



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
USEPA
980 College Station Road
Athens, Georgia 30605-2720

Title and Approval Sheet

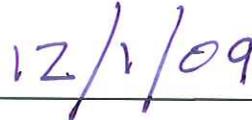
Title: Report, Geophysical Investigation, Crowder's Mountain Drum Site,
Kings Mountain, Cleveland County, North Carolina
SESD Project ID: 10-0098

Document Type: Investigation Final Report

Approving Official:



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



Date

SESD Project Leader:



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



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

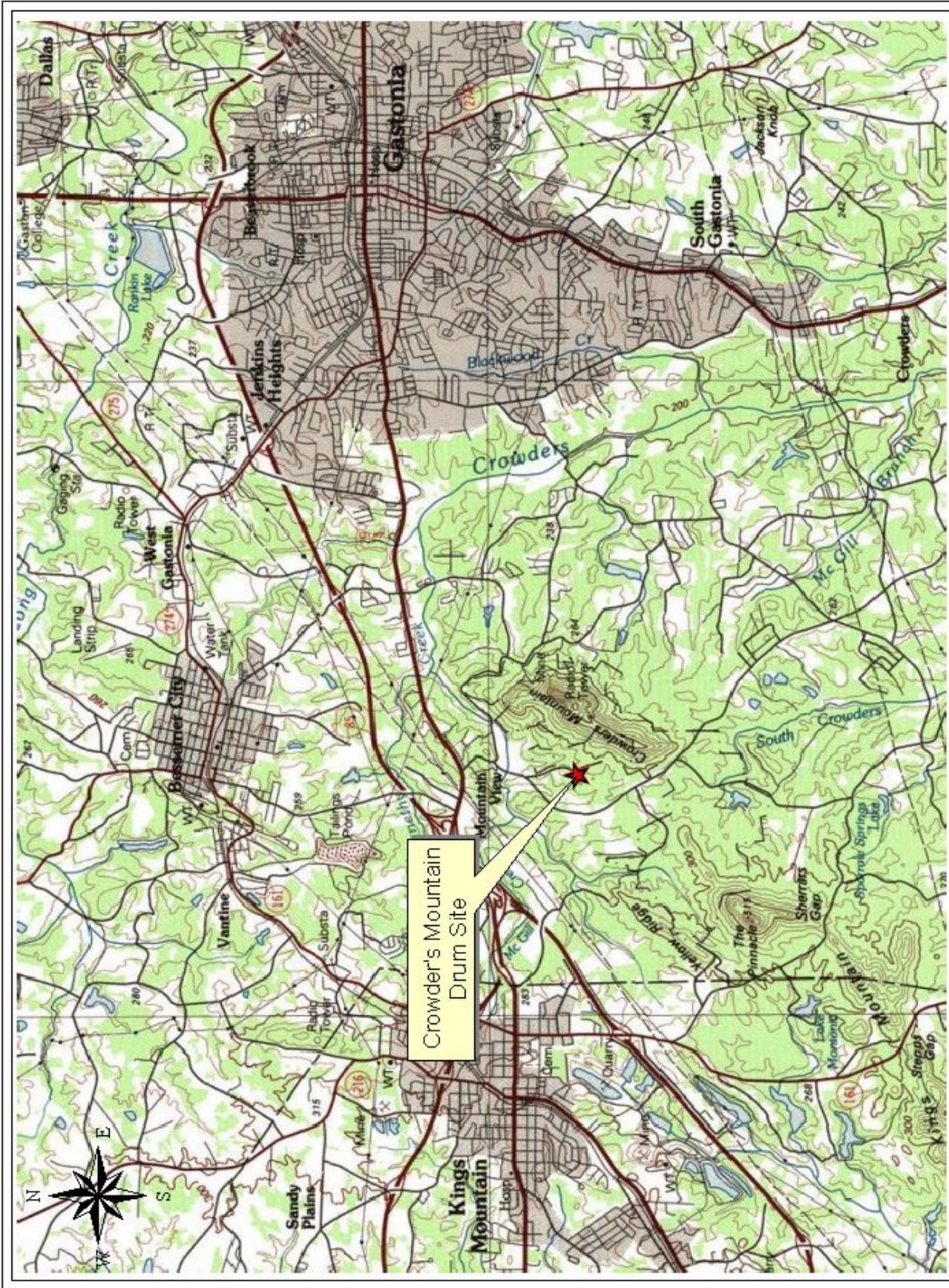


Figure 1
Site Location Map
Crowder's Mountain Drum Site
Kings Mountain, Cleveland County, North Carolina

Not To Scale

Map created with TOPO! Registered Trademark
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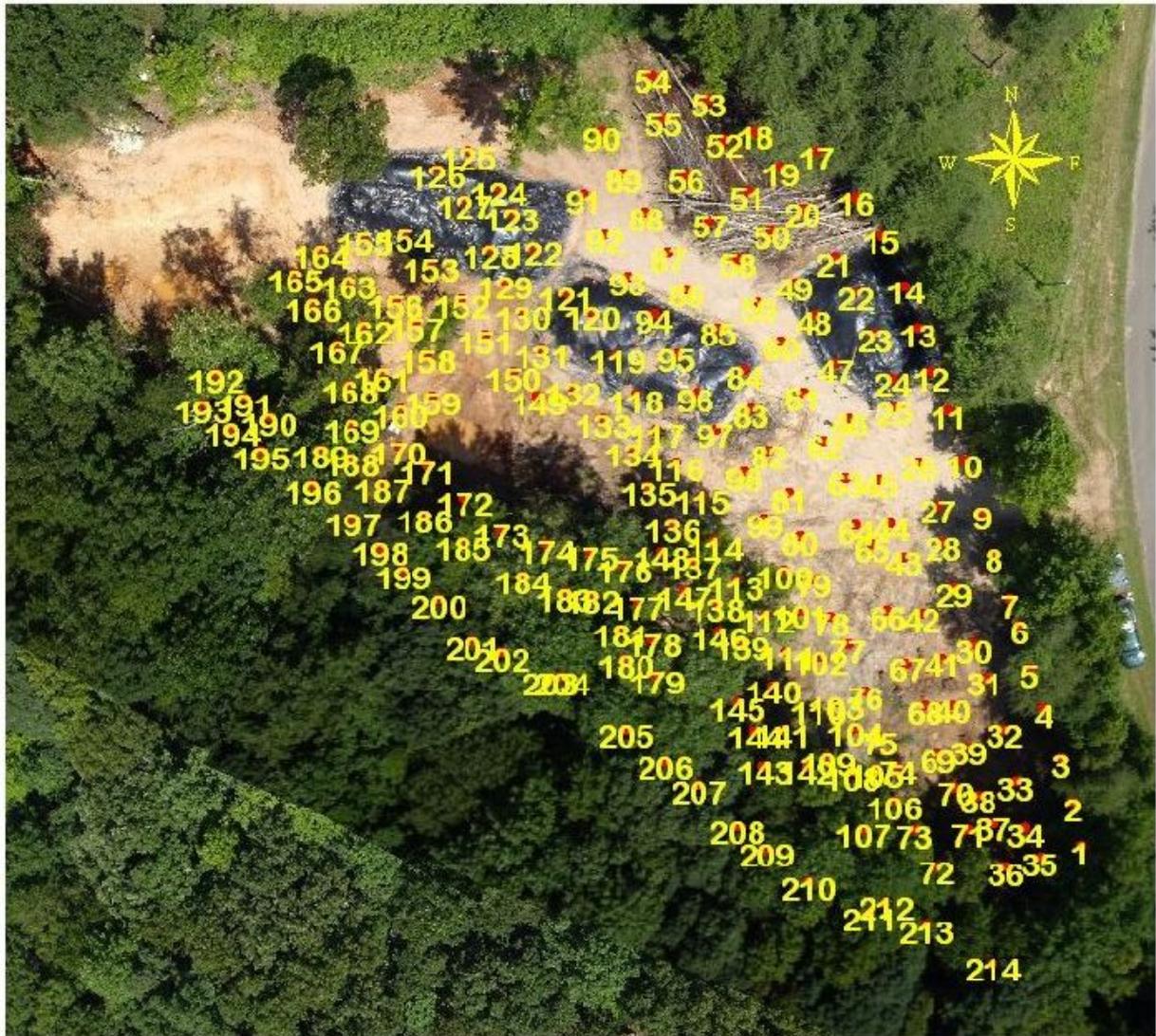


Figure 2
Site Map
Crowder's Mountain Drum Site
Kings Mountain, Cleveland County, North Carolina

**Not
To Scale**

SESD BlimpCam Imagery
August 2009





Explanation

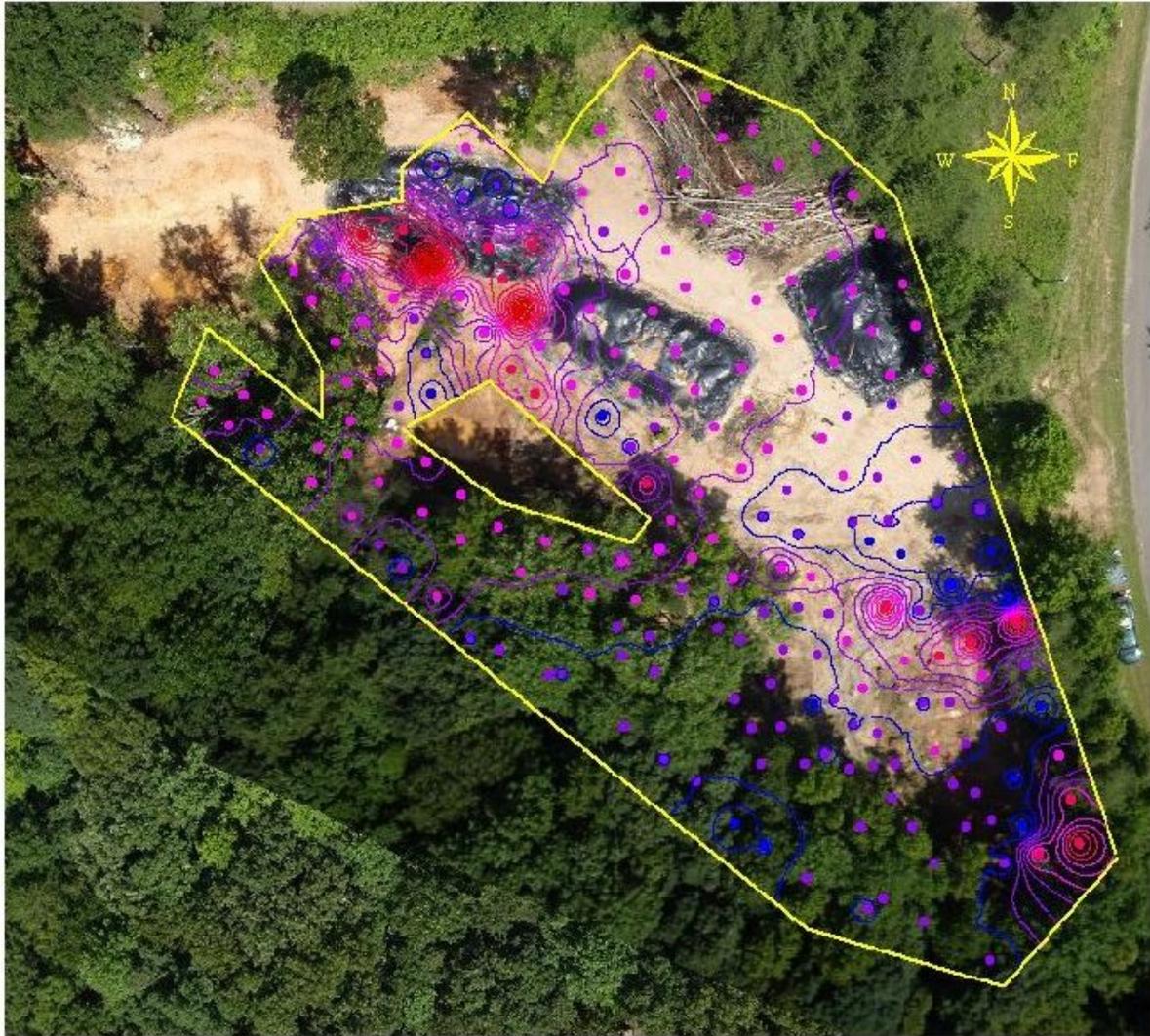
20 0 20 40 60 80 100 Feet



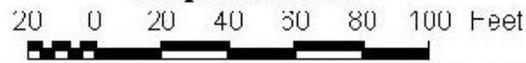
214 Geophysical Station and Number



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



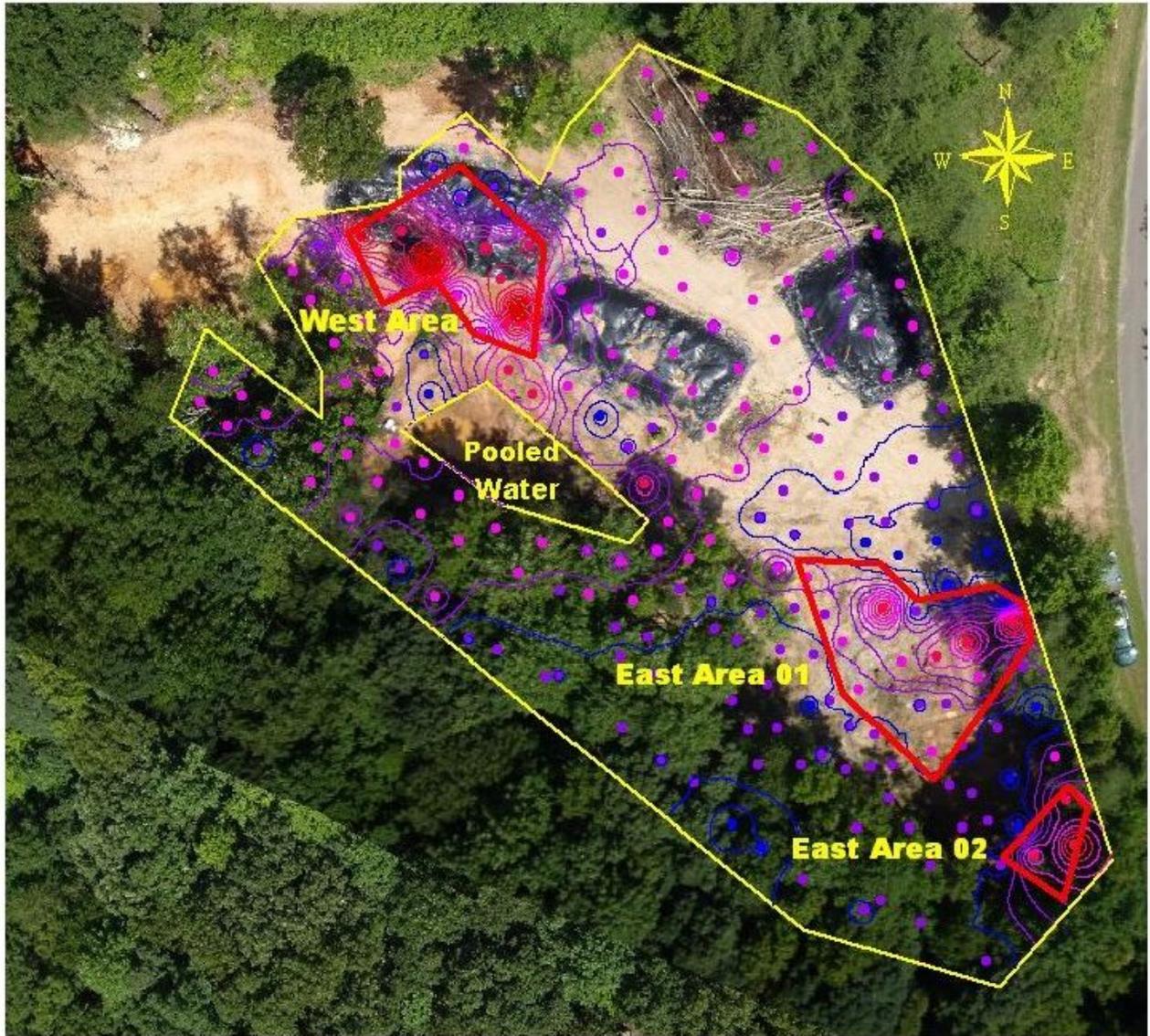
Explanation



- | | | | |
|---|--------------------------------|---|---------------------|
|  | Boundary of Geophysical Survey |  | Geophysical Station |
| Contours of Magnetic Field | | | |
|  | 49887 - 50330 |  | 49887 - 50330 |
|  | 50331 - 50692 |  | 50331 - 50692 |
|  | 50693 - 51372 |  | 50693 - 51372 |
|  | 51373 - 52733 |  | 51373 - 52733 |
|  | 52734 - 54102 |  | 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
36	50537	-81.28686619	35.23250393
37	50432	-81.28687954	35.2325414
38	50456	-81.28689518	35.23256432
39	50666	-81.2869053	35.23260527
40	50663	-81.28692208	35.23264002
41	51543	-81.28693207	35.23267929
42	50434	-81.28695348	35.23271733
43	50196	-81.28697246	35.2327651
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
58	51017	-81.28714369	35.23301545
59	50997	-81.28712189	35.23297817
60	50879	-81.28709811	35.2329454
61	50814	-81.28707574	35.23290305
62	50762	-81.28705284	35.23286246
63	50721	-81.28703135	35.23283121
64	50394	-81.28702152	35.23279125
65	50235	-81.28700533	35.23277573
66	52356	-81.28698813	35.23271948
67	51140	-81.28696882	35.23267514
68	50567	-81.28694992	35.23263964
69	50776	-81.28693668	35.23259896
70	50518	-81.28691887	35.23257135
71	50499	-81.2869048	35.23253589
72	50488	-81.28693803	35.23250442
73	50517	-81.28696071	35.23253473
74	50538	-81.28697856	35.23258866
75	50525	-81.28699604	35.23261387
76	50752	-81.28701085	35.23265155
77	50878	-81.28702867	35.23269053
78	50689	-81.28704665	35.23271378
79	50887	-81.28706464	35.23274531
80	50378	-81.28707878	35.23278171
81	50434	-81.28708909	35.23281802
82	50775	-81.28711047	35.23285386
83	50810	-81.28713017	35.23288865
84	50907	-81.28713621	35.23292125
85	51007	-81.28716302	35.23295672
86	50955	-81.28719531	35.23298955
87	50843	-81.28721394	35.23301991
88	50776	-81.28723787	35.23305378
89	50756	-81.28726096	35.23308657
90	50824	-81.28728288	35.2331215
91	50740	-81.2872999	35.23306882
92	50676	-81.28727881	35.2330356
93	50772	-81.28725532	35.23299917
94	50860	-81.28722834	35.23296861
95	50942	-81.28720506	35.23293531
96	50940	-81.2871848	35.23290179
97	50889	-81.28716496	35.23287122
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103	50638	-81.28704138	35.2326426
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End of Report