system on geophysical investigations.

3.0 SPECIFIC REQUIREMENTS.

The Contractor shall prepare a Work Plan, perform field work, and issue a report on the work as follows:

3.1 (Task 1) Work Plan. This is a firm-fixed price task. The Contractor shall prepare and submit a Work Plan and a Safety Plan in accordance with DIDs MR-005-05, and MR-005-06 that describes the proposed field team, equipment, methodology, data recording and reporting techniques, and submit to the Contracting Officer for approval. It is strongly recommended that all field personnel participating in the field effort be U.S. citizens to avoid schedule delays caused by facility access complications. Note that the site does not contain known or suspected surface or subsurface UXO, and that no Contractor UXO safety escort is required. The Work Plan should be constructed so that all field work is scheduled within a 5 consecutive day work week.

3.2 (Task 2) Seed Items. This is a firm-fixed price task. The Contractor shall, working with AFRL, bury 20 seed items within the project site. The seed items shall consist of ferrous steel pipe approximately 2 inches in diameter, 12 inches long, buried horizontally 18 inches deep to the bottom, in an east-west orientation. Each of these seed items shall be surveyed in to the nearest foot.

3.3 (Task 3) Geophysical Survey of Site. This is a firm-fixed price task. The Contractor shall perform geophysical surveys with an EM-61 MkII and a G-858 magnetometer of a 2 acre site at Tyndall Air Force base, in accordance with the approved work plan and that uses integrated geophysical/navigation procedures and quality standards that are typical of OE sites where munitions the size of hand-grenades through 155mm projectiles are anticipated. Lane spacings shall be no larger than one-meter. The site to be mapped will be furnished reasonably free of vegetation and surface impediments, and of other surface hazards to include UXO. Two sets of geophysical surveys are required. A pre-operational EM and mag geophysical survey shall be performed by the Contractor. AFRL will then operate the magnetic scrap collection system over the entire two-acre site, which will require no more than one day. The Contractor shall then perform a post-operational EM and mag geophysical over the same site, using the same procedures as the first geophysical survey.

3.4 (Task 4) Reporting. The Contractor shall prepare an engineering report, augmented with maps, photographs and tables as appropriate, that documents the pre-and post geophysical surveys, the reported strength of the magnetic fields applied by the magnetic scrap collection system, and that compares the results of the two geophysical surveys. The Contractor shall provide color maps representing the results of each the DGM surveys performed. All photos shall be provided in digital JPEG format. All survey data shall be provided in a Microsoft Excel spreadsheet in tabular format. All data shall all be placed on DVD-ROM and provided to the Contracting Officer.

4.0 SCHEDULE AND SUBMITTALS

4.1 Format and Content of Reports. The contractor shall submit reports that are formatted in accordance with paragraphs 1.0 through 1.4 of DID MR 001.

4.2 Review Comments. Various reviewers will have the opportunity to review submittals made by the Contractor under this Contract. The Contractor shall review all comments received through the USAESCH PM

and evaluate their appropriateness based upon their merit and the requirements of the SOW. The Contractor shall provide written response to each comment.

4.3 Correspondence. The Contractor shall keep a record of each phone conversation and written correspondence affecting decisions relating to the performance of this TO. A summary of the phone conversations and written correspondence shall be submitted with the monthly progress report to the Contracting Officer.

4.4 Schedule and Submittals. The Contractor shall submit all deliverable data to the Contracting Officer and other reviewers shown in Section 4.5 IAW the following schedule. All submittals shall be delivered to all addressees no later than the close of business (COB) on the day indicated in this paragraph. The schedule is as follows:

Schedule Element	**Date**
Contract Award (CA)	tbd
Submit Draft Work Plan	10 days after CA
Submit Final Work Plan	10 days after receiving comments on Draft Outline.
Submit Draft Final Report	90 days after CA.
Submit Final Report	30 days after receiving comments on Draft Report.
Monthly Reports (To Contracting Officer plus copy furnished to Mr. Young)	Monthly.
The overall completion date	120 Days after CA.

4.5 Contract Deliverables. The contractor shall furnish copies of the reports as indicated to each addressee listed and in the quantities indicated. Following each submission, comments generated as a result of their review shall be incorporated by the contractor.

ADDRESS
U.S. Army Engineering and Support Center
CEHNC-OE-DC (Roger Young)
P.O. Box 1600
Huntsville, Alabama 35807-4301

QUANTITY
4 Drafts
8 Finals

4.6 Electronic Copies. In addition to the paper copies required for submission, the Contract shall submit 8 copies of the final on CD-ROM or DVD that shall be formatted in Adobe .pdf format.

4.7 Contract DIDs. The following DIDs have submission requirements that may be applicable to this SOW. The DIDs are available on the USAESCH Web Page at http://www.hnd.usace.army.mil/oew/CX_MR_DIDs.aspx

Table 2- Data Item Description Index

Number	Date	Title
MR-001	current	Type 1 Work Plan
MR-005-05	current	Geophysical Investigations
MR-005-06	current	Accident Prevention Plan
MR-045	current	Report/Minutes, Record of Meetings
MR-055	current	Telephone Conservation/Correspondence Records
MR-080	current	Monthly Status Report

5.0 PUBLIC AFFAIRS.

The Contractor shall not make available or publicly disclose any data generated or reviewed under this contract or any subcontract unless specifically authorized by the Contracting Officer. When approached by any person or entity requesting information about the subject of this contract, the Contractor shall defer to the PAO for response. All reports and data generated under this task order are the sole property of the DoD which has unlimited rights regarding its use. Distribution to any other source by the Contractor is prohibited unless authorized by the Contracting Officer.

Section E - Inspection and Acceptance

INSPECTION AND ACCEPTANCE TERMS

Supplies/services will be inspected/accepted at:

CLIN	INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
0001	N/A	N/A	N/A	Government

Section F - Deliveries or Performance

DELIVERY INFORMATION

CLIN	DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
0001	31-DEC-2006	1	US ARMY ENGINEERING & SUPPORT CENTER CEHNC-CT 4820 UNIVERSITY SQUARE HUNTSVILLE AL 35816 SEE "ADMINISTERED BY" FOB: Destination	DACA87

Section G - Contract Administration Data

ACCOUNTING AND APPROPRIATION DATA

AA: 21620200000 088130 252A4LF61K49300826000 ENVR 01110
AMOUNT: $34,406.72
CIN W31RYO620285610001: $34,406.72

APPENDIX B
MAPS

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

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July 2008

APPENDIX B
MAPS

This appendix is included behind this page.

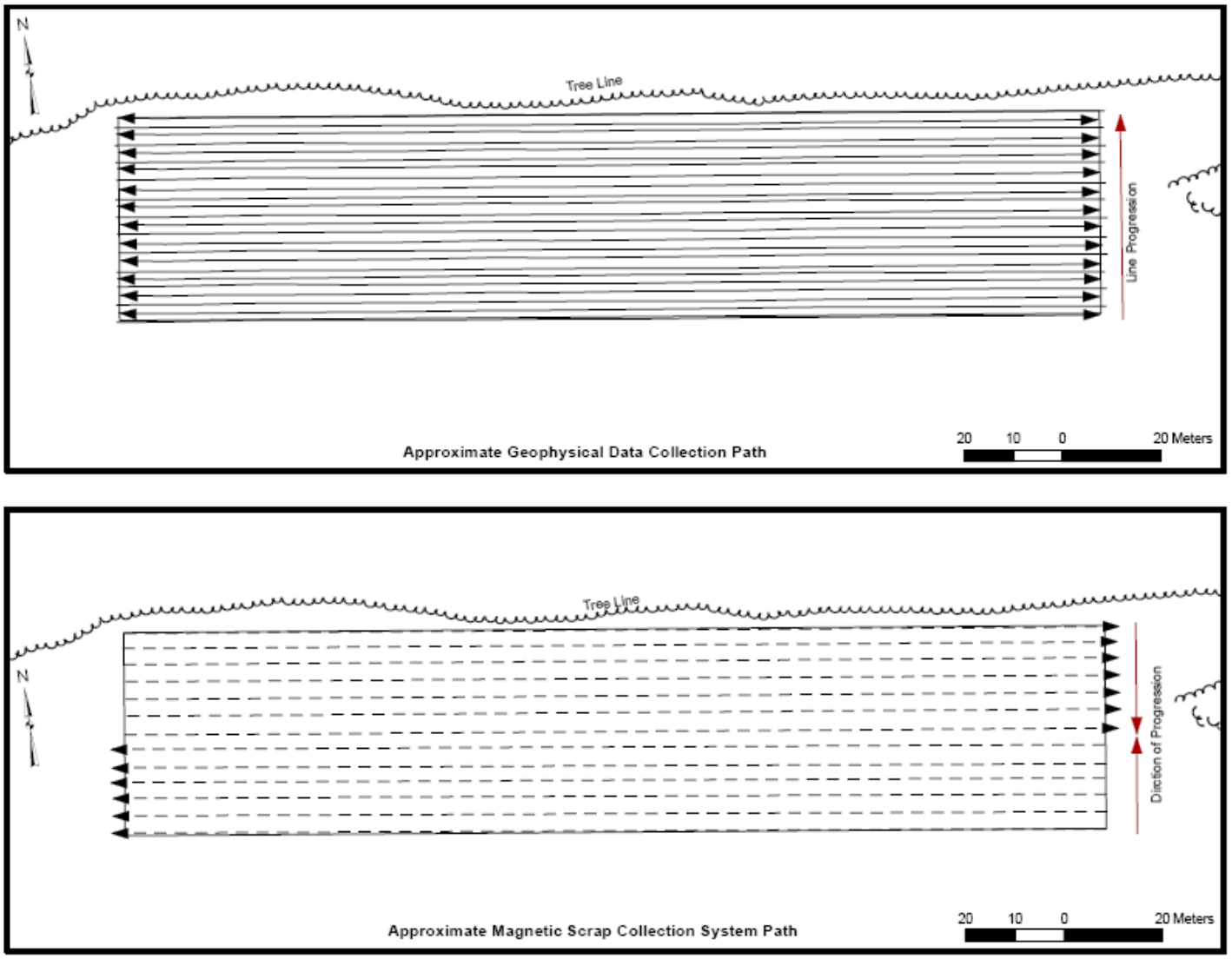
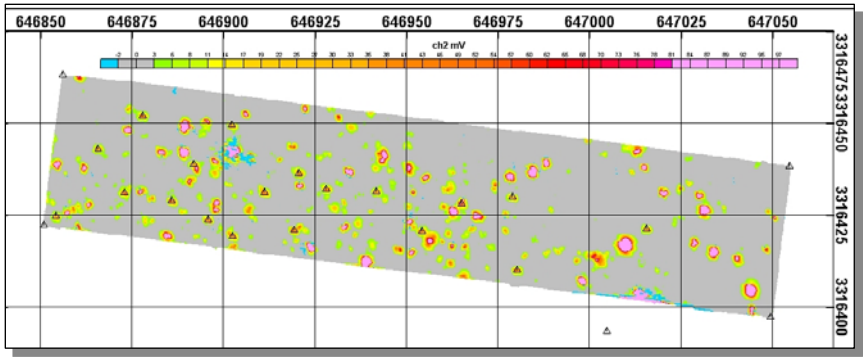
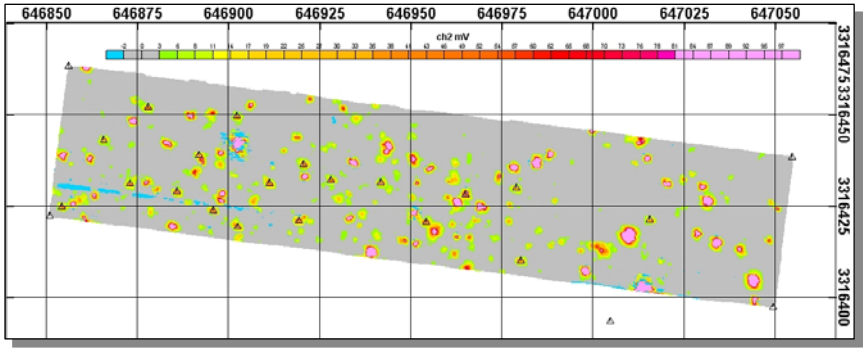


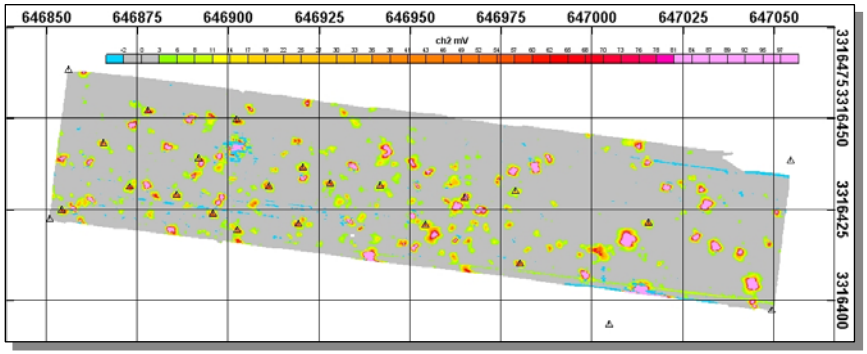
Figure B-1 Field Instrument Operations Plan



EM Baseline – September 2006 Survey Pre-Magnet Operation



EM - September 2006 Survey Post-Magnet Operation

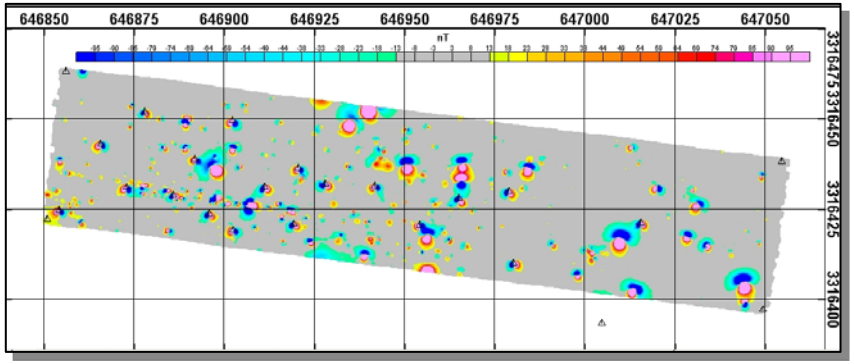


EM - July 2007 Survey Post-Magnet Operation

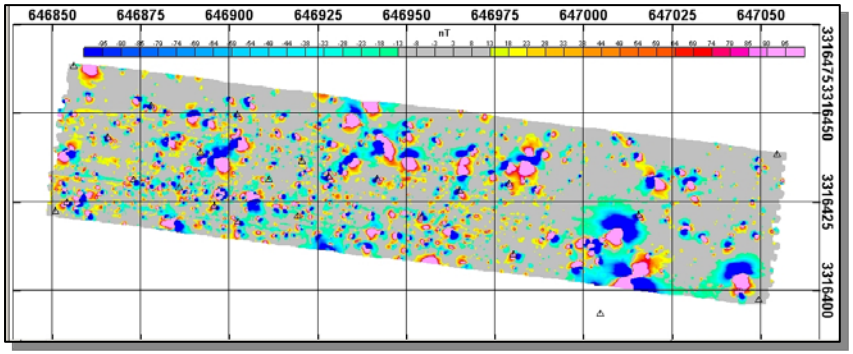
Initial Conclusion

EM61 MKII data does indicate an influence to the targets or soil type (sand) by the AFRL Electromagnet Scrap Collection System; however the elevated EM responses are consistent across the targets and soils and does not appear to negatively impact the identification and selection of targets.

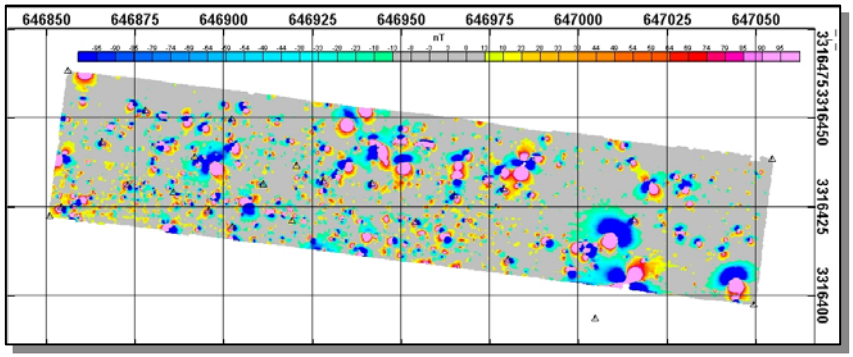
Figure B-2 Time Domain Electromagnetics, Geonics EM61 MK2, Channel 1



Magnetometer Baseline – September 2006 Survey Pre-Magnet Operation



Magnetometer - September 2006 Survey Post-Magnet Operation



Magnetometer - July 2007 Survey Post-Magnet Operation

Initial Conclusion

Magnetometer data indicates strong influence to the targets and the soil type (sand) by the AFRL Electromagnet Scrap Collection System. Additionally, the influence is still present 10 months later.

Figure B-3 Magnetics, Geometrics G-858 Magnetometer, Analytic Signal (nT)

APPENDIX C
GEOPHYSICAL DATA (CD)

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

Prepared for:

United States Army Engineering and Support Center, Huntsville
Attn: CEHNC-OE-DC (Roger Young)
P.O. Box 1600
Huntsville, Alabama 35807-4301

Contract: W912DY-04-D-0018
Task Order: 0009

Prepared By:

EODT
EOD TECHNOLOGY, INC.
2229 Old Highway 95
Lenoir City, Tennessee 37771

July 2008

APPENDIX C
GEOPHYSICAL DATA

This appendix is included behind this page on CD-ROM.

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: MAGNETIC INFLUENCE EVAL. **Project Location:** TYNDALL AFB, FL

Geophysical Contractor: EODT **Design Center POC:** ROGER YOUNG

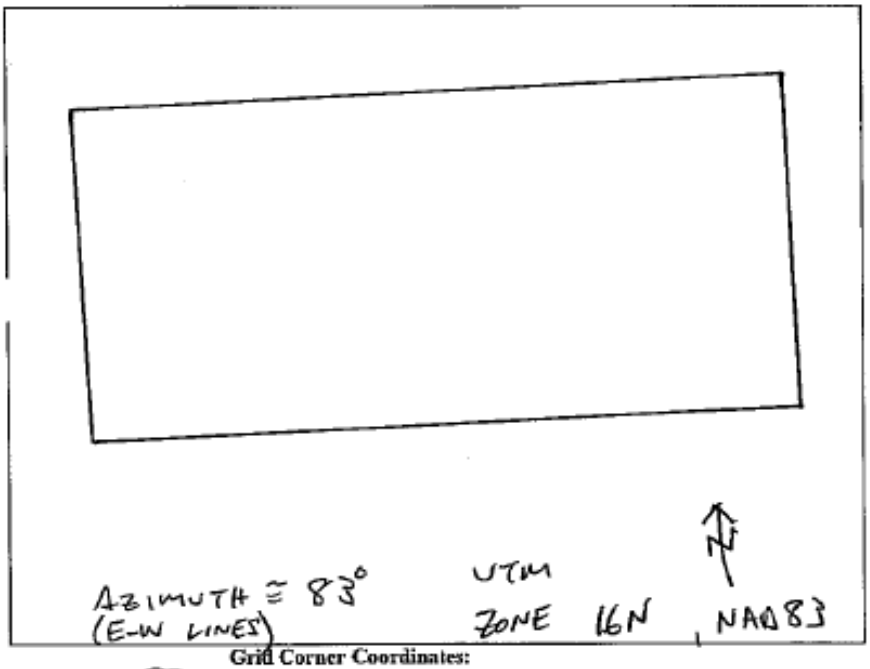
Project Geophysicist: MIKE COMMIER **Site Geophysicist:** MIKE COMMIER

Survey Area ID: AFRL SITE 3 **Date:** 09/18/06 **Field Team:** RICHARD PENNY, JOHN CLARK

Survey Type: ☒ Grid ☐ Meandering Path ☐ Transect ☐ Other _____

Coordinate System: ☒ UTM ☐ State Plane NAD _____ ☐ Local ☐ Other _____ **Unit of Measure:** ☒ meters ☐ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☒ Level ☐ Moderate Slope ☐ Steep
☐ Rolling ☐ Ruts ☐ Gullies
☐ Rocky ☐ Swampy ☐ Dangerous

Tree Cover: **Tree Height:** ____
☒ None ☐ Light ☐ Medium ☐ Thick

Brush:
☒ None ☐ Light ☐ Medium ☐ Thick

Weather:
☒ Sunny ☐ Cloudy ☐ Drizzle
☒ Rain ☒ Thunderstorms ☐ Hail
☐ Fog ☐ Humid ☐ Snow

Grid Corner Coordinates:

	(UTM) State Plane	Local
SW	646850.98, 3316422.17	0, 0
NW	646856.15, 3316463.24	0, 41.4
NE	647054.58, 3316438.26	200, 41.4
SE	~~646850.98, 3316422.17~~ 647049.91, 3316397.19	200, 0

	Start	End	File Name
Battery Voltage:	____	____	
Static Background Value:	____	____	_____, _____
Static Response Value:	____	____	_____, _____
Instrument Clock Drift:	_____		

Raw Data File Name: _____ **Repeat Data File Name:** _____

Geophysical Instrumentation: G-858 MAGS, EM61 MK2 TOWED ARRAY **Serial Number:** _____

Base Station: TRIMBLE GPS, G-858 MAG **Serial Number:** _____

Navigation Method: TRIMBLE GPS **Serial Number:** _____

Additional Comments: _____

APPENDIX D
DAILY LOG

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

Prepared for:

United States Army Engineering and Support Center, Huntsville
Attn: CEHNC-OE-DC (Roger Young)
P.O. Box 1600
Huntsville, Alabama 35807-4301

Contract: W912DY-04-D-0018
Task Order: 0009

Prepared By:

EODT
EOD TECHNOLOGY, INC.
2229 Old Highway 95
Lenoir City, Tennessee 37771

July 2008

APPENDIX D
DAILY LOG

Magnetic Influence Evaluation Project Daily Log

Tyndall Air Force Base, FL

September, 2006

Saturday, Sept. 16 – Tested G-8585 gear and it seemed to work fine. The GPS was communicating as expected with the G858 data logger. Packed up all the equipment and then started the mobilization to Panama City, FL. Drove as far as Columbus, GA and spent the night there.

Sunday, Sept. 17 – Continued with the mobilization. Just north of Douthan, AL, about 45 miles north of Panama City, the F350 towing the trailer broke down. The problem was a bad transfer case. The truck was towed to the Ford dealer and a U-Haul truck was rented. The gear was transferred to the U-Haul and the trailer connected. The mobilization was completed at 2200 that night.

Monday, Sept. 18 – Met Air Force Robotics Lab POC, Mike Derringer and his subordinates, Bill and Lee about 0800. They gave us a safety briefing, then escorted us to the project area. We established a 200m x 41.4m rectangular work area using the Trimble GPS. At the same time, the 20 seed items were emplaced and subsequently had their positions established using GPS. This work was completed by 1230. We then set-up and tested the EM61 Mk2 towed array system. It was found that the Polaris Ranger was the apparent source of intermittent noisy data. We then used the AFRL John Deere Gator and had acceptable results. Rain, thunder and lightning were intermittent sources of delay throughout the day, costing about 75 minutes. We had to leave by 1530, as that is the quitting time at the facility.

Tuesday, Sept.19 - Arrived at the gate at 0700, proceeded to the test site and completed the tailgate safety briefing. We completed EM61 AM static and latency tests then proceeded to collect the 2 acre project site with no problems (1030 finish). About 1.5 hours was spent in pure data collection time, including a repeat of the first line collected on the grid. Rain came in at that point and lasted until about 1330. Took a look at the data and determined that it was acceptable. Assembled the G-858 magnetics gear and were all set to go but then had intermittent GPS communication issues. The problem is an intermittent one, but seems to be associated with the cabling as opposed to the GPS gear or output. The electronics lab here at Tyndall AFRL will look at the suspect cable first thing in the morning. We left at 1600. Lee, the client rep. stayed late with us.

Wednesday, Sept. 20 – Arrived at the gate at 0700, proceeded to the test site and completed the tailgate safety briefing. Went to the electronics shop where they repaired our faulty cable (disconnected resistor in the serial plug that accepts the GPS input). Returned to the site where we tested everything and found it all to be in good working order. We completed G-858 AM static test then proceeded to collect the 2 acre project site with no problems (1030 finish). About 1.5 hours was spent in pure data collection time, including a repeat of the last line collected on the grid. We then completed the PM

static test and did the latency test. Took a look at the data and determined that it was acceptable. While doing maintenance on the towed array it was discovered that we had a broken axle. Lee took the problem to the AFRL facility and started the process of having one made for us. We packed up and left at 1330. AFRL was planning on running their magnetic scrap collection system this afternoon. The weather was beautiful today….sunny, calm, 85 degrees.

Thursday, Sept. 21 – Arrived at the gate at 0700, proceeded to the test site and completed the tailgate safety briefing. AFRL was not able to run their magnetic scrap collection system yesterday, due to technical problems. AFRL continued to work out their technical issues this morning and finished their magnetic scrap collector coverage of the project grid by 1200. While waiting, we completed the G-858 AM static test and the octant test. We then finished repairing the EM61 towed array trailer with the new axle that AFRL made for us. We then proceeded to collect the 2 acre project site with no problems (1430 finish). About 1.5 hours was spent in pure data collection time, including a repeat of the last line collected on the grid. We then completed the PM static test and downloaded the data. It was noticed today that one of the seed items (S-2) had been inadvertently placed just outside the boundary of the grid and so cannot be considered in the study. We packed up and left at 1330. The weather was beautiful today….sunny, calm, 88 degrees.

Friday, Sept. 22 – Arrived at the gate at 0700, proceeded to the test site and completed the tailgate safety briefing. We conducted an AM static test for the G-858 and re-collected a 25m line segment that had bad data. We then collected the PM static test and downloaded the data. Next, we conducted the AM static test for the EM61. We then proceeded to collect the 2 acre project site with no problems (1100 finish). About 1.2 hours was spent in pure data collection time, including a repeat of the first line collected on the grid. We completed the PM static test and downloaded the data. Everything looked good. Roger Young went along with our suggestion of leaving the seed items emplaced so that future surveys could be conducted over the area to observe the effects of time with respect to the seed items and their magnetic condition. We packed up the rented Geometrics mag gear and left it for pick-up by Fedex. Packed up the truck and trailer and departed the site at 1400. The weather was intermittent sun and showers, sometimes heavy.

Saturday, Sept. 23 - Demobilized all people and equipment from the project to Lenoir City, TN.

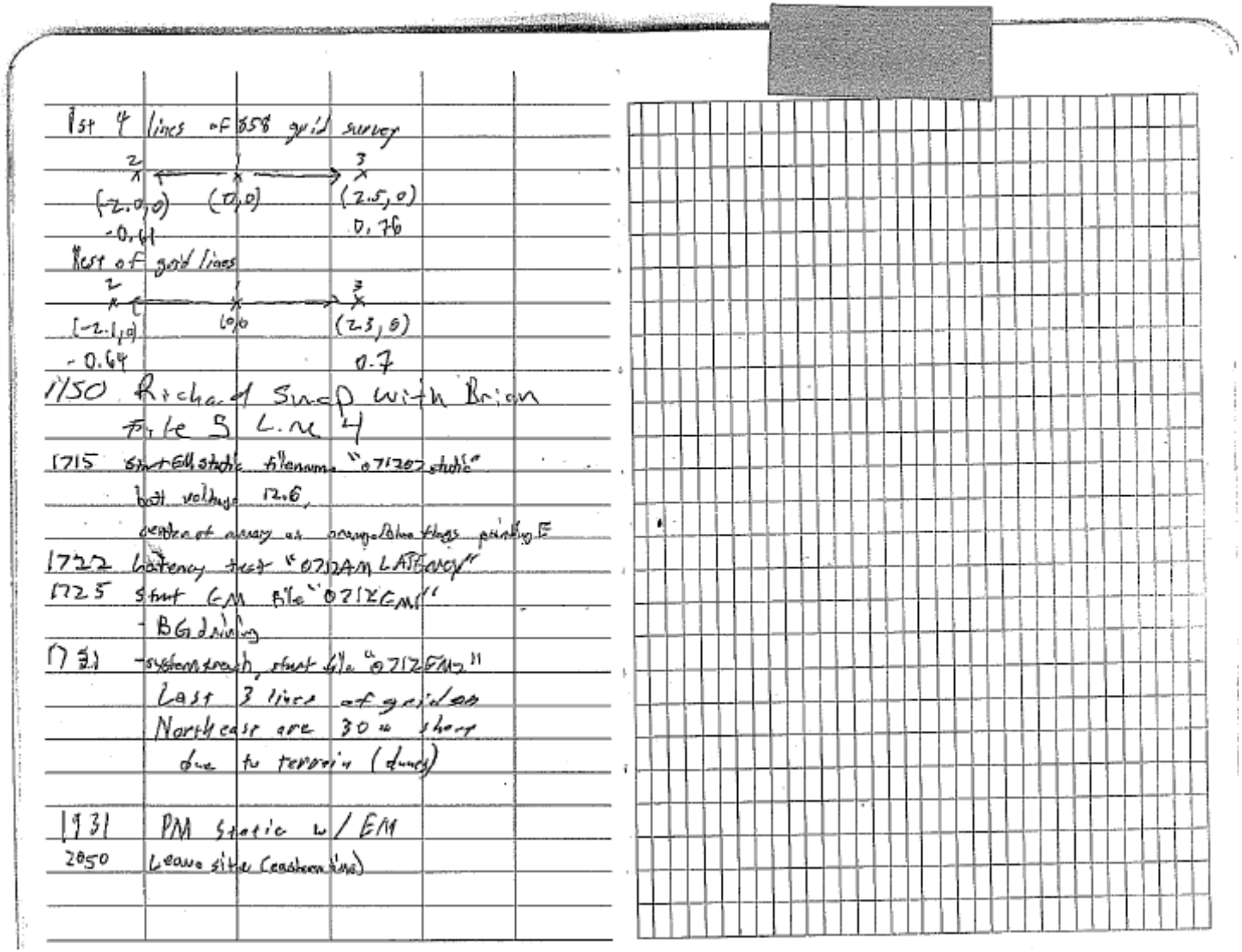
7/12/07

Magnetic Influence Survey - Tyndall AFB

0650 Drive out from Hotel
Richard Perry, Brian Gafney, Heeson Chung
0710 Visitor Center for Tyndall AFB
0730 Meet w/ Mike [illegible] at Robotics Research Lab
0740 Tailgate safety - heat stress
0745 Setup basestation CP02 - HC
Setup mag cart + mag basestation - RP and BG
0930 grid setup
0945 mag ~~[illegible] test~~ HC 7/12/07 setup
S/N 29168 ([illegible] console) - C1823 ([illegible] sensor)
29465 (new console) - C951 ([illegible]) [illegible]
- C1712 ([illegible]) [illegible]

1000 858 Octant test (already located in
R. Perry B. Gafney NW corner of [illegible]
~~1000~~ [illegible]) File #1
1015 858 AM Static Test 3 min no
R. Perry B. Gafney 1 min with
1 min no File #2

1100 859 latency test File #3
H. Chung, B. Gafney
1116 858 grid survey File #4
H. Chung, B. Gafney


1st 4 lines of 858 grid survey
2 (-2.0,0) 1 (0,0) 3 (2.5,0)
-0.61 0.76
Rest of grid lines
2 1 3
[-2.1,0] 0,0 (2.5,0)
-0.64 0.7
1150 Richard Swap with Brian
File 5 Ln 4
1715 Start EM static filename "071207 static"
batt voltage 12.6
center of array at orange/blue flags pointing E
1722 latency test "071AM LATENCY"
1725 start GM file "071GEM"
- BG driving
1731 - system trash, start file "071PM"
Last 3 lines of grid on
Northeast are 30 m short
due to terrain (dune)
1931 PM static w/ EM
2050 Leave site (cashews line)

APPENDIX E
SAFETY RECORDS

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

Prepared for:

United States Army Engineering and Support Center, Huntsville
Attn: CEHNC-OE-DC (Roger Young)
P.O. Box 1600
Huntsville, Alabama 35807-4301

Contract: W912DY-04-D-0018
Task Order: 0009

Prepared By:

EODT
EOD TECHNOLOGY, INC.
2229 Old Highway 95
Lenoir City, Tennessee 37771

July 2008

APPENDIX E
SAFETY RECORDS

ACCEPTANCE FORM

ABBREVIATED SITE SAFETY AND HEALTH PLAN
FOR THE
TYNDALL AIR FORCE BASE TWO ACRE TEST SITE.

I have read and agree to abide by the contents of the Abbreviated Site Safety and Health Plan, and I have attended the Safety Briefing for the aforementioned site.

NAME (PRINTED)	OFFICE	SIGNATURE	DATE
MIKE CONNIER	EODT	Mike Connier	09/16/06
RICHARD PENNY	EODT	Richard Penny	09/16/06
JOHN CLARK	EODT	John Clark	09/16/06

Person Presenting the Safety Briefing: MIKE CONNIER

Signature: Mike Connier Date: 09/16/06

ACCEPTANCE FORM

ABBREVIATED SITE SAFETY AND HEALTH PLAN
FOR THE
TYNDALL AIR FORCE BASE TWO ACRE TEST SITE.

I have read and agree to abide by the contents of the Abbreviated Site Safety and Health Plan, and I have attended the Safety Briefing for the aforementioned site.

NAME (PRINTED)	OFFICE	SIGNATURE	DATE
Herman Chang	EODT	Herman Chang	7/2/07
Richard Perry	EODT	Richard M. Perry II	7/2/07
Bruce Geesey	EODT	Bruce Geesey	7/2/07

Person Presenting the Safety Briefing:

Signature: Herman Chang Date: 7/2/07

EODT DAILY INSPECTION AND WEEKLY AUDIT LOG FOR GEOPHYSICAL OPERATIONS

DATE: 9/22/06	TIME:	LOG NO.:
CONTRACT NO.: W912DY-04-D-0018	TASK ORDER NO.: 9	
SITE NAME AND LOCATION: AFRL SITE 3, TYNDALL AFB, FL		

WEATHER CONDITIONS: GENERALLY SUNNY SOME RAIN + THUNDER/LIGHTNING ON MON., TUES, FRIDAY.

I. AREAS INSPECTED: (List by grid number, Team or task) GEOPHYSICAL TEAM WORKING AT AFRL, SITE #3, TYNDALL AFB, FL

II. INSPECTION RESULTS

Item Description	Pass	Item Description	Pass
1. Personal Protection (PPE) per SSHP	(Y) / N	9. Geophysical Detection Equipment	(Y) / N
2. Work Practices Follow SSHP/WP	(Y) / N	10. Geophysical Detection Equipment Calibration	(Y) / N
3. Site Control/Decon per SSHP N/A	Y / N	11. MSDSs and Container Labeling per SSHP	(Y) / N
4. First Aid Kit(s)/Eyewash Station(s)	(Y) / N	12. On- and Off-Site Communications	(Y) / N
5. Fire Extinguisher(s)	(Y) / N	13. Site House Keeping	(Y) / N
6. Flammable Storage Areas N/A	Y / N	14. Explosives / Ordnance Storage Areas	NA
7. Safety and Health Monitoring Equipment Use	(Y) / N	15. Other: (list)	Y / N
8. Monitoring Equipment Calibration	(Y) / N	16. Other: (list)	Y / N

III. SUMMARY OF DEFICIENCIES NOTED: (If Required)

IV. CORRECTIVE ACTIONS RECOMMENDED: (If required)

V. REINSPECTION RESULTS: (If required)

VI. SIGNATURES:

Site Safety and Health Officer

I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (if necessary)

Sr. UXO Supervisor / Project Manager

Note: Safety Inspections are to be conducted each day and documented on this form. This form will also be used to document the Weekly Safety Audit conducted at the end of each workweek. The weekly audit will not only indicate the present status of the site/site operations, but will also be used to note the current status of deficiencies noted during daily inspections. Any daily inspection forms where deficiencies have been noted, and the weekly audit will be faxed to the EODT Occupational Safety and Health Manager

EODT DAILY INSPECTION AND WEEKLY AUDIT LOG FOR GEOPHYSICAL OPERATIONS

DATE: 7/12/08	TIME: 1340	LOG NO.: 1
CONTRACT NO.: W912DY-04-D-0018	TASK ORDER NO.: 9	
SITE NAME AND LOCATION: Air Force Robotics Lab, Tyndall AFB		
WEATHER CONDITIONS: Clear Sky, 90°		

I. AREAS INSPECTED: (List by grid number, Team or task) MLE Grid

II. INSPECTION RESULTS

Item Description	Pass	Item Description	Pass
1. Personal Protection (PPE) per SSHP	Y / N	9. Geophysical Detection Equipment	Y / N
2. Work Practices Follow SSHP/WP	Y / N	10. Geophysical Detection Equipment Calibration	Y / N
3. Site Control/Decon per SSHP N/A	Y / N	11. MSDSs and Container Labeling per SSHP	Y / N
4. First Aid Kit(s)/Eyewash Station(s)	Y / N	12. On- and Off-Site Communications	Y / N
5. Fire Extinguisher(s)	Y / N	13. Site House Kasping	Y / N
6. Flammable Storage Areas N/A	Y / N	14. Explosives / Ordnance Storage Areas	NA
7. Safety and Health Monitoring Equipment Use	Y / N	15. Other: (list)	Y / N
8. Monitoring Equipment Calibration	Y / N	16. Other: (list)	Y / N

III. SUMMARY OF DEFICIENCIES NOTED: (If Required)

IV. CORRECTIVE ACTIONS RECOMMENDED: (If required)

V. REINSPECTION RESULTS: (If required)

VI. SIGNATURES:

Site Safety and Health Officer

I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (if necessary)

Sr. UXO Supervisor / Project Manager

Note: Safety inspections are to be conducted each day and documented on this form. This form will also be used to document the Weekly Safety Audit conducted at the end of each workweek. The weekly audit will not only indicate the present status of the site/site operations, but will also be used to note the current status of deficiencies noted during daily inspections. Any daily inspection forms where deficiencies have been noted, and the weekly audit will be faxed to the EODT Occupational Safety and Health Manager

SAFETY BRIEFING CHECKLIST

(Check subjects discussed)

The Tyndall Air Force Base Two-Acre Test Site. Date: 09/18/06

General Information

- [X] Purpose of Visit
- [X] Identify Key Site Personnel
- [ ] Training & Medical Requirements

Site Specific Information

- [X] Site Description/Past Uses
- [ ] Results of Previous Studies
- [X] Potential Site Hazards
- [X] OE Safety Procedures
- [ ] Site SOPS
- [X] Site Control and Communications
  - ( ) Emergency Hand Signals
- [X] Emergency Response
  - (✓) Location of First Aid Kit
  - (✓) Emergency Phone Numbers & Location
  - (✓) Location of Nearest Medical Facility & Location of Map to Facility
- [ ] PPE and decontamination
- [ ] Sensitive or Endangered/threatened Species or Habitats

Stress the following during the briefings:

If an unanticipated hazardous condition arises, stop work, evacuate the immediate area, and notify the Project Geophysicist.

SAFETY BRIEFING CHECKLIST

(Check subjects discussed)

The Tyndall Air Force Base Two-Acre Test Site. Date: 09/19/06

General Information

- ☐ Purpose of Visit
- ☐ Identify Key Site Personnel
- ☐ Training & Medical Requirements

Site Specific Information

- ☐ Site Description/Past Uses
- ☐ Results of Previous Studies
- ☒ Potential Site Hazards
- ☐ OE Safety Procedures
- ☐ Site SOPS
- ☐ Site Control and Communications
  - ( ) Emergency Hand Signals
- ☐ Emergency Response
  - ( ) Location of First Aid Kit
  - ( ) Emergency Phone Numbers & Location
  - ( ) Location of Nearest Medical Facility & Location of Map to Facility
- ☐ PPE and decontamination
- ☐ Sensitive or Endangered/threatened Species or Habitats

Stress the following during the briefings:

If an unanticipated hazardous condition arises, stop work, evacuate the immediate area, and notify the Project Geophysicist.

SAFETY BRIEFING CHECKLIST

(Check subjects discussed)

The Tyndall Air Force Base Two-Acre Test Site. Date: 09/20/06

General Information

- ☐ Purpose of Visit
- ☐ Identify Key Site Personnel
- ☐ Training & Medical Requirements

Site Specific Information

- ☐ Site Description/Past Uses
- ☐ Results of Previous Studies
- ☒ Potential Site Hazards
- ☐ OE Safety Procedures
- ☐ Site SOPS
- ☐ Site Control and Communications
  - ( ) Emergency Hand Signals
- ☐ Emergency Response
  - ( ) Location of First Aid Kit
  - ( ) Emergency Phone Numbers & Location
  - ( ) Location of Nearest Medical Facility & Location of Map to Facility
- ☐ PPE and decontamination
- ☐ Sensitive or Endangered/threatened Species or Habitats

Stress the following during the briefings:

If an unanticipated hazardous condition arises, stop work, evacuate the immediate area, and notify the Project Geophysicist.

SAFETY BRIEFING CHECKLIST

(Check subjects discussed)

The Tyndall Air Force Base Two-Acre Test Site. Date: 09/21/06

General Information

- ☐ Purpose of Visit
- ☐ Identify Key Site Personnel
- ☐ Training & Medical Requirements

Site Specific Information

- ☐ Site Description/Past Uses
- ☐ Results of Previous Studies
- ☒ Potential Site Hazards
- ☐ OE Safety Procedures
- ☐ Site SOPS
- ☐ Site Control and Communications
  - ( ) Emergency Hand Signals
- ☐ Emergency Response
  - ( ) Location of First Aid Kit
  - ( ) Emergency Phone Numbers & Location
  - ( ) Location of Nearest Medical Facility & Location of Map to Facility
- ☐ PPE and decontamination
- ☐ Sensitive or Endangered/threatened Species or Habitats

Stress the following during the briefings:

If an unanticipated hazardous condition arises, stop work, evacuate the immediate area, and notify the Project Geophysicist.

SAFETY BRIEFING CHECKLIST

(Check subjects discussed)

The Tyndall Air Force Base Two-Acre Test Site. Date: 09/22/06

General Information

- ☐ Purpose of Visit
- ☐ Identify Key Site Personnel
- ☐ Training & Medical Requirements

Site Specific Information

- ☐ Site Description/Past Uses
- ☐ Results of Previous Studies
- ☒ Potential Site Hazards
- ☐ OE Safety Procedures
- ☐ Site SOPS
- ☐ Site Control and Communications
  - ( ) Emergency Hand Signals
- ☐ Emergency Response
  - ( ) Location of First Aid Kit
  - ( ) Emergency Phone Numbers & Location
  - ( ) Location of Nearest Medical Facility & Location of Map to Facility
- ☐ PPE and decontamination
- ☐ Sensitive or Endangered/threatened Species or Habitats

Stress the following during the briefings:

If an unanticipated hazardous condition arises, stop work, evacuate the immediate area, and notify the Project Geophysicist.

SAFETY BRIEFING CHECKLIST

(Check subjects discussed)

The Tyndall Air Force Base Two-Acre Test Site. Date: 7/12-01

General Information

- ☑ Purpose of Visit
- ☑ Identify Key Site Personnel
- ☐ Training & Medical Requirements

Site Specific Information

- ☑ Site Description/Past Uses
- ☑ Results of Previous Studies
- ☑ Potential Site Hazards
- ☑ OE Safety Procedures
- ☐ Site SOPS
- ☑ Site Control and Communications
  - ( ) Emergency Hand Signals
- ☑ Emergency Response
  - ( ) Location of First Aid Kit
  - ( ) Emergency Phone Numbers & Location
  - ( ) Location of Nearest Medical Facility & Location of Map to Facility
- ☐ PPE and decontamination
- ☐ Sensitive or Endangered/threatened Species or Habitats

Stress the following during the briefings:

If an unanticipated hazardous condition arises, stop work, evacuate the immediate area, and notify the Project Geophysicist.

EODT SAFETY TRAINING ATTENDANCE LOG
GEOPHYSICAL OPERATIONS

Date: 9/18/06	Instructor(s):	Time:	Log No.:
Contract Number: W912DY-04-D-0018		Delivery Order Number: 9	
Site Name & Location: TYNDALL AFB, FL			

Training Provided: ☐ Initial Site Hazard Training ☐ Weekly Safety Training
Other: ☒ Tailgate Safety Briefing ☐ Task/Hazard Specific Trng

I. TRAINING TOPICS COVERED

Work Plan and /SSHP: PURPOSE, COMMUNICATION, FIRST AID
UXO/OE Hazards: NA
Chemical Hazards: NA
Physical Hazards:
Emergency Procedures:
Other: SLIPS, TRIPS, FALLS, LIGHTNING, HEAT

II. TRAINING COURSE ATTENDEES

Name (printed)	Signature	Organization
MIKE CORMIER		EODT
RICHARD PERRY		EODT
JOHN CLARK		EODT

III. TRAINING VERIFICATION

I certify that the personnel listed on this roster (to include the second page if needed) have received the safety training described above.

Site Safety and Health Officer

Sr. UXO Supervisor / Project Manager

EODT SAFETY TRAINING ATTENDANCE LOG
GEOPHYSICAL OPERATIONS

Date: 9/19/06	Instructor(s):	Time:	Log No.:
Contract Number: W912DY-04-0018		Delivery Order Number: 9	
Site Name & Location: TYNDALL AFB, FL			

Training Provided: ☐ Initial Site Hazard Training ☐ Weekly Safety Training
Other: ☒ Tailgate Safety Briefing ☐ Task/Hazard Specific Trng _____

I. TRAINING TOPICS COVERED

Work Plan and /SSHP: _____
UXO/OE Hazards: NA
Chemical Hazards: NA
Physical Hazards: _____
Emergency Procedures: _____
Other: LIGHTNING

II. TRAINING COURSE ATTENDEES

Name (printed)	Signature	Organization
MIKE CONNIER	Michael Connier	EODT
RICHARD PERRY	Richard Perry	EODT
JOHN CLARK	John Clark	EODT

III. TRAINING VERIFICATION

I certify that the personnel listed on this roster (to include the second page if needed) have received the safety training described above.

Michael Connier
Site Safety and Health Officer

Sr. UXO Supervisor / Project Manager

EODT SAFETY TRAINING ATTENDANCE LOG
GEOPHYSICAL OPERATIONS

Date: 9/20/06	Instructor(s):	Time:	Log No.:
Contract Number: W912DY-04-D-0018		Delivery Order Number: 9	
Site Name & Location: TYNDALL AFB, FL			

Training Provided: ☐ Initial Site Hazard Training ☐ Weekly Safety Training
Other: ☒ Tailgate Safety Briefing ☐ Task/Hazard Specific Trng _____

I. TRAINING TOPICS COVERED

Work Plan and /SSHP: _____
UXO/OE Hazards: NA
Chemical Hazards: NA
Physical Hazards: _____
Emergency Procedures: _____
Other: HEAT

II. TRAINING COURSE ATTENDEES

Name (printed)	Signature	Organization
MIKE CONNIER	Michael Connier	EODT
RICHARD PENNY	Richard Penny	"
JOHN CLARK	John Clark	"

III. TRAINING VERIFICATION

I certify that the personnel listed on this roster (to include the second page if needed) have received the safety training described above.

Michael Connier
Site Safety and Health Officer

Sr. UXO Supervisor / Project Manager

EODT SAFETY TRAINING ATTENDANCE LOG
GEOPHYSICAL OPERATIONS

Date: 9/21/06	Instructor(s):	Time:	Log No.:
Contract Number: W912DY-04-D-0018		Delivery Order Number: 9	
Site Name & Location:			

Training Provided: ☐ Initial Site Hazard Training ☐ Weekly Safety Training
Other: ☒ Tailgate Safety Briefing ☐ Task/Hazard Specific Trng _____

I. TRAINING TOPICS COVERED

Work Plan and /SSHP: _____
UXO/OE Hazards: NA
Chemical Hazards: NA
Physical Hazards: _____
Emergency Procedures: _____
Other: SLIPS, TRIPS, FALLS

II. TRAINING COURSE ATTENDEES

Name (printed)	Signature	Organization
MIKE CONNLEN		EODT
RICHARD PERRY		"
JOHN CLARK		"

III. TRAINING VERIFICATION

I certify that the personnel listed on this roster (to include the second page if needed) have received the safety training described above.

Site Safety and Health Officer

Sr. UXO Supervisor / Project Manager

EODT SAFETY TRAINING ATTENDANCE LOG
GEOPHYSICAL OPERATIONS

Date: 9/22/06	Instructor(s):	Time:	Log No.:
Contract Number: W912DY-04-D-0018		Delivery Order Number: 9	
Site Name & Location:			

Training Provided: ☐ Initial Site Hazard Training ☐ Weekly Safety Training
Other: ____X Tailgate Safety Briefing ☐ Task/Hazard Specific Trng ____

I. TRAINING TOPICS COVERED

Work Plan and /SSHP: ____
UXO/OE Hazards: NA
Chemical Hazards: NA
Physical Hazards: ____
Emergency Procedures: ____
Other: LIGHTNING

II. TRAINING COURSE ATTENDEES

Name (printed)	Signature	Organization
MIKE CORMIER	Michael Cormier	EODT
RICHARD PERRY	Richard Perry	"
JOHN CLARK	John Clark	"

III. TRAINING VERIFICATION

I certify that the personnel listed on this roster (to include the second page if needed) have received the safety training described above.

Michael Cormier
Site Safety and Health Officer

Sr. UXO Supervisor / Project Manager

EODT SAFETY TRAINING ATTENDANCE LOG
GEOPHYSICAL OPERATIONS

Date: 7/12/07	Instructor(s): H. Chang	Time: 0740	Log No.: 001
Contract Number: W912DY-04-D-0018		Delivery Order Number: 9	
Site Name & Location: Air Force Robotics Lab, Tyndall, AFB, FL			

Training Provided: Initial Site Hazard Training — Weekly Safety Training
Other: ____ X Tailgate Safety Briefing — Task/Hazard Specific Trng ____

I. TRAINING TOPICS COVERED

Work Plan and /SSHP: Personal Communication, First aid
UXO/OE Hazards: NA
Chemical Hazards: NA
Physical Hazards: Heat related emergency
Emergency Procedures:
Other: Snakes, Knives, Cattle, lightning, heat

II. TRAINING COURSE ATTENDEES

Name (printed)	Signature	Organization
Heesoo Chang	Heesoo Chang	EODT
Richard Perry	Richard M. Perry II	EODT
Brian Gentry	Brian Gentry	EODT

III. TRAINING VERIFICATION

I certify that the personnel listed on this roster (to include the second page if needed) have received the safety training described above.

Site Safety and Health Officer — Sr. UXO Supervisor / Project Manager

APPENDIX F
SURVEY DATA

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

Prepared for:

United States Army Engineering and Support Center, Huntsville
Attn: CEHNC-OE-DC (Roger Young)
P.O. Box 1600
Huntsville, Alabama 35807-4301

Contract: W912DY-04-D-0018
Task Order: 0009

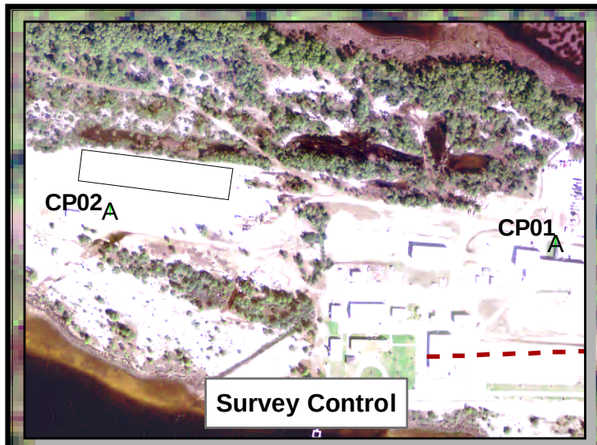
Prepared By:

EODT
EOD TECHNOLOGY, INC.
2229 Old Highway 95
Lenoir City, Tennessee 37771

July 2008

APPENDIX F
SURVEY DATA

This appendix is included behind this page.



PNT_ID	NORTH	EAST	ELEV	COMMENT
CP01	3316340.661	647480.930	2.000	BASE CONTROL
CP02	3316384.270	646893.051	2.000	BASE CONTROL
NE	3316438.262	647054.581	0.720	GRID
NW	3316463.243	646856.147	0.720	GRID
S01	3316410.007	646980.235	1.139	SEED
S02	3316393.353	647004.644	0.936	SEED
S03	3316421.126	647015.499	1.011	SEED
S04	3316429.869	646978.902	1.228	SEED
S05	3316427.964	646965.003	1.104	SEED
S06	3316436.333	646920.590	0.951	SEED
S07	3316449.572	646902.312	1.244	SEED
S08	3316438.898	646891.892	0.929	SEED
S09	3316424.766	646854.233	0.779	SEED
S10	3316451.969	646877.872	0.834	SEED
S11	3316420.595	646954.246	1.095	SEED
S12	3316431.408	646941.677	1.002	SEED
S13	3316431.926	646927.918	1.003	SEED
S14	3316420.872	646919.279	0.963	SEED
S15	3316431.102	646911.132	0.902	SEED
S16	3316419.209	646902.469	0.929	SEED
S17	3316423.691	646895.695	0.873	SEED
S18	3316428.800	646885.890	0.868	SEED
S19	3316431.047	646872.929	0.824	SEED
S20	3316443.022	646865.730	0.857	SEED
SE	3316397.187	647049.410	0.720	GRID
SW	3316422.167	646850.976	0.720	GRID

NW
NE
SW
SE
S10
S07
S20
S08
S06
S19
S18
S15
S13
S12
S05
S04
S09
S17
S16
S14
S11
S03
S01
S02
CP02
A

30 15 0 30 Meters

KEY MAP

NOTES

1. Models generated produced in ArcMap using Spatial Analysts Inverse Weighted Distance (IDW)
   Cell size = 0.2
   Exponent of Distance: 0.5
   Search Radius: Fixed - 4 Meters

2. Delta Mag is generated using Arcmap Spatial Analyst Map Algebra:. A substraction of pre-survey grid values from post-survey grid values.

US Army Engineering and Support Center
Huntsville, Alabama

Title:

Figure F-1
Survey Data

Project:

Magnetic Influence Evaluation
Tyndall Air Force Base, Panama City, Florida

EOD Technology, Inc.
2229 Old Highway 95
Lenior City, TN 37771
PH 865-988-6063, Fax 6067

EODT
EOD TECHNOLOGY, INC.

APPENDIX G
PHOTOGRAPHS

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

Prepared for:

United States Army Engineering and Support Center, Huntsville
Attn: CEHNC-OE-DC (Roger Young)
P.O. Box 1600
Huntsville, Alabama 35807-4301

Contract: W912DY-04-D-0018
Task Order: 0009

Prepared By:

EODT
EOD TECHNOLOGY, INC.
2229 Old Highway 95
Lenoir City, Tennessee 37771

July 2008

APPENDIX G
PHOTOGRAPHS

Photo G1: September 2006 Pre-Survey Conditions

Photo G2: September 2006 Pre-Survey Surface Metallic Debris

Photo G3: September 2006 Pre-Survey Geonics EM-61 MKII Three Sensor Vehicle Towed Array (VTA)

Photo G4: September 2006 Pre-Survey EM-61 MKII VTA Data Collection

Photo G5: September 2006 Pre-Survey Geometrics G-858 Proton Precession Background Monitor

Photo G6: September 2006 Pre-Survey Geometric G-858 Cesium Vapor Total Field Magnetometer Man Portable Towed Array

Photo G7: September 2006 Baseline Survey Geometric G-858 Data Collection

Photo G8: September 2006 Baseline Survey Geometric G-858 Data Collection

Photo G9: September 2006 Air Force Research Laboratory Control Vehicle and Magnetic Scrap Collection System

Photo G10: September 2006 Air Force Research Laboratory Magnetic Scrap Collection System Power and Control Systems

Photo G11: September 2006 Air Force Research Laboratory Magnetic Scrap Collection System in Operation

Photo G12: September 2006 Air Force Research Laboratory Magnetic Scrap Collection System Ground Surface Effects

Photo G13: September 2006 Air Force Research Laboratory Magnetic Scrap Collection System Ground Surface Effects

Photo G14: September 2006 Air Force Research Laboratory Magnetic Scrap Collection System Ground Surface Effects

Photo G15: September 2006 Post Magnet Operation Survey
Geometric G-858 Data Collection

Photo G16: September 2006 Post Magnet Operation Survey
Geometric G-858 Data Collection

Photo G17: September 2006 Post Magnet Operation Survey
Geometric G-858 Data Collection

Photo G18: September 2006 Post Magnet Operation Survey
Geometric G-858 Data Collection

Photo G19: September 2006 Post Magnet Operation
EM-61 MKII VTA Data Collection

Photo G20: September 2006 Post Magnet Operation
EM-61 MKII VTA Data Collection

Photo G21: July 2007 Disturbed Area in the North-East Portion of the Site

Photo G22: July 2007 Disturbed Area in the North-East Portion of the Site

Photo G23: July 2007 Post Magnet Operation Survey
Geometric G-858 Data Collection

Photo G24: July 2007 Post Magnet Operation Survey
Geometric G-858 Data Collection

Photo G25: July 2007 Post Magnet Operation
EM-61 MKII VTA Data Collection

Photo G26: July 2007 Post Magnet Operation
EM-61 MKII VTA Data Collection

Photo G27: July 2007 Post Magnet Operation
EM-61 MKII VTA Data Collection

APPENDIX H
Magnetic Susceptibility Study of Sand at ARFL Test Site #3, Tyndall AFB, Bay County, Florida

FOR THE

MAGNETIC INFLUENCE EVALUATION AT TYNDALL AIR FORCE BASE PANAMA CITY, FLORIDA

Prepared for:

United States Army Engineering and Support Center, Huntsville
Attn: CEHNC-OE-DC (Roger Young)
P.O. Box 1600
Huntsville, Alabama 35807-4301

Contract: W912DY-04-D-0018
Task Order: 0009

Prepared By:

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Lenoir City, Tennessee 37771

July 2008

APPENDIX H
MAGNETIC SUSCEPTIBILITY STUDY OF SAND AT ARFL TEST SITE #3

Magnetic Susceptibility Study of Sand at ARFL Test Site #3, Tyndall AFB, Bay County, Florida

Prepared by: Janet E. Simms, Engineering Geology and Geophysics Branch
and
H. Jay Bennett, Environmental Systems Branch

U. S. Army Engineer Research and Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Prepared for: Roger Young, U. S. Army Engineer Huntsville Center, Advanced Technology Branch

Date: 30 October 2007

DRAFT REPORT

Introduction

The U.S. Army Engineer Huntsville Center (CEHNC), Advanced Technology Branch, requested the U.S. Army Engineer Research and Development Center (ERDC), Geotechnical and Structures Laboratory and Environmental Laboratory, to conduct a magnetic susceptibility study of the local soil present within the Air Force Research Laboratory (AFRL) Test Site #3, located on Tyndall Air Force Base, Bay County, Florida. The local soil is described as a white, fine-grained sand containing some organic material. Visible on the surface are some rocks and asphalt debris. The site likely contains fill material from other areas of the installation (Michael Dearinger, AFRL, personal communication).

The purpose of the soil magnetic susceptibility study is to determine if the soil contains a magnetic component that could influence magnetometer and electromagnetic geophysical sensors such that anomalous background readings could potentially mask targets of interest. The sand is suspected of containing magnetic minerals that could have acquired an enhanced magnetic signature following surface clearance of the site using a magnetic surface clearance system. A comparison of magnetic survey data of the site, acquired by EODT Technology, Inc. in September 2006, prior to use of the magnetic clearance system and following a surface sweep with the system, revealed a significant increase in the number of relevant anomalies present in the post-survey magnetometer data. A subsequent post-magnetic survey, conducted by EODT on 12 July 2007, was comparable to the first post-magnetic survey. A magnetic susceptibility analysis by the ERDC[1] of a sand sample obtained during the 2006 data collection indicated that the sand contained little, or no, magnetic minerals; the magnetic susceptibility values were representative of a non-magnetic sand. Although the sand sample appeared clean, CEHNC requested a more thorough study that coincided with the second post-magnetic survey by EODT in July 2007. This report describes the field data collection effort on 13 July 2007 and laboratory analysis to further evaluate the sand for magnetic properties.

Data Acquisition

The pre- and first post-magnetic survey data collected by EODT in September 2006 were compared to determine the location of five 2-m by 2-m grids. The locations of these grids represent areas in the pre- and post-survey data that contained limited, or no, distinguishable anomalies. The grid locations are shown on plots of the pre- and post-magnetic survey data collected by EODT in Figure 1. Note that the pre- and post-survey 1 data are plotted using the same color scale. The second post-survey data set exhibits a shift in the background values, so the color scale is shifted about 100 nT.

The 2-m grids were aligned with magnetic north. A Geometrics G-858 magnetometer was used to acquire total magnetic field readings along survey lines spaced 25-cm apart, with a sampling rate of 10 Hz. The data were collected along unidirectional lines, i.e., the first data sample of each line was at the southern end. Volume magnetic susceptibility measurements were collected at 50-cm grid spacing using a Bartington MS2D sensor. At least one surface soil sample was collected from each grid; two samples were collected from grids 2 and 5. The soil samples were analyzed in the

[1] Memo by Janet Simms, ERDC, to Jay Bennett, ERDC, and supplied to Roger Young, HNC, dated 20 April 2007, subject: Analysis of Sand Sample.

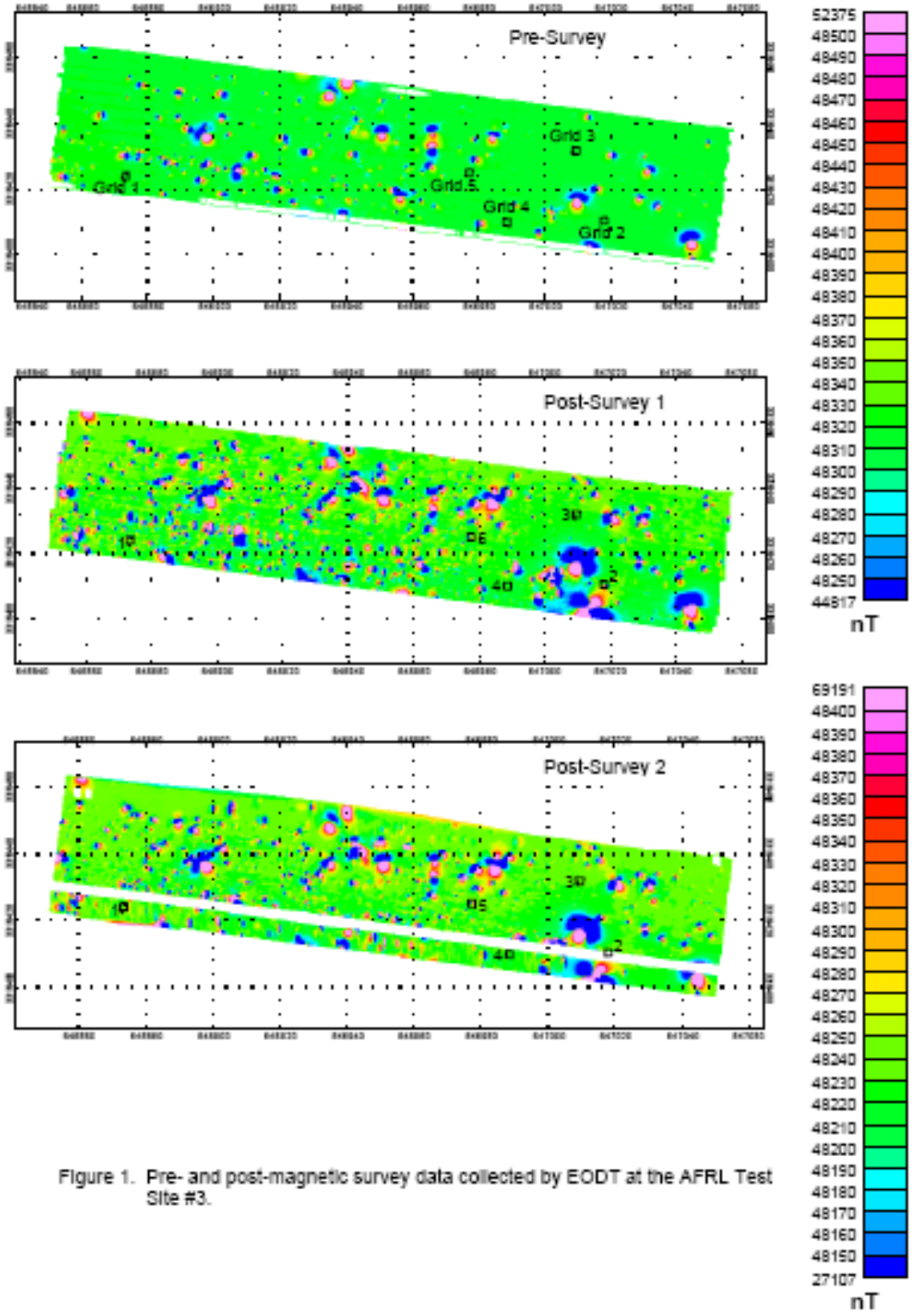


Figure 1. Pre- and post-magnetic survey data collected by EODT at the AFRL Test Site #3.

laboratory using a Bartington MS2B sensor to measure the volume and mass magnetic susceptibility. Several rocks were visible on the surface so one representative sample was collected and brought back to the laboratory for identification. The rock is a white to tan, fine to coarse grained fossiliferous limestone. Evidence of shell fragments and worm burrows suggest the rock formed in a shallow water marine environment.

Data Discussion

The magnetometer and magnetic susceptibility field data are presented on a single plot for each of the five 2-m by 2-m grids (Figure 2). Although an attempt was made to select grid sites free of anomalies, the magnetometer data show that all of the grids have an anomaly present. The anomaly only dominates a portion of the grid, so the magnetic background level is still discernible. None of the grids exhibit an enhanced magnetic background response that would be expected if the soil contained a concentration of magnetic minerals.

In most of the grids, the magnetic susceptibility measurements exhibit minimal influence from the anomalies. The exception is grid 5 (Figure 2e, location (0.5, 1.0)), where a strong volume magnetic susceptibility value was measured directly over the anomaly. Two repeat measurements were acquired. Prior to each measurement, the surface sand was disturbed by sifting the sand through the operator's fingers. Each subsequent measurement resulted in a lower reading. It is possible that there are minute remnants of the anomaly source concentrated in the surface sand, with the source likely at a greater depth. A soil sample was collected at this location, however, laboratory analysis of the sample did not show any anomalous readings (refer to Table 1, sample G5, location (0.5, 1.0)). If there was a small concentration of iron-bearing material in the sample, then it would have been disseminated during collection, and therefore undetectable in the laboratory analysis. In both the field and laboratory data, the magnetic susceptibility values are either negative or small positive values. The negative values are indicative of a diamagnetic material, such as quartz, which is the primary constituent of sand.

Summary

Geophysical surveys were performed over five 2-m by 2-m grids within the AFRL #3 Test Site to determine if the sandy soil had acquired a magnetic remanence after a magnetic surface clearance system had been used at the site. Both total magnetic field and magnetic susceptibility data were collected. The data show no indications that the sand has any measurable magnetic minerals present that could influence a magnetometer survey.

It is likely that the enhanced magnetic response seen in the magnetic data collected by EODT after the magnetic surface clearance system was used is attributable to an enhancement in the remanent magnetization of the ferrous-bearing items buried in the subsurface.

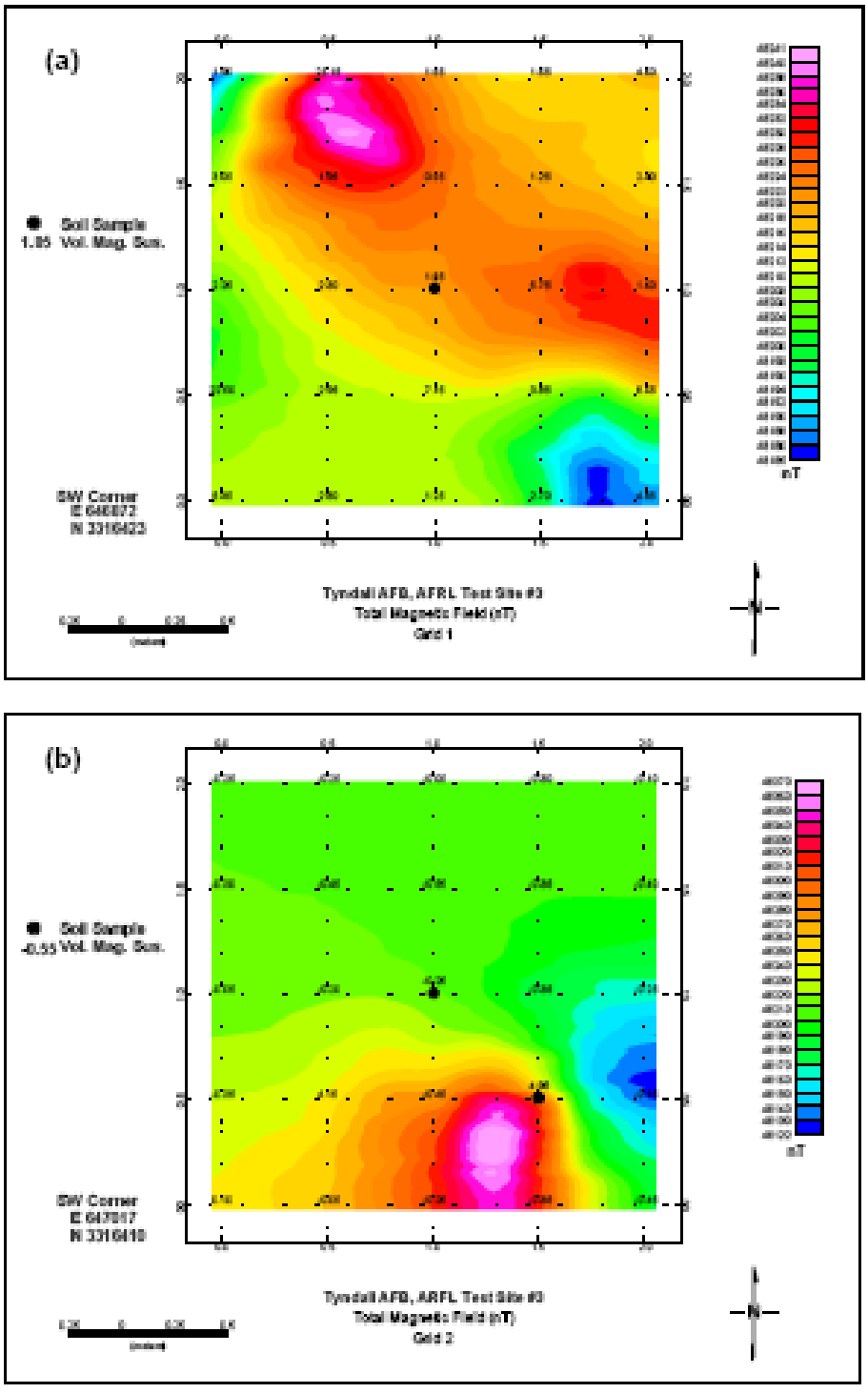
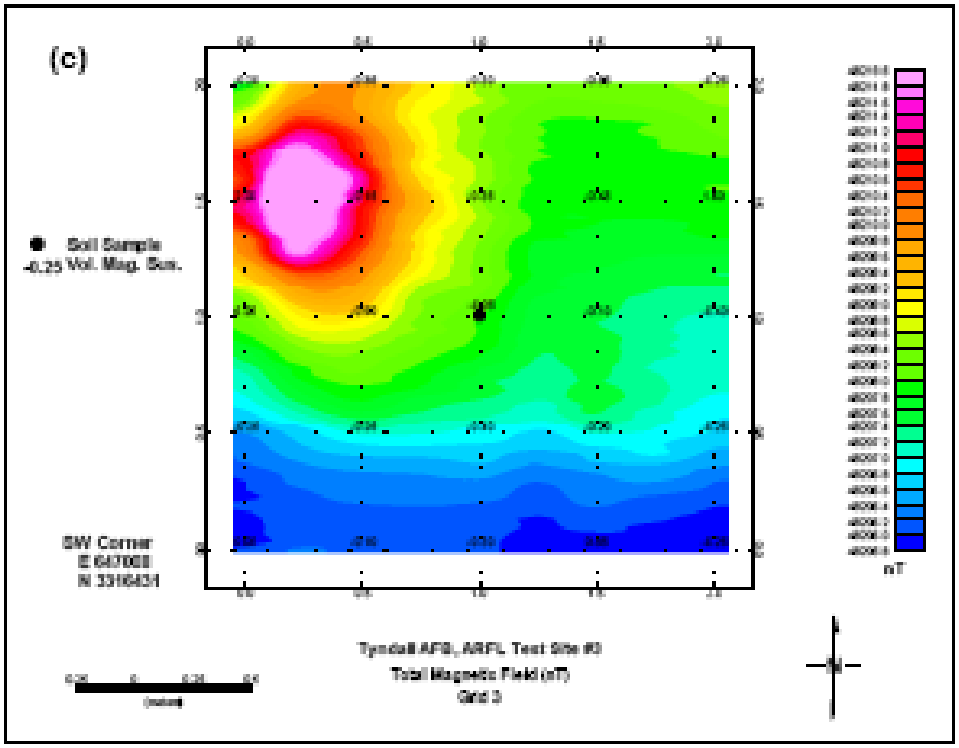


Figure 2. Total magnetic field study over select grids on ARFL Test Site #3. Numbers represent in situ volume magnetic susceptibility values. (a) Grid 1; (b) Grid 2; (c) Grid 3; (d) Grid 4; and (e) Grid 5. Refer to Figure 1 for grid locations.



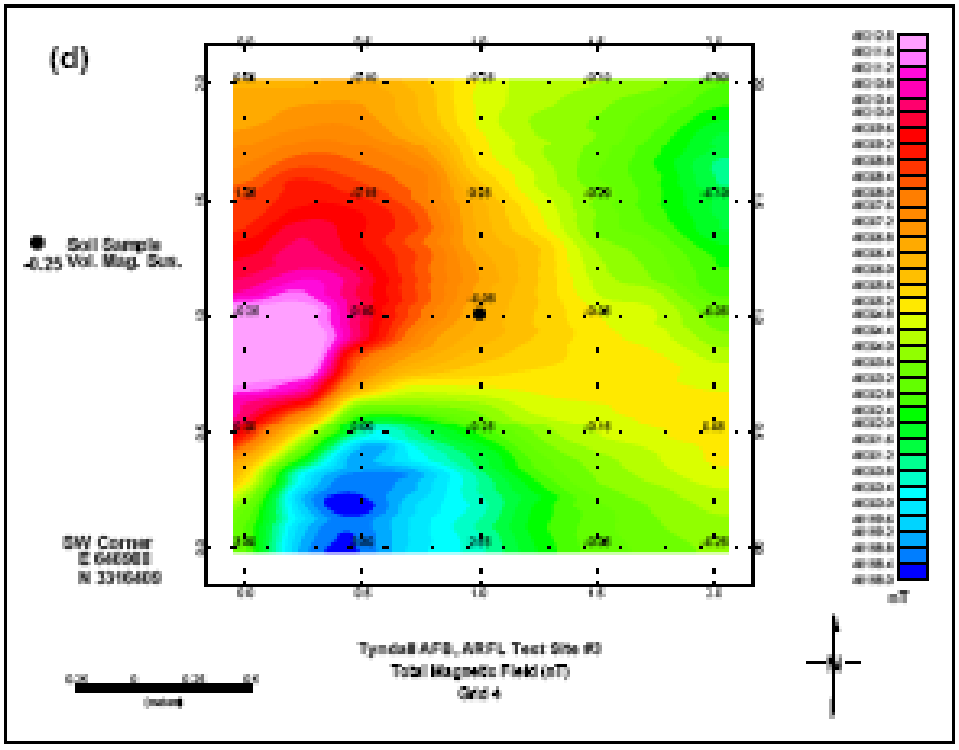


Figure 2. Continued.

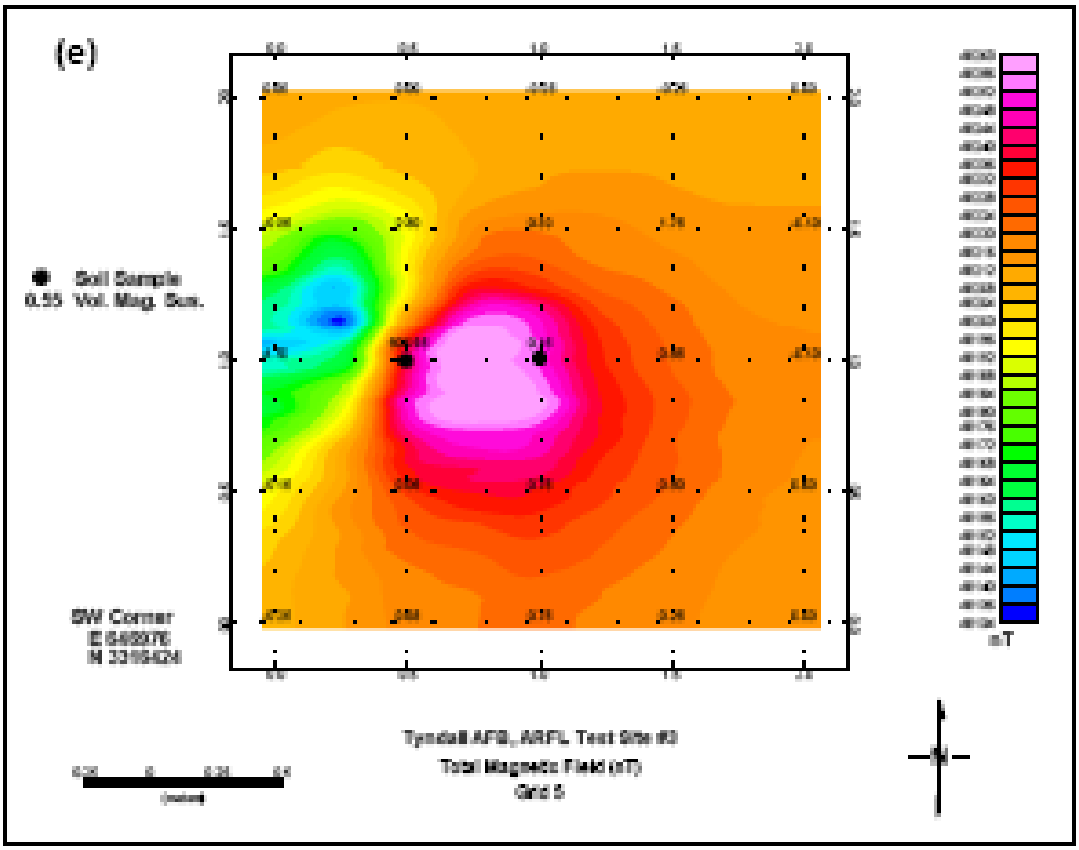


Figure 2. Continued.

Table 1. Magnetic Susceptibility of Soil Samples (Laboratory)

Grid	Location				Magnetic Susceptibility	
	X, m	Y, m	Easting	Northing	Avg. Volume $\times 10^{-5}$ SI	Avg. Mass $\times 10^{-9}$ m^3/kg
1	1.0	1.0	646873	3316423	-0.017	-0.001
2	1.0	1.0	647018	3316410	-0.450	-0.030
2	1.5	0.5	647018	3316410	-0.483	-0.032
3	1.0	1.0	647009	3316432	-0.233	-0.015
4	1.0	1.0	646988	3316410	-0.017	-0.001
5	0.5	1.0	646976	3316425	-0.27	-0.02
5	1.0	1.0	646977	3316425	-0.317	-0.019