



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

Science and Ecosystem Support Division
Enforcement and Investigations Branch
980 College Station Road
Athens, Georgia 30605-2720

December 2, 2009

4SESD-EIB

MEMORANDUM

SUBJECT: Report Transmittal, Geophysical Investigation, Crowder's Mountain Drum Site, Kings Mountain, Cleveland County North Carolina; SESD Project No. 10-0098

FROM: Donald Hunter, Regional Expert *Donald Hunter*
Air and Superfund Section

THRU: Mike Bowden, Section Chief *MBowden*
Air and Superfund Section

TO: David Andrews, On-Scene Coordinator
Emergency Response and Removal Branch
Superfund Division

Please find attached three copies of the report for the geophysical investigation conducted at the Crowder's Mountain Drum Site, Kings Mountain, Cleveland County, North Carolina. This investigation was conducted November 16-17, 2009. Included with the report is a customer service feedback form. Please fill this out and return it to Mike Bowden at your earliest convenience.

Please don't hesitate to contact me if you have any questions regarding this report. I can be reached at hunter.don@epa.gov or (706) 355-8605.

Attachments

United States Environmental Protection Agency
Region 4
Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605-2720



*West Area Anomaly (Green Flagging)
Crowder's Mountain Drum Site*

Report
Geophysical Investigation
Crowder's Mountain Drum Site
Kings Mountain, Cleveland County, North Carolina
Dates of Investigation: November 16-17, 2009

SESD Project Identification Number: 10-0098

Requestor: David Andrews
ERRB, Superfund Division
USEPA
61 Forsyth St. SW
Atlanta, Georgia 30303-8960

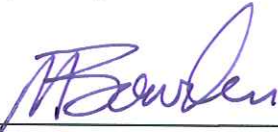
SESD Project Leader: Don Hunter
Enforcement and Investigations Branch
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980 College Station Road
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Title and Approval Sheet

Title: Report, Geophysical Investigation, Crowder's Mountain Drum Site,
Kings Mountain, Cleveland County, North Carolina
SESD Project ID: 10-0098

Document Type: Investigation Final Report

Approving Official:



Mike Bowden, Chief
Air and Superfund Section
Enforcement and Investigations Branch

12/1/09

Date

SESD Project Leader:



Don Hunter, Regional Expert
Air and Superfund Section
Enforcement and Investigations Branch

12/1/09

Date

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INTRODUCTION

During November 16-17, 2009, personnel from the Region 4 United States Environmental Protection Agency (EPA), Science and Ecosystem Support Division, Air and Superfund Section, conducted a geophysical investigation at the Crowder's Mountain Drum Site, located at 630 Ross Road, near the town of Kings Mountain, North Carolina (see Figure 1, Site Location Map). This investigation was requested by Mr. David Andrews, On-Scene Coordinator (OSC), Region 4 EPA, Superfund Division, Emergency Response and Removal Branch, Atlanta, Georgia, to provide information regarding the location of buried drums at the site.

The following personnel comprised the investigation team for this project:

<u>Name</u>	<u>Organization</u>	<u>Responsibility</u>
Donald Hunter	Region 4 EPA, SESD	Project Leader, Magnetometer Operator
Jonathan Vail	Region 4 EPA, SESD	Safety Officer, GPS, Data Analyst

SUMMARY

A grid of 214 points was established and located using GPS. The grid measurement points and the total magnetic field measurements obtained at each of the points were mapped using ArcView®. The magnetometer data were contoured using ArcView® Spatial Analysis and three distinct anomalous areas were identified, suggestive of significant amounts of buried ferrous material (drums). The locations of each of the three areas were ground-truthed using electromagnetic induction and the presumed boundary of each anomalous area was marked with spray paint and survey flagging for future reference.

BACKGROUND

In the summer of 2009, Region 4 USEPA, Emergency Response and Removal Branch began the clean-up of the Crowder's Mountain Drum Site. Figure 2, Site Map, depicts the site as of August 2009. The site was cleared and numerous drums were excavated, many in poor condition, as well as quantities of soil contaminated with various solvents and paint waste. After initiation of the removal, it was determined by the On-Scene Coordinator that further investigation, to more precisely define the areas containing buried drums, was warranted. At this point, the removal activities were suspended and SESD was contacted regarding conducting a geophysical investigation to provide more detailed information with respect to the locations of additional buried drums at the site. This report details the findings of this investigation.

INVESTIGATION METHODOLOGY AND RESULTS

Data Collection

Upon arrival at the site on November 16, 2009, the survey grid to be used to obtain the total magnetic field data was established. One survey team member paced the grid, establishing points at approximately 12 feet – 15 feet centers, marking each measurement point with orange spray paint. The remaining survey member followed with a Trimble®

GeoXH global positioning system (GPS) unit and logged the geographic coordinates (WGS84) of each measurement point. Figure 3, Survey Grid, shows the grid established for this investigation. This activity was an accredited activity conducted in accordance with SESDPROC-110-R2, Global Positioning System.

The following morning, the magnetometer survey was conducted using an EG&G UniMag II Model G-846 Portable Proton Precession Magnetometer. Magnetometer surveys are not within the scope of SESD's ISO 17025 field activities accreditation, however, the survey was conducted in accordance with the manufacturers operating manual for the instrument.

Data Analysis

An ArcView® project was created with the geographic coordinate shapefile of the grid measurement locations and the downloaded total magnetic field data. These data are found in the table, Total Magnetic Field Intensity Measurements, in the tables section at the end of this report. ArcView® Spatial Analysis was used to contour the total magnetic field data, generating a color-graded contour map, shown in Figure 4, Contoured Total Magnetic Field Data. Three distinct anomalous areas present themselves in the contoured data. These are shown in Figure 4 and are identified as the West Area and East Areas 01 and 02.

After the data was contoured in the field, each of the three identified areas was ground-truthed with electromagnetic induction using a Fisher® TW-6 M-Scope Pipe and Cable Locator. This activity was conducted outside of the scope of SESD's ISO 17025 field activities accreditation, however, it was conducted in accordance with the instrument manufacturers operating manual. There was very good agreement between the Fisher® instrument response and the three anomalies indicated by the magnetometry. There was little or no instrument response during surveys of the site conducted outside of the identified anomalies, however, there was a significant response while over the areas in the general vicinity of each of the contour anomalies. The boundary of each area, as indicated by a distinct drop in instrument response while moving away from the approximate center of the anomaly, was marked with white spray paint, as well as survey stakes and flagging. The boundary or area of each anomalous feature was also mapped using GPS for import into the ArcView® project created for the total magnetic field data contouring. Each of the three areas, as defined by the Fisher® instrument response, is shown in Figure 5, Approximate Boundaries, Anomalous Areas.

CONCLUSION

Based on the total magnetic field data contouring of proton precession magnetometer measurements and subsequent ground-truthing using electromagnetic induction, three distinctly anomalous areas were identified by this geophysical investigation. These areas, presented in Figure 5, are identified as the West Area and East Areas 01 and 02.

REPORT FIGURES

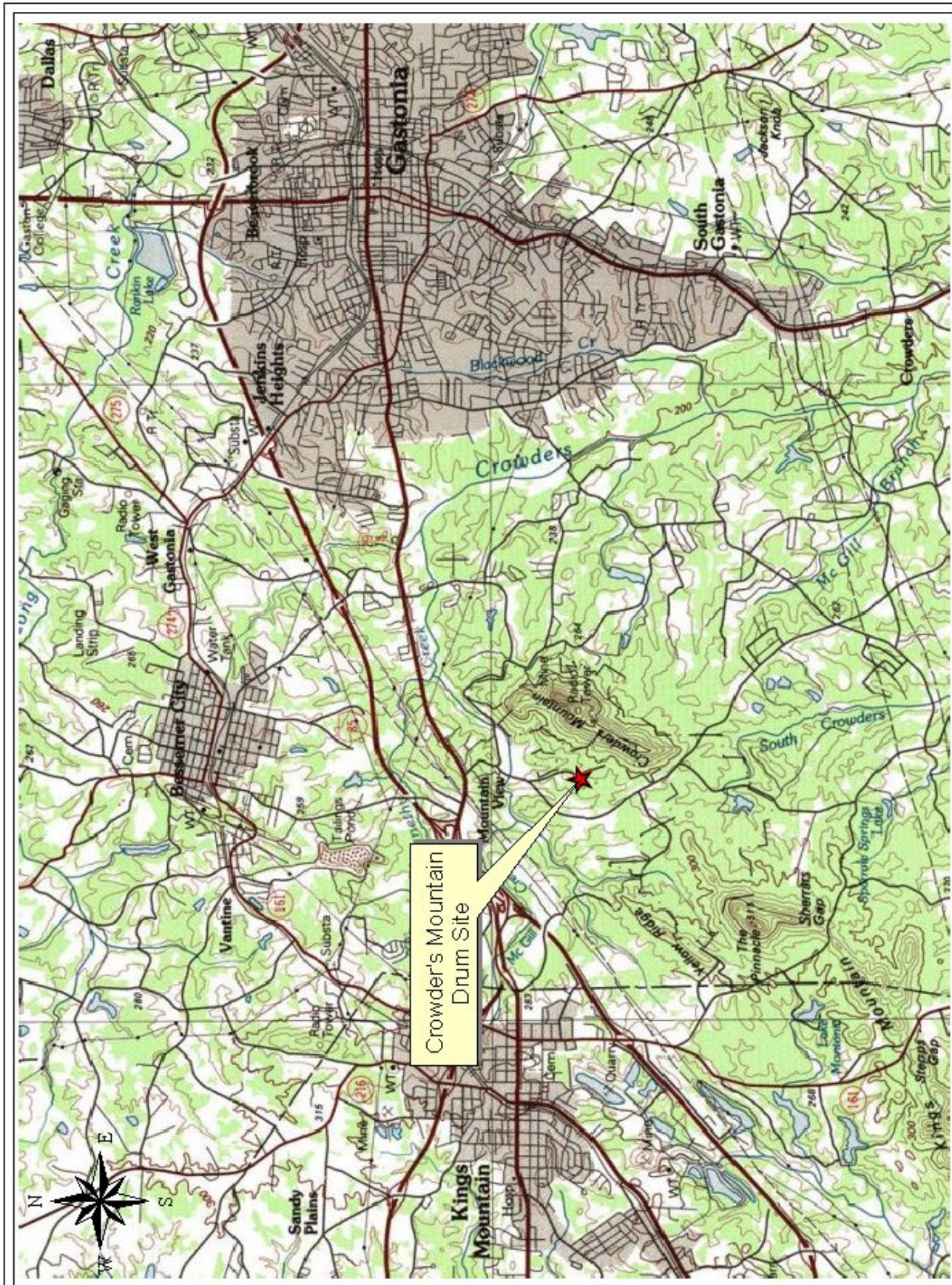
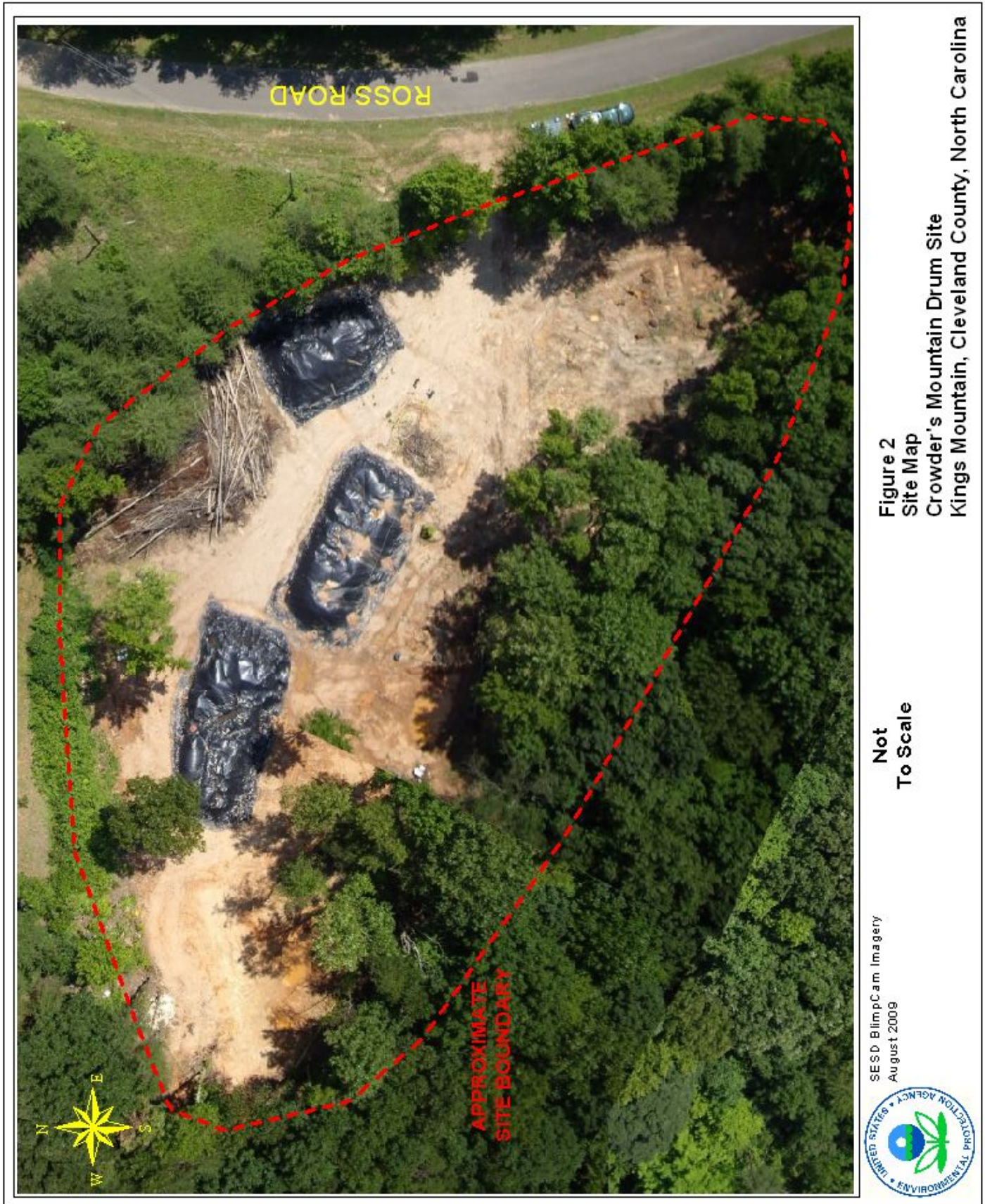


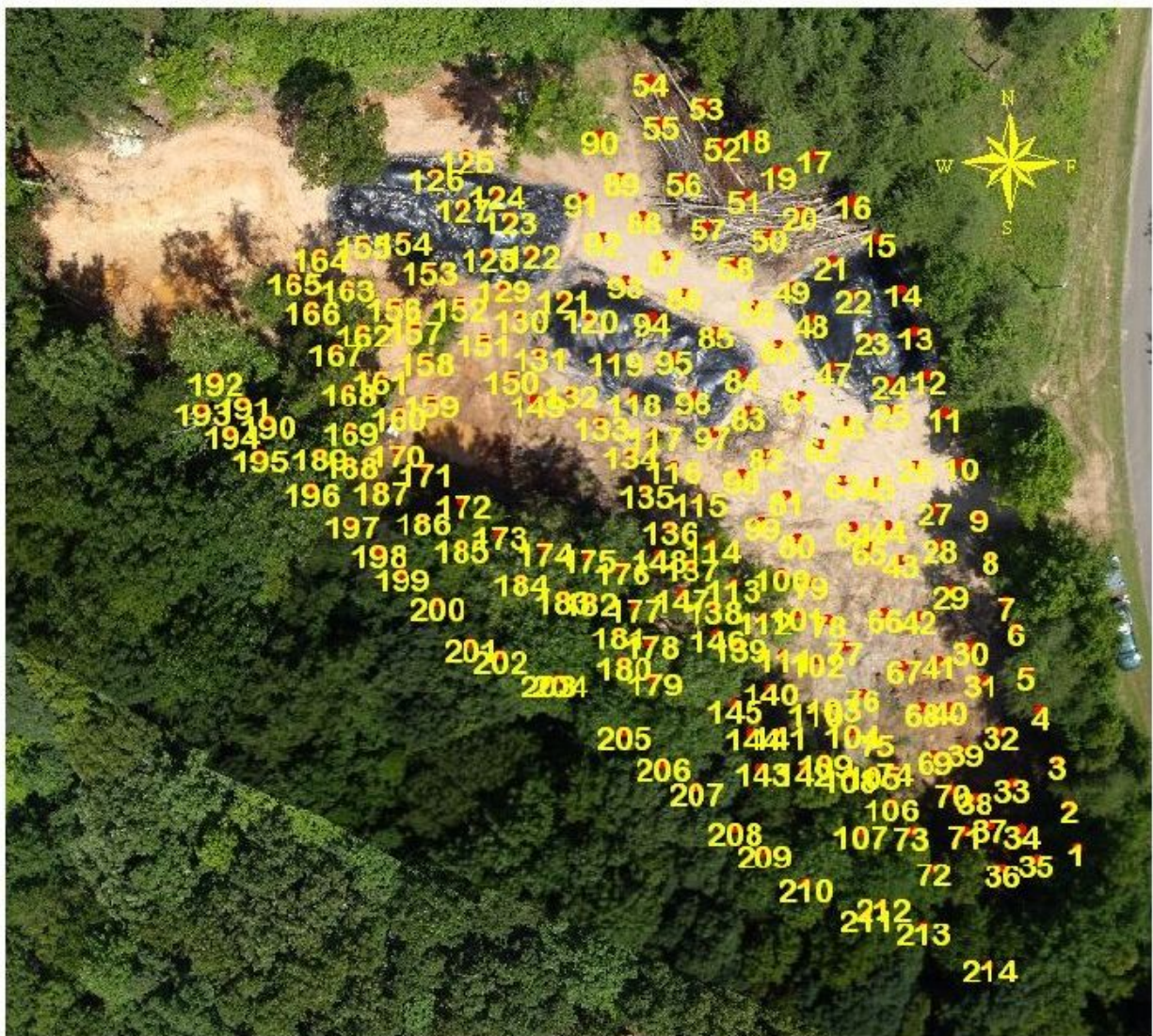
Figure 1
Site Location Map
Crowder's Mountain Drum Site
Kings Mountain, Cleveland County, North Carolina

Not To Scale

Map created with TOPO! Registered Trademark
 Copyright 2002 National Geographic







Explanation

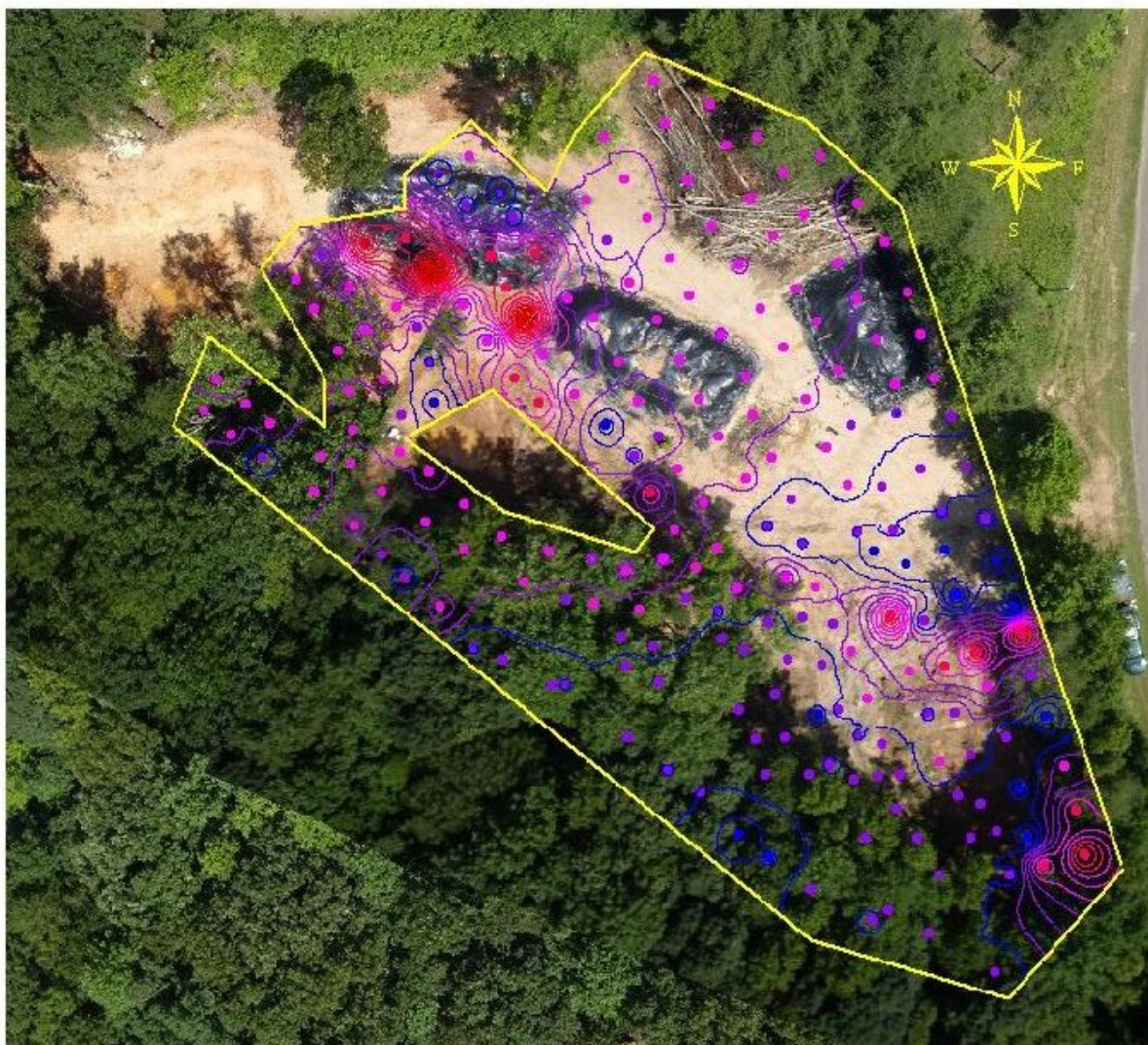
20 0 20 40 60 80 100 Feet



214 Geophysical Station and Number



Figure 3
Survey Grid
Geophysical Investigation
Crowder's Mountain Drum Site
Kings Mountain, Cleveland County, North Carolina



Explanation

20 0 20 40 50 80 100 Feet



Boundary of Geophysical Survey



Contours of Magnetic Field



49887 - 50330



50331 - 50692



50693 - 51372



51373 - 52733



52734 - 54102

• Geophysical Station

Magnetic Field Value Range (nanoTeslas)

• 49887 - 50330

• 50331 - 50692

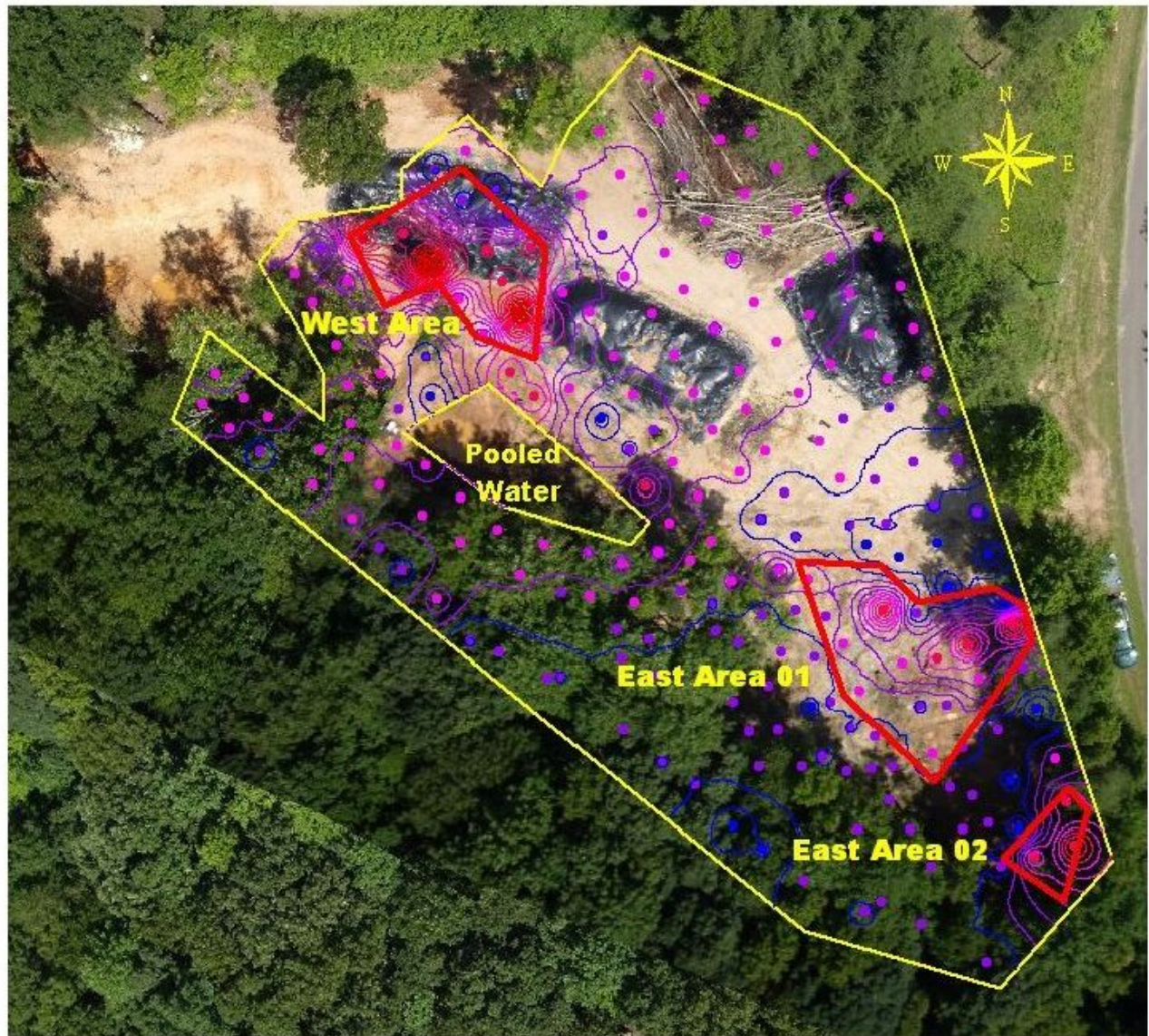
• 50693 - 51372

• 51373 - 52733

• 52734 - 54102

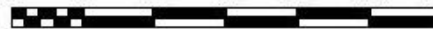


Figure 4
Contoured Total Magnetic Field Data
Geophysical Investigation
Crowder's Mountain Drum Site
Kings Mountain, Cleveland County, North Carolina



Explanation

20 0 20 40 60 80 100 Feet



Boundary of Geophysical Survey



Magnetic Field Anomaly Boundaries



Figure 5
Approximate Boundaries, Anomalous Areas
Geophysical Investigation
Crowder's Mountain Drum Site
Kings Mountain, Cleveland County, North Carolina

REPORT TABLES

Total Magnetic Field Data and Geographic Coordinates

5 total pages

Total Magnetic Field Intensity Measurements
Magnetometer Survey
Crowder's Mountain Drum Site
Kings Mountain, Cleveland County, North Carolina

Station	Magfield(nT)	Longitude	Latitude
1	52454	-81.28678994	35.23252172
2	51598	-81.28679843	35.23255854
3	50853	-81.28681017	35.23259477
4	50144	-81.28682917	35.2326367
5	50671	-81.28684339	35.23267108
6	52546	-81.28685406	35.23270739
7	50129	-81.2868634	35.23272913
8	50072	-81.28688043	35.23276765
9	50419	-81.28689178	35.23280287
10	50462	-81.28691138	35.23284618
11	50646	-81.28692638	35.2328879
12	50724	-81.28694427	35.23292038
13	50790	-81.28695754	35.23295672
14	50741	-81.28697186	35.23299234
15	50762	-81.28699516	35.23303478
16	50741	-81.28702234	35.23306747
17	50859	-81.28706162	35.23310555
18	50841	-81.28712579	35.23312263
19	50874	-81.2870984	35.23309202
20	50820	-81.28707698	35.23305761
21	50819	-81.28704325	35.23301633
22	50795	-81.28702294	35.23298729
23	50776	-81.28700217	35.23295239
24	50707	-81.28698413	35.23291543
25	50599	-81.28698274	35.23289127
26	50512	-81.28695733	35.23284505
27	50407	-81.28693669	35.23280862
28	50212	-81.28693249	35.23277706
29	49887	-81.28692139	35.2327382
30	52329	-81.28690134	35.23269079
31	51241	-81.28688944	35.23266353
32	50523	-81.2868691	35.23261996
33	50330	-81.28685646	35.23257586
34	50134	-81.28684794	35.23253648
35	51747	-81.28683167	35.23251215
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40	50663	-81.28692208	35.23264002
41	51543	-81.28693207	35.23267929
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44	50406	-81.28698584	35.23279355
45	50595	-81.28699682	35.23283002
46	50678	-81.28702826	35.23288153

47	50783	-81.28704162	35.23292688
48	50845	-81.28706435	35.23296747
49	50905	-81.28708522	35.2329948
50	50870	-81.28710854	35.23303923
51	50880	-81.28713259	35.23307068
52	50835	-81.28715691	35.23311572
53	50804	-81.28717295	35.23314974
54	50897	-81.28723136	35.23316945
55	50836	-81.2872191	35.23313308
56	50840	-81.28719691	35.23308591
57	50903	-81.28717086	35.23304802
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61	50814	-81.28707574	35.23290305
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64	50394	-81.28702152	35.23279125
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End of Report