



engineering and constructing a better tomorrow

January 7, 2011

Mr. Carter Williamson
On-Scene Coordinator
U.S. EPA, Region 4
ERRB – 11th Floor
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

Subject: **Letter Report of Geophysical Investigation
Mills Gap Road Groundwater Contamination Site
MACTEC Project 6690-03-9450
CERCLA Docket No. CER-04-2004-3755**

Dear Mr. Williamson:

MACTEC Engineering and Consulting, Inc. (MACTEC), on behalf of CTS Corporation (CTS) and Mills Gap Road Associates (MGRA), is pleased to present this Letter Report of Geophysical Investigation for the above-referenced Site. The activities described in this Report were performed pursuant to the Administrative Order on Consent (AOC) for Removal Action between the United States Environmental Protection Agency (EPA) Region 4, Emergency Response and Removal Branch, and CTS and MGRA, effective January 22, 2004. In response to an e-mail dated September 30, 2010, MACTEC prepared a "Work Plan for Geophysical Investigation", dated October 29, 2010, for conducting a geophysical investigation in the southeast portion of the Site. The Work Plan was approved by EPA on November 16, 2010. The following sections describe the project background information, geophysical investigation activities, findings and future actions.

BACKGROUND INFORMATION

In November 1999, EPA and Tetra Tech EM Inc. Superfund Technical Assistance and Response Team (START) personnel conducted a reconnaissance of the Site and identified miscellaneous debris and polyethylene drums buried against a fence line along the Site's southwestern property line (actual location is along the southeastern property line). The results of the reconnaissance, as well as soil sampling in the southeastern portion of the Site, are documented in a Trip Report dated February 17, 2000. Field screening of soil samples, as well as laboratory analysis, did not detect Site-specific compounds in the southeastern portion of the Site.

A geophysical investigation was conducted at the Site in August 2000 by Lockheed Martin Corporation under EPA's Response Engineering and Analytical Contract (REAC). The results of the survey are described in a Trip Report dated December 20, 2000. An electromagnetic sensor (referenced as terrain conductivity meter in the Trip Report) and magnetometer were used to collect readings along survey lines located in the following areas: north of the Site building; south of the Site building, between to the southern wall of the building and the steep hill located approximately 30 to 40 feet south of the building; along the gravel road located in the southern portion of the Site;

and approximately 50 feet east of the Site building on the adjacent property. The geophysical survey did not identify buried tanks, drums, debris, or other potential sources of contamination. In September of 2000, eight trenches were excavated at the Site by REAC personnel in areas where anomalous geophysical readings were identified. Buried sources of contamination were not encountered in the trenches.

EPA personnel conducted a reconnaissance of the Site on September 21, 2010, and again identified the three polyethylene barrels/drums adjacent to the fence located along the Site's southeastern property line. Two of the drums are partially buried and the third drum is completely buried but visible from the east through the fence. Based on the potential presence of additional buried debris in the southeastern portion of the Site (southeast of the 2000 geophysical survey), the EPA directed that a surface geophysical investigation be conducted in the southeastern portion of the Site in preparation for removal of the identified debris and drums against the fence.

GEOPHYSICAL INVESTIGATION

Prior to conducting the geophysical investigation, MACTEC personnel cleared debris located on the ground in the vicinity of the proposed activities (Photograph 1), as metallic debris would interfere with the survey results and non-metallic/vegetative debris would hamper access. On December 7, 2010, Geo Solutions, Ltd. (Geo Solutions) mobilized to the Site to perform the geophysical investigation under the direction of MACTEC personnel. Also present at the Site were personnel from EPA's Environmental Response Team and an EPA Superfund Technical Assessment & Response Team (START) contractor. As noted in the Work Plan for Geophysical Investigation, two areas of surface debris containing concrete/bricks and floor tiles were excluded from the investigation area.

Geo Solutions provided MACTEC a report of the geophysical investigation, which is attached. As indicated in Geo Solutions' report, three surface geophysical methods were used to locate potential buried debris in the southeastern portion of the Site: multi-frequency electromagnetic (EM) profiler, ground-penetrating radar (GPR), and magnetometer.

The EM survey identified several anomalies adjacent to the fence located along the eastern and southern property boundary. The anomalies were further investigated using a magnetometer, and several pieces of metal debris were identified on the ground surface and determined to be the source of the anomalies (Photograph 2). The EM survey did not identify anomalies or indications of buried debris at distances greater than approximately five feet inside the fence. The elevated readings along the property boundary are attributed to the adjacent metal fence.

Upon completion of the EM survey and review of the data in the field, the GPR survey was configured and conducted. The GPR survey consisted of five arrays: two arrays across the central portion of the area toward the southeast corner, one array to the north along the western portion of the area, and two arrays in the vicinity of the previously-identified polyethylene barrels/drums. The GPR survey identified additional minor metal debris on the ground surface (Photograph 3); however, the GPR survey did not indicate buried debris in the surveyed areas.

GEOPHYSICAL INVESTIGATION FINDINGS

The geophysical investigation did not indicate buried debris in the survey area, other than the limited debris and polyethylene barrels/drums previously identified at the southeast corner of the Site. The debris at the southeast corner of the Site is limited to the area of the fence to approximately six feet to the west. Incidental, isolated, and discrete metal debris identified on the

ground surface during the investigation is not related to potential drum or other debris burial or disposal activities. As shown by the green shaded areas in the EM survey and the lack of reflection in the GPR profiles, buried drums or debris was not identified in the area of the investigation except for the southeast corner.

FUTURE ACTIONS

As directed by EPA, the identified debris and polyethylene barrels/drums in the southeast corner of the property will be excavated and removed/disposed off the Site pursuant to a Work Plan to be submitted to EPA for review and approval.

CLOSING

If you have any questions regarding the information contained herein, please do not hesitate to contact us at (828) 252-8130.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.



Susan E. Kelly, P.E., L.G.
Senior Engineer

for Susan E. Kelly
with permission



Matthew E. Wallace, P.E.
Principal Engineer

SEK/MEW:sek

attachments: Photographs
Geo Solutions Report

cc: Marvin Gobles, CTS Corporation
Elizabeth Ahlemann, CTS Corporation
Michael F. Dolan, Jones Day
William Clarke, Robert & Stevens, P.A.



Photograph 1: View of surficial metal and plastic debris cleared from geophysical investigation area prior to implementing geophysical survey.



Photograph 2: View of surficial metal debris identified during EM profiling.



Photograph 3: View of surficial metal debris identified during EM profiling.



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January 4, 2011

Ms. Susan Kelly
MACTEC Engineering and Consulting, Inc.
1308 Patton Avenue
Asheville, North Carolina 28806

Re: Geophysical Investigation of Potential Buried Material, CTS Site, Mills Gap Road, Arden, North Carolina

Dear Ms. Kelly:

Geo Solutions Limited, Inc. (Geo Solutions) is pleased to submit this report of findings for a geophysical survey completed on December 7, 2010 at CTS Site located on Mills Gap Road, Arden, North Carolina (Figure 1)



Location of site along Mills Gap Road, Arden, NC.

Background

MACTEC Engineering and Consulting, Inc. (MACTEC) is currently conducting an Environmental Assessment at a site located on Mills Gap Road. The site is currently a vacant building surrounded by grass and forest land. MACTEC has been told that a portion of the property may contain potential buried debris in an area to the south of the main building complex (Figure 1). However, the potential location of the debris is not known. As such, MACTEC desires to complete a limited geophysical evaluation over an approximate 1-acre area utilizing a portable multifrequency electromagnetic (EM) profiler and ground-penetrating radar (GPR) equipped with the appropriate antenna determined by site conditions, and a magnetometer.

Field Activities

Geo Solutions completed three types of geophysical surveys as part of this investigation:

1. Geo Solutions completed a detailed EM evaluation (survey lines spaced at approximately 5-ft and data points every 0.5 ft along each profile line). These data were collected utilizing a Geophex Model GEM-2. The location of the data points were measured utilizing a CSI GPS that directly records the location of each EM data point. From this data, Geo Solutions prepared a site map illustrating the distribution of in-phase (metal detection mode) and conductivity (apparent conductivity) values.
2. Geo Solutions also completed a limited Ground-penetrating radar (GPR) evaluation of portions of the site where anomalous EM results indicate potential buried debris and more general profiles to evaluate the response of the GPR instrument to the subsurface conditions. Because the site is located within the mountain region of North Carolina, the soils are likely to contain high concentrations of clay minerals. As anticipated, the presence of clay minerals in the subsurface greatly hampered the depth of detection by the GPR equipment. Geo Solutions obtained some records to depths of 8 feet.
3. Finally, Geo Solutions completed limited magnetometer scanning in specific areas where buried metal was visually seen. Here, the magnetometer was used more as a metal detector to pin-point the exact location of small metal objects.

Results

EM Evaluation

The EM results are presented in Figures 2, 3, 4, and 5.

In general, Figures 2 through 4 illustrates the results of the 3870 Hz, 11070 Hz, and 90030 Hz in-phase and conductivity data. This information is generally used to indicate the location of buried metal material and the presence of potentially conductive soils or scattered debris. This would include but not limited to: buried concrete with metal

reinforcement, buried underground storage tanks (USTs), septic tanks, and utilities. Here the site had been previously searched for scattered surface debris, and limited surface disturbance had been completed to remove larger pieces of material and provide access for the geophysical evaluation. MACTEC recognized the presence of potential asbestos-like floor tile material and as such left this material in place as well as an area of significant concrete debris. These areas of debris on the ground surface were excluded from the investigation area and are identified on each accompanying map.

Geo Solutions identified the following anomalous EM conditions that were evaluated during the field investigation:

- An area with a strong EM anomaly coincided with the presence of several large (0.5 to 1 ft) metal objects located along the east side of the site and along a chain-link fence.
- A small area represented by a positive anomaly located along the southeast side of the site where several plastic drums were noted. This is also the site where the removal of surface debris had taken place. Geo Solutions discovered a small quantity of metal wire that was likely the source of the EM anomaly. Geo Solutions also noted a break in the chain-link fence. Typically, discontinuity in fencing can account for EM anomalies.

A summary figure (Figure 5) illustrates the location of the above anomalies.

GPR Evaluation

GPR site survey evaluations were completed following the completion of the EM survey. The GPR survey profiles were completed along the areas identified as potential buried material. Here, Geo Solutions found evidence of very limited scattered metal debris (field evaluation indicated small quantities of short wire strands, metal clips, and pipe hangers).

A total of 5 GPR records are presented in this evaluation. The location of the GPR profiles is presented in Figure 6 and the GPR profiles are presented in Figure 7. Most notable in these records is the presence of steeply dipping bedding structures probably associated with the bedrock or saprolite soils. Here, the soils appear to be undisturbed below a depth of approximately 2 to 3 feet.

Conclusions and Recommendations

Geo Solutions has completed a limited geophysical evaluation of the CTS Site Property. Here, we found evidence for the presence of limited surface debris. Furthermore, the results of the EM evaluation indicate broad areas of the site that show no evidence of any debris, surface or buried. We conclude that the site has not been used as a site for burial of debris. A summary of the identified surface features is presented in Figure 5.

Additionally, using GPR, Geo Solutions discovered that the soil has not been disturbed below 2 to 3 feet below the land surface. As such, the site does not represent a disposal site where excavation and fill has occurred. Because of previous site cleanup by MACTEC was fairly thorough, very little surface debris was detected.

Because Geo Solutions has concluded that no buried material is present at this site, we recommend no additional geophysical surveys are necessary.

Geo Solutions is pleased to have been provided this opportunity, please give me a call should you have any questions concerning the above findings.

Very truly yours,

GEO SOLUTIONS LIMITED, INC.



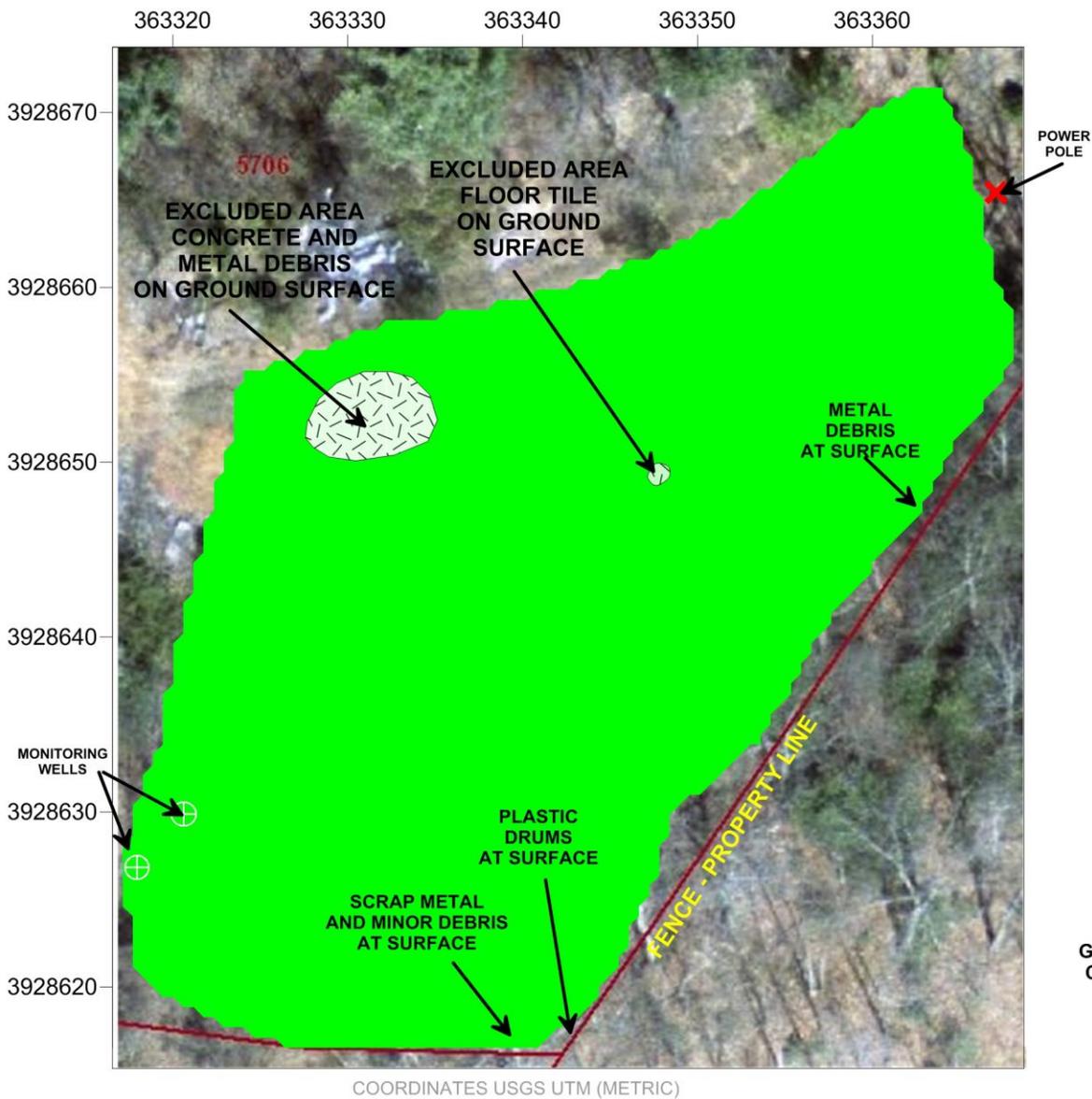
Ronald A. Crowson, North Carolina Licensed Geologist Number 1

FIGURES 1 THROUGH 7

FIGURE 1



SITE LOCATION MAP AND GENERAL MAP ILLUSTRATING THE LOCATION OF FEATURES WITHIN THE GEOPHYSICAL SURVEY AREA



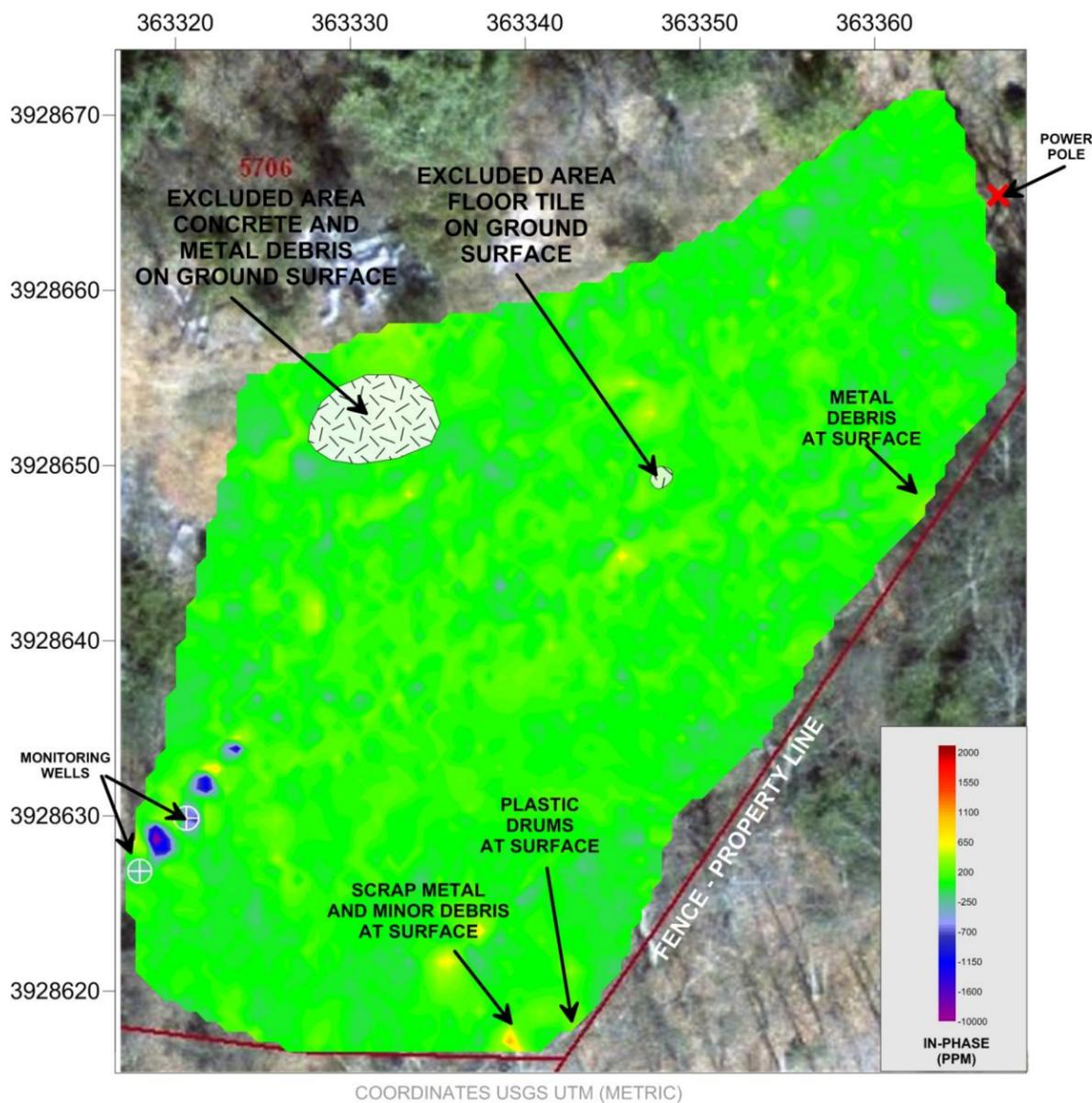
GEOPHYSICAL SURVEY
CTS-MILLS GAP ROAD
ARDEN, NC

DECEMBER 2010

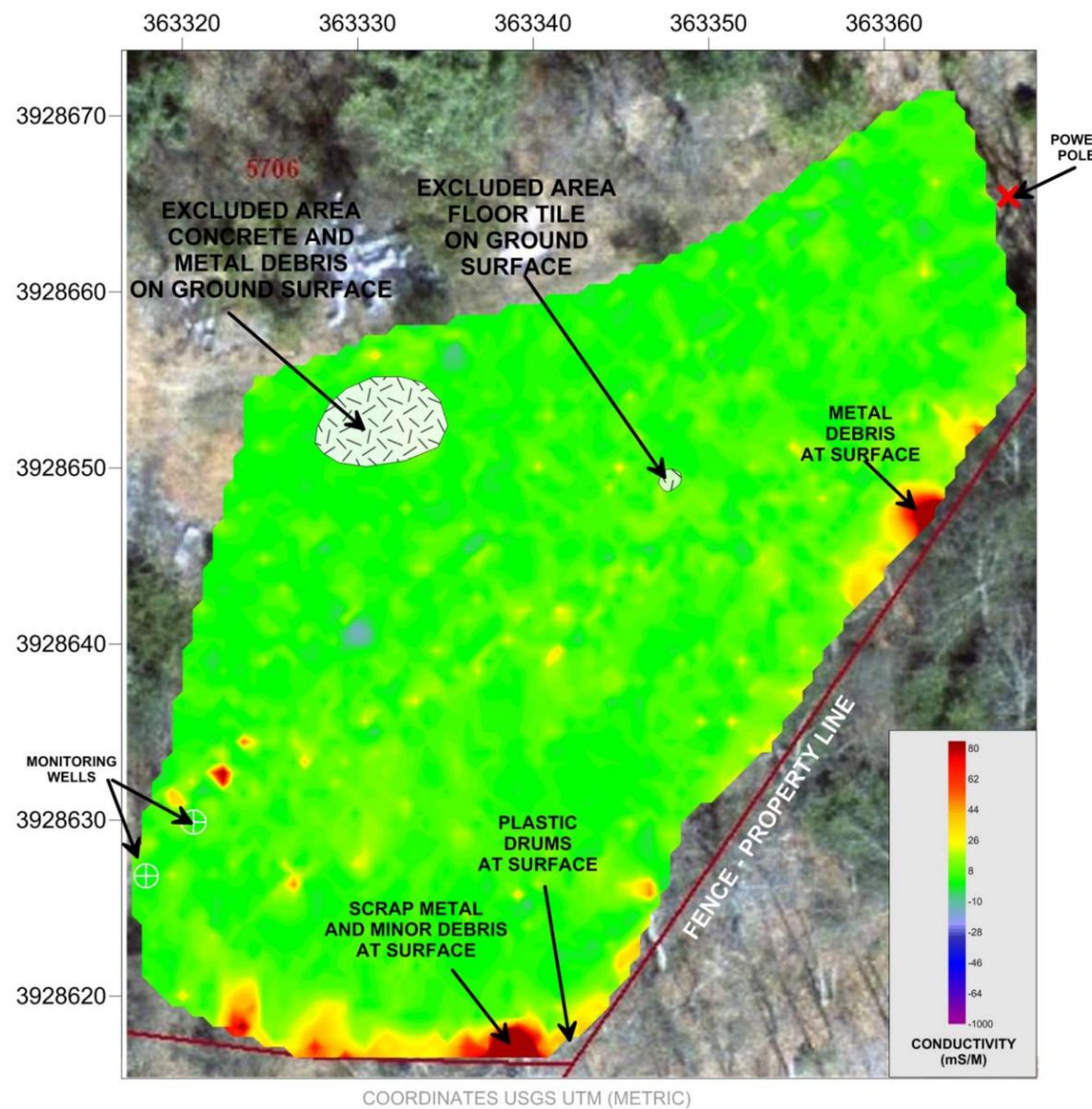
FIGURE 2



EM DATA
3870 Hz IN-PHASE DATA (METAL DETECTION MODE)



EM DATA
3870 Hz CONDUCTIVITY MODE



**RESULTS OF MULTIFREQUENCY
ELECTROMAGNETIC
GEOPHYSICAL SURVEY
3870 Hz FREQUENCY**

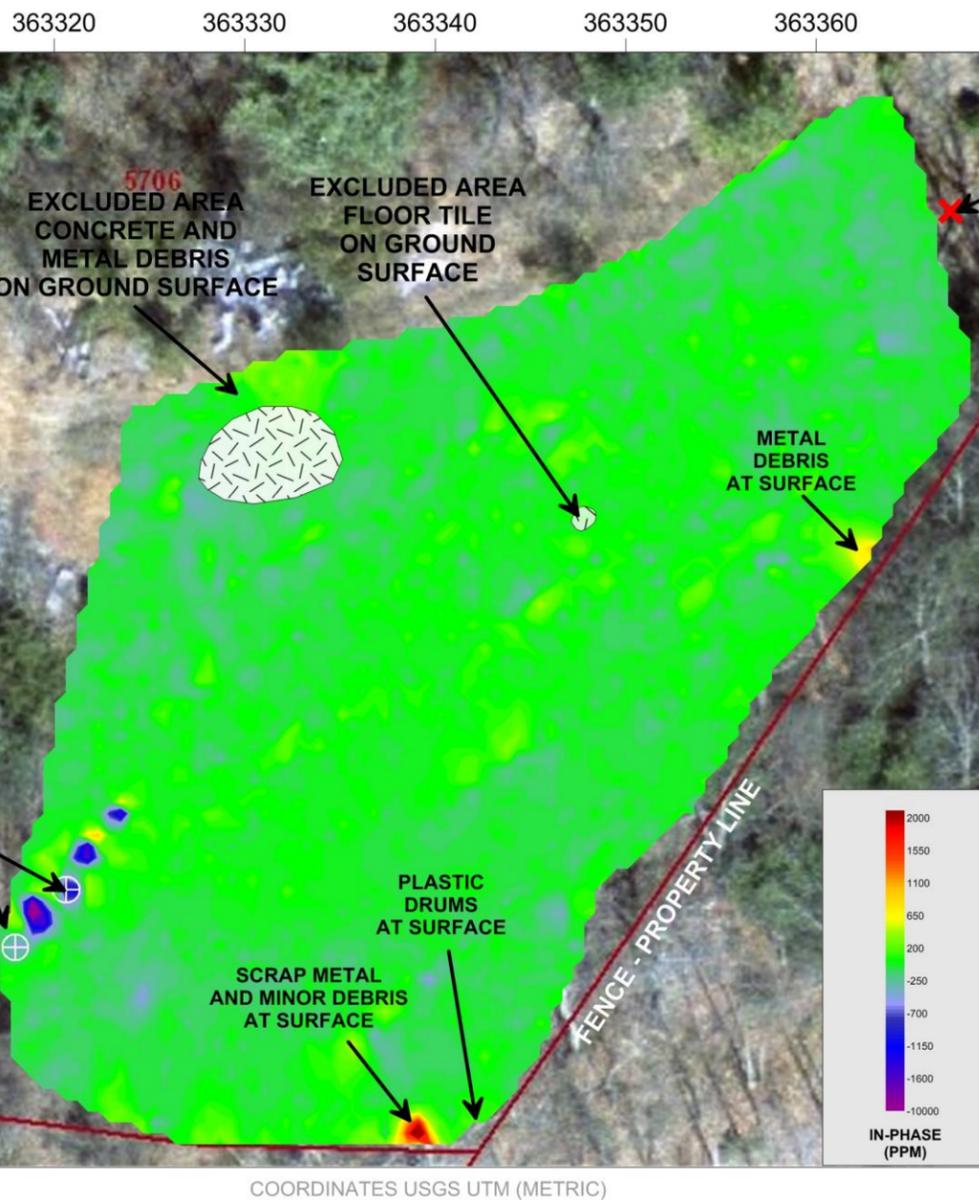
**GEOPHYSICAL SURVEY
CTS-MILLS GAP ROAD
ARDEN, NC**

DECEMBER 2010

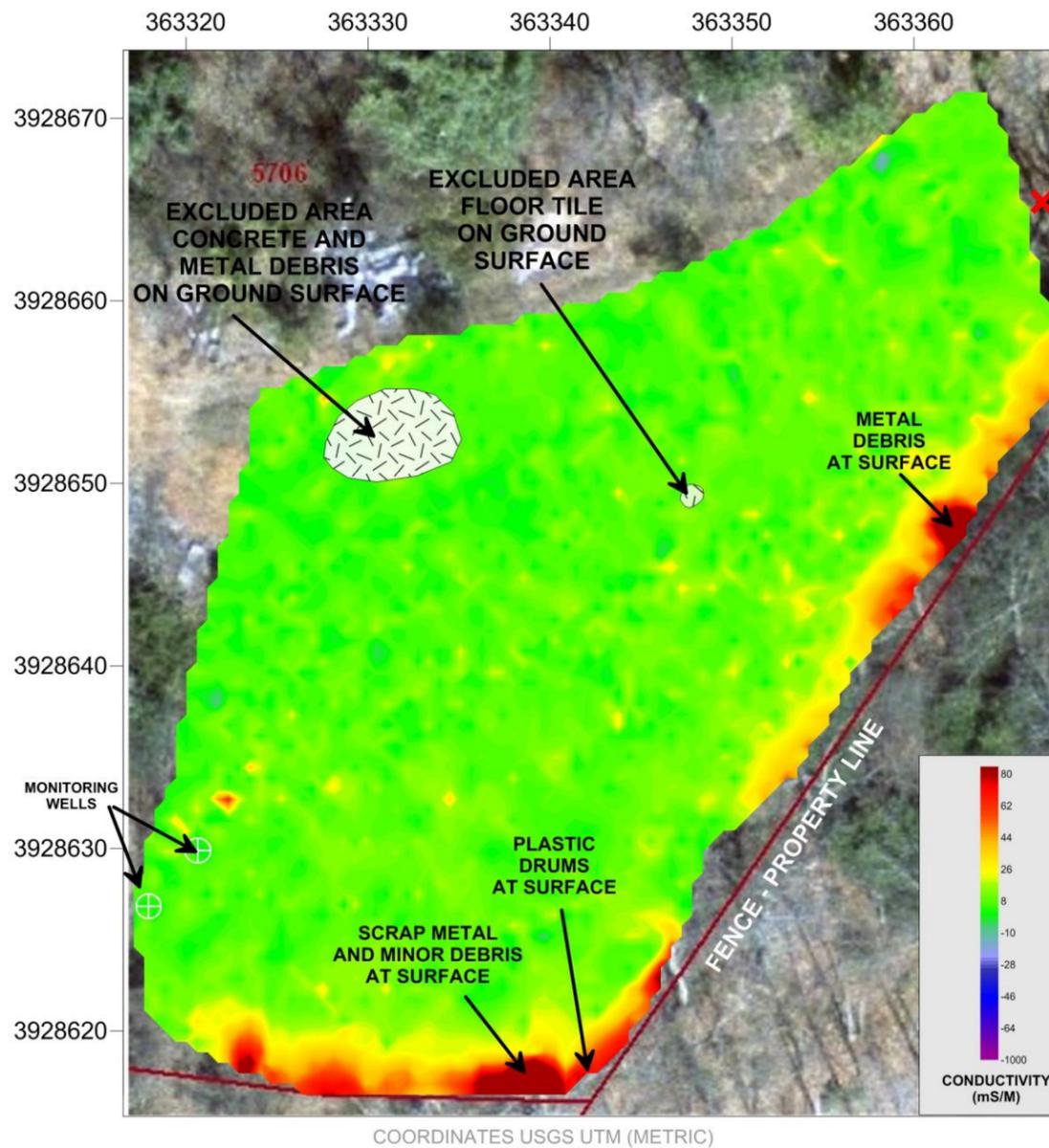
FIGURE 3



EM DATA
11070 Hz IN-PHASE DATA (METAL DETECTION MODE)



EM DATA
11070 Hz CONDUCTIVITY MODE



**RESULTS OF MULTIFREQUENCY
ELECTROMAGNETIC
GEOPHYSICAL SURVEY
11070 Hz FREQUENCY**

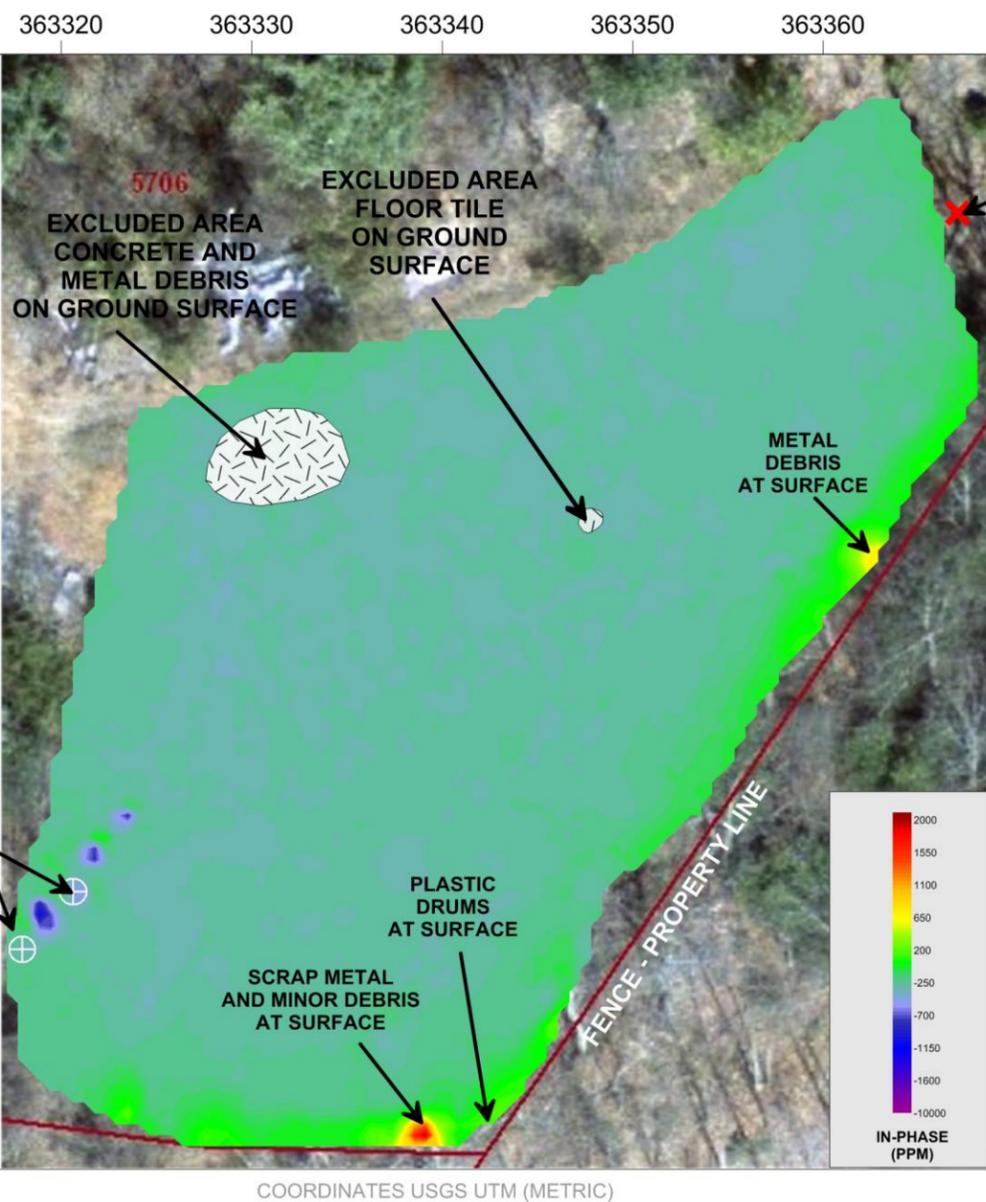
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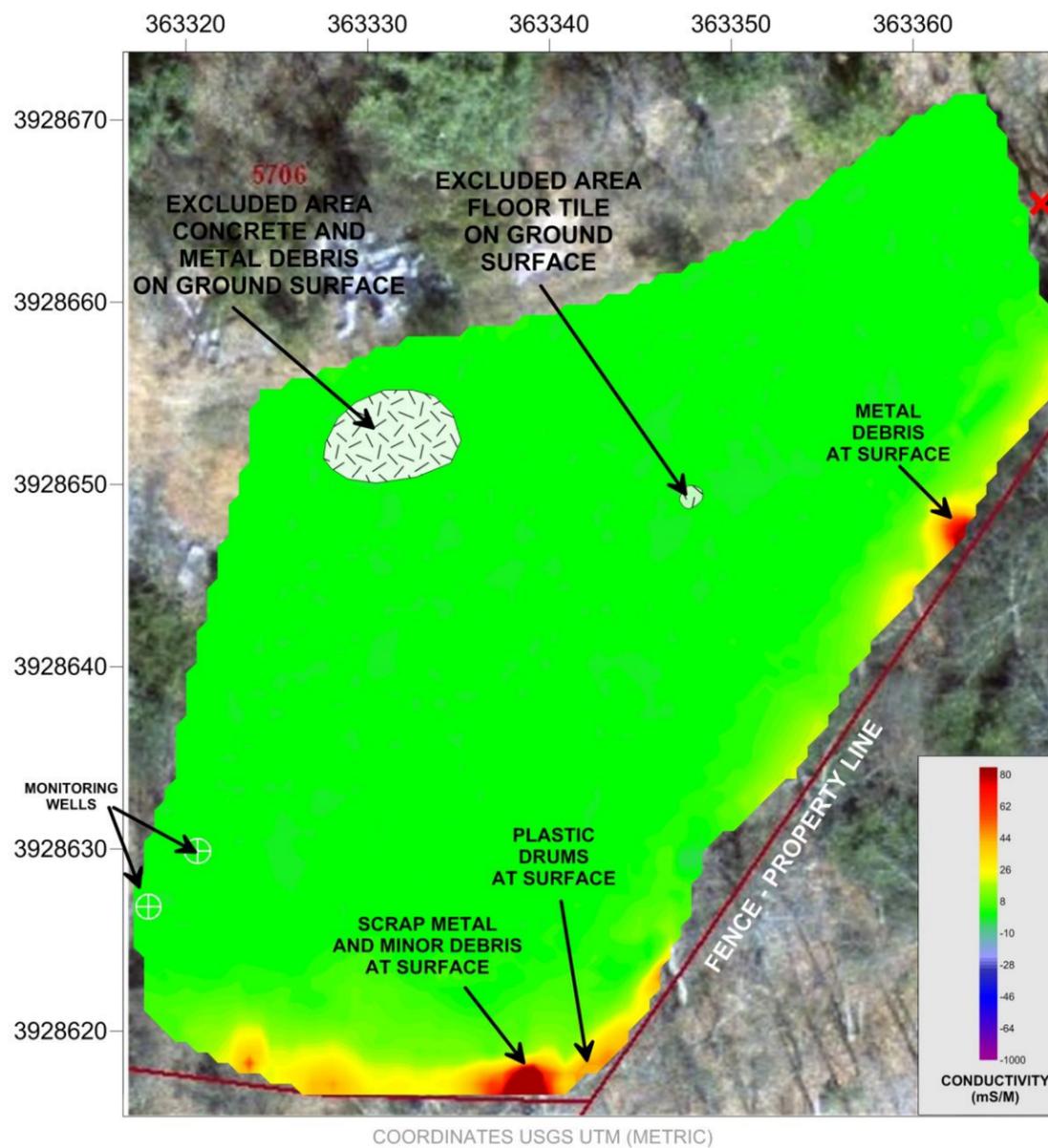
FIGURE 4



EM DATA
90030 Hz IN-PHASE DATA (METAL DETECTION MODE)



EM DATA
90030 Hz CONDUCTIVITY MODE



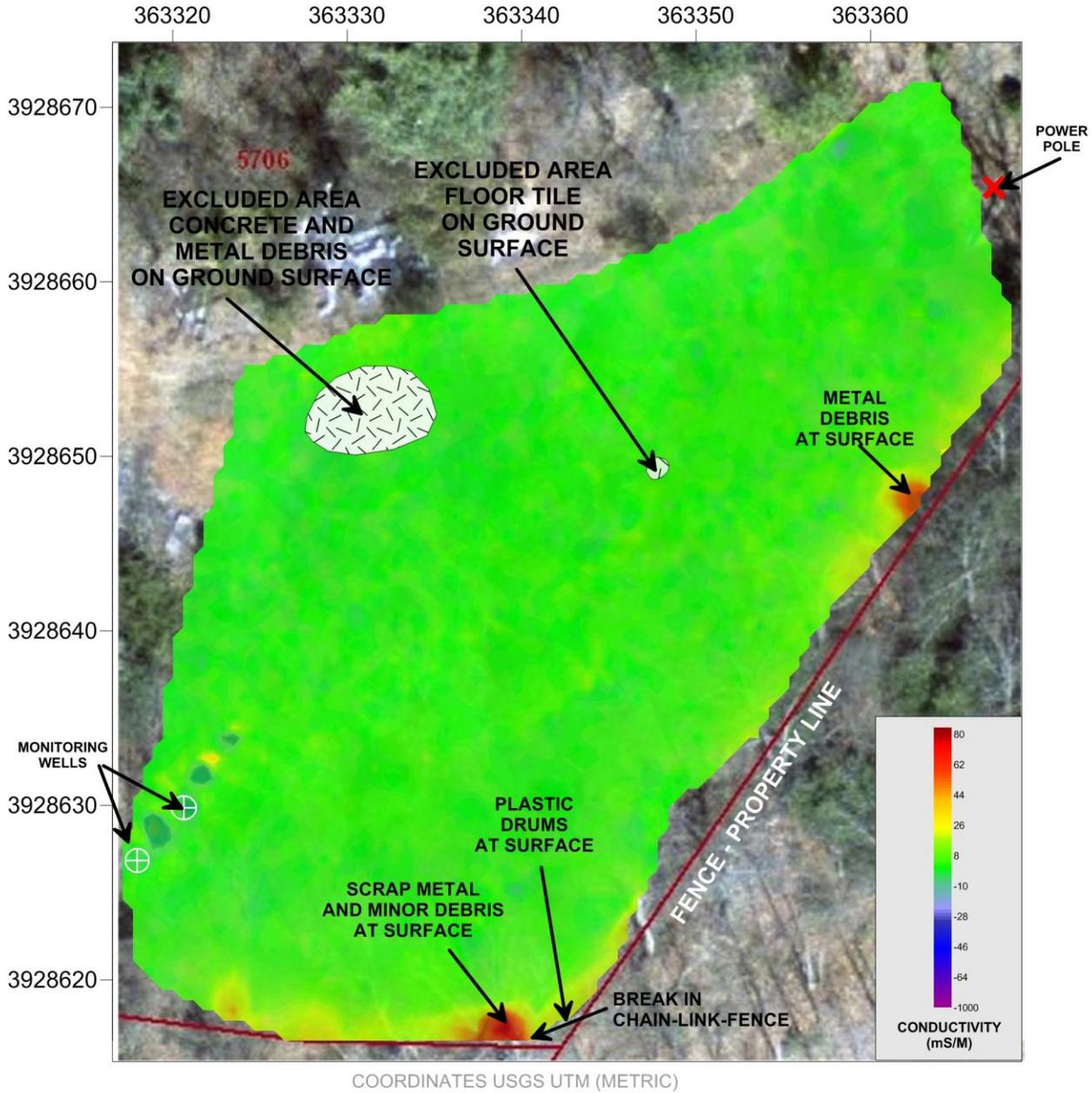
**RESULTS OF MULTIFREQUENCY
ELECTROMAGNETIC
GEOPHYSICAL SURVEY
90030 Hz FREQUENCY**

**GEOPHYSICAL SURVEY
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ARDEN, NC**

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FIGURE 5

SUMMARY OF EM ANOMALIES

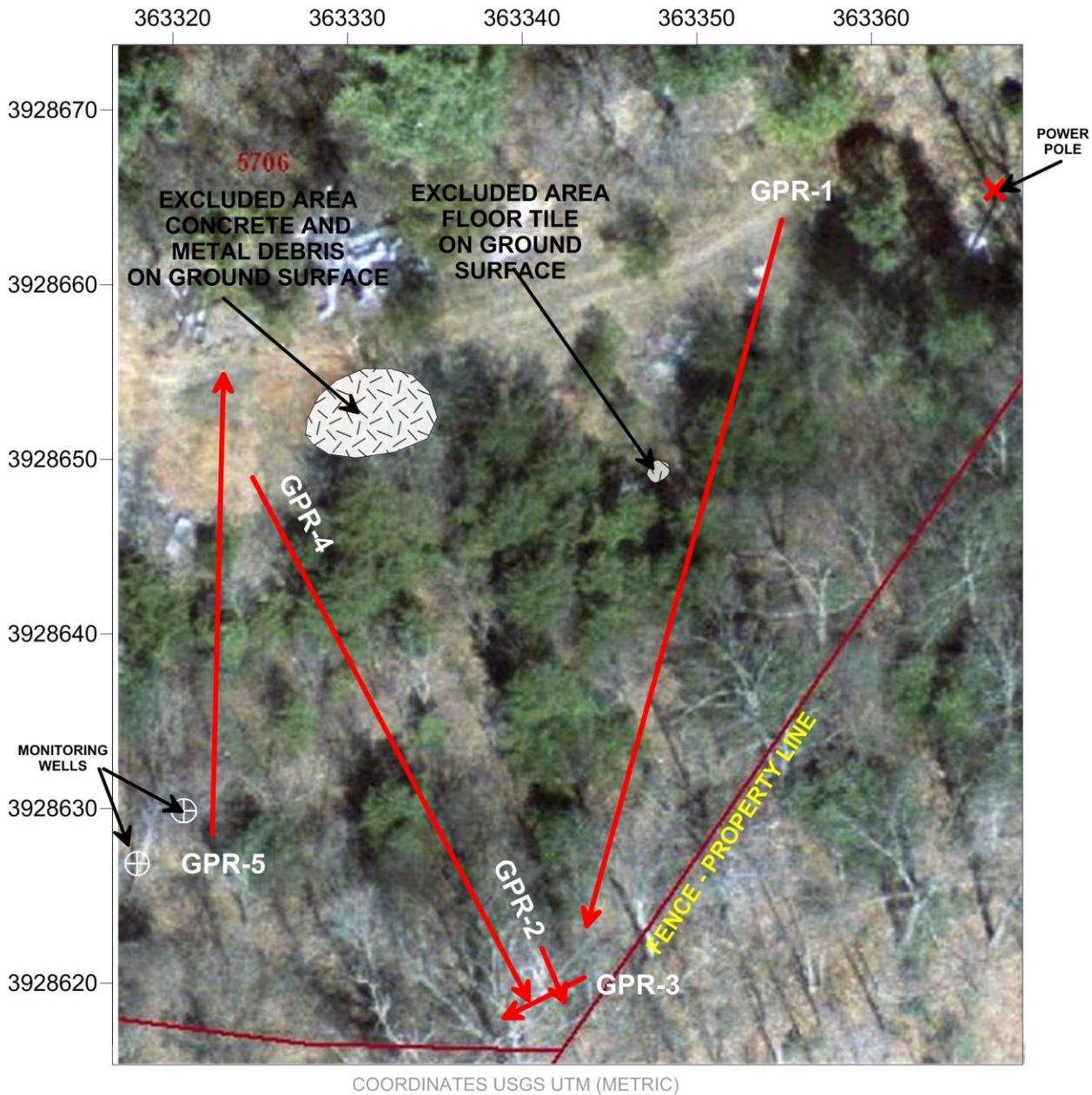


GEOPHYSICAL SURVEY CTS-MILLS GAP ROAD ARDEN, NC

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FIGURE 6

LOCATION OF GROUND-PENETRATING RADAR PROFILE LINES

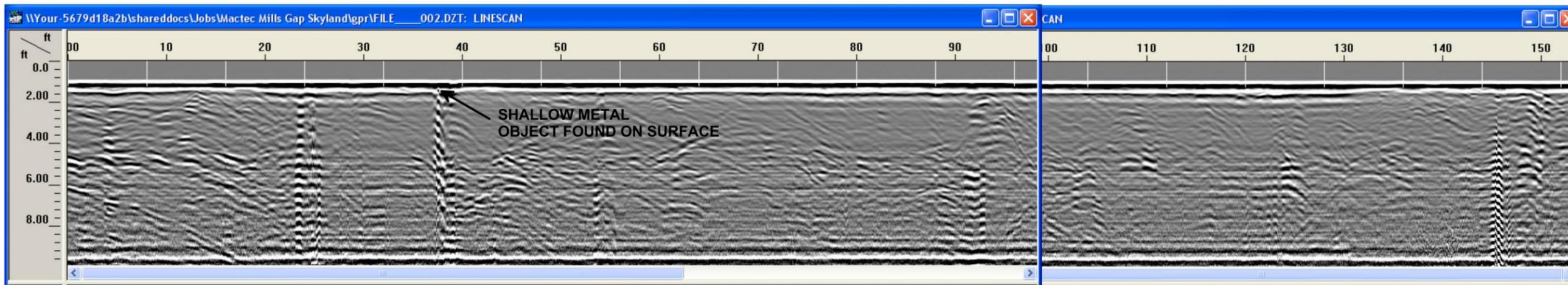


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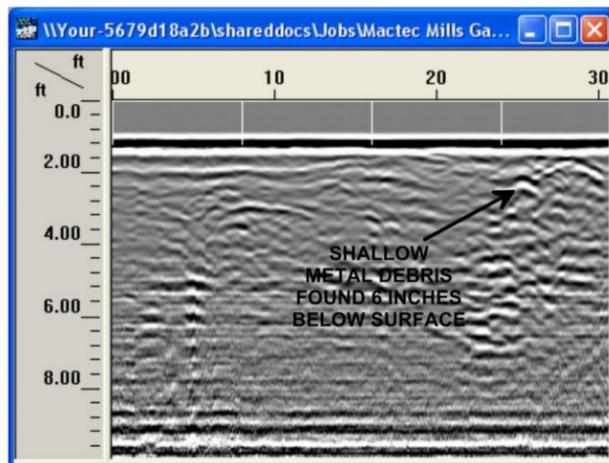
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GPR-1

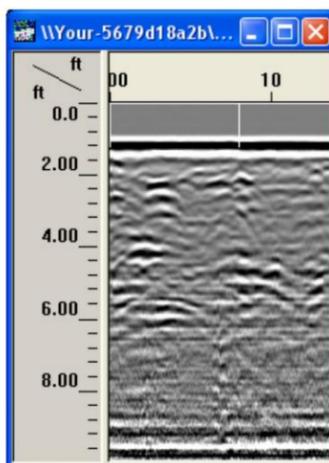
FIGURE 7



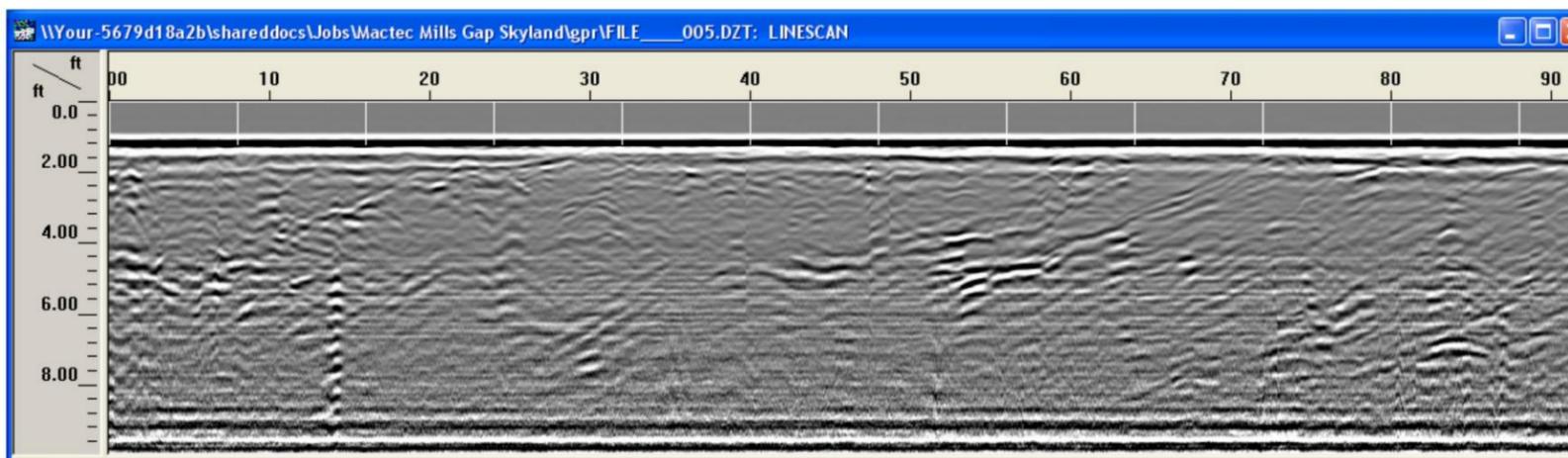
GPR-2



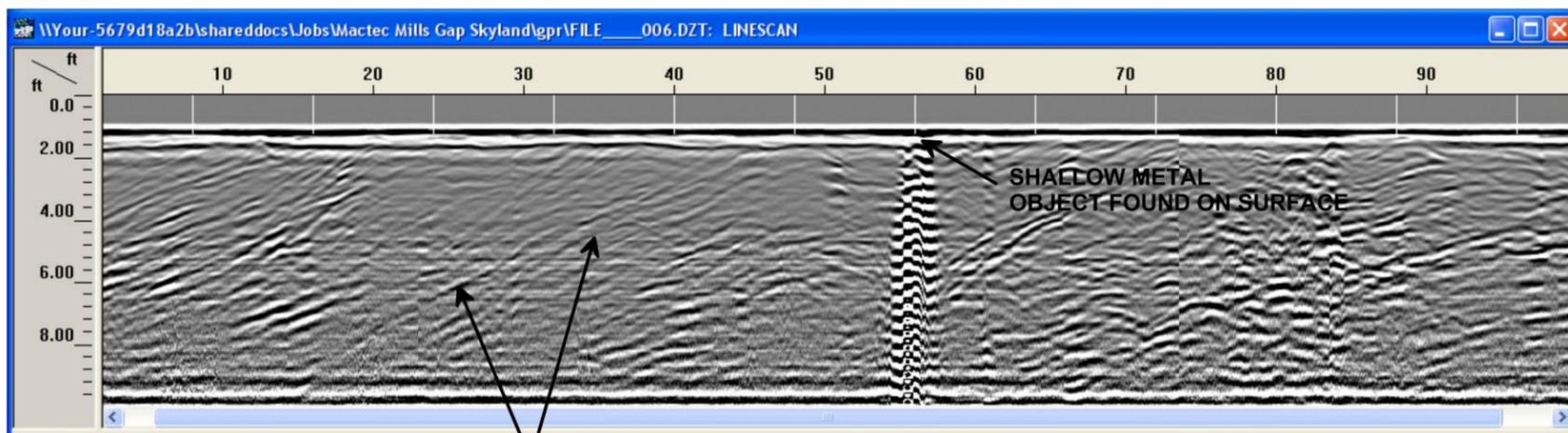
GPR-3



GPR-4



GPR-5



BEDDING STRUCTURES IN BEDROCK/SAPROLITE

RESULTS OF GROUND-PENETRATING RADAR EVALUATION

GEOPHYSICAL SURVEY
CTS-MILLS GAP ROAD
ARDEN, NC

DECEMBER 2010