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35 Station 21

ENGINEERING DATA TRANSMITTAL

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This document was reviewed following the procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

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SUPPORTING DOCUMENT

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6. Author

Name: for K. A. Bergstrom

J. W. Fassett
Signature

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7. Abstract

WHC, 1994, Bergstrom, K. A. and T. H. Mitchell, *Geophysical Investigation of 216-U-8 Clay Vitrified Pipe Transfer Line, 200 West Area*, WHC-SD-EN-TI-210, Rev. 0, Westinghouse Hanford Company, Richland, Washington."

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CONTENTS

1.0 OBJECTIVE

Two geophysical surveys were conducted over a vitrified clay pipeline (VCP) that was used to transfer liquid radioactive waste from the 224-U Building to the 216-U-8 and 216-U-12 cribs (Figure 1). The objectives of the surveys were to locate the VCP in the northern site, locate the bends in the VCP in the southern site, and locate possible utilities or pipelines at both sites. Ground-penetrating radar (GPR) was the method chosen for the surveys. Electromagnetic induction (EMI) was also used at the southern site to map the extent of a possible pipeline. It is very difficult to detect most VCPs with GPR, however, excavation boundaries for the pipeline are often discernible.

2.0 GROUND-PENETRATING RADAR METHODOLOGY

The GPR system used for this work utilized a 300-megahertz antenna. The antenna transmits electromagnetic (EM) energy into the ground which is reflected back to a receiving antenna where variations in the return signal are recorded. Common reflectors include natural geologic conditions such as bedding, cementation, moisture, and clay; or man-made objects such as pipes, barrels, foundations, and buried wires.

The method is limited in depth by transmit power, receiver sensitivity, frequency, and attenuation of the transmitted energy, which can be strongly affected by geology. Depth of investigation is also influenced by highly conductive material, such as metal drums, which reflect all the energy back to the receiver. Therefore, the method cannot "see" below such objects. Maximum depth of penetration for this survey seemed to be about 10 to 12 ft.

Display and interpretation of the data are similar to seismic reflection data. In some areas, interpretations can be straightforward, but often unknown parameters within a highly variable subsurface yield complex data. Data for these surveys were collected with a Geophysical Survey Systems Inc. (GSSI) Subsurface Interface Radar (SIR) [a trademark of Geophysical Survey Systems Inc. (GSSI)] System 8, model 4800 and digitally stored on a GSSI DT6000A tape drive. A recording window of 100 nanoseconds, two-way travel time, was used for each survey. Figure 2 summarizes survey parameters for each survey.

3.0 GRID LOCATION

The survey boundary for the northern site measure 60 ft by 110 ft (Figure 3). The southern site is 50 ft by 100 ft (Figure 4). Painted stakes mark the corners of the grid. The long axis of the north survey strikes approximately north-south. The long axis of the southern survey strikes N50E. All distances were measured and posted in feet. Separate grids were used for each survey. The southwestern corner of each grid is designated E100/N100 and serves as the "origin" for the survey locations. The letters "N" or "E" refer

to a direction that trends generally north or east, respectively. The number refers to a distance in feet. For example, grid point E135/N120 lies 35 ft "east" and 20 ft "north" of grid point E100/N100.

Data were collected along two sets of profiles perpendicular to each other. Spacing between profiles was 5 ft.

4.0 QUALITY CONTROL

These data were collected using procedures in WHC-CM-7-7, EII 11.2, Rev. 3, *Environmental Investigations and Site Characterization Manual*, Westinghouse Hanford Company. The data and records are stored in the Geophysics files.

5.0 RESULTS

The VCP was not identified in the GPR data at the northern site. Its anticipated depth was 10-12 ft. The excavation for the VCP was detected between E115 and E140 (Figure 3). The western boundary for the excavation was not well defined between N160 and N195. There were no linears identified passing through the proposed excavation corridor (Figure 1), with the character of a pipeline or utility,. Based on the data, the interpreted location of the pipe is E125-E130.

The VCP at the southern site appears to be much shallower. The data suggest it may be 5 ft or less below the surface in places. The edges of the excavation from N100 to N190 are between E120 and E135 (Figure 4) and were quite distinct in the data (Figure 5). However, the excavation boundaries weren't apparent north of N190, suggesting that the VCP bends to the north near N200 (see Figure 1). Data from reconnaissance profiles south of the gridded portion of the survey suggests that the second bend in the VCP is near N90.

Several profiles were extended beyond N200. These profiles detected a linear, with the characteristic signature of a pipeline, approximately 3 ft below the surface (Figure 4). The was no previous knowledge of the pipeline. The linear was traced across the entire surface contamination area with an EM-31D (a trademark of Geonics Ltd.), an EMI geophysical tool.

Figure 1. Site Location Map for 216-U-8 Investigation.

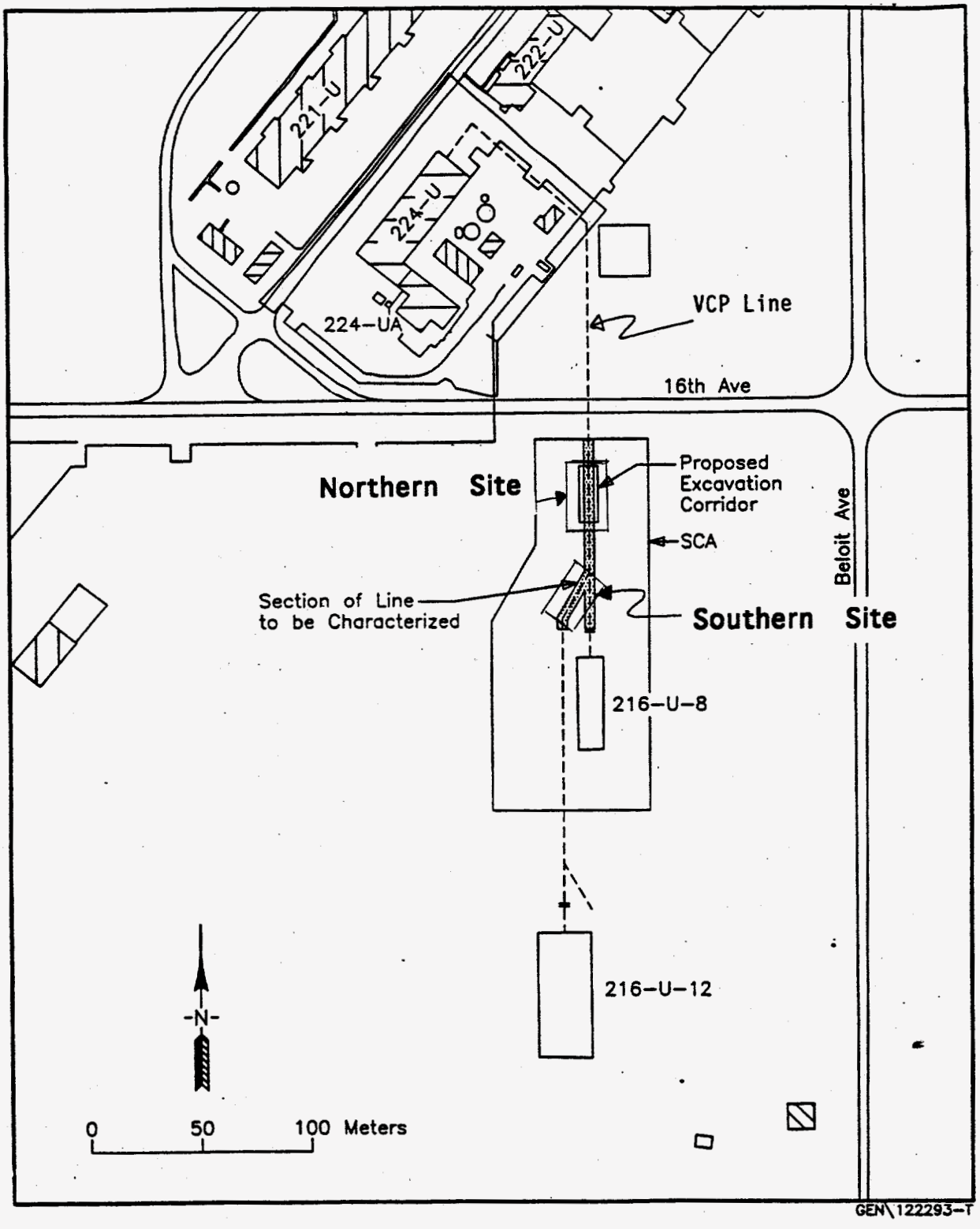
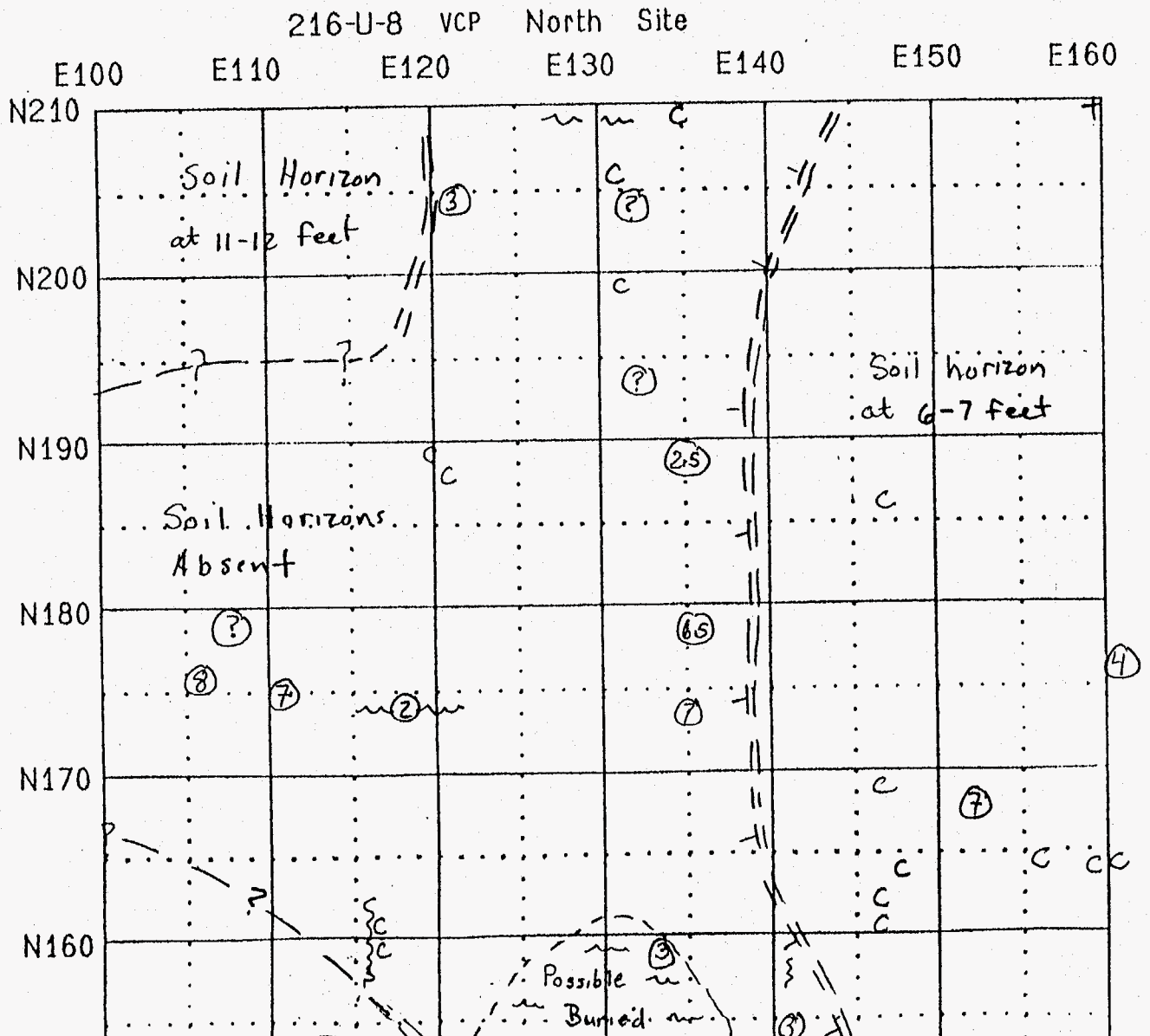


Figure 2. GPR Parameters for 216-U-8 VCP Investigation.

GROUND PENETRATING RADAR (GPR) SURVEY

Team Geophysics, Westinghouse Hanford Operations

TITLE: 216-U-8 VCP	DATE: 1-10-94 2-7-94
LOCATION: SOUTH OF U-PLANT ~ 50 FEET SOUTH OF 16 STREET. EXTENSION ~ 500 FEET SOUTH	
CLIENT: Rowley	DATA COLLECTED BY K.A. Bergstrom & T.H. Mitchell
EQUIPMENT USED: GSSI System 8, model 4800 Calibrator Model P731 Digital Tape Recoder DT6000A	ANTENNA(S) USED: 100 ____ 300 XX 100 BISTATIC ____
	LOG BOOK: EFL1109
	TIME WINDOW (NS): 100
PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3	
GRID : 60X110 / 50X100' NO. OF PROFILES: 38 & 35 PARAMETERS: Two sets of perpendicular profiles; five feet between north-south and east-west profiles.	
DATA TAPE NO.: 94-7&10 RECORDS LOCATION: Geophysical field files TAPE ADDRESS : 0-26426 / 7236-32600 CALIBRATION ADDRESS: 25828-26426 / 32439-32600	
INTERPRETED BY : K. A. Bergstrom REVIEWED BY : T.H. Mitchell	
OBJECTIVE(S): To locate trench and Clay vitrified pipe if possible. Locate possible underground utilities.	
NOTES: Antenna pulled by hand at 1-2 mph. 60-meter cable. Both site were surface contamination areas SCA. Extension grid at N50E. Used new fiberglass covers over antennas.	


216-U-8 VCP North Site
E100
E110
E120
E130
E140
E150
E160
N210
N200
N190
N180
N170
N160
Soil Horizon at 11-12 feet
Soil horizon at 6-7 feet
Soil Horizons Absent
Possible Buried

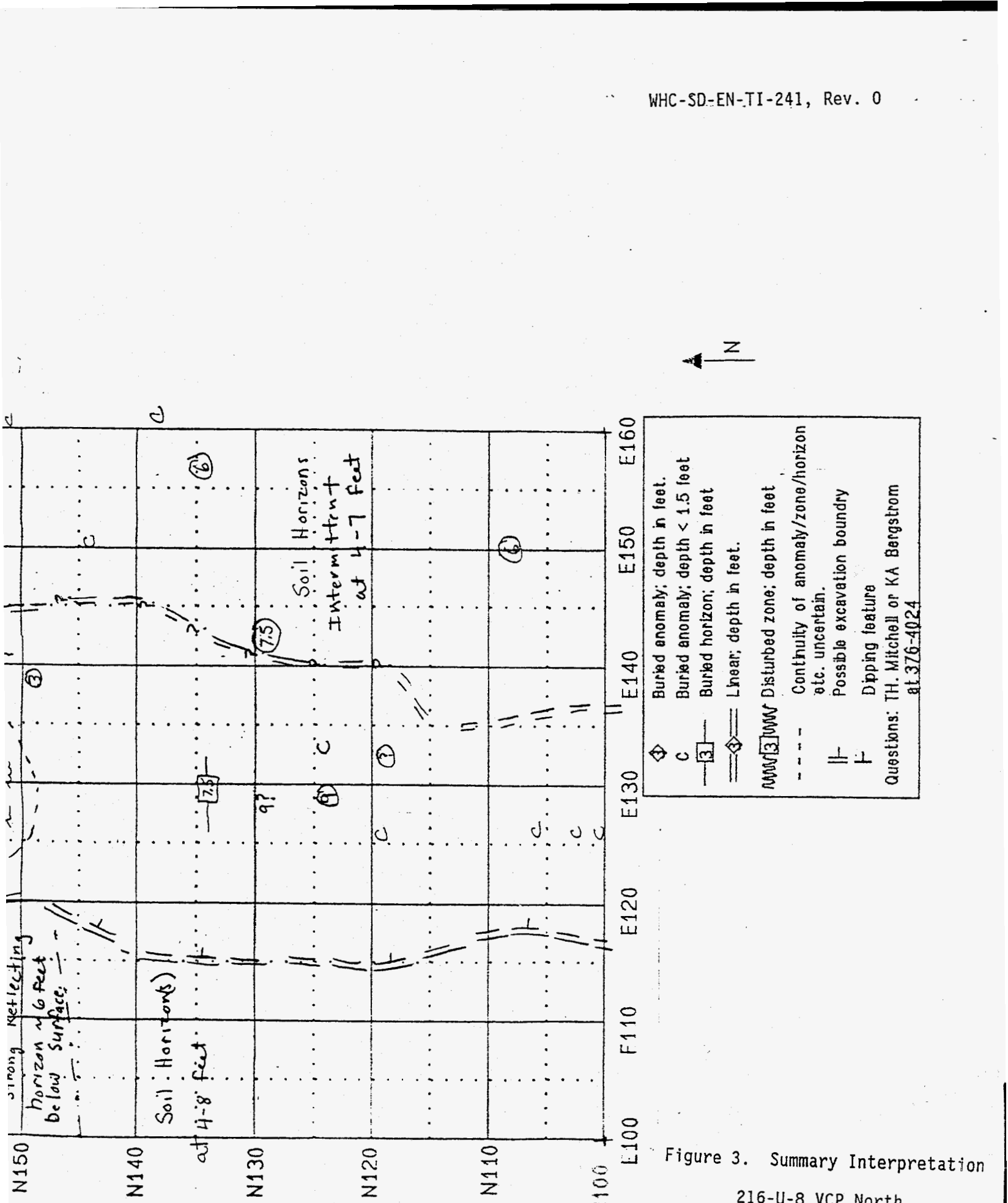
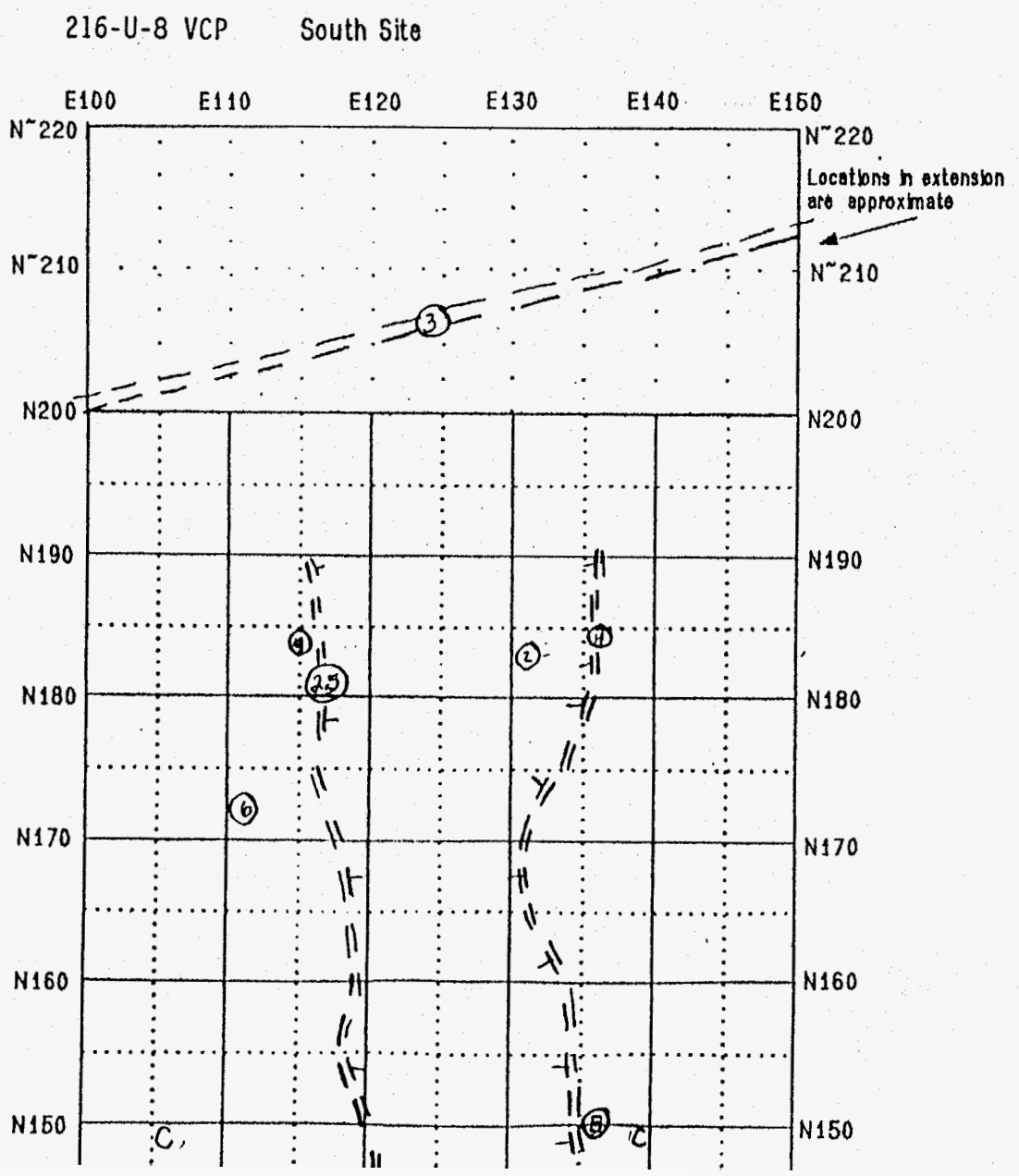


Figure 3. Summary Interpretation 216-U-8 VCP North.


216-U-8 VCP South Site
E100
E110
E120
E130
E140
E150
N~220
N~210
N200
N190
N180
N170
N160
N150
Locations in extension are approximate
3
4
2
1
2.5
6
5
C
C'

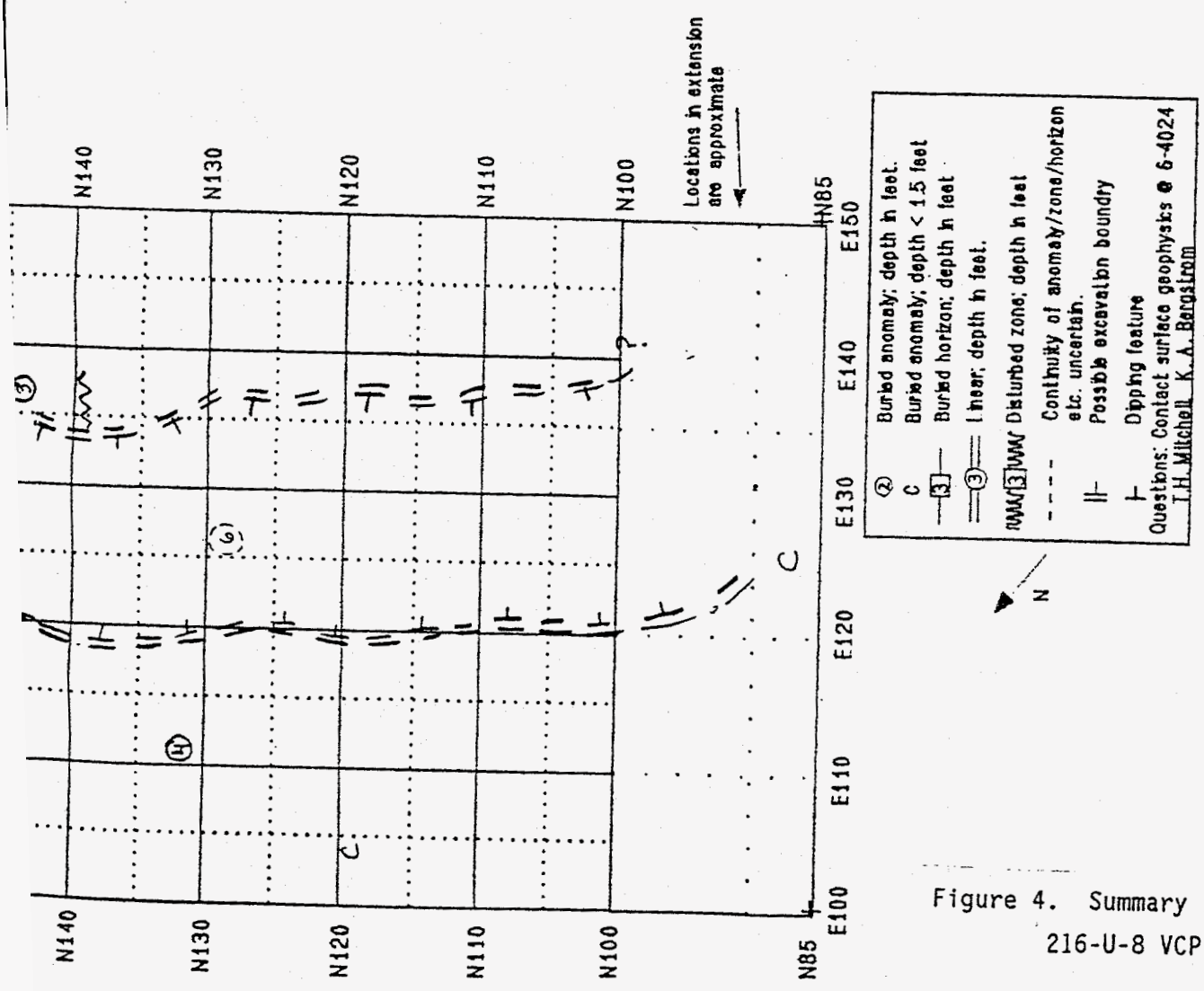


Figure 4. Summary Interpretation 216-U-8 VCP South.

Figure 5. GPR Profile N155, Southern Site.