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1. EDT

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1	WHC-SD-EN-TI-213		0	Geophysical Investigation of French Drain, 116-B-9, and Dry Well, 116-B-10, 100 B/C Area	N/A	1/2	1	
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1/2	1/2	Cog. Eng. K. A. Bergstrom	<i>K.A. Bergstrom</i>	1-27-94	H6-06	EPIC (2)			H6-08	3	
1/2	1/2	Cog. Mgr. J. W. Fassett	<i>J.W. Fassett</i>	1-29-94	H6-06	J. W. Roberts			H6-02	3	
		QA				M. T. Stankovich			H6-02	3	
		Safety				T. H. Mitchell			H6-06	3	
		Env.				IRA (2)			H4-17	3	
3		Geophysical Files (2)			H6-06						
3		Central Files (2)			L8-04						

18. <i>K.A. Bergstrom</i> K.A. Bergstrom Signature of EDT Originator	19. Authorized Representative for Receiving Organization	20. <i>J.W. Fassett</i> J.W. Fassett Cognizant/Project Engineer's Manager	21. DOE APPROVAL (if required) Ltr. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments

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1.0 INTRODUCTION

French Drain 116-B-9 and Dry Well 116-B-10 are both located within the 100 B/C-2 Operable Unit, 100 B/C Area (Figure 1). The 116-B-9 French Drain is approximately 4 ft in diameter by 3 ft deep. The exact location or use of the drain is not clear (DOE-RL 1991).

The 116-B-10 Dry Well is a 3 ft-diameter, tile-lined well on a concrete slab, 7 ft below the surface, overlain by a manhole cover (DOE-RL 1991). The exact location of the well is uncertain. The objective of the survey was to locate the Dry Well and the French Drain. The area to be investigated had several buildings in the area which subsequently have been torn down. Ground penetrating radar (GPR) was the geophysical method chosen for the investigation.

2.0 GROUND PENETRATING RADAR METHODOLOGY

The 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 wire.

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 14 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 survey boundary is essentially a 180 ft by 190 ft rectangle. The exception is the northwest corner where the grid deviates around a building (Plate I). Painted stakes mark the corners of the grid. The long axis of the survey strikes approximately north-south. All distances were measured and posted in feet. The southwestern corner of the grid is designated E100/N100

Figure 1. Location Map.

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 RESULTS

This document summarizes the results of the investigation. For detailed information on specific areas within the survey boundaries, the reader should contact the authors. Plate I is an interpretation summary of the data and should be referred to during the following discussion.

Most of the area investigated has been disturbed by excavation or contains significant amounts of debris buried beneath the surface. There were several linears identified that are most likely utilities or pipelines. It is quite possible that there might be other utilities/pipelines that are "hidden" among the buried debris. The locations of the French Drain and Dry Well were not determined. However, additional information on the geometry and configuration of the features would aid in their identification by enhancing pattern recognition within this "busy" data set.

The central portion of the site apparently has up to 2 ft of gravel fill overlying, what appears to be, the original surface prior to the demolition of the building(s) that once occupied the site. The majority of the buried debris appears to be remnants of the building(s). The highest concentration of buried debris is located between E160 and E260. East of E270 there are significantly fewer anomalies, compared with the rest of the site, with most of the anomalies relatively spread out, isolated, and shallow (less than 2 ft). West of E160 there are moderate amounts of buried debris relative to the central portion of the survey.

The interpretation summary map (Plate I) groups areas of similar character into three categories, denoted Zones A, B, and C.

Zones designated "A" are areas with high concentrations of anomalies that have the characteristics of buried construction debris. Figure 2 shows an example of a GPR profile that crosses Zone A. Minimal attempt was made at differentiating between the individual or groups of anomalies within Zone A. There is one area within Zone A (E175/N220) that has a unique character relative to the surrounding area. The concentration of anomalies is denser and may all be related to a single feature.

Zones designated as B are areas where a consistent reflective horizon has characteristics of a buried cement slab. Figures 2 and 3 show a Zone B type reflector approximately 2 ft below the surface.

Zone C is an area in the central portion of the site that has a reflective horizon 5 to 6 ft below the surface. The continuity of the horizon within the zone cannot be clearly resolved because numerous anomalies are above the horizon. An example of Zone C is shown in Figure 3.

116-B-97 B-10

1993 300 Mhz 100 nsec

N130

E100 - E290

Zone B

110 120 130 140 150 160 170 180

Figure 2. Ground Penetrating Radar Profile N130.

Several identified linears terminate once they enter Zones A, B, and/or C suggesting that they were utilities/pipes that serviced the buildings that once occupied the site (Plate I).

Two factors heavily influenced this investigation and the lack of success in locating the Dry Well and/or French Drain. First, the abundance of buried debris found throughout the site might mask the GPR signature of the French Drain or Dry Well. Second, the lack of information on how the features were constructed made it difficult to create a conceptual model of what they would look like in a GPR record.

It is quite likely that the features of interest are in the GPR data but, for reasons mentioned above, were not recognized. The authors should be consulted prior to any excavation or drilling in this area.

5.0 REFERENCES

DOE-RL, 1991, *Remedial Investigation/Feasibility Study Work Plan for the 100-BC-1 Operable Unit, Hanford Site, Richland, Washington*, DOE-RL-90-07, Draft B, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

CYCLONE FENCE @ ~E90

E100
N280

Fire hydrant ~E107/N270

BUILDING

4

N

N

N240 E110 E120 E130 E140 E150 E160

CYCLONE FENCE @ ~N288

CYCLONE FENCE @ ~E295

- - TELEPHONE POLE
- - BURIAL GROUND MONUMENT
- - METAL POLE

- ③ Buried anomaly; depth in feet.
- C Buried anomaly; depth < 1.5 f
- [3]— Buried horizon; depth in feet
- ==③== Linear; depth in feet.
- ~[3]~ Disturbed zone; depth in feet
- Continuity of anomaly/zone/

Buried anomaly; depth in feet.
 Buried anomaly; depth < 1.5 feet
 Buried horizon; depth in feet
 Linear; depth in feet.

A

Highly Disturbed Area, high concentrations of buried debris

B

Buried reflector, slab-like feature

- - TELEPHONE POLE
- - BURIAL GROUND MONUMENT
- - METAL POLE

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/horiz etc. uncertain.

Plate I. Summary Interpretation Map of the French Drain, 116-B-9, and Dry Well/Quench Tank, 116-B-10 Investigation.

DATE

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