

NOV 05 1993

11

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT No 141948

Station # 12

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Environmental Engineering 81234	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: ER	6. Cog. Engr.: K. A. Bergstrom	7. Purchase Order No.: N/A
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		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:



15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(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-177		0	Geophysical Investigation of 105 DR Storage Basin, 116-DR-3, 100 D Area	4	1/2	1	

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) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1/2	1/2	Cog. Eng. K. A. Bergstrom	<i>K.A. Bergstrom</i>	10-13-93	H6-06	EDMC	<i>(Signature)</i>		H6-08	3	
1/2	1/2	Cog. Mgr. J. W. Fassett	<i>J.W. Fassett</i>	10-19-93	H6-06	N. M. Naikimbalkar	<i>(Signature)</i>		H6-02	3	
		QA				TRA clearance	<i>(Signature)</i>		H4-19		
		Safety									
		Env.									
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 Date: 10-13-93	19. _____ Authorized Representative for Receiving Organization Date: _____	20. <i>J.W. Fassett</i> J. W. Fassett Cognizant/Project Engineer's Manager Date: 10-19-93	21. DOE APPROVAL (if required) Ltr. No. <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments
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Date Received: 10/26/93 MS	INFORMATION RELEASE REQUEST	Reference: WHC-CM-3-4
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Title Geophysical Investigation of 105 DR Storage Basin Trench 116-DR-3, 100 D Area	Unclassified Category UC-	Impact Level 4
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New or novel (patentable) subject matter? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", has disclosure been submitted by WHC or other company? <input type="checkbox"/> No <input type="checkbox"/> Yes Disclosure No(s).	Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Identify)
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Title of Journal N/A

CHECKLIST FOR SIGNATORIES			
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			Name (printed) Signature Date
Classification/Unclassified Controlled Nuclear Information	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<i>S. BERGLIN</i> <i>[Signature]</i> <i>10/28/93</i>
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RL Program/Project	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>E. D. Gutter</i> <i>[Signature]</i> <i>10/29/93</i>
Publication Services	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>L.A. BROWN</i> <i>[Signature]</i> <i>11/1/93</i>
Other Program/Project	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Information conforms to all applicable requirements. The above information is certified to be correct.

<table style="width: 100%;"> <tr> <td style="width: 30%; padding: 5px;">References Available to Intended Audience</td> <td style="width: 10%; text-align: center; padding: 5px;"><input checked="" type="checkbox"/> Yes</td> <td style="width: 10%; text-align: center; padding: 5px;"><input type="checkbox"/> No</td> </tr> <tr> <td style="padding: 5px;">Transmit to DOE-HQ/Office of Scientific and Technical Information</td> <td style="text-align: center; padding: 5px;"><input type="checkbox"/> Yes</td> <td style="text-align: center; padding: 5px;"><input checked="" type="checkbox"/> No</td> </tr> <tr> <td style="padding: 5px;">Author/Requestor (Printed/Signature)</td> <td style="text-align: center; padding: 5px;"><input type="checkbox"/> Yes</td> <td style="text-align: center; padding: 5px;"><input checked="" type="checkbox"/> No</td> </tr> <tr> <td style="padding: 5px;">K. A. Bergstrom <i>K.A. Bergstrom</i></td> <td style="text-align: center; padding: 5px;">Date</td> <td style="text-align: center; padding: 5px;">10-13-93</td> </tr> <tr> <td style="padding: 5px;">Intended Audience</td> <td colspan="2" style="padding: 5px;"><input type="checkbox"/> Internal <input type="checkbox"/> Sponsor <input checked="" type="checkbox"/> External</td> </tr> <tr> <td style="padding: 5px;">Responsible Manager (Printed/Signature)</td> <td style="text-align: center; padding: 5px;">Date</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">J. W. Fassett <i>J.W. Fassett</i></td> <td style="text-align: center; padding: 5px;">10-19-93</td> <td style="padding: 5px;"></td> </tr> </table>	References Available to Intended Audience	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Transmit to DOE-HQ/Office of Scientific and Technical Information	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Author/Requestor (Printed/Signature)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	K. A. Bergstrom <i>K.A. Bergstrom</i>	Date	10-13-93	Intended Audience	<input type="checkbox"/> Internal <input type="checkbox"/> Sponsor <input checked="" type="checkbox"/> External		Responsible Manager (Printed/Signature)	Date		J. W. Fassett <i>J.W. Fassett</i>	10-19-93		<table style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; padding: 5px;">INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP</th> </tr> <tr> <td colspan="2" style="padding: 5px;">Stamp is required before release. Release is contingent upon resolution of mandatory comments.</td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 20px;">  </td> </tr> <tr> <td style="width: 50%; padding: 5px;">Date Cancelled</td> <td style="width: 50%; padding: 5px;">Date Disapproved</td> </tr> </table>	INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP		Stamp is required before release. Release is contingent upon resolution of mandatory comments.				Date Cancelled	Date Disapproved
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SUPPORTING DOCUMENT		1. Total Pages 8
2. Title Geophysical Investigation of 105 DR Storage Basin Trench 116-DR-3, 100 D Area	3. Number WHC-SD-EN-TI-177	4. Rev No. 0
5. Key Words Radar, Geophysics	6. Author Name: K. A. Bergstrom <i>KA. Bergstrom</i> Signature Organization/Charge Code 81234/PA2AA	
<p>APPROVED FOR PUBLIC RELEASE <i>v. Birkhead 11/4/93</i></p>		
7. Abstract K. A. Bergstrom, T. H. Mitchell, 1993, "Geophysical Investigation of 105 DR Storage Basin, 116-DR-3, 100 D Area WHC-SD-EN-TI-177, Rev. 0, Westinghouse Hanford Company, Richland, Washington".		
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9. Impact Level 4		

Geophysical Survey of 105-DR Storage Basin Trench, 116-DR-3, 100 D Area.

Objective

The objective of the survey was to locate the boundaries of the 105-DR Storage Basin Trench (116-DR-3) and to determine whether additional waste is buried at the site. The trench is located to the southeast of the 105-DR reactor building (Figure 1). However, its precise location is in question because of inconsistent documentation. Ground-Penetrating Radar (GPR) was the geophysical method selected to conduct the investigation. GPR has been used successfully to detect similar trenches on the Hanford Site.

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.

Depth of penetration, which varies from site to site, was 10-12 feet for this survey. The method is limited in depth by transmit power, receiver sensitivity, and attenuation of the transmitted energy. 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.

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.

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

Grid Location

Two possible sites were investigated. The first site (Phase I) is located outside of the perimeter fence (Figure 1). It is rectangular, measuring 80 feet X 175 feet (Figure 2). Blue 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 this grid is designated E100/N50 and serves as the "origin" for the survey locations.

The second site (Phase II) is located approximately 20 feet to the west of the Phase I site, on the inside of the perimeter fence (Figure 1). The site is rectangular, measuring 70 feet X 100 feet. Blue stakes mark the corners of the grid. The long axis of the survey strikes approximately north-south. The southwestern corner of this grid is designated E80/S10 and serves as the "origin" for the survey locations.

The letters "N", "S" or "E" refer to a direction that trends generally north, south or east, respectively. The number refers to a distance in feet. For example, grid point E125/N215 lies 25 feet "east" and 15 feet "north" of grid point E100/N100. Grid point S10 is located 10 feet south of N00 and 20 feet south of N10.

Data for both sites were collected along two sets of profiles perpendicular to each other. Spacings between data profiles were 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. Figure 4 summarizes the survey parameters.

Results

Phase I data were collected outside of the perimeter fence (Figure 1). The data were initially collected between N100 and N225. The lack of a consistent geologic pattern, paleosols and/or crossbedding, which are common features in the 100 D area, suggests that the native strata has been disturbed. However, there was no evidence of a trench the size and shape predicted by the documentation. There were two linears identified that have the characteristics of underground utilities or pipes that pass through the site (Figure 2).

The grid was expanded 50 feet to the south, again with inconclusive results. There were no large concentrations of GPR

anomalies at the Phase I site that would be indicative of solid waste disposal, although there were numerous scattered anomalies that appear to be from metallic objects.

A second site (Phase II) was selected to the west of Phase I, approximately 10 feet to the west of the perimeter fence (Figure 1). Analogous to the first site, the subsurface appears to be disturbed, but there was no evidence of the trench.

A cement monument is located at E95/N64, which was suspected as a possible marker for the trench location. However, there was no direct evidence of a trench in the GPR data. An east-west trending linear feature, that comes in from the east near N70, may be related to the monument. It appears to terminate at the monument. The significance of the linear is unknown. There are scattered isolated anomalies throughout the remainder of the site, but no evidence of large concentrations of buried solid waste is observed.

Three hypothesis were considered based on the investigation; 1) the trench boundaries are not within the area investigated, 2) the trench boundaries do not provide an adequate dielectric contrast to be detected with conventional GPR procedures, or 3) the trench is not the size and shape that was in the documentation and was possibly overlooked.

The geophysicists responsible for this investigation should be consulted prior to selecting sites for testing or drilling to reduce the potential for hitting underground obstructions.

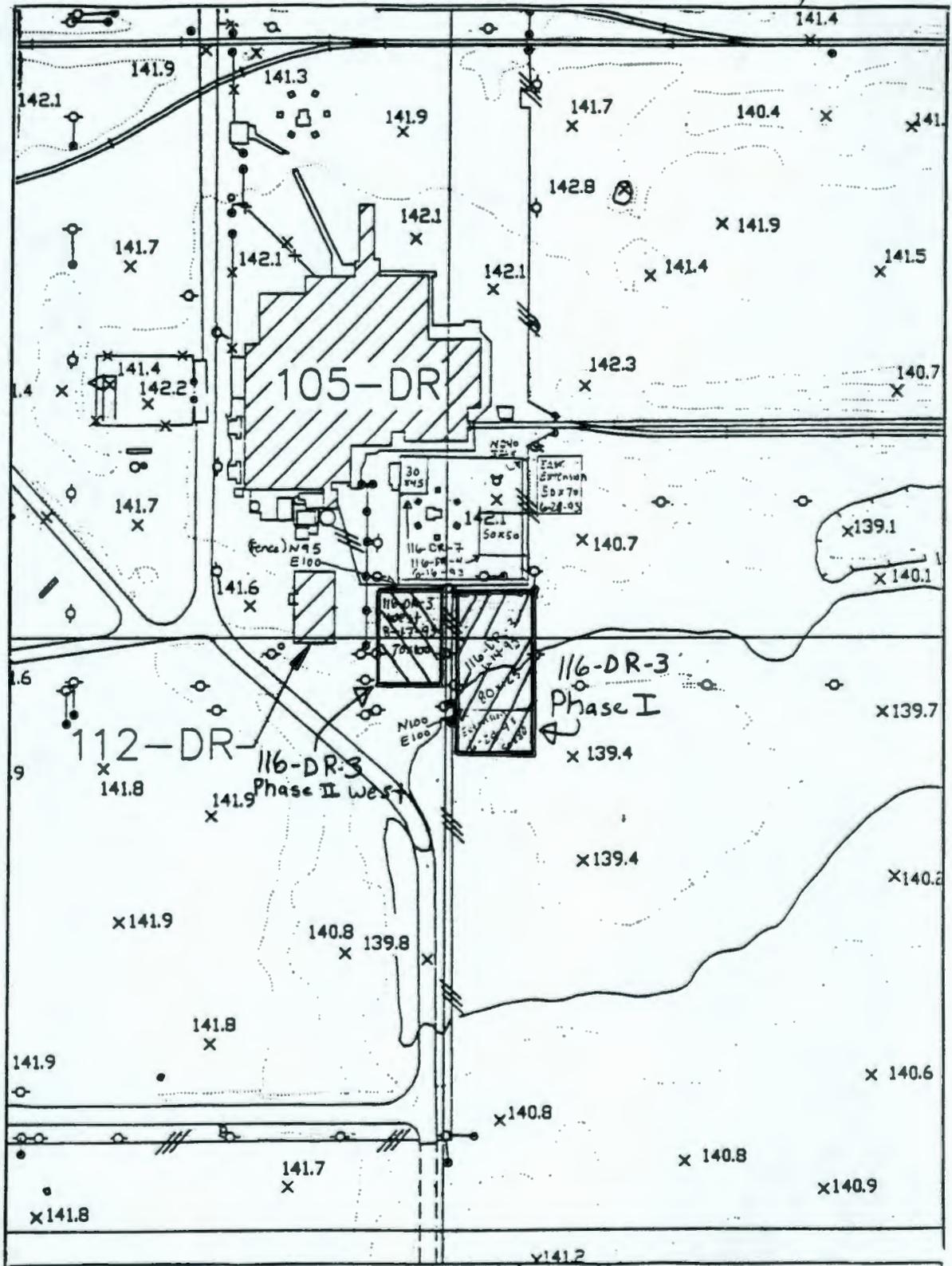


Figure 1. Location Map

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

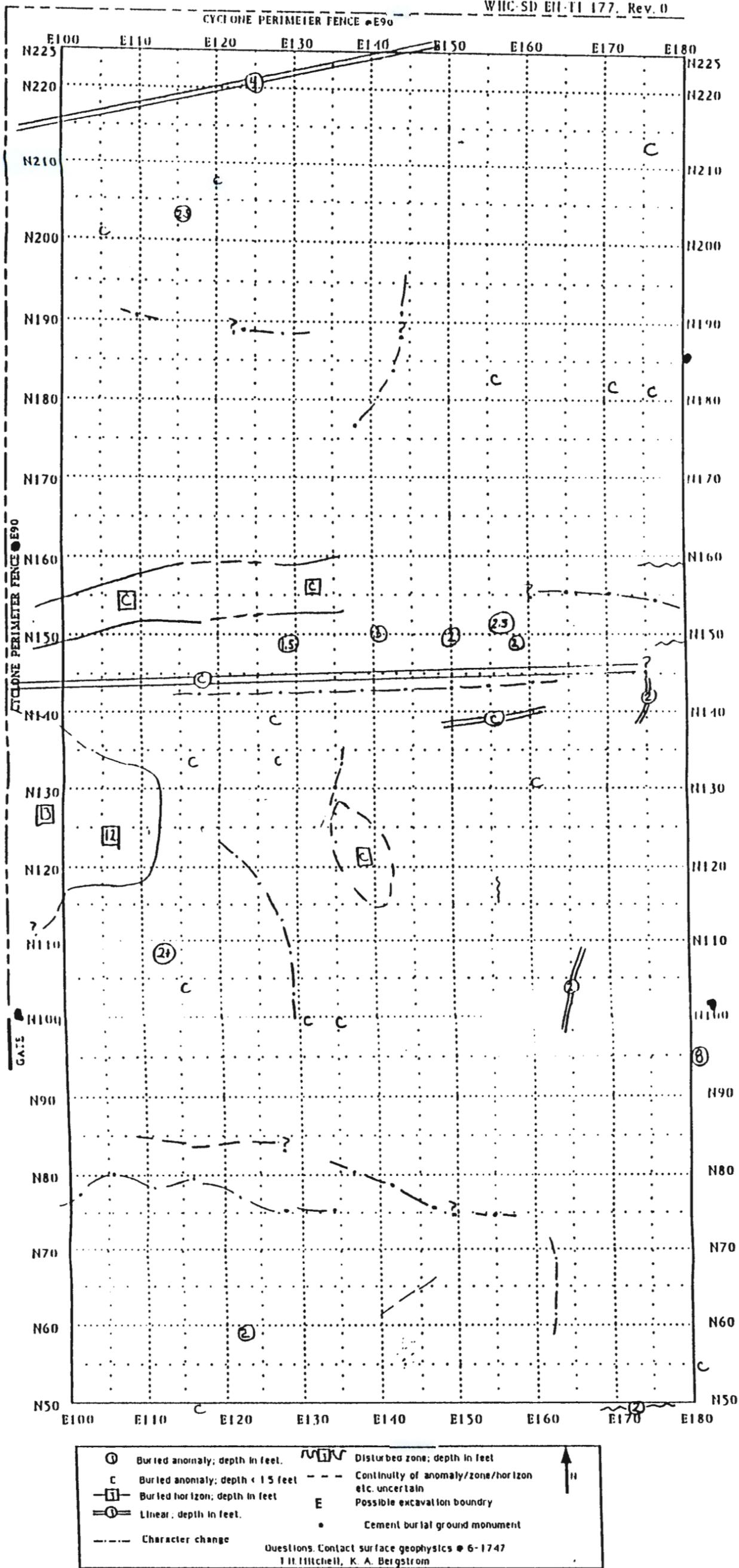
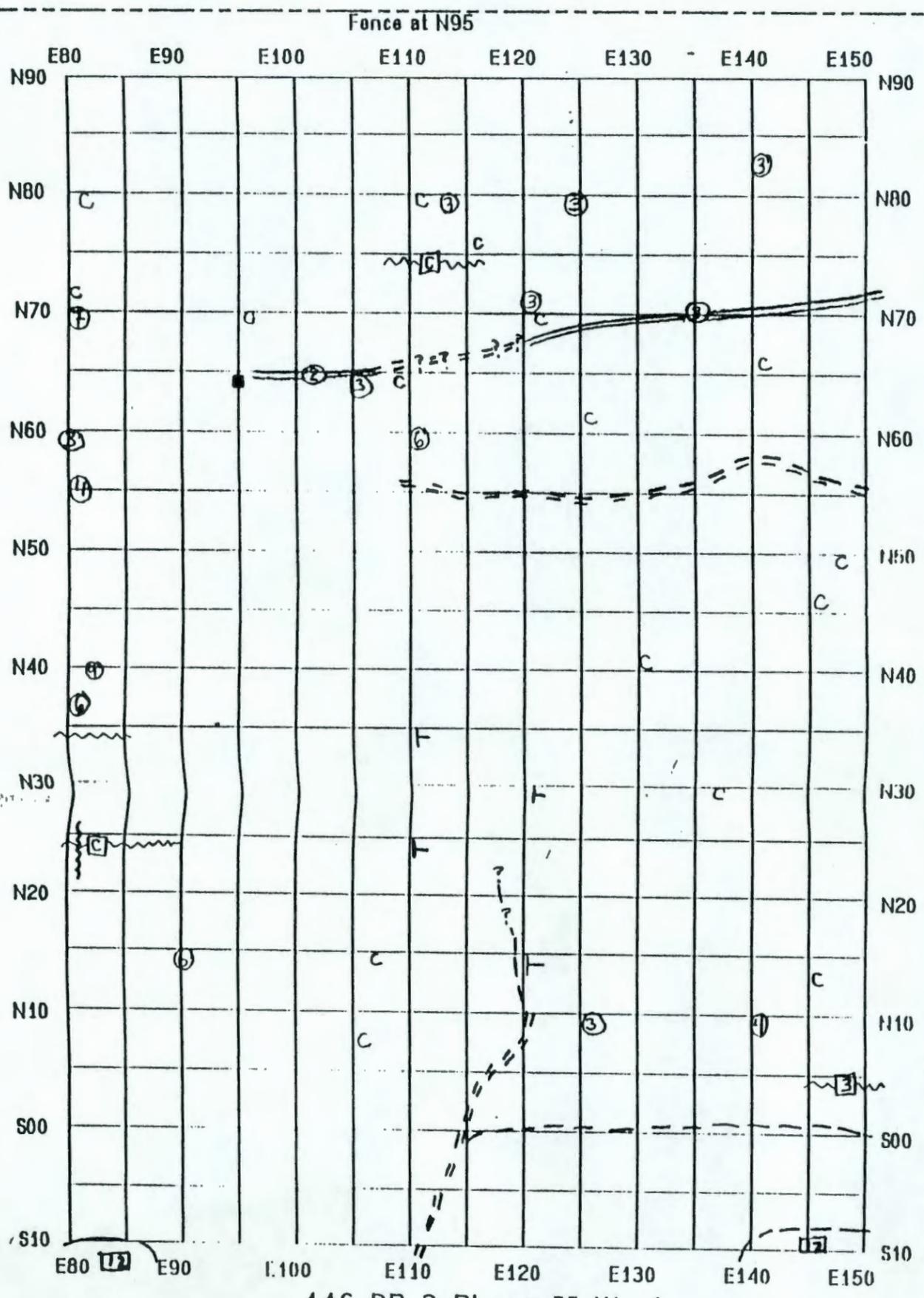


Figure 2 . 116-DR-3 Interpretation Summary.



116-DR-3 Phase II West

③	Buried anomaly; depth in feet.	---	Possible excavation boundary
C	Buried anomaly; depth < 1.5 feet	- - -	Continuity of anomaly/zone/horizon etc. uncertain.
③	Buried horizon; depth in feet	~ ~ ~	Disturbed zone; depth in feet
④	Linear; depth in feet.	T	Dipping horizon
■	Concrete monument (?)		

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

Figure 3 . Summary Interpretation

GROUND-PENETRATING RADAR (GPR) SURVEY

Team Geophysics, Westinghouse Hanford Operations

TITLE: 116-DR-3 Storage Basin Trench	DATE: 6-14-93, 6-28-93 & 8-17-93
LOCATION: 1) Southwest of 105 DR reactor. Just outside of perimeter fence. 6-14-93 & 6-28-93 2) ~20 west of site #1. Just inside of perimeter fence 8-17-93	
CLIENT: Niaknimbalkar	DATA COLLECTED BY K.A. Bergstrom & T.H. Mitchell
EQUIPMENT USED: GSSI System 8, model 4800 Calibrator Model P731 Digital Tape Recorder DT6000A	ANTENNA(S) USED: 100 _____ 300 <u>XX</u> 100 BISTATIC _____
	LOG BOOK: EFL 1052
	TIME WINDOW (NS): 100
PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3	
GRID : <u>80X175'</u> NO. OF PROFILES: <u>65</u> TOTAL FOOTAGE COLLECTED: <u>5000</u> <u>70X100'</u>	
PARAMETERS: Two sets of perpendicular profiles; five feet between profiles at each site.	
DATA TAPE NO.: <u>93-15,93-17</u> RECORDS LOCATION: <u>Geophysical field files</u> <u>&93-18</u>	
TAPE ADDRESS : <u>16578-49997</u> CALIBRATION ADDRESS: <u>49426-49997, 17405-17712,</u> <u>17712-26311& 0-25259</u> <u>&24776-25259</u>	
INTERPRETED BY : <u>K. A. Bergstrom</u> REVIEWED BY : <u>T.H. Mitchell</u>	
INTERPRETATION DELIVERED TO <u>Niaknimbalkar/Spicer</u> DATE : <u>6-28-93, &9-4</u>	
OBJECTIVE(S): Locate 116-DR-3 Storage basin trench, map boundaries, analyze whether additional data buried at site.	
NOTES: Antenna pulled by hand at 1-2 mph. 50-meter cable. Pulled on south and east side of survey marks. Data originally collected on 6-14-93. After data interpretation original grid extended 50 feet to south on 6-28-93. Data interpretation still had no indication of trench. G. Jackson uncovered documentation of trench possibly being on inside of perimeter fence (west of first site). Site 2 data collected on 8-17-93.	

Figure 4. Parameter Summary for Data Collection at 116-DR-3.