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Signature of EDT Originator — Date

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Document Title:	Geophysical Investigation for Proposed Flow Meter Installation Holes, 100H Area
Release Date:	12/28/94

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Niki Solis — 12/28/94

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SUPPORTING DOCUMENT

1. Total Pages 10

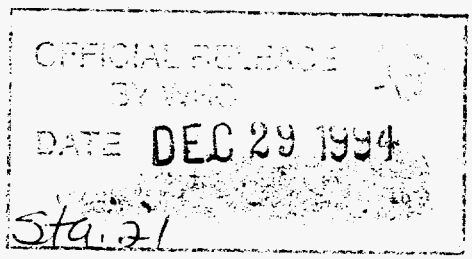
2. Title	3. Number	4. Rev No.
Geophysical Investigation for Proposed Flow Meter Installation Holes, 100H Area	WHC-SD-EN-TI-263	0

5. Key Words	6. Author
Flowmeter, Geophysics, Ground-Penetrating Radar	Name: J.P. Kiesler James P Kiesler 12/21/94 Signature Organization/Charge Code 8H240/J8HH3

7. Abstract

Kiesler, J. P. and G. J. Szwartz, 1994, "Geophysical Investigation for Proposed Flow Meter Installation Holes, 100H Area." WHC-SD-EN-TI-263, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

8. RELEASE STAMP



CONTENTS

FIGURES:

1.0 OBJECTIVE

The objectives of the surveys were to locate subsurface obstructions that may affect the drilling of two holes to be fit with flow meters in the 100-H Area of the Hanford Site (Figure 1). Possible drill sites with the least likelihood of encountering identified obstructions were identified based upon the results of the survey. Ground-penetrating radar (GPR) was the method selected for the investigations. The electromagnetic induction method was also used to verify that the general site is relatively void of metallic debris at depth.

2.0 GROUND-PENETRATING RADAR METHODOLOGY

The GPR system used for this work utilized a 300-megahertz antenna to transmit the electromagnetic 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. The maximum depth of penetration for this survey seemed to be about 10 to 14 ft.

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 using 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.

3.0 GRID LOCATION

Each survey boundary was a rectangle, one measuring 50 ft by 50 ft, and the other measuring 50 ft by 60 ft (Figures 2 and 3). The "#1" and "#2" grid designations were assigned by Westinghouse Hanford Company (WHC) Geophysics. Painted stakes mark the corners of each grid. 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

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

"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. 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 others. 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* (WHC). The data and records are stored in the Geophysics files.

5.0 RESULTS

5.1 SITE #1

The eastern portion of the site has a reflector at 14 to 15 ft below the surface (Figure 4). This reflector is at the very maximum depth the site and the time window allows for radar penetration. Other than the reflector previously described, there are few anomalies in the bounds of the survey grid. The few anomalies are shown on the interpretation map. The pre-chosen drill site is over a reflector at depth. It should be moved to an area away from the reflector and not over the few buried anomalies. The reflector at depth can have many interpretations associated with it, ranging from a natural lithologic layer to a man-made layer like a foundation. It is difficult to give a preferred interpretation of the layer because it is at the maximum radar depth allowed by the time window chosen. A detailed interpretation of the layer is beyond the scope of this project. It is important to determine that the layer does not dip down below the time window (out of the radar depth limits) and that the layer terminates at approximately the boundary shown on the map. Moving the drill site outside this dashed boundary will avoid the layer when drilling.

5.2 SITE #2

The entire site appears to be disturbed, with little indication of intact geology. Most of the interpretation map of Figure 5 is covered with a stipple pattern showing this disturbance. Within this area, it is difficult to isolate single anomalies. It is even more difficult to correlate an anomaly from line to line; thus, the linear correlations on the interpretation map are broken and have question marks. The objective was to find a suitable location to drill. The location communicated by WHC Geophysics was N145, E105. If the interpretation is to be used for other objectives, it is important to contact WHC Geophysics first. The data can be reviewed another time for more detail outside the proposed drill coordinates, and for better correlations of linear anomalies running through the disturbed zone.

6.0 REFERENCES

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

Figure 1. Location Map.

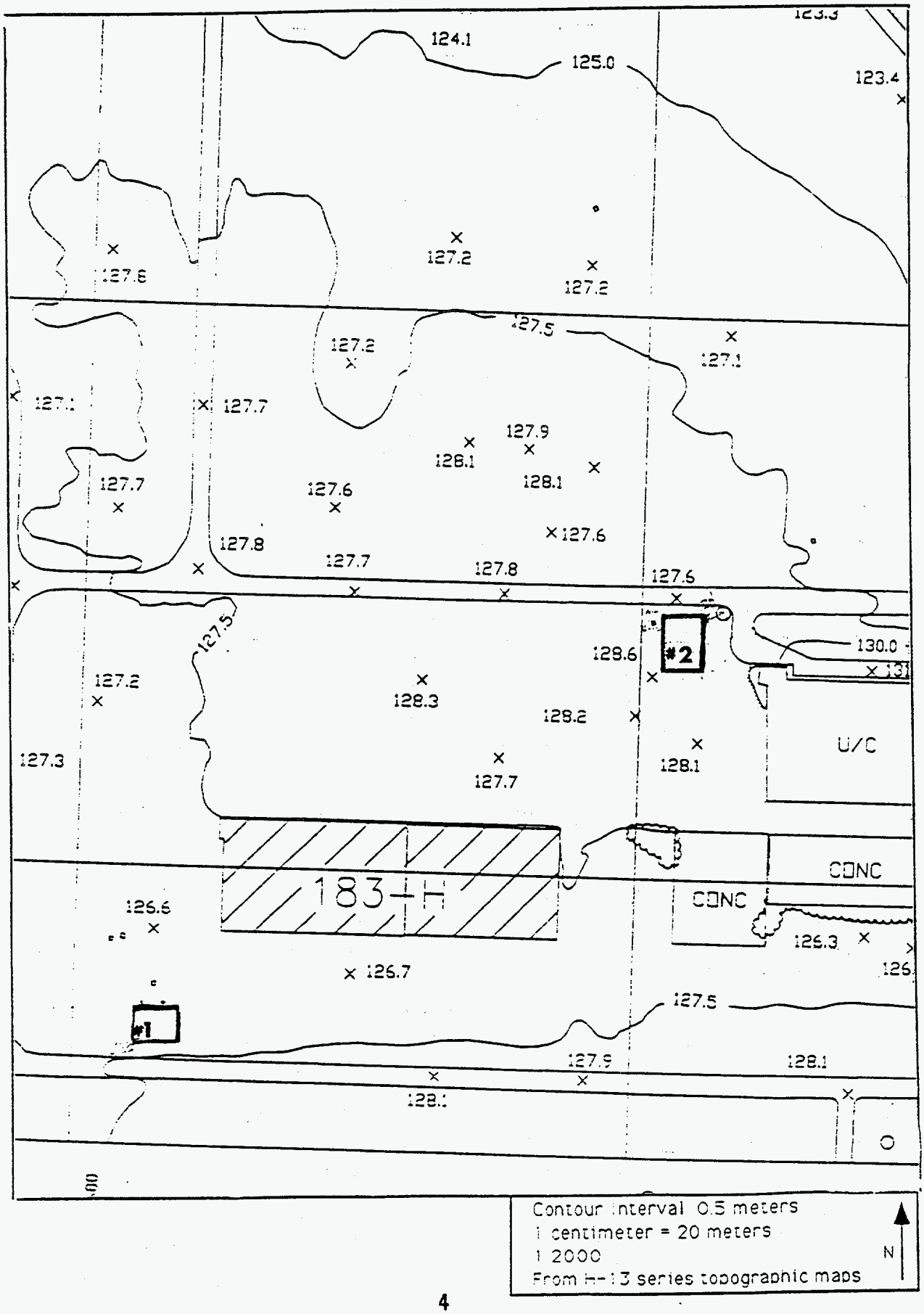

Figure 2. GPR Parameters for Flow Meter Site #1.

GROUND PENETRATING RADAR (GPR) SURVEY

Team Geophysics, Westinghouse Hanford Operations

TITLE: Flow Meter Site#1, near H3-2	DATE: 4/20/94
LOCATION: North of 100 H reactor building.	
CLIENT: Olin Amos	DATA COLLECTED BY G.J. Szwartz & J.P. Kiesler
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 : 50X50' NO. OF PROFILES: 28 TOTAL FOOTAGE COLLECTED: 2300	
PARAMETERS: Two sets of perpendicular profiles; five feet between north-south and 5 feet between east-west profiles.	
DATA TAPE NO.: 94-17 RECORDS LOCATION: Geophysical field files	
TAPE ADDRESS : 0-15315 CALIBRATION ADDRESS: ____	
INTERPRETED BY : K.A. Bergstrom REVIEWED BY : G.J. Szwartz	
INTERPRETATION DELIVERED TO Olin Amos DATE : 4/21/94	
OBJECTIVE(S): To locate possible obstructions to drilling a hole for the flow meter.	
NOTES: Antenna pulled by hand at 1-2 mph on south and east side of survey marks.	

Figure 3. GPR Parameters for Flow Meter Site #2.

GROUND PENETRATING RADAR (GPR) SURVEY

Team Geophysics, Westinghouse Hanford Operations

TITLE: Flow Meter Site#2, near H4-7	DATE: 4/20/94
LOCATION: North of 100 H reactor building.	
CLIENT: Olin Amos	DATA COLLECTED BY G.J. Szwartz & G.W. McLellan
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 : 50X60' NO. OF PROFILES: 26 TOTAL FOOTAGE COLLECTED: 2200	
PARAMETERS: Two sets of perpendicular profiles; five feet between north-south and 5 feet between east-west profiles.	
DATA TAPE NO.: 94-17 RECORDS LOCATION: Geophysical field files	
TAPE ADDRESS : 15315-30227 CALIBRATION ADDRESS: ____	
INTERPRETED BY : G.J. Szwartz REVIEWED BY : T.H. Mitchell	
INTERPRETATION DELIVERED TO Olin Amos DATE : 4/22/94	
OBJECTIVE(S): To locate possible obstructions to drilling a hole for the flow meter.	
NOTES: Antenna pulled by hand at 1-2 mph on south and east side of survey marks.	

Figure 4. Flow Meter Site #1.

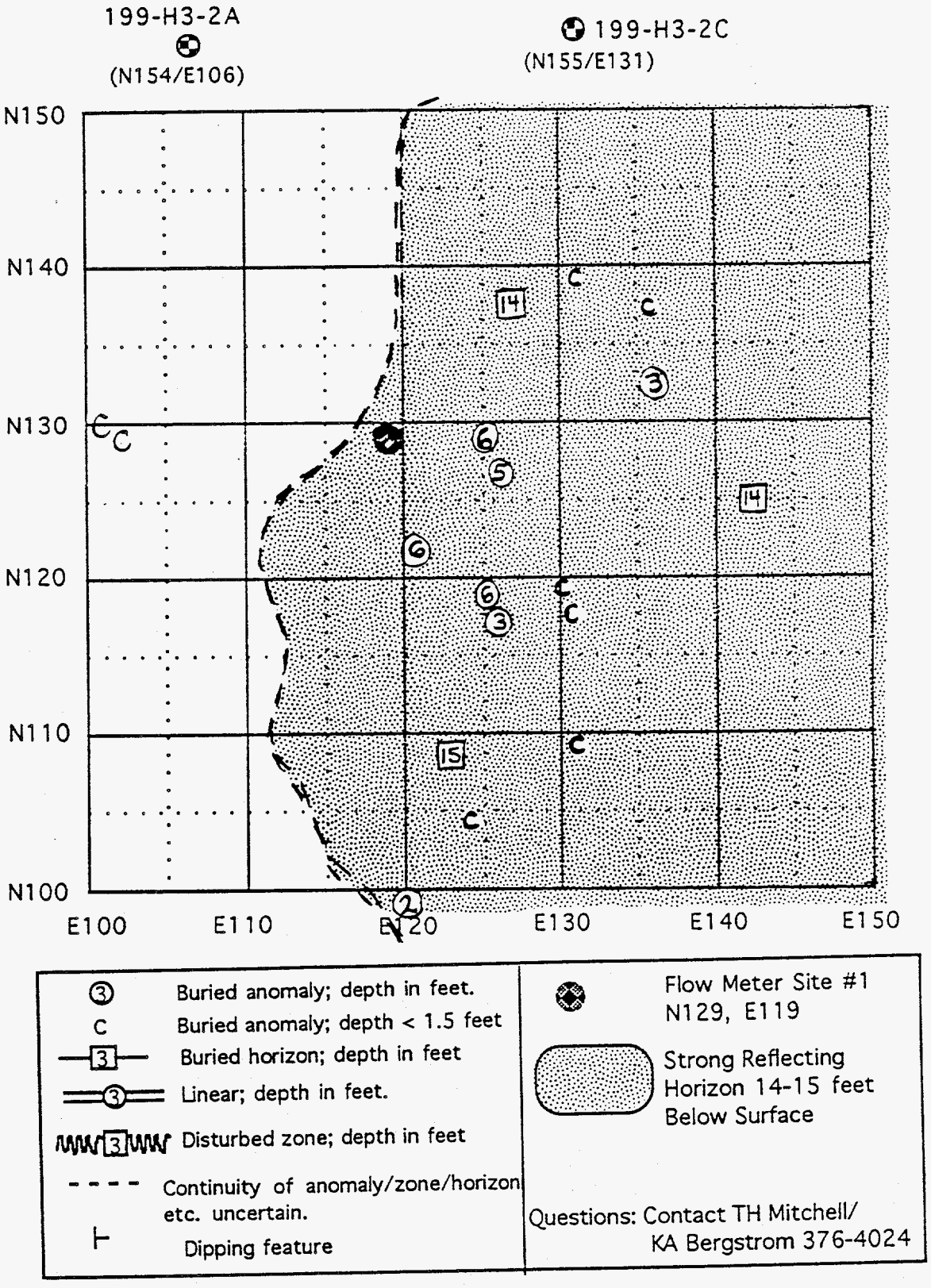

Figure 5. Flow Meter Site #2.