50a #51 38 emu NOV 30 1994	ENGINEERING DATA TRANSMITTAL	Page 1 of 1 1. EDT 600589
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2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Environmental Engineering 81234	4. Related EDT No.: N/A
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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Impact Level	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-EN-TI-229		0	Geophysical survey for proposed borehole 199-K-107A, 100 K Area	N/A	2		

16. KEY		
Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)										(G)	(H)
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
1	2	Cog. Eng. T. H. Mitchell	<i>T.H. Mitchell</i>	1/27/94	H6-06	EPIC (2)			H6-08	3	
1	2	Cog. Mgr. J. W. Fassett	<i>J.W. Fassett</i>		H6-06	B. A. Williams			H6-06	3	
		QA				J. F. Keller			L4-93	3	
		Safety				ERC			H6-08	3	
		Env.				OSTI (2)			H8-07	3	
		Geophysical Files (2)			H6-06						
		Central Files (2)			L8-04						

18. T. H. Mitchell Signature of EDT Originator <i>T.H. Mitchell</i> 1/27/94	19. _____ Authorized Representative Date for Receiving Organization	20. J. W. Fassett Cognizant/Project Engineer's Manager <i>J.W. Fassett</i> 1-28-94	21. DOE APPROVAL (if required) Ltr. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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BD-7400-172-2 (07/91) GEF097

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Document Number: WHC-SD-EN-TI-229, REV. 0

Document Title: Geophysical Survey for proposed borehole 199-K-107A,
100-K Area

Release Date: 11/30/94

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

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Niki L. Solis

11/28/94

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SUPPORTING DOCUMENT		1. Total Pages 7
2. Title Geophysical Survey for proposed borehole 199-K-107A, 100-K Area	3. Number WHC-SD-EN-TI-229	4. Rev No. 0
5. Key Words Geophysics, radar, GPR	6. Author Name: <u>T.H. Mitchell</u> <u>J.W. Fasiell</u> Signature Organization/Charge Code 8C540/PA2AA	
7. Abstract <i>11/28/94 ch/Soled</i> Mitchell, T.H., 1994, <i>Geophysical Survey for Proposed Borehole 199-K-107A, 100-K Area</i> , WHC-SD-EN-TI-229, Rev. 0, Westinghouse Hanford Company, Richland, Washington.		
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MASTER

1.0 OBJECTIVE

The objective of the survey was to locate subsurface obstructions that may affect the drilling of proposed borehole, 199-K-107A, located about 100 ft northwest of the 105 KW Building, 100-K Area (Figure 1). Based upon the results of the survey, possible drill sites within the zone, with the least likelihood of encountering identified obstructions, were identified.

2.0 GROUND-PENETRATING RADAR METHODOLOGY

The ground-penetrating radar (GPR) system used for this work utilized a 300-megahertz 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 was 12 to 15 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.

3.0 GRID LOCATION

The initial survey boundary was a rectangle, measuring 50 ft by 70 ft, and subsequently expanded to the northeast (Figures 2a and 2b). The extension was 50 by 55 ft. Painted stakes mark the corners of the grid. The survey grid strikes approximately N28W. All distances were measured and posted in feet. The "southwestern" corner of the grid is designated E100/N100 and serves as the "origin" for the survey locations. The letters "N" and "E" refer to a direction that trends generally north and 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. Figure 3 summarizes survey parameters.

5.0 RESULTS

The survey is bounded on the northwest by a paved road. The N170 grid line is on the road centerline or extended centerline as the road curves to the southeast. Refer to Figures 2a and 2b during the following discussion.

Five linear anomalies/pipe-like features were identified in this interpretation. Four of the linear features are parallel and strike northwest. They are also parallel to the survey grid lines. The first linear is shallow, from 1 to 3 ft below the surface, striking along the E127 grid line. This linear intersects a sewer drain at N148/E127. The pipe is visible in the sewer drain. The pipe continues beyond the survey grid, both to the northwest and to the southeast.

The second linear anomaly strikes along the E146 grid line. It continues across the entire grid at about 8 to 10 ft below the surface, depending on the topography. The third linear anomaly is about 13 to 14 ft below the surface, striking along the E162 grid line. The fourth linear is slightly off the grid, striking along about the E202 grid line. This linear is at or near the surface and correlates with a pipe observed on the northwest side of the road.

The last linear anomaly, observed at this survey location, strikes southwest-northeast along about the N109 grid line. It correlates with a fire hydrant located at E178/N109. This linear is about 5 ft below the surface and does not appear to extend beyond the hydrant to the southwest.

Several isolated anomalies, at various depths, are observed in the data. Additionally, two areas that appear disturbed, with perplexing character, are plotted. Because of the uncertain nature of these two areas, they were avoided when recommending a borehole location.

Initially, the proposed borehole was staked at N130/E122. The new proposed borehole location is N139/E176. This location appears free of anomalies and is over 10 ft from interpreted linear anomalies/pipe-like features.

Figure 1. Location Map.

Figure 2b. Interpretation Summary

BOREHOLE K-107A East Extension

NOTE: A subtle layer about 6 feet below the surface exists throughout much of the area

③	Buried anomaly; depth in feet.	---	Continuity of anomaly/zone/horizon etc. uncertain.
C	Buried anomaly; depth < 1.5 feet		Uncertain character/disturbed zone
—[3]—	Buried horizon; depth in feet		Disturbed zone; depth in feet
==③==	Linear; depth in feet.		

Questions: Contact surface geophysics @ 6-1747
T.H. Mitchell, K.A. Bergstrom

Figure 3. GPR Parameters for the 199-K-107A Well Site Survey.

GROUND PENETRATING RADAR (GPR) SURVEY

Geophysics Group, Westinghouse Hanford Operations

TITLE: Borehole 199-K-107A		DATE: 12/16/93
LOCATION: 100 K Area		
CLIENT:	DATA COLLECTED BY G.J. Schwartz, T.H. Mitchell, & J.R. Kunk	
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-1109	
	TIME WINDOW (NS): 100	
PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3		
GRID : 50 X 70 NO. OF PROFILES: <u>24</u> TOTAL FOOTAGE COLLECTED: <u>1300</u> Extension: 50 X 55 FEET <u>23</u> <u>1205</u>		
PARAMETERS: Two sets of perpendicular profiles; five feet between profiles		
DATA TAPE NO.: <u>94-5</u> RECORDS LOCATION: <u>Geophysical field files</u> TAPE ADDRESS : <u>15149-32957</u> CALIBRATION ADDRESS: <u>37363-32957</u> Extension: <u>44999-61001</u>		
INTERPRETED BY : <u>G.J. Schwartz/T.H. Mitchell</u> REVIEWED BY : <u>T. Mitchell/K. Bergstrom</u>		
INTERPRETATION DELIVERED TO _____ DATE : <u>12/22/93</u>		
OBJECTIVE(S): To locate subsurface obstructions that may adversely affect the borehole.		
NOTES: Antenna pulled by hand at 1-2 mph on south and east side of survey marks. The survey area was extended to the east on 12/22/93 utilizing the same parameters and reference for location. The extension interpretation was completed on 12/28/93.		