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7. Abstract WHC, 1994, Bergstrom, K. A. and T. H. Mitchell, <i>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.</i> "	8. PURPOSE AND USE OF DOCUMENT - This document was prepared for use within the U.S. Department of Energy and its contractors. It is to be used only to perform, direct, or integrate work under U.S. Department of Energy contracts. This document is not approved for public release until reviewed. PATENT STATUS - This document copy, since it is transmitted in advance of patent clearance, is made available in confidence solely for use in performance of work under contracts with the U.S. Department of Energy. This document is not to be published nor its contents otherwise disseminated or used for purposes other than specified above before patent approval for such release or use has been secured, upon request, from the Patent Counsel, U.S. Department of Energy Field Office, Richland, WA. DISCLAIMER - This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.	
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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). There 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.

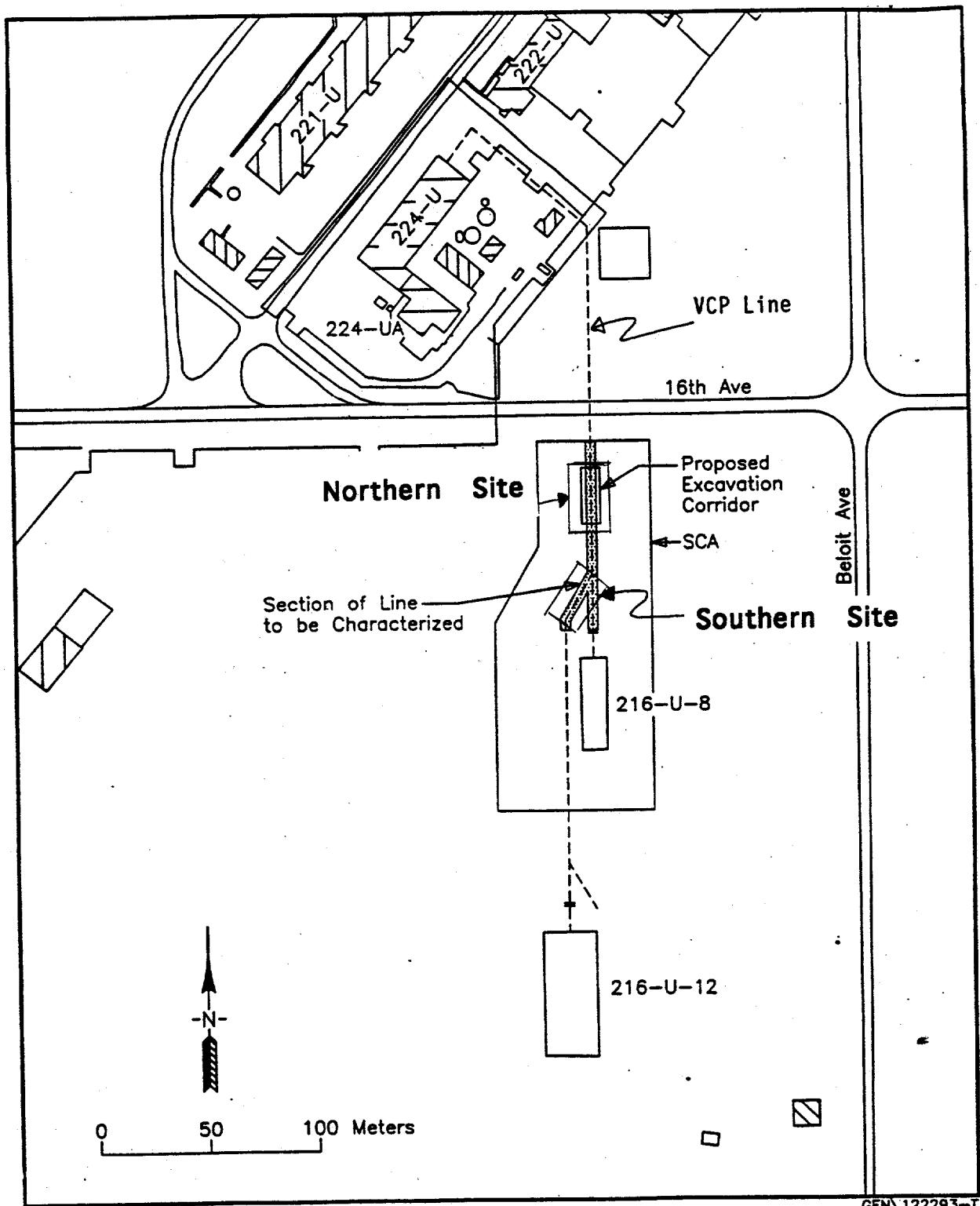


Figure 2. GPR Parameters for 216-U-8 VCP Investigation.

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 <u> </u> 300 <u> </u> XX 100 BISTATIC <u> </u>	
	LOG BOOK: EFL1109	
	TIME WINDOW (NS): 100	
PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3		
GRID : <u>60X110</u> NO. OF PROFILES: <u>38 & 35</u> <u>50X100'</u>		
PARAMETERS: Two sets of perpendicular profiles; five feet between north-south and east-west profiles.		
DATA TAPE NO.: <u>94-7 & 10</u> RECORDS LOCATION: <u>Geophysical field files</u>		
TAPE ADDRESS : <u>0-26426</u> CALIBRATION ADDRESS: <u>25828-26426</u> <u>7236-32600</u> <u>32439-32600</u>		
INTERPRETED BY : <u>K. A. Bergstrom</u> REVIEWED BY : <u>T.H. Mitchell</u>		
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.		

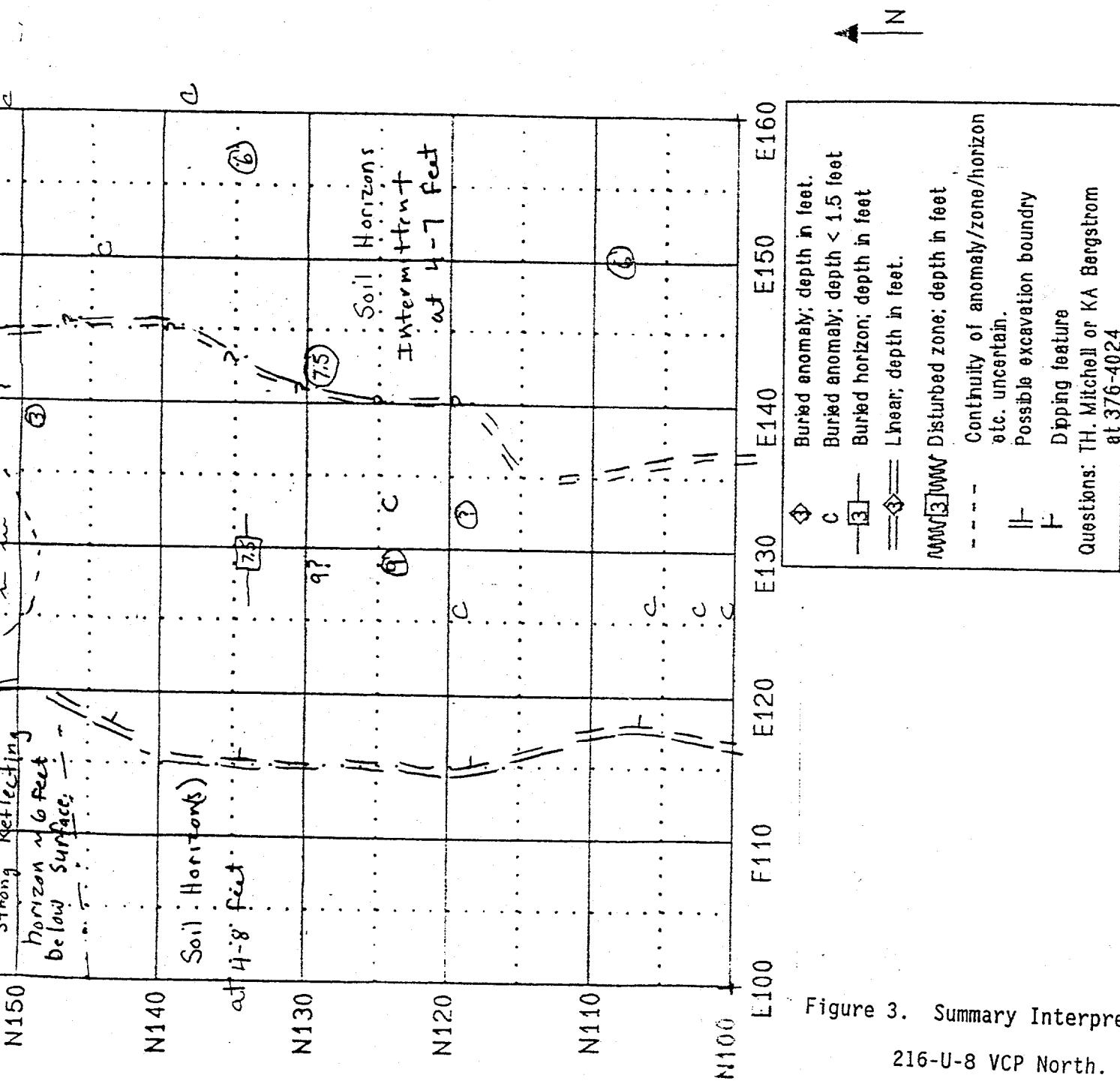
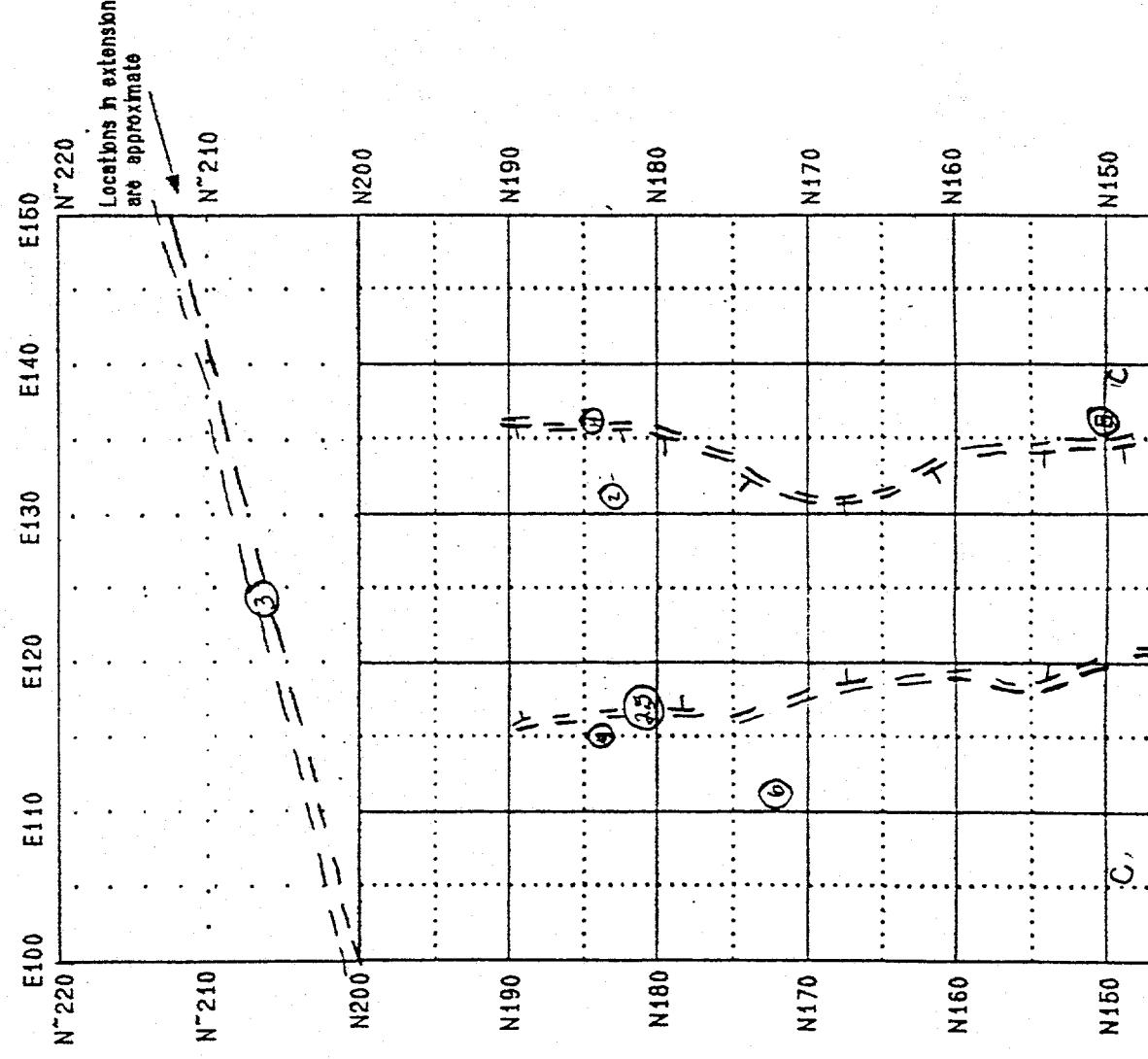


Figure 3. Summary Interpretation

216-U-8 VCP North.

216-U-8 VCP South Site



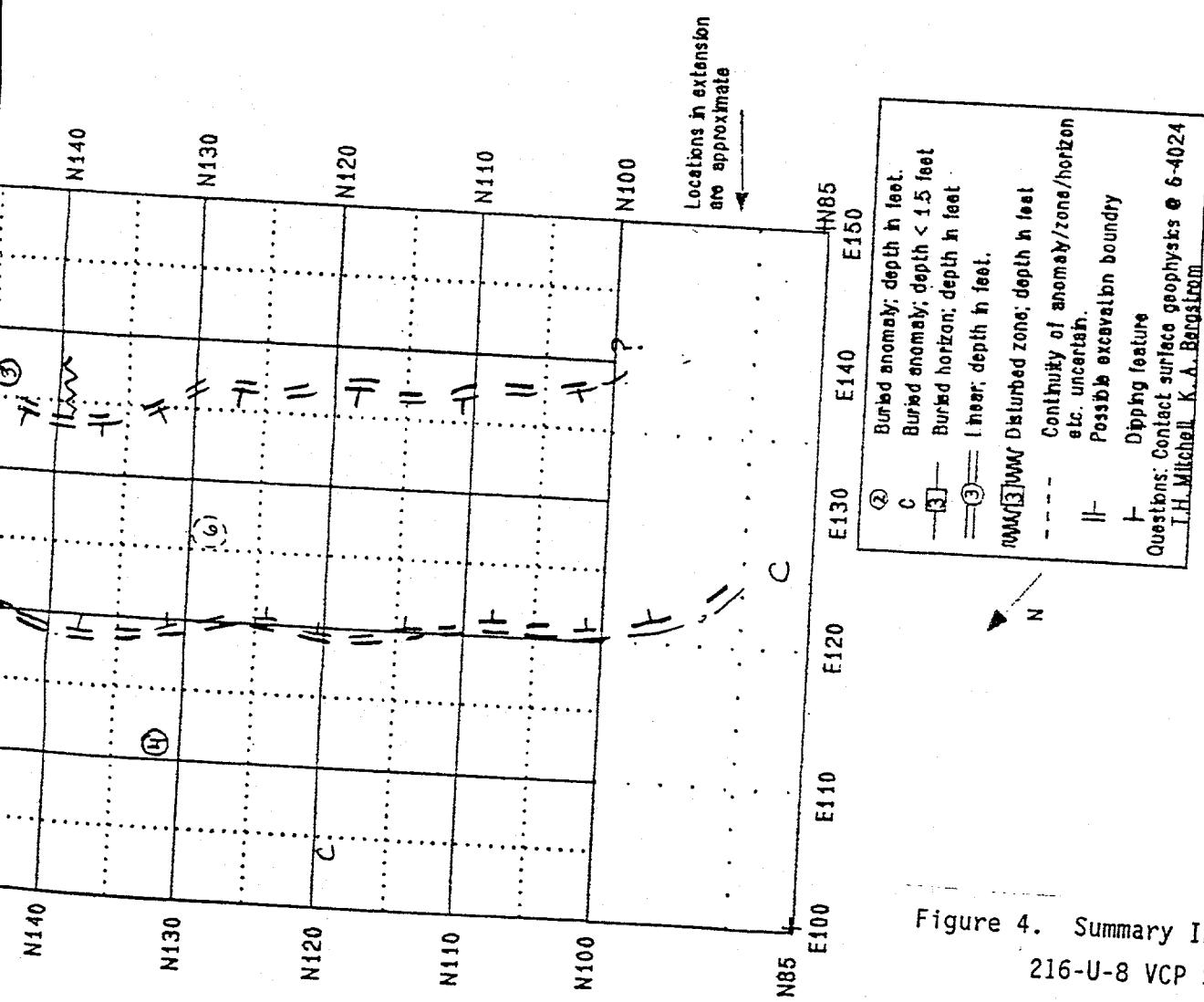


Figure 5. GPR Profile N155, Southern Site.

