DEC 27 1994
35 STATION 21

ENGINEERING DATA TRANSMITTAL

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RELEASE AUTHORIZATION

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Release Date: 12/22/94

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

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WHC Information Release Administration Specialist:

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12/22/94

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SUPPORTING DOCUMENT		1. Total Pages 9
2. Title Geophysical Survey for Proposed Boreholes, 199-K-109A, 199-K-110A, and 199-K-111A, 100K Area	3. Number WHC-SD-EN-TI-253	4. Rev No. 0
5. Key Words Ground-Penetrating Radar, subsurface, geology	6. Author Name: <i>for</i> T.H. Mitchell <i>J.W. Faslett</i> Signature Organization/Charge Code 8H240/JBHH3	
7. Abstract <p>A survey was conducted to locate subsurface obstructions that may affect the drilling of three proposed boreholes in the 100K Area. Drill sites with the least likelihood of encountering obstructions were identified by the method of ground-penetrating radar. These results are presented in this document.</p>		
		8. RELEASE STAMP <div style="border: 1px solid black; padding: 10px; margin: 10px;"> OFFICIAL RELEASE BY WHC DATE DEC 27 1994 35 Station 21 </div>

Geophysical Survey for Proposed Boreholes 199-K-109A, 199-K-110A, and 199-K-111A, 100 K Area.

Objective

The objectives of the surveys were to locate subsurface obstructions that may affect the drilling of three proposed boreholes, 199-K-109A, 199-K-110A, and 199-K-111A (Figure 1). Based upon the results of the survey, possible drill sites with the least likelihood of encountering identified obstructions were identified. Ground-penetrating radar was the method selected for the investigations.

Ground-Penetrating Radar Methodology

The ground-penetrating radar (GPR) system used for this work utilized a 300-megahertz (MHz) antenna to transmit the electromagnetic (EM) energy into the ground. The transmitted energy 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 14 feet.

Display and interpretation of the data are similar to that of seismic reflection data. In some areas, interpretations can be straight forward, 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)[™] 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. Figure 2 shows the parameters of each survey.

[™] A trademark of Geophysical Survey Systems Inc. (GSSI).

Grid Location

Each survey boundary was square, measuring 50 feet by 50 feet (See Figures 3, 4, and 5). Painted stakes mark the corners of the grid. Each survey grid strikes approximately N28W. All distances were measured and posted in feet. The southwestern most corner of the 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 feet "east" and 20 feet "north" of grid point E100/N100. Referred points within the grid are best found if it is assumed the grid is oriented north-south.

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

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.

Results

199-K-109A

The entire site appears to be disturbed, with little indication of intact geology. The eastern half of the site, as defined by the hatched pattern (Figure 3), contains significant amounts of what appears to be buried debris. The top of the debris starts at about 3 to 6 feet below the surface. The northwestern corner of the site is dominated by two reflectors at 2 and 7 feet below the surface. The 7-foot reflector is the most notable reflector and appears to be intermittent throughout the northern half of the disturbed area as well. The source of the reflector(s) is unknown. A north-south (N28W) trending linear was detected at approximately E90. It is estimated to be 10 feet below the surface and is probably a buried pipe or utility. A second linear was identified cutting across the southwest corner of the site. The source of the linear is not clear. It could be a pipe or utility or a coincidental alignment of anomalies. It is estimated at 8-10 feet below the surface.

The borehole was initially located at N124/E136. Another location at N119/E121, is recommended in order to reduce the likelihood of drilling into significant debris.

199-K-110

The entire site appears to be disturbed, with little indication of intact geology. The southern half of the site, as defined by the hatched pattern (Figure 4), contains significant amounts of what appears to be buried debris. The top of the debris starts at about 3 to 6 feet below the surface. Three linears were identified that have the characteristics of buried pipes/utilities (See Figure 4). The western most of the north-south trending linears might be several closely spaced pipes/utilities.

The borehole was initially located at N111/E131 which is located right directly over one of the linears. Another location at N139/E106, is recommended in order to reduce the likelihood of drilling into significant debris.

199-K-111A

The entire site for the borehole 199-K-111A appears to be relatively free of buried debris. There were no linears identified, which are generally good indications of buried pipes or utilities.

Figure 1. Location Map

Contour Interval 0.5 meters
1 centimeter = 20 meters
1:2000
From H-13 series topographic maps

GROUND PENETRATING RADAR (GPR) SURVEY

Geophysics Group, Westinghouse Hanford Operations

TITLE: Boreholes 199-K-109A,110A,111A		DATE: 3/22/94	
LOCATION: 100 K Area			
CLIENT: Bruce Williams		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 <u>XX</u> 100 BISTATIC ____	
		LOG BOOK: EFL-1122	
		TIME WINDOW (NS): 100	
PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3			
GRID : 50 X 50 NO. OF PROFILES: <u>20</u> TOTAL FOOTAGE COLLECTED: <u>1000</u> All three sites 50 x 50 feet			
PARAMETERS: Two sets of perpendicular profiles; five feet between profiles.			
DATA TAPE NO.: <u>94-14</u>		RECORDS LOCATION: <u>Geophysical field files</u>	
TAPE ADDRESS : <u>0-31498</u>		CALIBRATION ADDRESS: <u>31203-31498</u>	
OBJECTIVE(S): To locate subsurface obstructions that may adversely affect the borehole.			
NOTES: Antenna pulled by hand at 1-2 mph on the south and east side of the survey marks.			

Figure . 2 GPR Parameters for the 199-K-109A,110A, and 111A well site survey.

Fig-2

BOREHOLE 199-K-109A

N150 at middle of road.

Questions: K.A. Bergstrom or T.H. Mitchell
at 376-4024

③	Buried anomaly; depth in feet.
C	Buried anomaly; depth < 1.5 feet
— 3 —	Buried horizon; depth in feet
== 3 ==	Linear; depth in feet.
~~~~ 3 ~~~~	Disturbed zone; depth in feet
---	Continuity of anomaly/zone/horizon etc. uncertain.
⊥	Possible excavation boundary.
⊘	Moderate to heavy concentrations of buried debris.

Figure 3 Interpretation Summary,
for Proposed Borehole
199-K-109A.

- ⊘ Reflecting horizons at 2 or 7 feet. Appear to be related to soil conditions.
- Original Proposed Borehole

BOREHOLE 199-K-110A

WHC-SD-EN-TI-253, Rev. 0

Questions: K.A. Bergstrom or T.H. Mitchell
at 376-4024

● Original borehole location.

③	Buried anomaly; depth in feet.
C	Buried anomaly; depth < 1.5 feet
— 3 —	Buried horizon; depth in feet
— ③ —	Linear; depth in feet.
3	Disturbed zone; depth in feet
- - - -	Continuity of anomaly/zone/horizon etc. uncertain.
⊘	Moderate to high concentrations of buried debris.

Figure 4 . Interpretation Summary, Proposed Borehole 199-K-110A.

Figure 5 . Interpretation Summary