DEC 21 1994
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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT

609159

2. To: (Receiving Organization) Distribution				3. From: (Originating Organization) Geophysics				4. Related EDT No.: N/A			
5. Proj./Prog./Dept./Div.: Earth & Environmental Technical Services				6. Cog. Engr.: T. H. Mitchell				7. Purchase Order No.: N/A			
8. Originator Remarks: Release to distribution								9. Equip./Component No.: N/A			
								10. System/Bldg./Facility: N/A			
11. Receiver Remarks:								12. Major Assm. Dwg. No.: N/A			
								13. Permit/Permit Application No.: N/A			
								14. Required Response Date: N/A			
15. DATA TRANSMITTED											
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted				(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-EN-TI-223		0	Geophysical Investigation of the SQ Tanks, 221-T Building, 200 West Area				N/A	2	1	
16. KEY											
Approval Designator (F)				Reason for Transmittal (G)				Disposition (H) & (I)			
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)				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			
(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Approval Designator 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.
4	1/2	Cog. Eng. T.H. Mitchell	<i>T.H.F.</i>	12/15/94	H6-07	Geophysical Files (2)			H6-06	3	
4	1/2	Cog. Mgr. J.W. Fassett	<i>J.W. Fassett</i>	12/15/94	H6-06	Central Files (2) + orig.			L8-04	3	
		QA				EPIC (2)			H6-08	3	
		Safety				OSTI (2)			H6-07 L8-07	3	
		Env.									
18.		19.				20.				21. DOE APPROVAL (if required) Ctrl. No.	
<i>T.H. Mitchell</i> Signature of EDT Originator		<i>J.W. Fassett</i> Authorized Representative for Receiving Organization				<i>J.W. Fassett</i> Cognizant Manager				☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
Date: 12-15-94		Date: 12-15-94				Date: 12-15-94					

BD-7400-172-2 (04/94) GEF097

BD-7400-172-1

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Document Number: WHC-SD-EN-TI-223, REV. 0

Document Title: Geophysical Investigation of the SQ Tanks, 221-T Building, 200 West Area

Release Date: 12/19/94

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

APPROVED FOR PUBLIC RELEASE

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12/19/94

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SUPPORTING DOCUMENT		1. Total Pages 8
2. Title Geophysical Investigation of the SQ Tanks, 221-T Building, 200 West Area	3. Number WHC-SD-EN-TI-223	4. Rev No. 0
5. Key Words Radar, GPR, Geophysics	6. Author Name: <i>SH</i> T. H. Mitchell <i>J.W. Bassett</i> Signature Organization/Charge Code 8H240/J8hh3	
7. Abstract Mitchell, T. H., K. A. Bergstrom, and G. J. Schwartz, 1994, "Geophysical Investigation of the SQ Tanks, 221-T Building, 200 West Area," WHC-SD-EN-TI-223, Rev. 0, Westinghouse Hanford Company, Richland, Washington		

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8. RELEASE STAMP

OFFICIAL RELEASE BY WHC DATE DEC 21 1994 35 <i>Station 21</i>
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A-6400-073 (08/94) WEF124

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GEOPHYSICAL INVESTIGATION OF THE SQ TANKS, 221-T BUILDING, 200 WEST AREA

1.0 OBJECTIVE

The SQ Tanks are located on the northwest side of the 221-T plant, in the 200-West Area (Figure 1). The objective of the survey was to locate subsurface obstructions that may affect the removal of tanks and supporting structures. Based upon the results of the survey, obstructions and linears were identified. Access was limited in the survey area due to structures, buildings, and construction work.

2.0 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 was reflected back to a receiving antenna where variations in the return signal were 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 about 10 to 12 ft.

Display and interpretation of the data are similar to that of seismic reflection data. In some areas, interpretations can be straight forward, but unknown parameters within a highly variable subsurface often 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 (ns), two-way travel time, was used. A few GPR profiles were collected with a 500 MHz antenna with a 50 ns window. Figure 2 summarizes survey parameters.

3.0 GRID LOCATION

The survey boundary is irregular, measuring roughly 110 ft by 95 ft (Figure 3). There are several large gaps in the data due to surface obstructions. A few profiles were extended, where possible, into the "No

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

Data" areas to look for correlation with the data surrounding the tanks. Painted stakes mark the corners of the grid. The long axis of the survey strikes northwest-southeast, but was denoted as the east-west direction for labeling ease in the field. All distances were measured and posted in feet. The western 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 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

Three above-ground tanks, support structures from removed tanks, a weight scale, risers, buildings, and curbs are all located within and around the survey area. These obstructions make the correlation of subsurface features across the area via continuous GPR profiles difficult (Figure 3). In the southwest and southeast portions of the grid, many anomalies were detected. Unfortunately, most of these anomalies cannot be reliably correlated into linears due to the lack of multiple adjacent GPR profiles. A few linears in these areas are plotted where the data quality warranted. Other linears could be inferred by lining up "isolated" anomalies, but were not plotted on Figure 3 as linears.

Two vertical concrete pipes/risers are exposed at the surface at about N126/E109 and N132/E195. Southwest trending linears extend from the vicinity of both of these surface features. The predominant areas for potential obstructions occur between the 221-T building and the "No Data" tank area in the southeastern portion of the survey area and to the southwest of the "No Data" areas. A continuous linear about 2 ft below the surface can be traced along the E203 grid line. Several potential, shallow, northwest-southeast striking linears are plotted near the 221-T building.

Only a few alignments of anomalies into interpreted linears were identified that would be indicative of a buried utility or pipe line. This may be due, in part, to the lack of continuous data across the middle of the survey area reducing the certainty of aligning anomalies into linears. Additionally, the concentration of anomalies that were detected suggests that there may be "debris" buried in some of the survey area. Due to "debris," utilities can be "hidden" and may be masked or undetected.

6.0 REFERENCES

WHC, *Environmental Investigations and Site Characterization Manual*,
WHC-CM-7-7, EII 11.2, Rev. 3, Westinghouse Hanford Company, Richland,
Washington.

Figure 1. Location Map.

Figure 2. GPR Parameters for the SQ Tank Area.

Geophysics Group, Westinghouse Hanford Operations

TITLE: SQ Tanks		DATE: 4/4/94
LOCATION: 200 West North of 221-T Plant		
CLIENT: Rod Griffen	DATA COLLECTED BY K.A. Bergstrom & G.J. Szwartz	
EQUIPMENT USED: GSSI System 8, model 4800 Calibrator Model P731 Digital Tape Recoder DT6000A	ANTENNA(S) USED: 100 _____ 300 <u>XX</u> 500 <u>XX</u>	
	LOG BOOK: EFL-1122	
	TIME WINDOW (NS): 100/50	
PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3		
GRID : 95X110 NO. OF PROFILES: <u>~80</u> TOTAL FOOTAGE COLLECTED: <u>1000</u>		
PARAMETERS: Two sets of perpendicular profiles; five feet between profiles.		
DATA TAPE NO.: <u>94-15</u> RECORDS LOCATION: <u>Geophysical field files</u>		
TAPE ADDRESS : <u>7765-44354</u> CALIBRATION ADDRESS: <u>44167-44354</u>		
OBJECTIVE(S): To locate subsurface obstructions that may adversely affect removal of tanks.		
NOTES: Antenna pulled by hand at 1-2 mph. Data contains numerous profiles of variable length. Numerous surface obstructions. No data in center of grid.		

SQ Tanks Investigation

③ Buried anomaly; depth in feet.
 C Buried anomaly; depth < 1.5 feet
 — 3 — Buried horizon; depth in feet
 — ③ — Linear; depth in feet.
 W W 3 W W Disturbed zone; depth in feet
 - - - Continuity of anomaly/zone/horizon
 etc. uncertain.
 || Possible excavation boundary
 Questions: Contact KA Bergstrom /TH
 Mitchell at 376-4024

Figure 3. Summary Interpretation of the SQ Tanks, T-Plant.