



CAPB 96

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS 27th FIGHTER WING (ACC)
CANNON AIR FORCE BASE, NEW MEXICO

Sanford

W. P. Ard, Colonel, USAF
Commander, 27th Support Group
100 S DL Ingram Blvd Suite 200
Cannon AFB NM 88103-5217

12 9 AUG 1986

Mr. Benito J. Garcia, Chief
Hazardous & Radioactive Materials Bureau
New Mexico Environment Department
2044 Galisteo Street
P O Box 26110
Santa Fe NM 87502



Dear Mr. Garcia

Enclosed is the geophysical report for Area of Concern D along with the proposed soil boring locations and a cover letter from the contractor with the rationale for these locations.

We wish to gain concurrence among NMED, U.S. EPA, and ourselves before proceeding. Since drilling is scheduled for the early part of Oct, a rapid response from your office would be greatly appreciated. If necessary, we can meet with your staff in Santa Fe.

If you have any questions, please contact Mr. Sanford Hutsell at (505) 784-6378.

Sincerely

W. P. ARD, Colonel, USAF
Commander, 27th Support Group

Attachments:

1. Geophysical Report
2. Proposed Locations
3. Contractor's Letter with rationale

cc:

NMED w/o encl (R. Kern)
NMED wo/ encl (B. Hoditschek)
U.S. EPA Region VI (D. Neleigh)
HQ ACC CES/ESVW w/o encl (M. Calvert)

August 6, 1996

Mr. Doug Mellema
U.S. Army Corps of Engineers
Omaha District
215 N. 17th Street
Omaha, NE 68102

RE: Site Inspection
Area of Concern (AOC) - D
Cannon Air Force Base, NM
Contract No. DACW45-93-D-0049

Dear Mr. Mellema:

IMS is pleased to submit the geophysical survey report and proposed soil boring locations for your review. Results of the geophysical survey indicate that no metallic drums or other containers are present within the confines of the surveyed area at AOC-D. Please refer to the geophysical survey report for detailed discussion of the results.

The proposed soil boring locations are shown in Figure 1. Three borings (SB-02, SB-03, and SB-05) are proposed inside the fairway of Hole #7 because the disposal pit reportedly lies under the fairway (as per personal communications with USACE). Drilling in the fairway would provide greater probability of drilling through the asbestos debris than areas outside the fairway. One boring (SB-01) is proposed north of the fairway to investigate the extent of the debris pit in that direction. Two borings (SB-04 and SB-06) are proposed south of the fairway in areas where chips of wall material (potentially asbestos containing material) were observed at the surface by IMS personnel during the geophysical survey.

I will appreciate receiving any comments you might have on the boring locations proposed by IMS. Thank you for your help. Please call us at 716-427-0690 if you have any questions.

Sincerely,



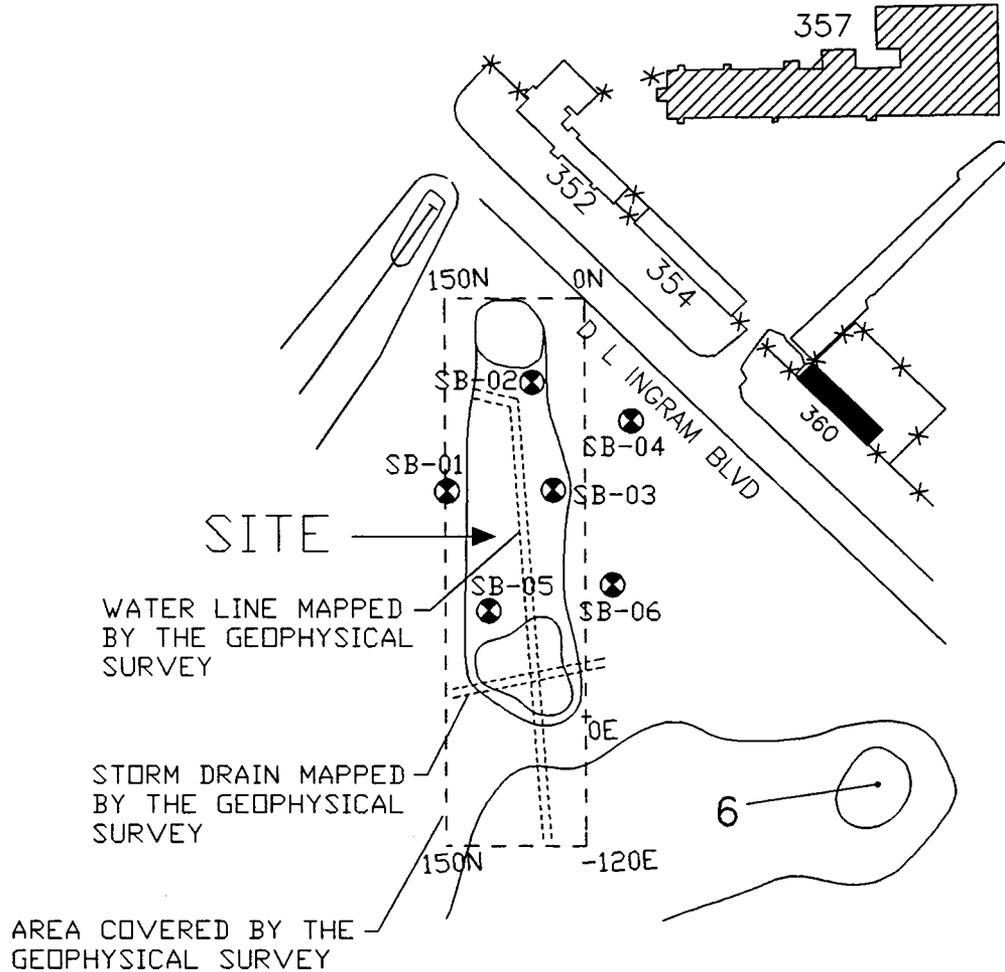
Praveen Srivastava, Ph.D.
Project Manager

Enclosures

c: Sanford Hutsell, CAFB

LEGEND

⊗ PROPOSED SOIL BORING LOCATIONS
SB-01



SCALE: 1"=200'

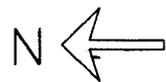


FIGURE-1
PROPOSED SOIL BORING LOCATIONS
ADC-D (HOLE #7)
CANNON AFB, NEW MEXICO

PREPARED FOR:
U.S. ARMY CORPS OF ENGINEERS
OMAHA, NEBRASKA

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SITE INSPECTION
GEOPHYSICAL SURVEY
REPORT
AREA OF CONCERN - D

CANNON AIR FORCE BASE
CLOVIS, NEW MEXICO



Prepared for
IMS
Rochester, New York

May 1996



Woodward-Clyde Consultants
101 S. 108th Avenue
Omaha, NE 68154

Project No. M9429E

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INTRODUCTION

1.1 PURPOSE AND SCOPE

This report summarizes the field data collection activities, data processing and results from a geophysical investigation of Area of Concern - D (AOC-D) at Cannon Air Force Base near Clovis, New Mexico. The AOC-D site is located on the base golf course in the vicinity of the 7th hole. Waste materials primarily consisting of building tiles containing asbestos were reportedly uncovered in trenches excavated along the 7th fairway during construction of the golf course irrigation network. Available information indicates that that these materials may have been buried in a waste disposal area located in this vicinity. However, accounts by some base personnel suggest that the tiles may have simply fallen from barracks buildings that were temporarily stored in this area in the past. The purpose of the geophysical investigation was to investigate AOC-D and assess if other potential sources of contamination, such as drums or metal containers, were disposed of in the suspected disposal area. The electromagnetic (EM) method, using the Geonics EM-61 (EM-61), was selected to accomplish this objective. The following sections provide a brief description of the EM method using the EM-61 and a discussion of the field program and results.

GEOPHYSICAL METHOD

2.1 ELECTROMAGNETIC METHOD USING THE GEONICS EM-61

The geophysical investigation of AOC-D was conducted using the Geonics EM-61. The EM-61 is a time domain EM instrument that is specifically designed to detect buried metal objects. The instrument generates rapid EM pulses through a transmitter coil. These pulses induce secondary EM fields in the near-surface materials. The secondary EM fields induced from moderately conductive subsurface materials (i.e. soil and rock) are of relatively short duration. However, the secondary EM fields induced from good electrical conductors and metallic objects, such as metal drums, are of relatively long duration. The EM-61 measures this prolonged response from metallic objects after the EM response from natural earth materials dissipates. Design of the EM-61 provides high resolution of metallic targets. The depth of investigation of the EM-61 is relatively insensitive to site specific subsurface conditions, and is reportedly capable of detecting a single 55 gallon drum to a depth of 10 feet.

The EM-61 measures the EM response in milliVolts (mV). Observed EM response values can be plotted and contoured to evaluate the variations across the site. It should be noted that variations in the measured EM response values from some background level are more diagnostic than the absolute values. Variations in EM response resulting from buried metallic objects, such as buried drums, are generally manifested by relatively large (greater than about 50 to 75 mV) anomalies. However, EM-61 anomalies can be masked by the interfering effects from nearby metallic objects.

The response amplitude for a given anomaly is primarily a function of the anomaly depth, although anomaly size has some effect as well. It is thus useful to have some means of interpreting the depth of a given anomaly. The EM-61 has a two-receiver coil system that facilitates the recognition of near-surface objects from deeper targets. The EM-61 can output the response of either (or both) coil(s), and can output a differential between the two. By comparing the output from both coils, near-surface anomalies can sometimes be identified.

3.1 SURVEY DESIGN

The geophysical investigation of AOC-D was designed to consider the specific site conditions encountered. The primary objective of the investigation was to identify possible buried metal objects including drums or containers that may have contained hazardous waste material. Results of previous geophysical investigations conducted in the vicinity of the golf course had indicated that the irrigation network can interfere significantly with some geophysical tools. Additionally, some empirical success had been achieved using the EM-61 in other investigations at the base golf course. Considering these previous findings, the EM-61 was chosen as the appropriate tool for this survey. The EM-61 survey was intended to provide focused mapping of buried metallic objects and help in discerning between the irrigation network and potential buried waste materials.

3.2 GRID LAYOUT

All geophysical field work was conducted on April 17 and April 18, 1996. The first step of the investigation involved establishing a geophysical survey grid at the site. The grid was laid using optical survey techniques and taped distance measurements. The initial survey grid encompassed an area 150 feet by 470 feet across the entire 7th hole area. Available information indicated that this was the most likely location of the suspected disposal area. However, after preliminary survey results did not appear to indicate the presence of buried drums, the survey grid was expanded 120 feet to the west onto the fairway of the golf course's 6th hole. The 150 feet width of the initial grid was also used for the expanded grid section.

The survey grid consisted of two base lines established along the northern and southern perimeters of the grid. These base lines were marked using pin flags and fluorescent paint marks placed at 5 foot centers. Upon completion of the geophysical investigation the corners of the EM grid were surveyed by Lydick Associates of Clovis, New Mexico using a total station surveying instrument. Figure 1 indicates the geophysical survey grid used for the investigation.

3.3 DATA COLLECTION AND PROCESSING

The EM-61 survey was conducted using a nominal station spacing of approximately 0.9 feet and a line separation spacing of 5 feet between each transect. The EM-61 was operated using the wheel trigger mode. Prior to conducting the survey, several test lines were conducted to calibrate the wheel trigger for the site terrain conditions. Processing of the EM-61 data included correcting the data station values using the survey line start and end point information. The wheel mode trigger provided accurate data stationing and the data processing resulted in only minor stationing adjustments.

Upon completion of the EM surveys the data were downloaded to a personal computer. The data were then formatted for input to a contouring program. Data plotting and contouring was accomplished using the computer software GEOSOFT. Inputs to the contouring program included the station coordinates and values, a selected spacing for gridding the raw data and a contour interval. Color-enhancing of the geophysical results was accomplished using the gridded output during contouring.

4.0**SURVEY RESULTS**

Results of the EM-61 data contouring is shown in Figures 2 and 3. Figure 2 shows the results of the channel 2 data. Channel 3 data, which is the difference between channel 1 and channel 2, is shown in Figure 3. As discussed earlier, some of the anomalies due to surface or near-surface features are eliminated or subdued in the channel 3 results.

Most of the anomalies apparent on the contour maps appear to be the result of buried utility lines, or associated with the golf course irrigation system, including sprinkler heads, sprinkler boxes, or drain pipe outlets. The high-amplitude linear anomaly that runs west to east across the entire survey area is likely a water line. The high-amplitude linear anomaly that runs northwest to southeast across the western portion of the site, and across the No. 7 tee box, is due to a 16-inch diameter corrugated metal storm drain pipe. The other low amplitude anomalies apparent in the central portion of the site are likely due to buried irrigation lines for the golf course.

There are several anomalies that are small and circular in shape which may encompass a few stations. However, these anomalies do not propagate across more than one transect line, which are separated by only five feet. If there were buried drums in the survey area, we would expect to observe an irregularly-shaped anomaly that would likely be observed along more than one transect line. Therefore, no anomalies indicative of buried drums or other buried wastes are seen, based on the geophysical survey results.

It is important to note that the EM-61 data has been contoured at a fine interval. The anomalies that are apparent on the plots, with the exception of those associated with the utility lines, represent subtle features that have been amplified to enhance interpretation. Based on experience from investigations at other sites, waste disposal areas with buried drums usually have anomaly amplitudes up to several times greater than those observed in this investigation.

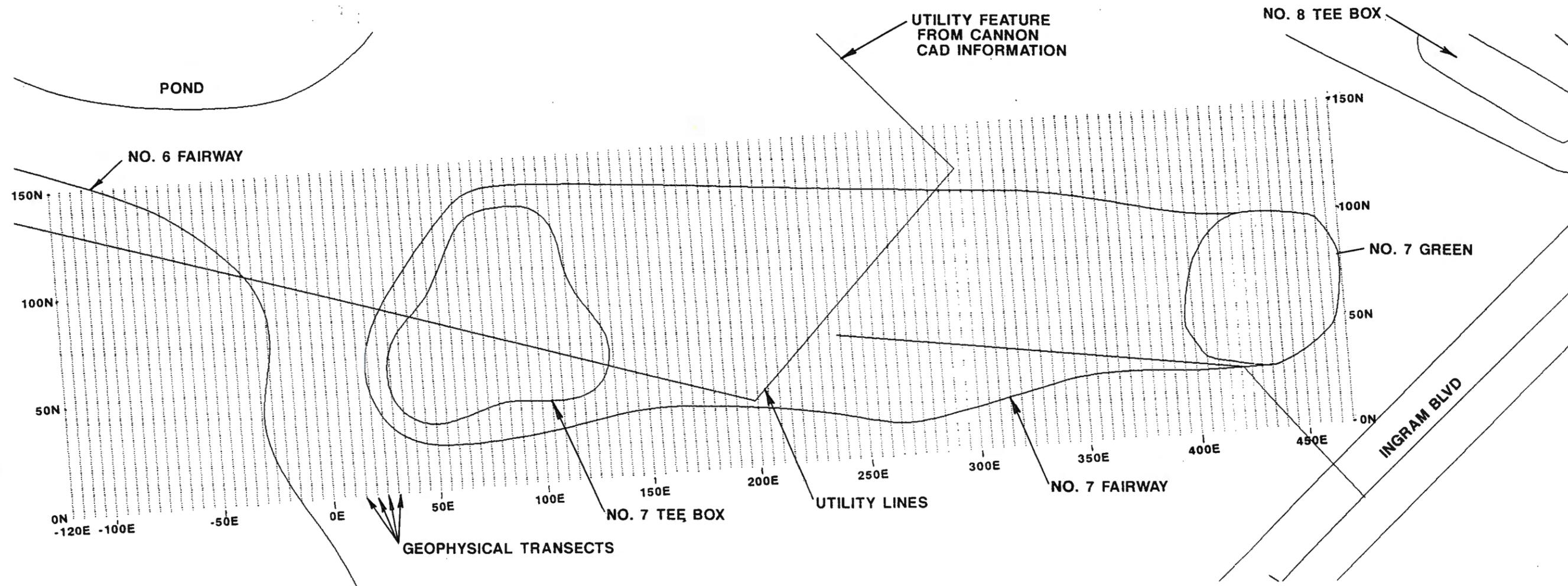
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SUMMARY

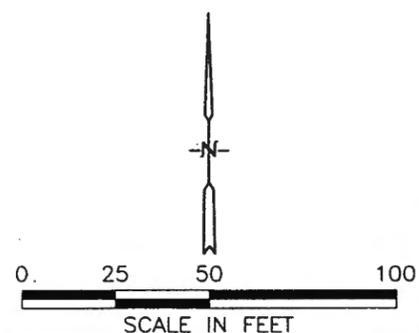
A geophysical investigation was conducted at Area of Concern - D (AOC-D) at Cannon Air Force Base in New Mexico. An electromagnetic survey using the Geonics EM-61 was conducted in an attempt to identify potential sources of contamination including metallic objects such as drums that may have been buried in a suspected waste disposal area. The geophysical results do not indicate the presence of buried drums or metal containers within the AOC-D investigation area. The anomalies detected by the geophysical investigation appear to be due to known cultural features.

5.1 LIMITATIONS

This work was conducted in accordance with reasonable and accepted engineering geophysics practices, and the interpretations and conclusions are rendered in a manner consistent with other consultants in our profession. However, all geophysical techniques have some level of uncertainty and limitations. No other representations to the client is expressed or implied, and no warranty or guarantee is included or intended.



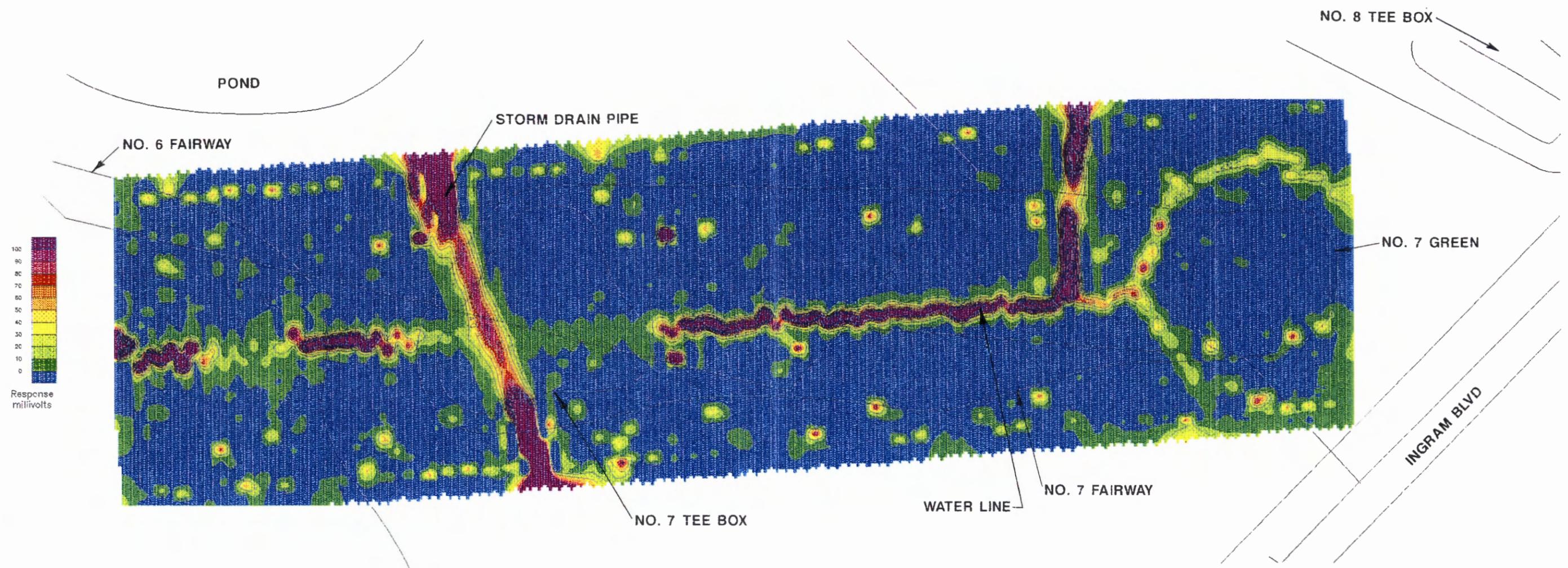
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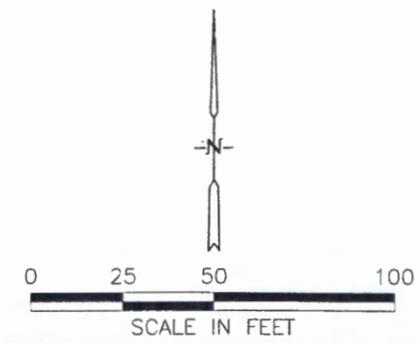
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Prepared by :	J.J.N.
Date :	5/13/96

AREA OF CONCERN - D
 GEOPHYSICAL GRID MAP
 CANNON AFB, NEW MEXICO

FIG. 1

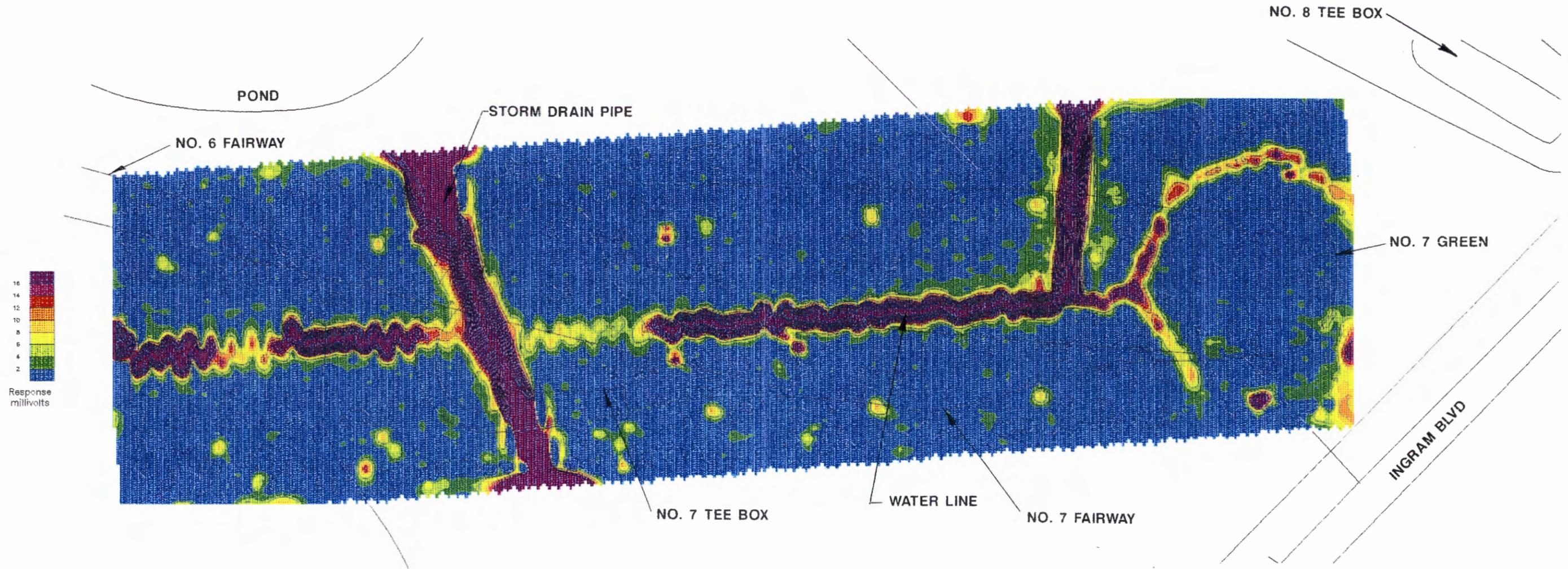


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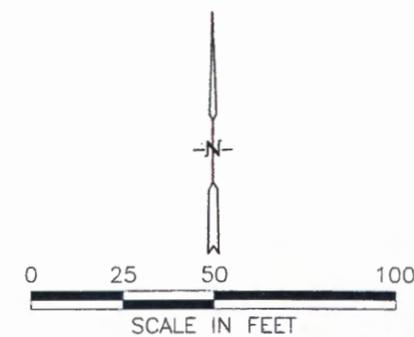


Job No. :	M9429E-2A	AREA OF CONCERN - D EM-61 ELECTROMAGNETICS CONTOUR MAP CHANNEL 2 DATA CANNON AFB, NEW MEXICO
Prepared by :	J.J.N.	
Date :	5/13/96	

FIG. 2



M9429003



Job No. :	M9429E-2A
Prepared by :	J.J.N.
Date :	5/13/96

AREA OF CONCERN - D
 EM-61 ELECTROMAGNETICS CONTOUR MAP
 CHANNEL 3 DATA
 CANNON AFB, NEW MEXICO

FIG. 3