

SEP 23 1994  
35 Station 21

ENGINEERING DATA TRANSMITTAL

|   |   |   |
|---|---|---|
| 2. To: (Receiving Organization)<br>Distribution | 3. From: (Originating Organization)<br>Liquid Effluents Management<br>8C540 | 4. Related EDT No.:<br>N/A                |
| 5. Proj./Prog./Dept./Div.:<br>ER                | 6. Cog. Engr.:<br>K. A. Bergstrom   | 7. Purchase Order No.:<br>N/A             |
| 8. Originator Remarks:<br><br>APPROVAL/RELEASE  |   | 9. Equip./Component No.:<br>N/A           |
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| 15. DATA TRANSMITTED |                          |               |              |  | (F)          | (G)                    | (H)                    | (I)                  |
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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-204         |               | 0            | Ground-Penetrating Radar Investigation Conducted in the 100 Areas, Hanford sites: Fiscal Year 1992 | N/A          | 2                      |                        |                      |
| 16. KEY              |                          |               |              |  |              |                        |                        |                      |

| Impact Level (F)             | Reason for Transmittal (G)  | Disposition (H) & (I)  |
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| 17. SIGNATURE/DISTRIBUTION<br>(See Impact Level for required signatures) |     |                            |                     |          |          |                         |               |          |          |        |       |
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| (G)  | (H) | (J) Name                   | (K) Signature       | (L) Date | (M) MSIN | (J) Name                | (K) Signature | (L) Date | (M) MSIN | Reason | Disp. |
| 4  | 1/2 | Cog. Eng. K. A. Bergstrom  | <i>KA Bergstrom</i> | 2-28-94  | H6-06    | EPIC (2)                |               |          | H6-08    |        | 3     |
| 4  | 1/2 | Cog. Mgr. J. W. Fassett    | <i>J.W. Fassett</i> | 3-14-94  | H6-06    | K. R. Fecht             |               |          | H6-06    |        | 3     |
|  |     | QA                         |                     |          |          | M. A. Holman            |               |          | H6-02    |        | 3     |
|  |     | Safety                     |                     |          |          | M. T. Stankovich (2)    |               |          | H6-02    |        |       |
|  |     | Env.                       |                     |          |          | M. M. Naiknimbalkar (3) |               |          | H6-02    |        |       |
| 3  |     | Geophysical Files (2) (15) |                     |          | H6-06    | J. M. Ayres             |               |          | H6-02    |        |       |
| 3  |     | Central Files (2)          |                     |          | L8-04    | OSTI (2)                |               |          | L8-07    |        | 3     |

|  |   |   |  |
|--|---|---|--|
| 18. <i>K.A. Bergstrom</i><br>K.A. Bergstrom<br>Signature of EDT Originator<br>Date | 19. _____<br>Authorized Representative for Receiving Organization<br>Date | 20. <i>J.W. Fassett</i><br>J.W. Fassett<br>Cognizant/Project Engineer's Manager<br>Date | 21. DOE APPROVAL (if required)<br>Ltr. No.<br><input type="checkbox"/> Approved<br><input type="checkbox"/> Approved w/comments<br><input type="checkbox"/> Disapproved w/comments |
|--|---|---|--|



**RELEASE AUTHORIZATION**

**Document Number:** WHC-SD-EN-TI-204, REV. 0

**Document Title:** Ground-Penetrating Radar Investigations Conducted in the 100 Areas, Hanford Site; Fiscal Year 1992

**Release Date:** 9/22/94

\* \* \* \* \*

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

**APPROVED FOR PUBLIC RELEASE**

\* \* \* \* \*

**WHC Information Release Administration Specialist:**

*N.L. Solis*

N.L. SOLIS

(Signature)

*9/22/94*

(Date)

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| 2. Title<br>Ground-Penetrating Radar Investigations Conducted in the 100 Areas, Hanford Site: Fiscal Year 1992 | 3. Number<br>WHC-SD-EN-TI-204 | 4. Rev No.<br>0 |
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| 5. Key Words<br>Radar, Geophysics, GPR<br><br><b>APPROVED FOR PUBLIC RELEASE</b> | 6. Author<br>Name: <sup>SOV</sup> K. A. Bergstrom<br><br><u>J.W. Fassett</u><br>Signature<br><br>Organization/Charge Code 86940/PA2AA |
|--|---|

7. Abstract *9/22/94 R. Solis*  
K. A. Bergstrom, J. R. Kunk, T. H. Mitchell, and G. J. Swartz, 1994, Ground Penetrating Radar Investigations Conducted in the 100 Areas, Hanford Site: Fiscal Year 1992, WHC-SD-EN-TI-204, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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9. Impact Level *ANIA*

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**GROUND PENETRATING RADAR INVESTIGATION  
CONDUCTED IN THE 100 AREAS, HANFORD SITES:  
FISCAL YEAR 1992**

## 1.0 Introduction

During Fiscal Year 1992, the Geophysics Group conducted forty-five Ground-Penetrating Radar (GPR) surveys in the 100 Areas (Figure 1). Objectives for the investigations varied, from locating cribs, trenches and septic systems to helping site boreholes. The results of each investigation were delivered to clients in the form of a map that summarized the interpretation of a given site. No formal reports were prepared. The purpose of this document is to show where and why each of the surveys was conducted. The data and interpretation of each survey are available by contacting the Westinghouse Hanford Company, Geophysics Group.

A map showing the location and basic parameters of each survey can be found in the Appendices of this report.

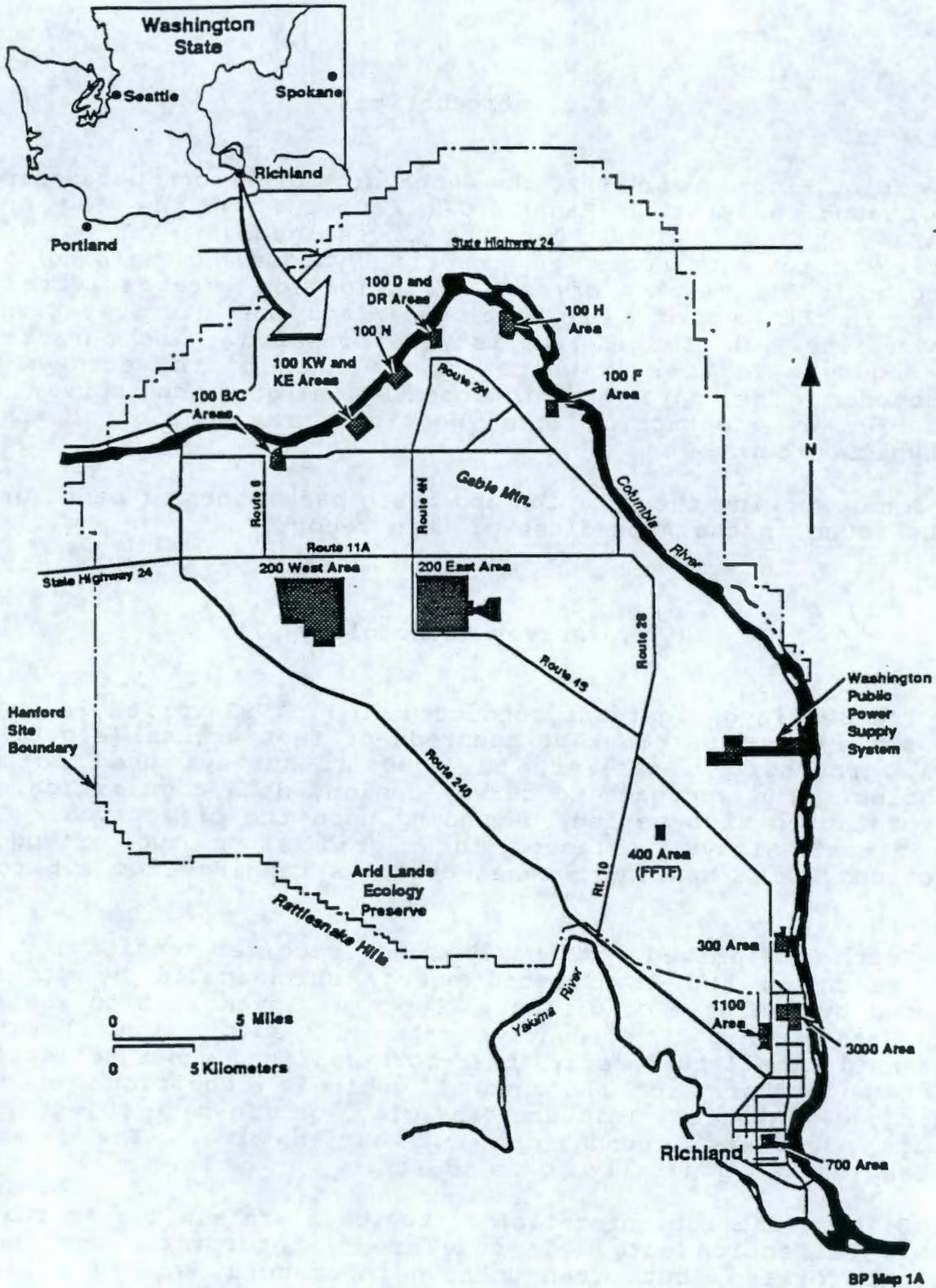
## 2.0 Survey Methodology

The GPR investigations conducted in FY 1992 varied in scale, from surveys on the order of hundreds of feet across (e.g. large burial grounds) to smaller, 50 X 50 ft surveys used to site boreholes. The approach to survey design, data acquisition, and interpretation also varied, depending upon the objectives. Data were almost always collected in a grid along two orthogonal directions, with spacing between profiles ranging from 2.5 to 10 ft.

Depth was limited by transmit power, receiver sensitivity, and attenuation of the transmitted energy which could be strongly affected by geologic conditions. Depth of investigation was also influenced by highly conductive material, such as metal drums, which reflect all the energy, therefore masking deeper reflectors. 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 depth of penetration was generally 10 to 15 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, yielded complex data.

Figure 1. Hanford Site.



Data for these surveys were collected with a Geophysical Survey Systems Inc. (GSSI) Subsurface Interface Radar (SIR)<sup>™</sup> System 8, model 4800 and digitally stored on a GSSI DT6000A tape drive. Both 100 and 300-MHz antennas were utilized. Recording windows ranged from 90 to 150 nanoseconds, two-way travel time. An idealized picture of the hardware configuration is shown in Figure 2.

The time window that was chosen for a particular survey was based on the objective of the survey and the soil conditions. A larger time window allowed data to be gathered from greater depths, but it was unreasonable to increase the window beyond the geologically and site-specifically given signal attenuation range. As a general rule, increased investigation depth (time window) decreases resolution. This is especially true for resolution deeper than 15 ft with the 300 MHz antenna.

### 3.0 Interpretation Approach

Interpretations start with "good data" that satisfy the objectives of the investigation. Tightly spaced profiles, collected in perpendicular directions, and if possible normal to the strike of features of interest are all characteristics of good data. Exceptions are large reconnaissance surveys where wide spacing between profiles is more practical. Good data characterizes the undisturbed geologic setting of the site and in many cases requires extending profiles well beyond the boundaries of the initial surveyed site. Close monitoring of the signal, real-time, is the most effective method for assuring "regional characterization." The scientist assigned to interpret the data should be directly involved in collecting the data.

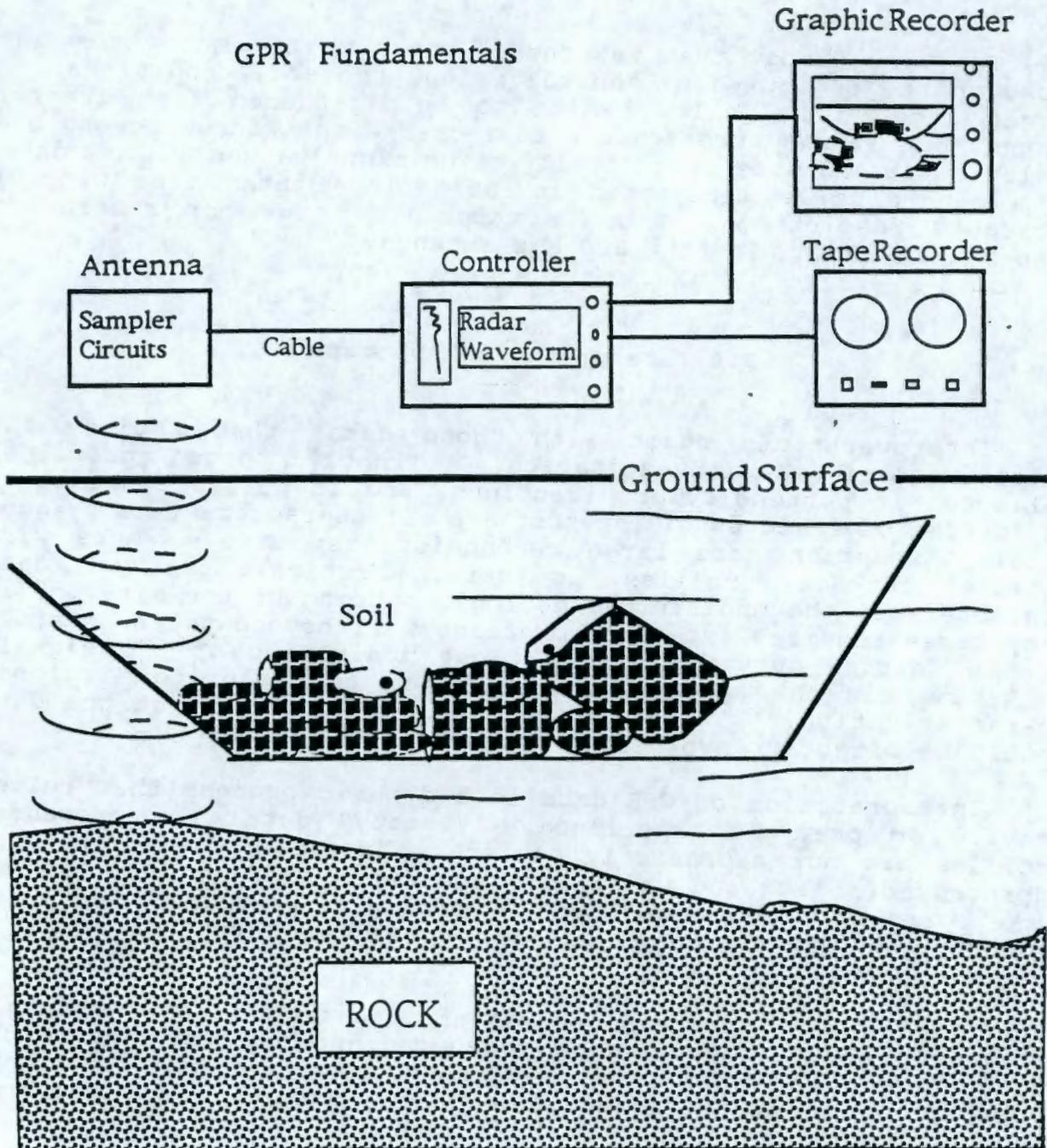
Interpretation of GPR data is a dynamic process that relies heavily on previous experience. "Pretty" data from processed profiles are not necessarily easier to interpret. In contrast, unprocessed, black and white data are often preferable. Line to line correlation, recognition of geologic features, character changes, and experience gained from previous investigations are relied upon heavily.

Little to no "processing" was applied to most of the data. Processing of GPR data is time consuming and may not enhance the interpretation. However, data processing is a tool that, when used properly, may significantly enhance some investigations. Processing should be used with discretion because it can also change the "character" of features, making the data more difficult to interpret.

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<sup>™</sup> A trademark of Geophysical Survey Systems Inc. (GSSI).

Figure 2. Ground-Penetrating Radar Methodology.



APPENDIX A

100 B/C

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Figure A-2. Location Map of GPR Survey 199-B2-12.

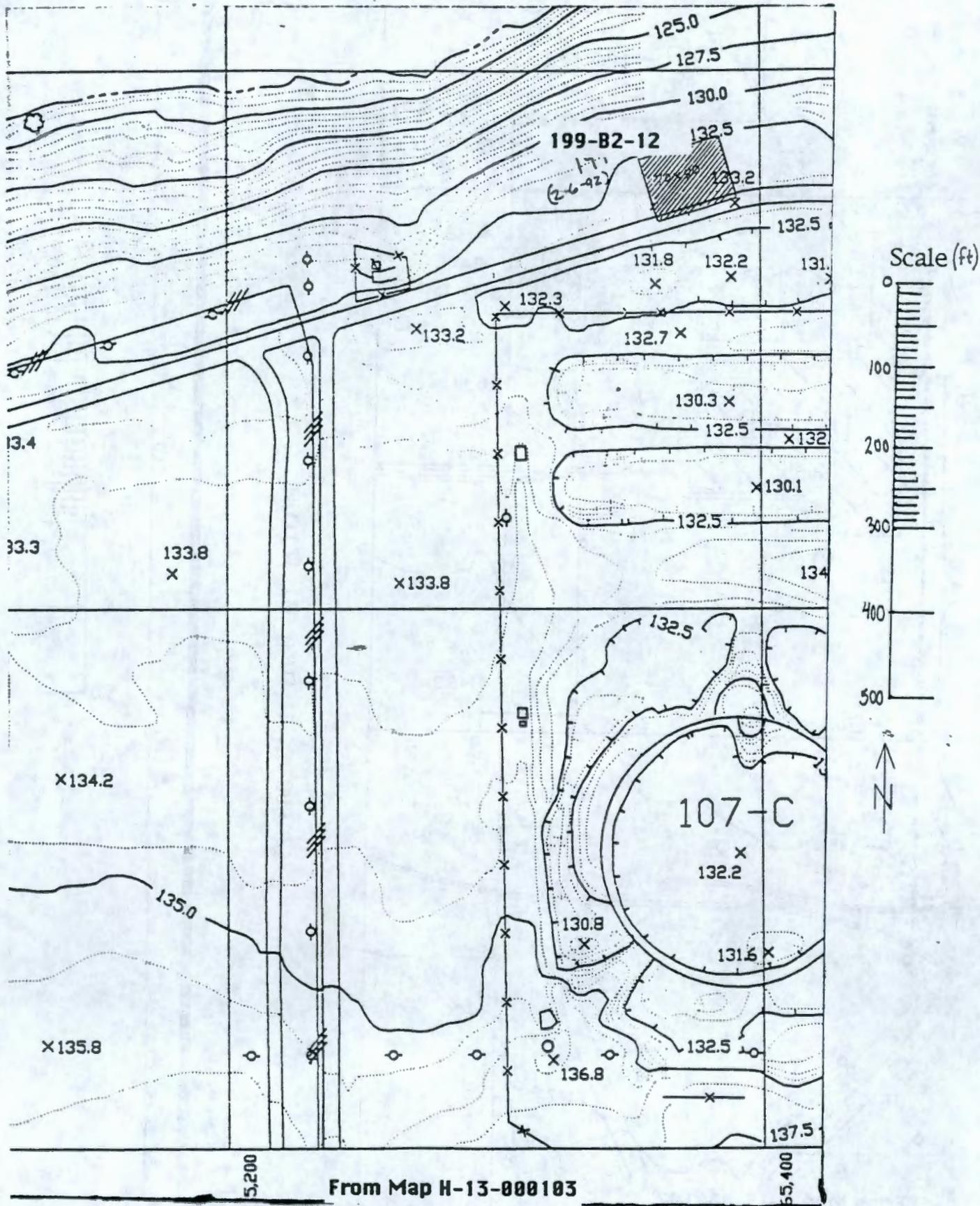


Figure A-3. Location Map of GPR Surveys B4-9 and 116-B-2.

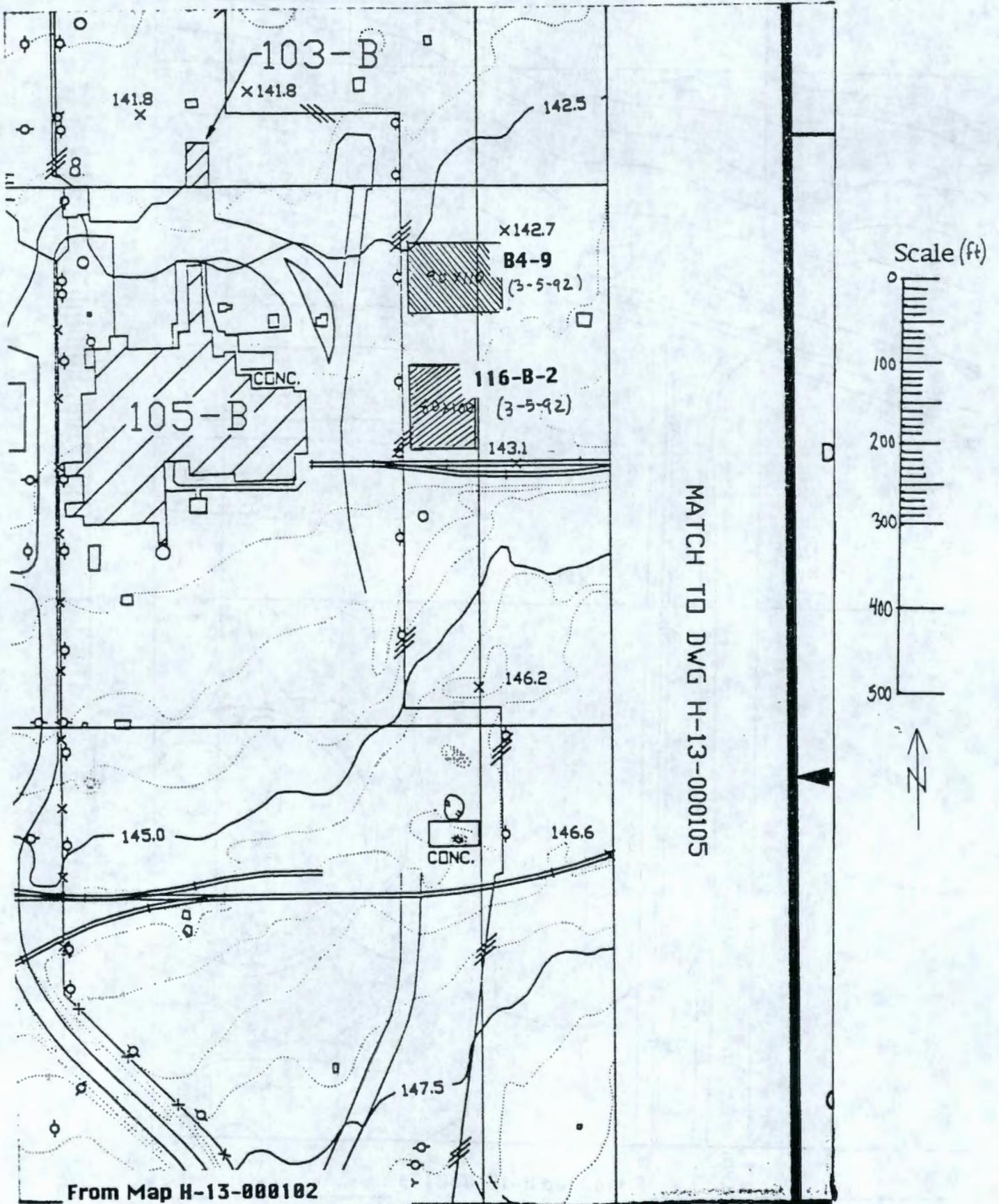


Figure A-4. Location Map of GPR Survey 199-B9-2.

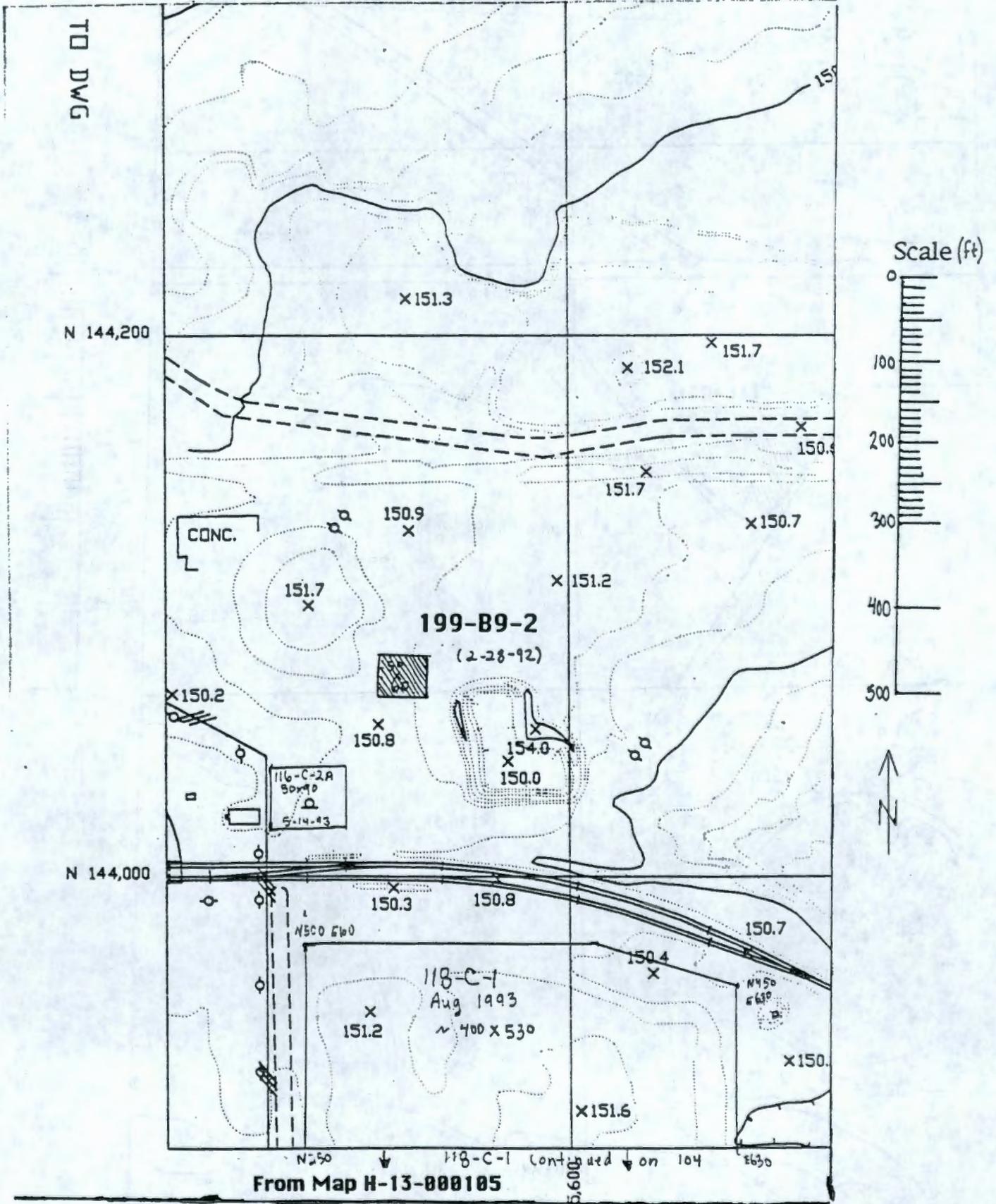


Figure A-5. Location Map of GPR Survey 116-B-1.

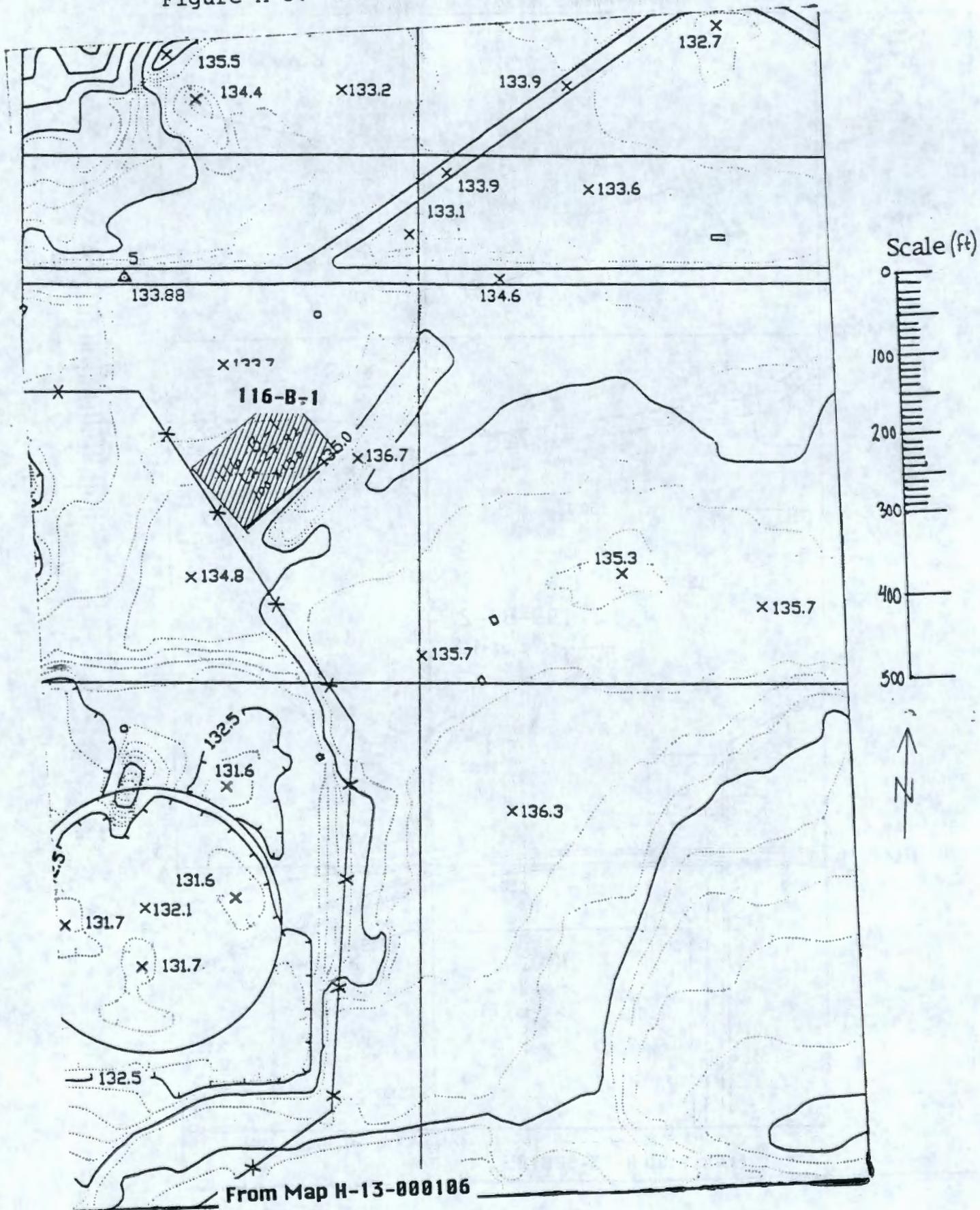


Figure A-6. Location Map of GPR Surveys 199-B5-2 and 116-B-5.

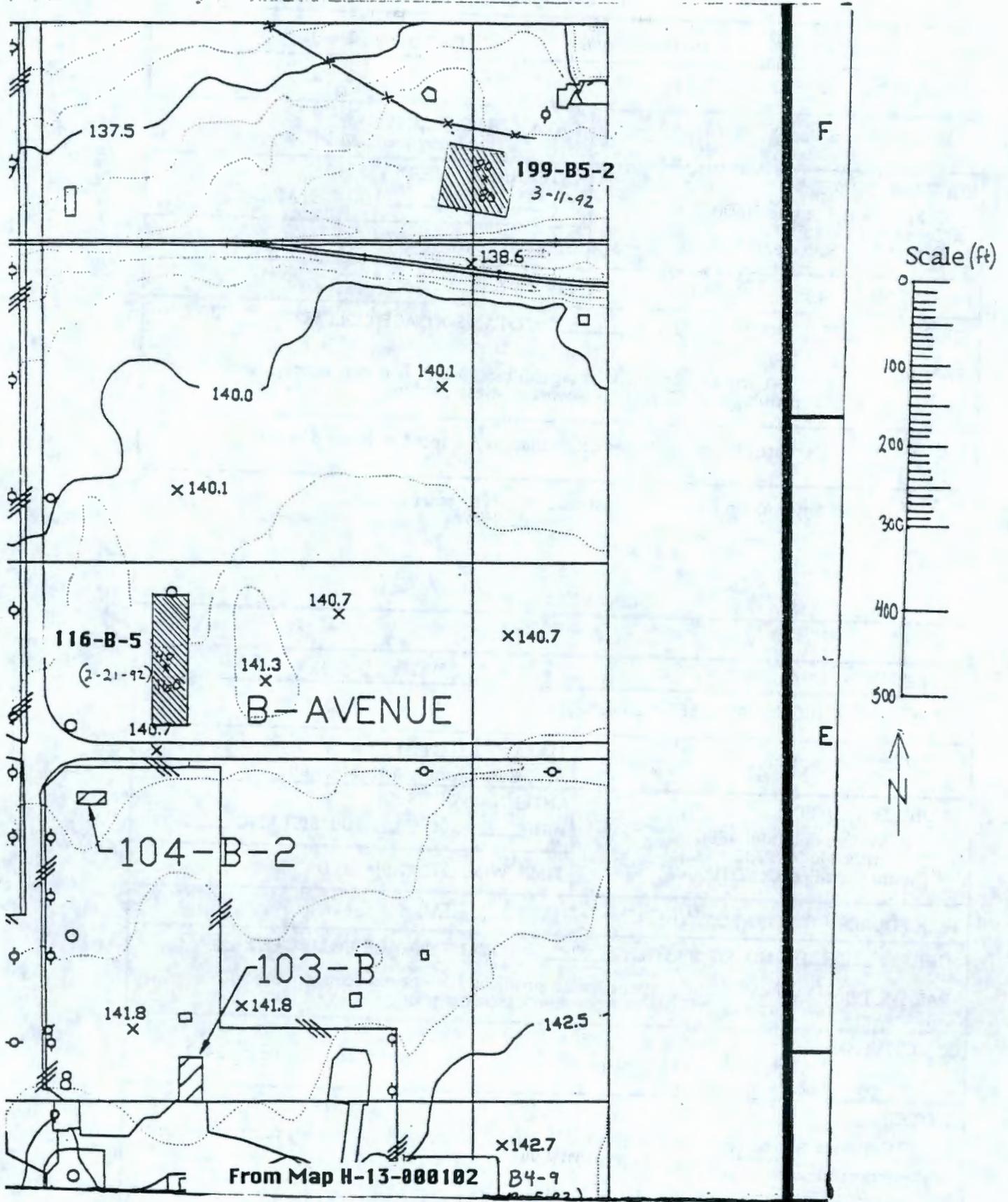


Table A-1. Parameters for GPR Surveys 199-B2-12 and B4-9/116-B-2.

|  |  |              |
|--|--|--------------|
| TITLE: 199-B2-12   |  | DATE: 2-6-92 |
| LOCATION: 100 B/C Area SEE FIGURE A-2.   |  |              |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                       | ANTENNA(S) USED:<br>100 <u>XX</u> 300 _____ 100 BISTATIC _____ |              |
|  | TIME WINDOW (NS): 100  |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |              |
| GRID : <u>70x80ft</u> NO. OF PROFILES: <u>15</u> TOTAL FOOTAGE COLLECTED: <u>~1100'</u>                                      |  |              |
| PARAMETERS: Two sets of perpendicular profiles; 10 feet between north-south profiles and 10 feet between east-west profiles. |  |              |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.                                 |  |              |
| NOTES: Pulled antenna on south and west side of survey marks.  |  |              |

|   |  |              |
|---|--|--------------|
| TITLE: 199-B4-9/116-B-2   |  | DATE: 3-5-92 |
| LOCATION: 100 B/C Area SEE FIGURE A-3   |  |              |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                            | ANTENNA(S) USED:<br>100 _____ 300 <u>XX</u> 100 BISTATIC _____ |              |
|   | TIME WINDOW (NS): 100  |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |              |
| GRID : <u>150x250ft</u> NO. OF PROFILES: <u>43</u> TOTAL FOOTAGE COLLECTED: <u>~5000</u>  |  |              |
| PARAMETERS: Two sets of perpendicular profiles; 10 feet between north-south profiles and 10 feet between east-west profiles.      |  |              |
| OBJECTIVE(S):<br>Locate utilities and buried debris that may effect the drilling of borehole B4-9.<br>Locate 116-B-2 crib         |  |              |
| NOTES:<br>Combined two surveys, B4-9 and 116-B-2, into one survey. Both surveys reconnaissance.<br>Proposed borehole at E186/N301 |  |              |

Table A-2. Parameters for GPR Surveys 199-B9-2 and 116-B-1.

|  |  |               |
|--|--|---------------|
| TITLE: 199-B9-2  |  | DATE: 2-28-92 |
| LOCATION: 100 B/C Area SEE FIGURE A-4.   |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                     | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |               |
|  | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>60x50ft</u> NO. OF PROFILES: <u>24</u> TOTAL FOOTAGE COLLECTED: <u>~1300'</u>                                    |  |               |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.                               |  |               |
| NOTES: Pulled antenna on south and west side of survey marks. Proposed well site at E125/N137.                             |  |               |

|  |  |               |
|--|--|---------------|
| TITLE: 116-B-1   |  | DATE: 2-27-92 |
| LOCATION: 100 B/C Area SEE FIGURE A-5  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                       | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |               |
|  | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>100x150ft</u> NO. OF PROFILES: <u>28</u> TOTAL FOOTAGE COLLECTED: <u>~3400</u>                                     |  |               |
| PARAMETERS: Two sets of perpendicular profiles; 10 feet between north-south profiles and 10 feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate 116-B-1 crib and determine whether proposed borehole site is located within the crib.                   |  |               |
| NOTES:<br><br>Pulled antenna on south and west side of survey marks.<br>Proposed borehole at E176/N202                       |  |               |

Table A-3. Parameters for GPR Surveys 199-B5-2 and 116-B5.

|  |  |                  |
|--|--|------------------|
| TITLE: 199-B5-2  |  | DATE: 3-11/12-92 |
| LOCATION: 100 B/C Area SEE FIGURES A-6.  |  |                  |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |                  |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                      | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |                  |
|  | TIME WINDOW (NS): 100  |                  |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |                  |
| GRID : <u>80x80ft</u> NO. OF PROFILES: <u>35</u> TOTAL FOOTAGE COLLECTED: <u>~2800'</u>                                    |  |                  |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |                  |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.                               |  |                  |
| NOTES: Pulled antenna on south and west side of survey marks. Proposed well site at E148/N135.                             |  |                  |

|   |  |               |
|---|--|---------------|
| TITLE: 116-B-5  |  | DATE: 2-21-92 |
| LOCATION: 100 B/C Area SEE FIGURE A-6   |  |               |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A             | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |               |
|   | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |               |
| GRID : <u>40x160ft</u> NO. OF PROFILES: <u>28</u> TOTAL FOOTAGE COLLECTED: <u>~1200'</u>                          |  |               |
| PARAMETERS: One set of east-west profiles from 3-7 feet apart   |  |               |
| OBJECTIVE(S): To delineate crib boundaries. If possible, determine if any areas had caved in.                     |  |               |
| NOTES: Crib had cave in potential. Had to pull antenna across crib with rope. Data limited to east-west profiles. |  |               |

APPENDIX B

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Figure B-2. Location Map of GPR Survey 199-K-34.

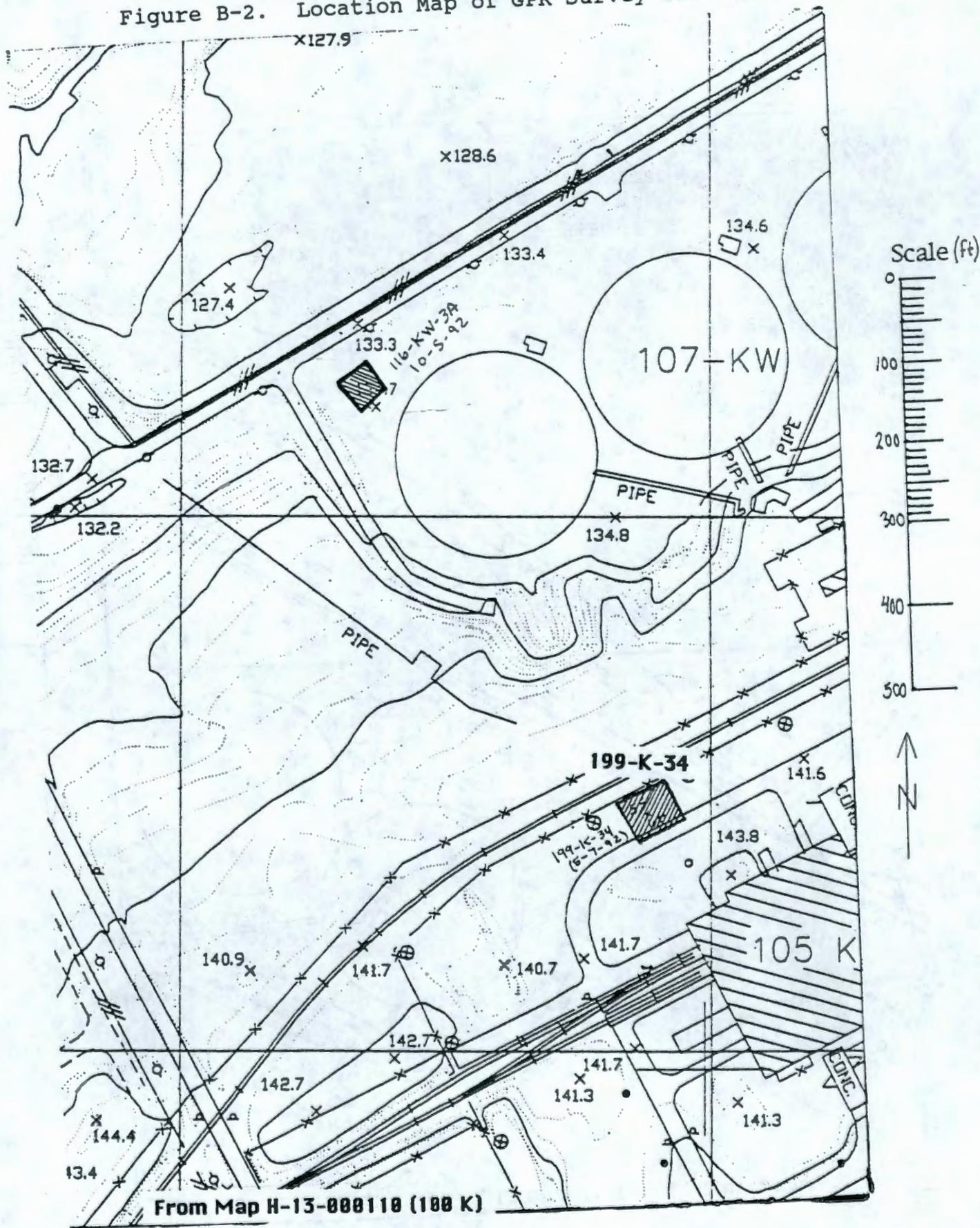


Figure B-3. Location Map of GPR Survey 199-K-32.

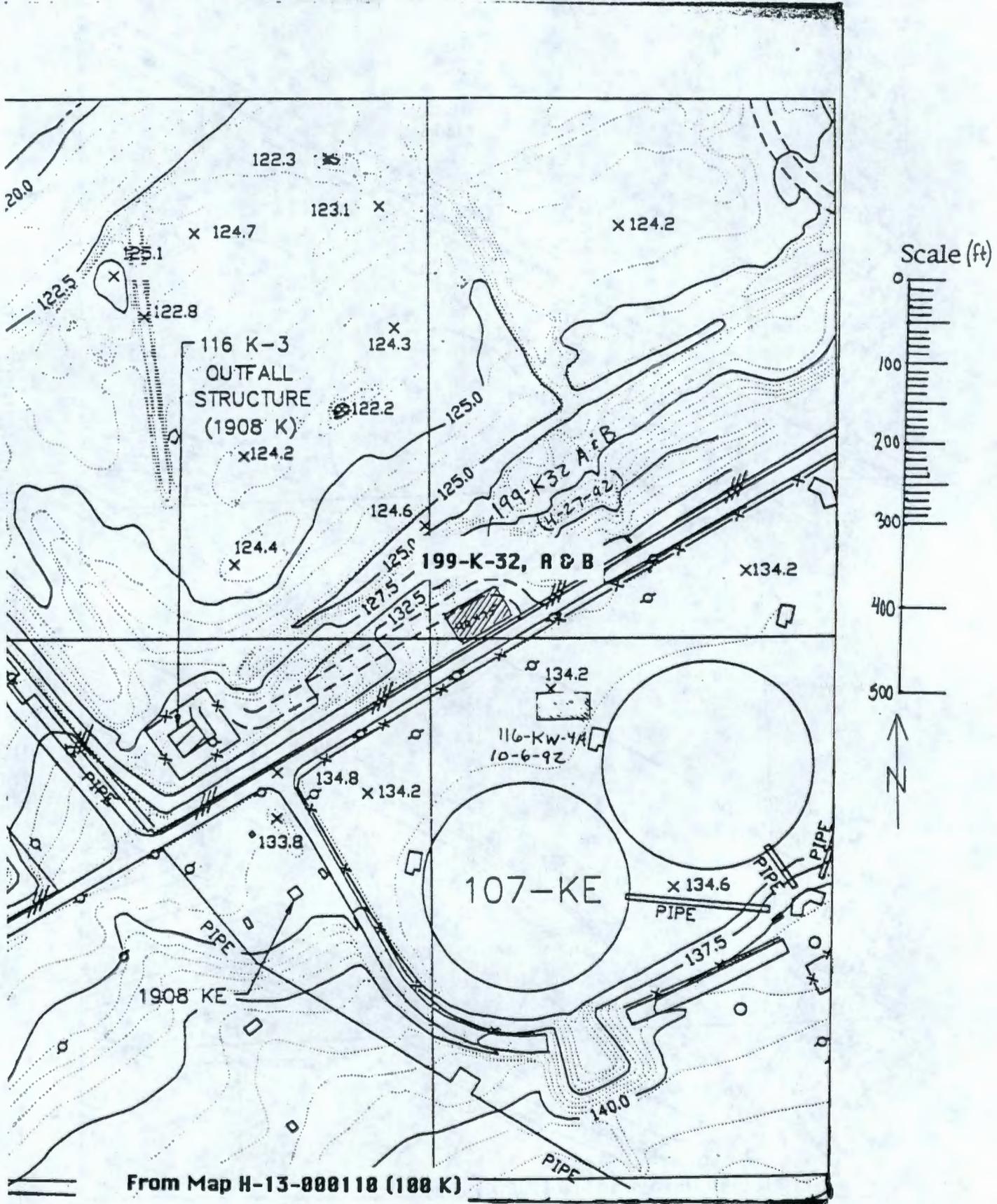


Figure B-4. Location Map of GPR Survey 199-K-36.

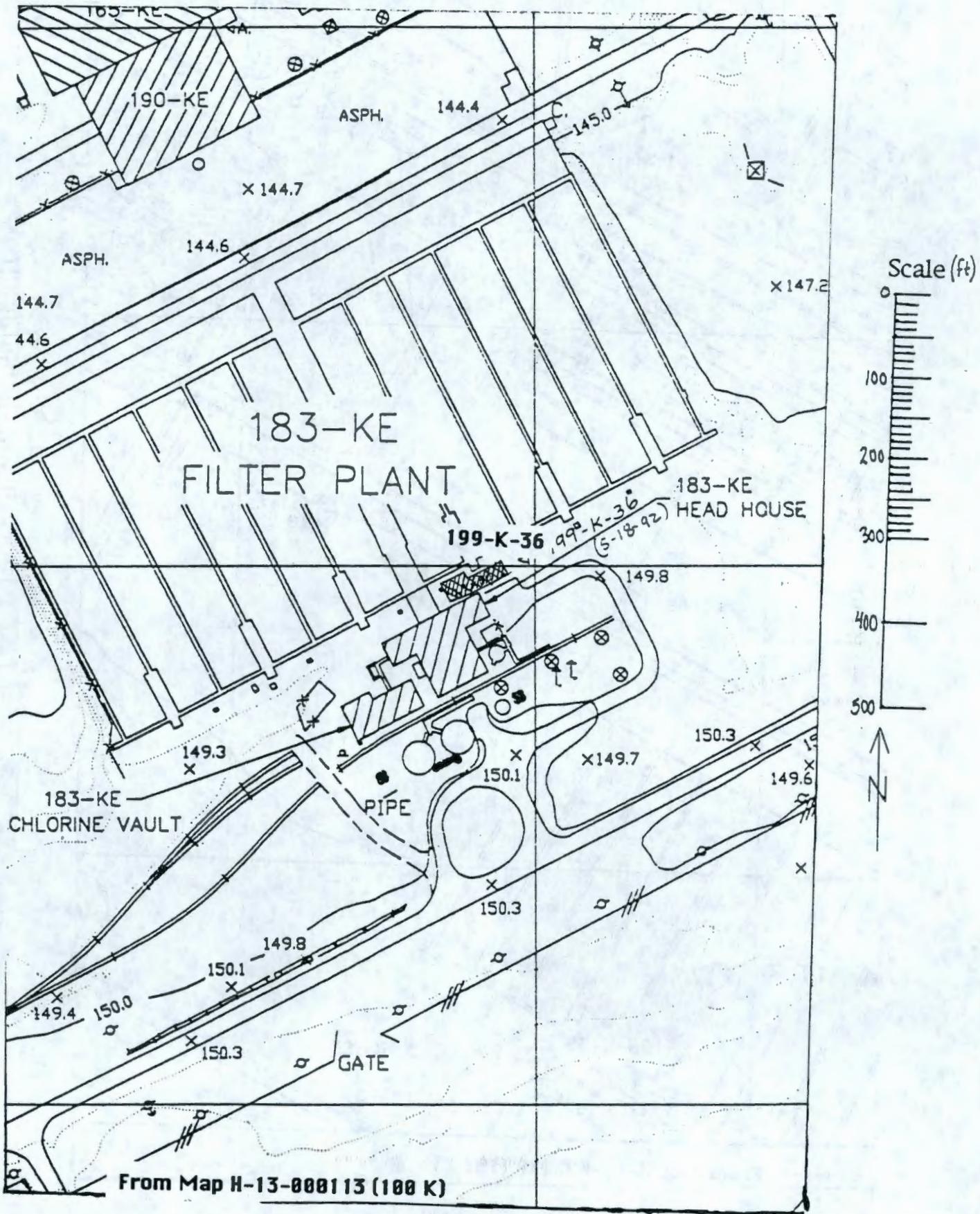


Figure B-5. Location Map of GPR Survey 199-K-35.

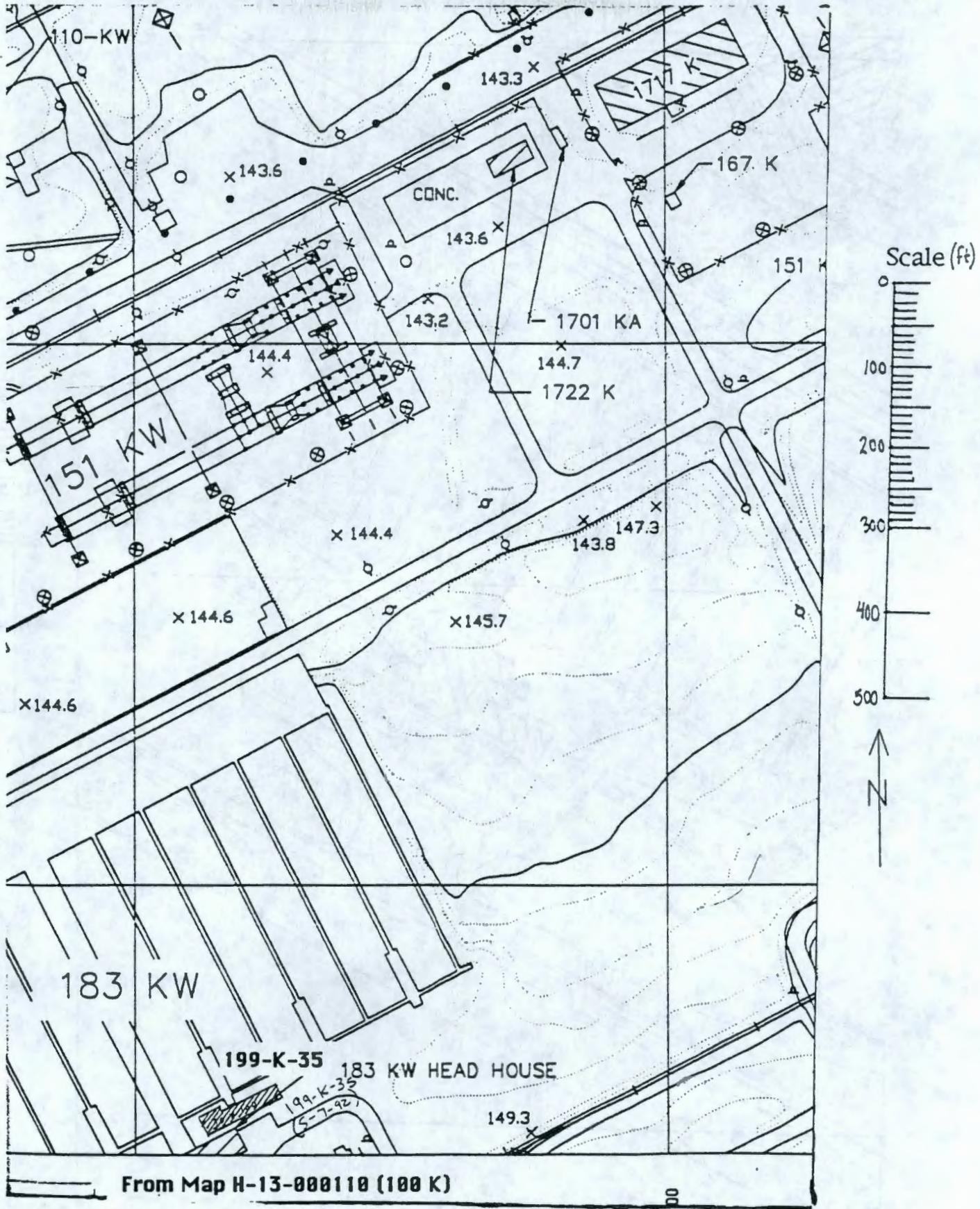


Table B-1. Parameters for GPR Surveys 199-K-34 and 199-K-32.

|  |  |              |
|--|--|--------------|
| TITLE: 199-K-34  |  | DATE: 5-7-92 |
| LOCATION: 100 K Area SEE FIGURE B-2.   |  |              |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                            | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |              |
|  | TIME WINDOW (NS): 90   |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |              |
| GRID : <u>60x55ft</u> NO. OF PROFILES: <u>26</u> TOTAL FOOTAGE COLLECTED: <u>1500'</u>   |  |              |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |              |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.                                     |  |              |
| NOTES: Pulled antenna on south and west side of survey marks. Proposed well site at E132/N120.                                   |  |              |

|  |  |               |
|--|--|---------------|
| TITLE: 199-K-32 A & B  |  | DATE: 4-29-92 |
| LOCATION: 100 K Area SEE FIGURE B-3  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A  | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |               |
|  | TIME WINDOW (NS): 90   |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>75x45ft</u> NO. OF PROFILES: <u>25</u> TOTAL FOOTAGE COLLECTED: <u>~1400'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles.                         |  |               |
| OBJECTIVE(S): Locate possible underground utilities. Investigate the proposed drill site for subsurface anomalies that would be detrimental to the well. |  |               |
| NOTES:<br>The survey grid covered two proposed well sites.   |  |               |

Table B-2. Parameters for GPR Surveys 199-K-36 and 199-K-35.

|   |  |              |
|---|--|--------------|
| TITLE: 199-K-35   |  | DATE: 5-7-92 |
| LOCATION: 100 K Area SEE FIGURE B-5.  |  |              |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A  | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |              |
|   | TIME WINDOW (NS): 100  |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |              |
| GRID : <u>35x100ft</u> NO. OF PROFILES: <u>27</u> TOTAL FOOTAGE COLLECTED: <u>1000'</u>   |  |              |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles.                                  |  |              |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.  |  |              |
| NOTES: Pulled antenna on south and west side of survey marks. Recommended that proposed borehole location be moved from E134/N126 to avoid hitting buried debris. |  |              |

|  |  |               |
|--|--|---------------|
| TITLE: 199-K-36  |  | DATE: 5-18-92 |
| LOCATION: 100 K Area SEE FIGURE B-4  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                           | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |               |
|  | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>80x30ft</u> NO. OF PROFILES: <u>27</u> TOTAL FOOTAGE COLLECTED: <u>~1000</u>   |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.                                     |  |               |
| NOTES: Pulled antenna on south and west side of survey markers. Proposed well site at N128/E133.                                 |  |               |

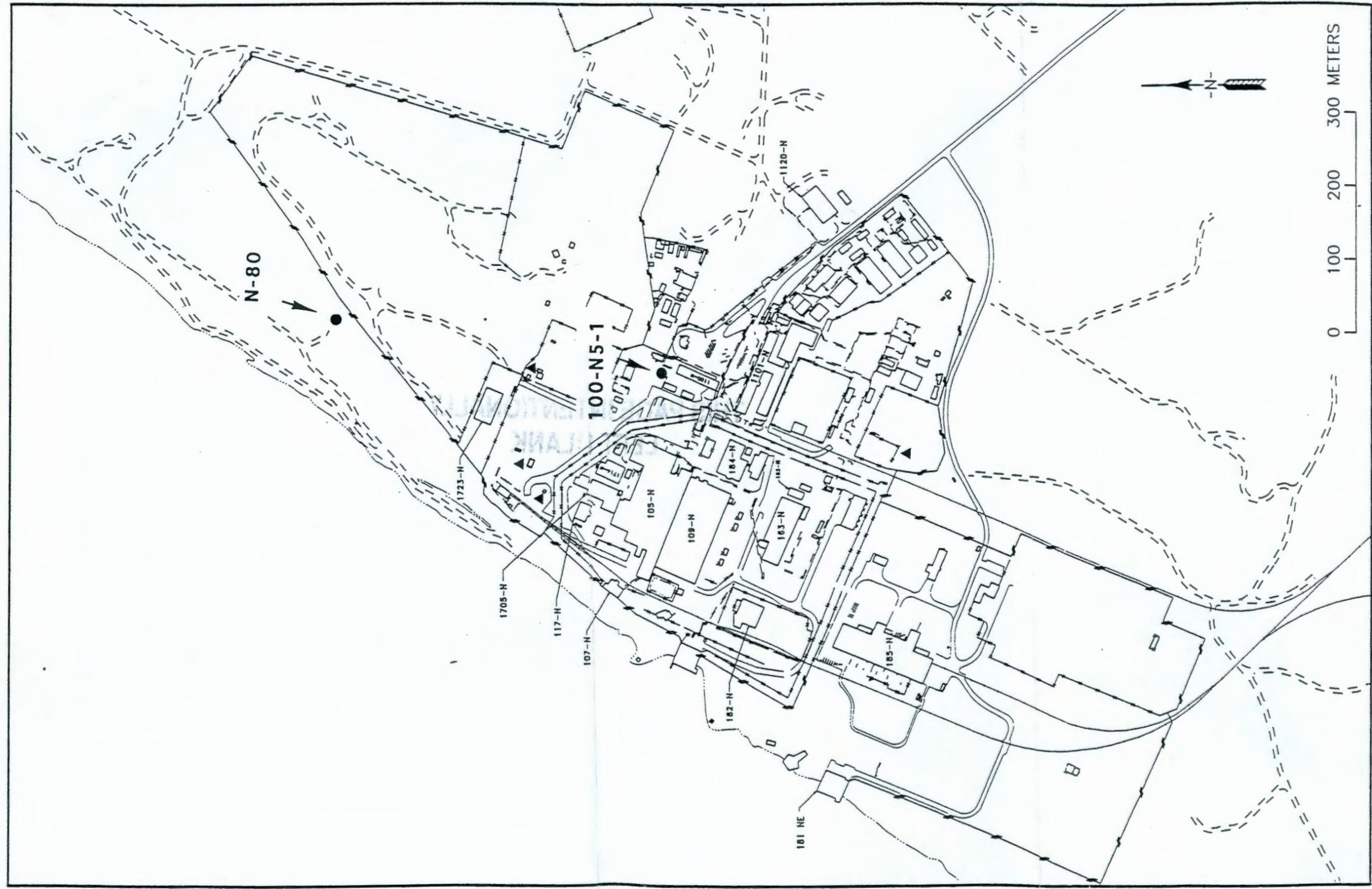
APPENDIX C

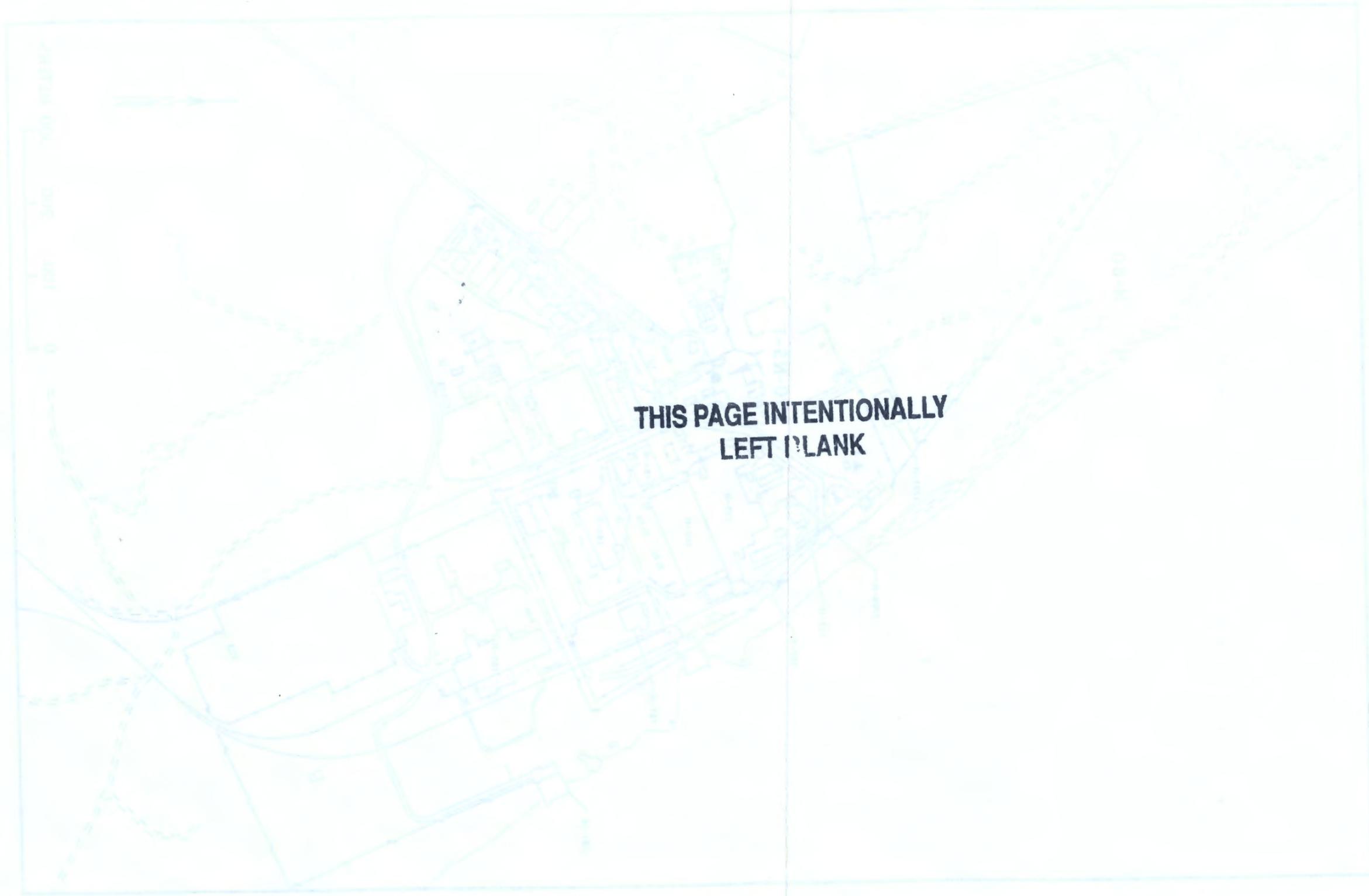
100 N

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Figure C-1. General Layout of the 100 N Area.





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Figure C-2. Location Map of GPR Survey 100N-G5-1.

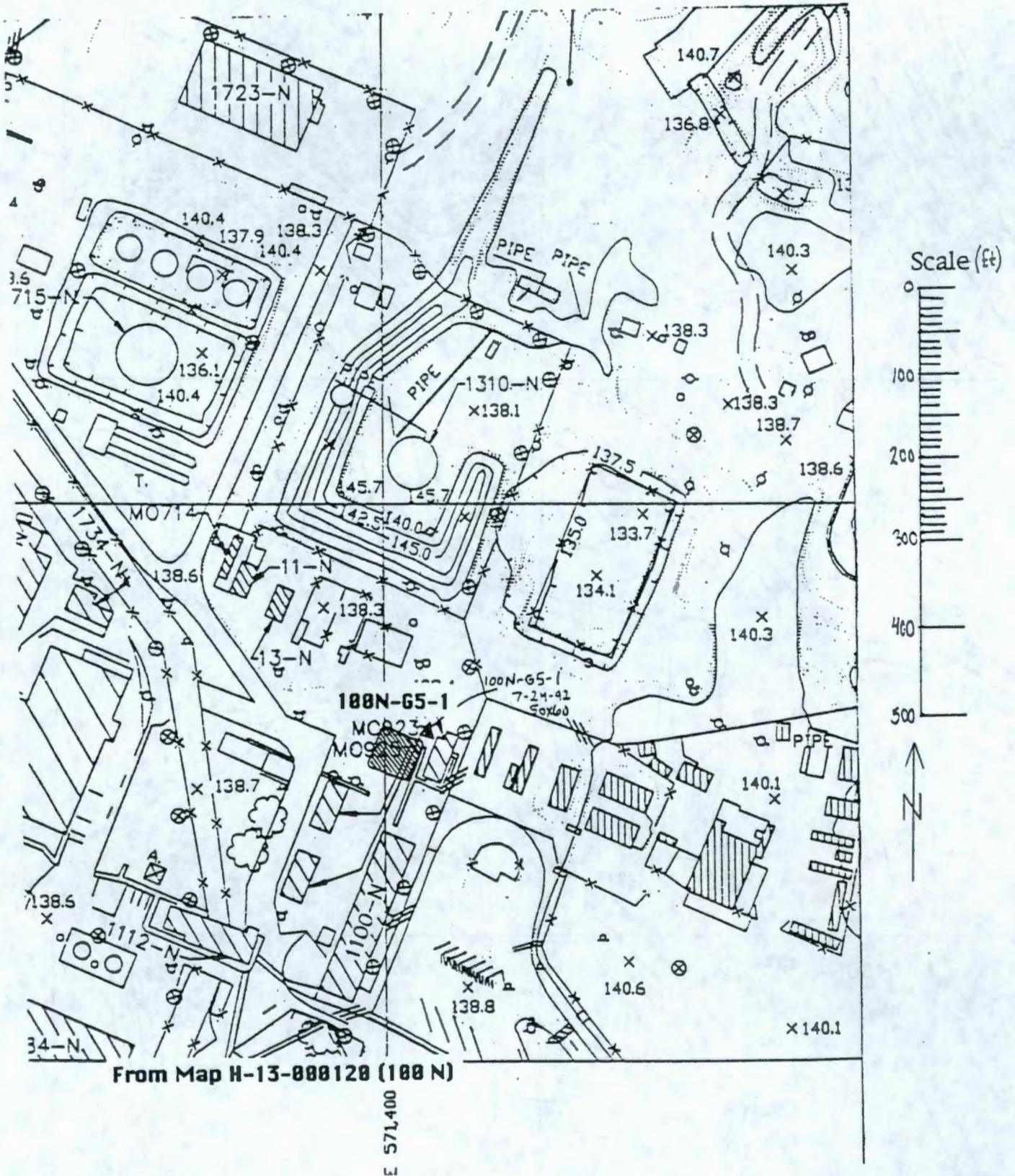




Table C-1. Parameters for GPR Surveys 100N-G5-1 and N-80.

|  |  |               |
|--|--|---------------|
| TITLE: 100N-G5-1   |  | DATE: 7-24-92 |
| LOCATION: 100 N Area SEE FIGURE C-2  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & J.R. Kunk                |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                            | ANTENNA(S) USED:<br>100 _____ 300 <u>XX</u> 100 BISTATIC _____ |               |
|  | TIME WINDOW (NS): 90   |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>50'X60'</u> NO. OF PROFILES: <u>24</u> TOTAL FOOTAGE COLLECTED: <u>1435'</u>   |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate excavation for an underground tank that had been previously removed. Locate well site within excavation.    |  |               |
| NOTES: Antenna pulled on south and west side of survey marks. Proposed well site at N135/E100.                                   |  |               |

|   |  |               |
|---|--|---------------|
| TITLE: N-80   |  | DATE: 6-19-92 |
| LOCATION: 100 N Area SEE FIGURE C-3   |  |               |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A   | ANTENNA(S) USED:<br>100 _____ 300 <u>XX</u> 100 BISTATIC _____ |               |
|   | TIME WINDOW (NS): 90   |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |               |
| GRID : <u>60x45ft</u> NO. OF PROFILES: <u>23</u> TOTAL FOOTAGE COLLECTED: <u>~1400</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles.  |  |               |
| OBJECTIVE(S):<br>Antenna pulled on south and west side of survey marks. Proposed well site at N132/E122.  |  |               |
| NOTES:<br>Two areas with relatively little sub-surface reflectors were identified. However most of the survey area has conductive clutter from Hanford gravels and buried debris. |  |               |

Table C-1. Parameters for GPR Surveys 100N-GS-1 and N-80.

|  |  |   |
|--|--|---|
| TITLE: 100N-GS-1   |  | DATE: 7-14-93   |
| LOCATION: 100 N Area SEE FIGURE C-3  |  |   |
| CLIENT: Tom Spicer   |  | DATA COLLECTED BY: K.A. Bergstrom & J.R. Kunk           |
| EQUIPMENT USED: GS21 System 8, model 4800<br>Callibrator Model P731<br>Digital Tape Recorder DT6000A                             |  | ANTENNA(S) USED: 100 _____ 300 _____ 100 BISTATIC _____ |
|  |  | TIME WINDOW (MS): 90                                    |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |   |
| GRID: 30X80V NO. OF PROFILES: 54 TOTAL FOOTAGE COLLECTED: 1418   |  |   |
| PARAMETERS: Two sets of perpendicular profiles: five feet between north-south profiles and five feet between east-west profiles. |  |   |
| OBJECTIVE(S): Locate _____<br>Locate _____<br>removed. _____   |  |   |
| NOTES: Antenna pulled on south and west side of survey marks. Profiles will be at N132VE100.                                     |  |   |

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|---|--|---|
| TITLE: N-80   |  | DATE: 6-19-93   |
| LOCATION: 100 N Area SEE FIGURE C-3   |  |   |
| CLIENT: Tom Spicer  |  | DATA COLLECTED BY: K.A. Bergstrom & J.R. Kunk           |
| EQUIPMENT USED: GS21 System 8, model 4800<br>Callibrator Model P731<br>Digital Tape Recorder DT6000A  |  | ANTENNA(S) USED: 100 _____ 300 _____ 100 BISTATIC _____ |
|   |  | TIME WINDOW (MS): 90                                    |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |   |
| GRID: 60X42L NO. OF PROFILES: 23 TOTAL FOOTAGE COLLECTED: 1400  |  |   |
| PARAMETERS: Two sets of perpendicular profiles: five feet between north-south profiles and five feet between east-west profiles.  |  |   |
| OBJECTIVE(S): Antenna pulled on south and west side of survey marks. Profiles will be at N132VE122.   |  |   |
| NOTES: Two areas with relatively little sub-surface reflectors were identified. However, most of the survey area has conductive clutter from handford graves and buried debris. |  |   |

APPENDIX D

100 D

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Figure D-2. Location Map of GPR Surveys 108-D, D-5-14, 116-D-3, 116-D-4, D5-15, 116-D-6, and 116-D-1A/1B.

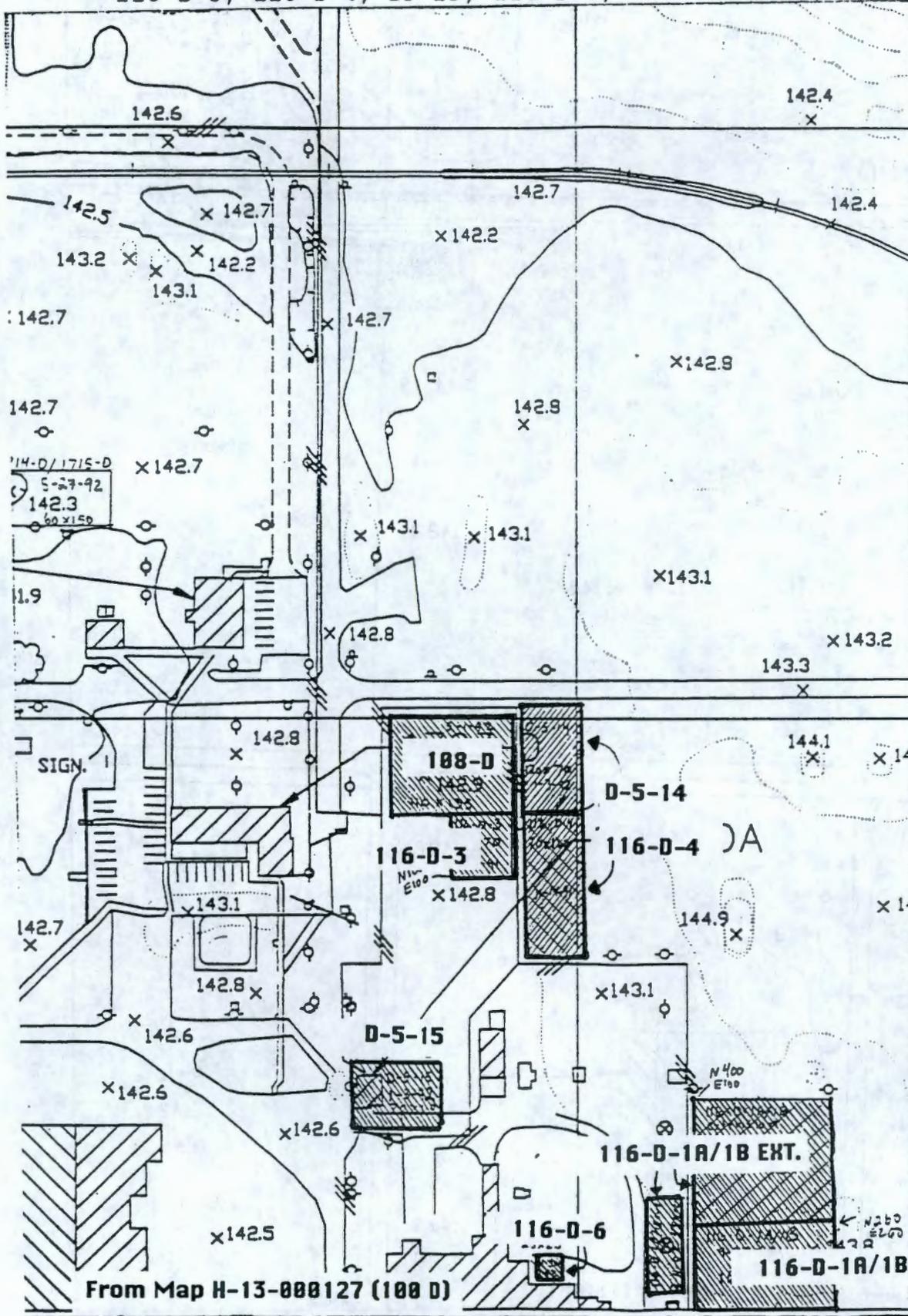


Figure D-3. Location Map of GPR Survey "Salt Pit."

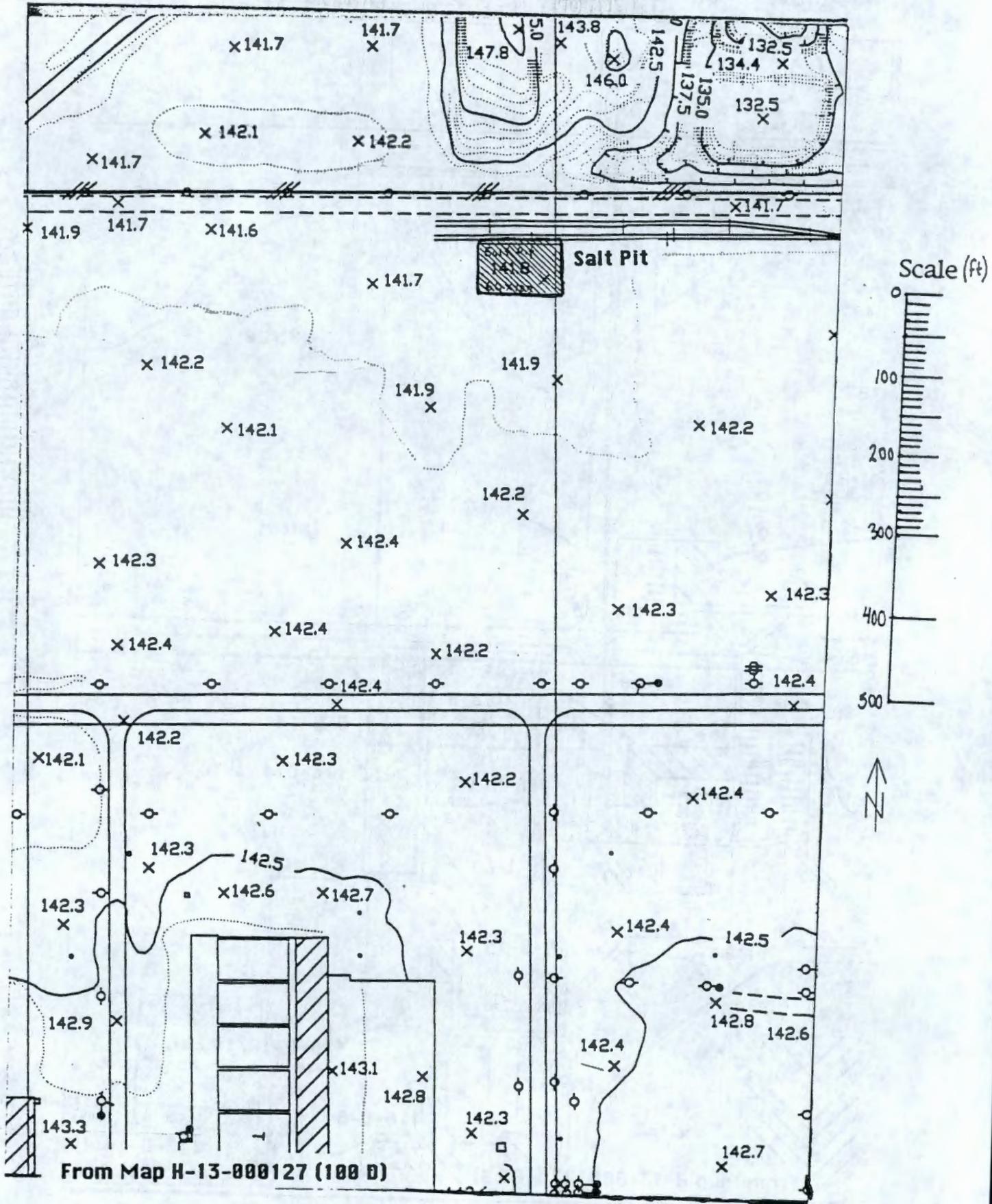


Figure D-4. Location Map of GPR Surveys 116-D-5 and 116-DR-5.

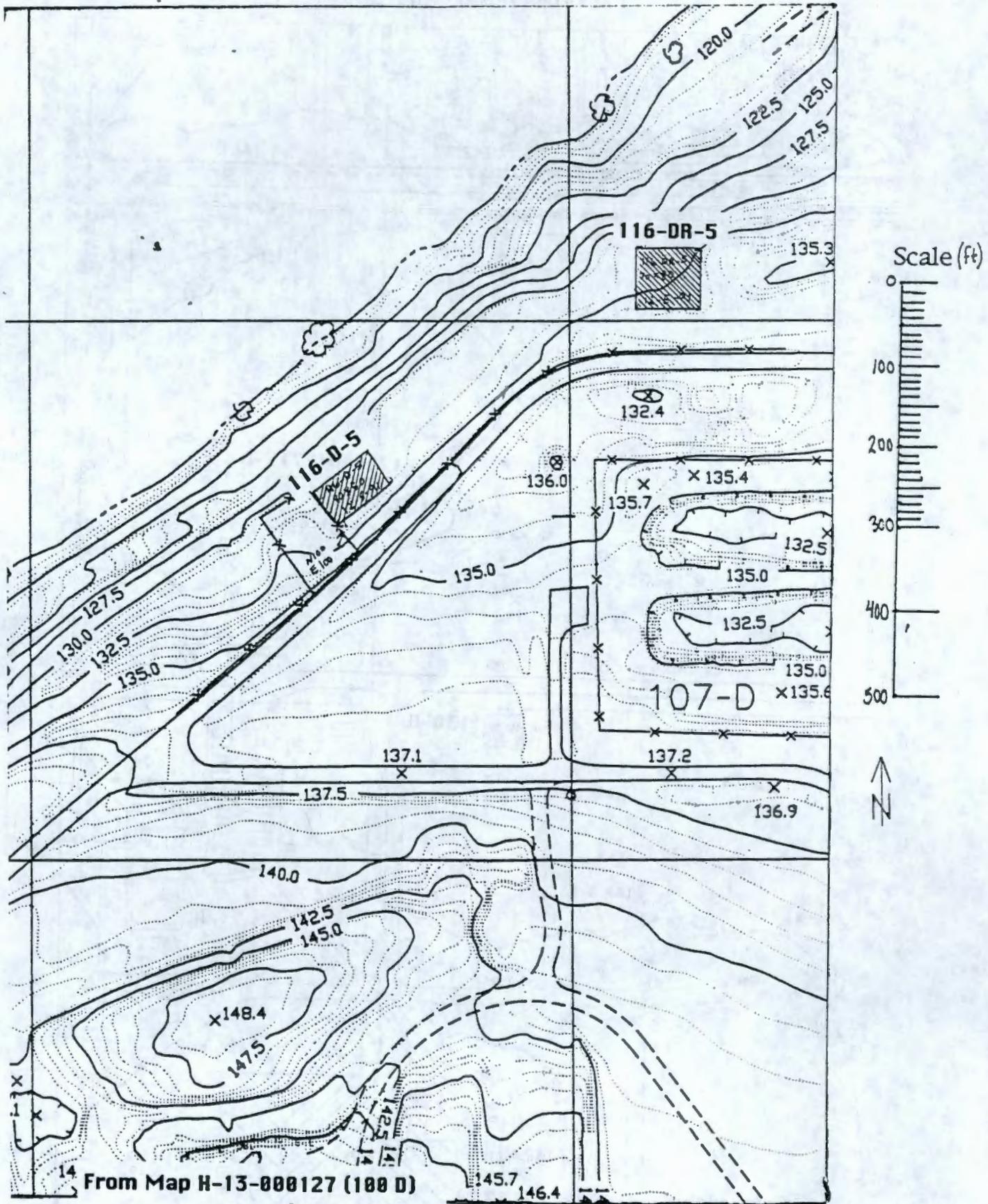




Figure D-6. Location Map of GPR Surveys 132-D-3, 11-D-9, 116-D-2, 1607-D4, and D-5-17.

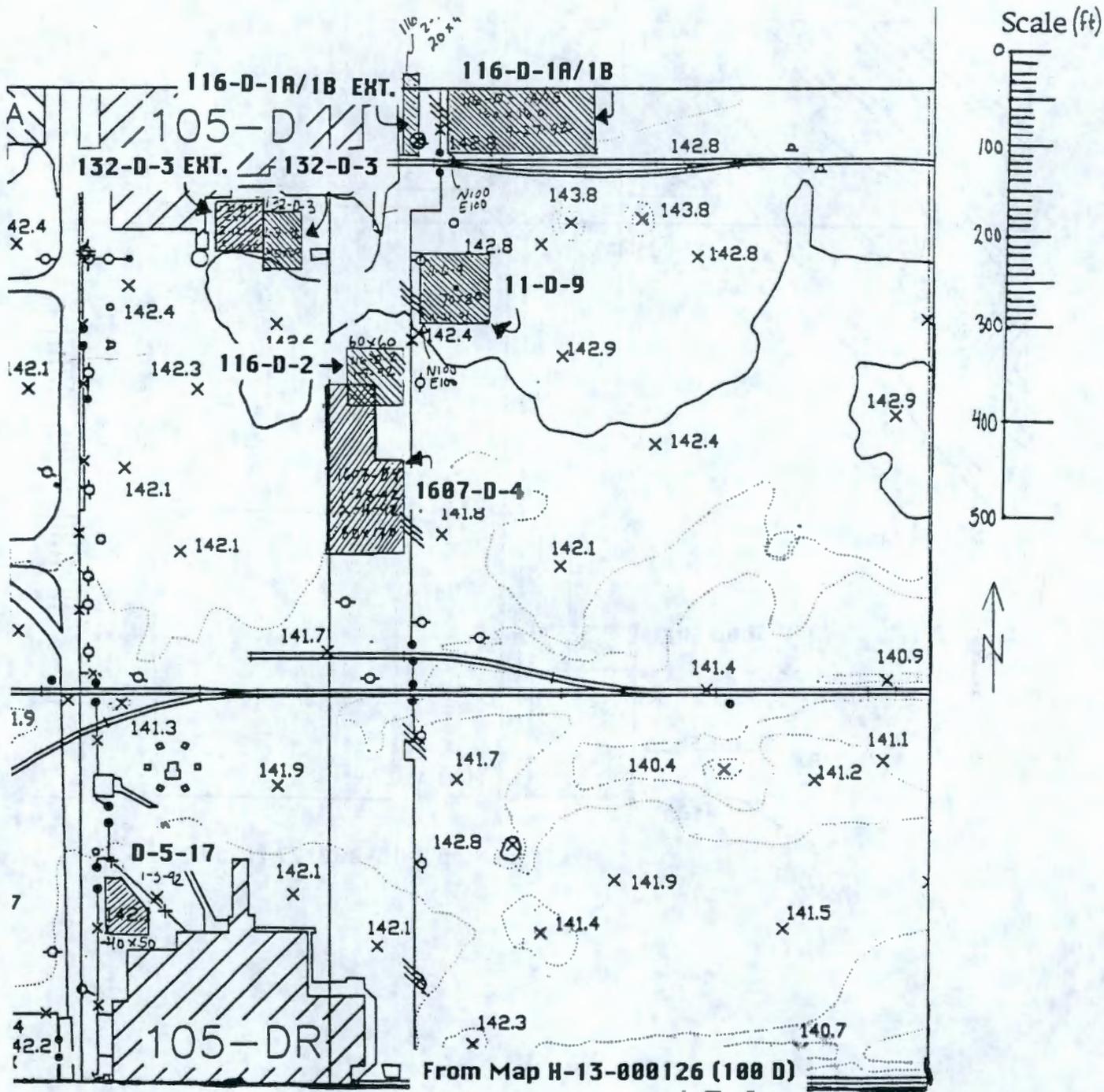
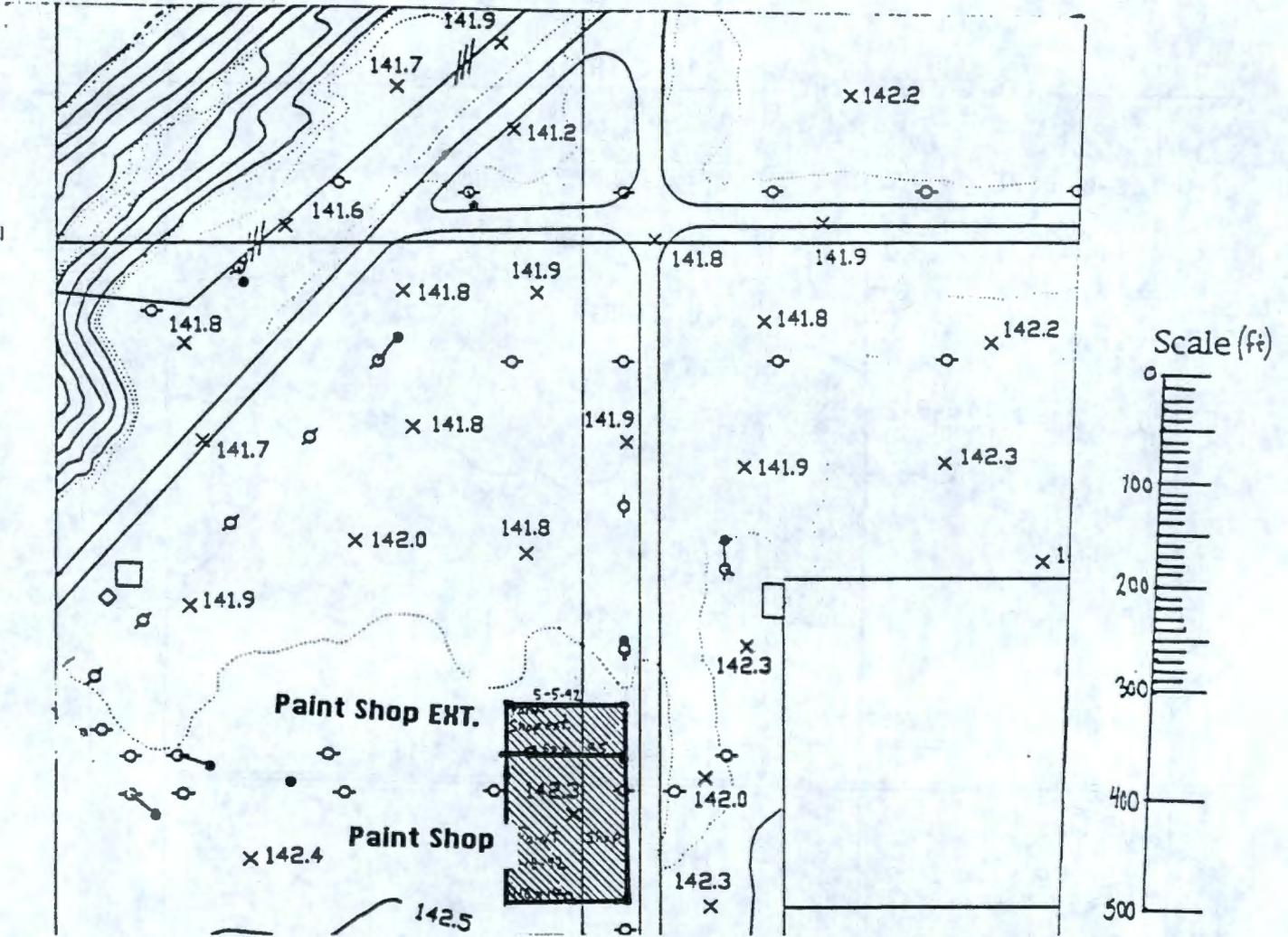


Figure D-7. Location Map of GPR Survey "Paint Shop."



From Map H-13-000127 (100 D)

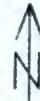


Figure D-8. Location Map of GPR Survey 116-DR-1 and 116-DR-2.

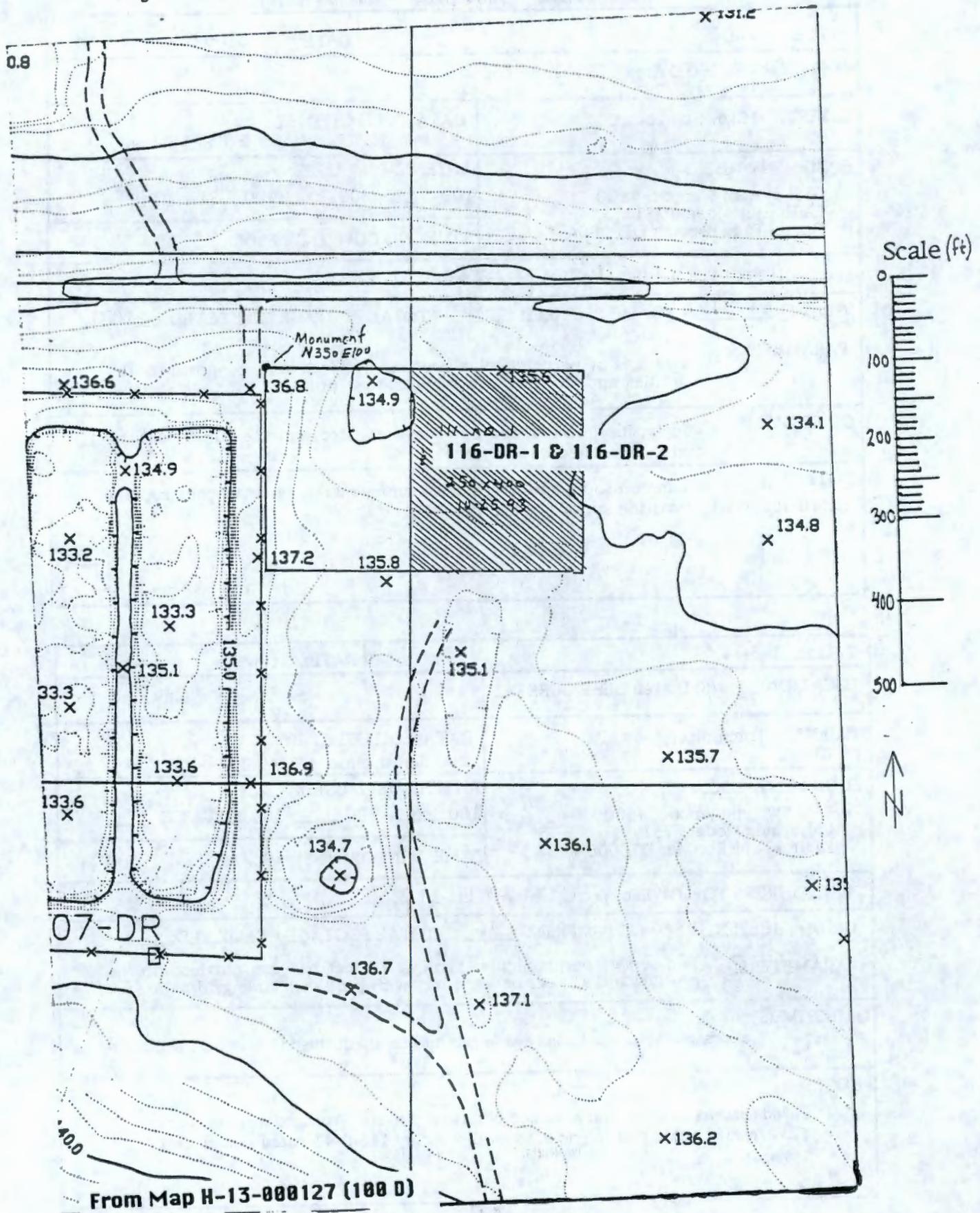


Table D-1. Parameters for GPR Surveys 108-D and D-5-14.

|  |  |              |
|--|--|--------------|
| TITLE: 108-D   |  | DATE: 5-1-92 |
| LOCATION: 100 D Area SEE FIGURE D-2.   |  |              |
| CLIENT: Mike Stankovich  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                               | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |              |
|  | TIME WINDOW (NS): 100  |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |              |
| GRID : <u>135X110ft</u> NO. OF PROFILES: <u>50</u> TOTAL FOOTAGE COLLECTED: <u>~6000'</u>  |  |              |
| PARAMETERS:<br>Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles.  |  |              |
| OBJECTIVE(S): Map facilities, utilities, and pipe lines associated with the 108-D building that once occupied the site.              |  |              |
| NOTES: Pulled antenna on south and west side of survey marks. A lot of construction debris scattered across the surface of the site. |  |              |

|   |  |              |
|---|--|--------------|
| TITLE: D-5-14   |  | DATE: 1-3-92 |
| LOCATION: 100 D Area SEE FIGURE D-2   |  |              |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & J.R. Kunk              |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A  | ANTENNA(S) USED:<br>100 <u>XX</u> 300 ____ 100 BISTATIC ____ |              |
|   | TIME WINDOW (NS): 90/120                                     |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |              |
| GRID : <u>40x55ft</u> NO. OF PROFILES: <u>16</u> TOTAL FOOTAGE COLLECTED: <u>~800</u>   |  |              |
| PARAMETERS: Two sets of perpendicular profiles; 10 feet between north-south profiles and 10 feet between east-west profiles. Same grid as K-35.                                       |  |              |
| OBJECTIVE(S):<br>Locate utilities and buried debris that may be effect the drilling of a borehole.  |  |              |
| NOTES:<br>Pulled antenna on south and west side of survey markers. Proposed well site is at E212/N258. Grid tied to grid used for GPR survey 116-D-4 located immediately to the west. |  |              |

Table D-2. Parameters for GPR Surveys 116-D-3 and 116-D-4.

|  |  |                |
|--|--|----------------|
| TITLE: 116-D-3 french drain  |  | DATE: 11-14-91 |
| LOCATION: 100 D Area SEE FIGURE D-2.   |  |                |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                        |                |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A   | ANTENNA(S) USED:<br>100 <u>xx</u> 300 <u>    </u> 100 BISTATIC <u>    </u> |                |
|  | TIME WINDOW (NS): 150  |                |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |                |
| GRID : <u>70x80ft</u> NO. OF PROFILES: <u>16</u> TOTAL FOOTAGE COLLECTED: <u>~900'</u>   |  |                |
| PARAMETERS: Two sets of perpendicular profiles; 10 feet between north-south profiles and 10 feet between east-west profiles.                               |  |                |
| OBJECTIVE(S): Locate french drain and map locations of utilities, pipes and buildings that once located at the site.                                       |  |                |
| NOTES: Pulled antenna on south and west side of survey marks. Profiles not close enough for detailed characterization. Proposed well site is at N130/E137. |  |                |

|  |  |                |
|--|--|----------------|
| TITLE: 116-D-4   |  | DATE: 11-14-91 |
| LOCATION: 100 D Area SEE FIGURE D-2  |  |                |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                        |                |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A   | ANTENNA(S) USED:<br>100 <u>xx</u> 300 <u>    </u> 100 BISTATIC <u>    </u> |                |
|  | TIME WINDOW (NS): 150  |                |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |                |
| GRID : <u>70x170ft</u> NO. OF PROFILES: <u>18</u> TOTAL FOOTAGE COLLECTED: <u>~1200'</u>   |  |                |
| PARAMETERS: Two sets of perpendicular profiles; 10 feet between north-south profiles and 10-20 feet between east-west profiles. Grid tied to 116-D-3 |  |                |
| OBJECTIVE(S): Locate east-west trending pipe that could possibly lead into trench.   |  |                |
| NOTES:<br>Pulled antenna on south and west side of survey markers.<br>The grid is an extension of the grid used for GPR survey 116-D-3.              |  |                |

Table D-3. Parameters for GPR Surveys D-5-15 and 116-D-6.

|  |  |              |
|--|--|--------------|
| TITLE: D-5-15  |  | DATE: 1-3-92 |
| LOCATION: 100 D Area SEE FIGURE D-2.   |  |              |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A  | ANTENNA(S) USED:<br>100 <u>xx</u> 300 _____ 100 BISTATIC _____ |              |
|  | TIME WINDOW (NS): 120  |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |              |
| GRID : <u>70x110ft</u> NO. OF PROFILES: <u>19</u> TOTAL FOOTAGE COLLECTED: <u>~1700'</u>   |  |              |
| PARAMETERS: Two sets of perpendicular profiles; 10 feet between north-south profiles and 10 feet between east-west profiles.                               |  |              |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.   |  |              |
| NOTES: Pulled antenna on south and west side of survey marks. Profiles not close enough for detailed characterization. Proposed well site is at N145/E157. |  |              |

|  |  |               |
|--|--|---------------|
| TITLE: 116-D-6 Cushion Corridor  |  | DATE: 1-30-92 |
| LOCATION: 100 D Area SEE FIGURE D-2  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                      | ANTENNA(S) USED:<br>100 _____ 300 <u>xx</u> 100 BISTATIC _____ |               |
|  | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>25x25ft</u> NO. OF PROFILES: <u>18</u> TOTAL FOOTAGE COLLECTED: <u>~300</u>                                      |  |               |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate cushion corridor.   |  |               |
| NOTES: Pulled antenna on south and west side of survey markers.  |  |               |

Table D-4. Parameters for GPR Surveys  
116-D-1A/1B and "Salt Pit."

|  |  |                                  |
|--|--|----------------------------------|
| TITLE: 116-D-1A/1B   |  | DATE: 9-27-91 10-1-91<br>2-11-92 |
| LOCATION: 100 D Area SEE FIGURE D-2.   |  |                                  |
| CLIENT: Tom Spicer / Duane Jacques   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                |                                  |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A   | ANTENNA(S) USED:<br>100 <u>xx</u> 300 <u>XX</u> 100 BISTATIC _____ |                                  |
|  | TIME WINDOW (NS): 90,120,&150                                      |                                  |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |                                  |
| GRID : <u>210x300ft</u> NO. OF PROFILES: <u>60</u> TOTAL FOOTAGE COLLECTED: <u>~10000'</u>   |  |                                  |
| PARAMETERS:<br>Two sets of perpendicular profiles; 10 feet between north-south profiles and 10 feet between east-west profiles. 5 feet between profiles on west side of fence. |  |                                  |
| OBJECTIVE(S):<br>Locate trench. Find debris free zone for emplacement of soil gas probes.  |  |                                  |
| NOTES:<br>Pulled antenna on south and west side of survey marks. Profiles not close enough for detailed characterization. Characterization conducted in three phases.          |  |                                  |

|   |  |               |
|---|--|---------------|
| TITLE: SALT PIT   |  | DATE: 5-27-92 |
| LOCATION: 100 D Area SEE FIGURE D-3   |  |               |
| CLIENT: Mike Stankovich   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                        | ANTENNA(S) USED:<br>100 _____ 300 <u>XX</u> 100 BISTATIC _____ |               |
|   | TIME WINDOW (NS): 90   |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |               |
| GRID : <u>60x100ft</u> NO. OF PROFILES: <u>34</u> TOTAL FOOTAGE COLLECTED: <u>~3000</u>                                       |  |               |
| PARAMETERS:<br>Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |               |
| OBJECTIVE(S):<br>Locate salt dissolving pit.  |  |               |
| NOTES:<br>Pulled antenna on south and west side of survey markers.  |  |               |

Table D-5. Parameters for GPR Surveys 116-D-5 and 116-DR-5.

|  |  |               |
|--|--|---------------|
| TITLE: 116-D-5 Outfall   |  | DATE: 12-5-91 |
| LOCATION: 100 D Area SEE FIGURE D-4.   |  |               |
| CLIENT: Tome Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell        |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                     | ANTENNA(S) USED:<br>100 ___ 300 <u>XX</u> 100 BISTATIC ___ |               |
|  | TIME WINDOW (NS): 90                                       |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>80x50ft</u> NO. OF PROFILES: <u>27</u> TOTAL FOOTAGE COLLECTED: <u>~1700'</u>                                    |  |               |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |               |
| OBJECTIVE(S):<br>Locate utilities and buried debris that may effect the drilling of proposed borehole.                     |  |               |
| NOTES: Pulled antenna on south and west side of survey marks. Proposed well site is at N125 and E133.                      |  |               |

|  |  |               |
|--|--|---------------|
| TITLE: 116-DR-5 outfall  |  | DATE: 12-5-91 |
| LOCATION: 100 D Area SEE FIGURE D-4  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell        |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                     | ANTENNA(S) USED:<br>100 <u>XX</u> 300 ___ 100 BISTATIC ___ |               |
|  | TIME WINDOW (NS): 120                                      |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>70x80ft</u> NO. OF PROFILES: <u>28</u> TOTAL FOOTAGE COLLECTED: <u>~1500'</u>                                    |  |               |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |               |
| OBJECTIVE(S):<br>Locate utilities and buried debris that may effect the drilling of proposed borehole.                     |  |               |
| NOTES:<br>Pulled antenna on south and west side of survey marks. Proposed well site is at N136 and E159.                   |  |               |

Table D-6. Parameters for GPR Surveys 1714-D/1715-D and 130-D-1.

|  |  |               |
|--|--|---------------|
| TITLE: 1714-D/1715-D   |  | DATE: 5-27-92 |
| LOCATION: 100 D Area SEE FIGURE D-5.   |  |               |
| CLIENT: Mike Stankovich  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                      | ANTENNA(S) USED:<br>100 <u>XX</u> 300 <u>XX</u> 100 BISTATIC _____ |               |
|  | TIME WINDOW (NS): 90,100,120                                       |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>160x50ft</u> NO. OF PROFILES: <u>44</u> TOTAL FOOTAGE COLLECTED: <u>~3800'</u>                                   |  |               |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate foundation of building and areas where solvents etc. may have been deposited.                         |  |               |
| NOTES: Pulled antenna on south and west side of survey marks. Oil/paint/solvent storage facility.                          |  |               |

|   |  |               |
|---|--|---------------|
| TITLE: 130-D-1  |  | DATE: 1-24-92 |
| LOCATION: 100 D Area SEE FIGURE D-5   |  |               |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                                   | ANTENNA(S) USED:<br>100 _____ 300 <u>XX</u> 100 BISTATIC _____ |               |
|   | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |               |
| GRID : <u>40x50ft</u> NO. OF PROFILES: <u>20</u> TOTAL FOOTAGE COLLECTED: <u>~900'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles.              |  |               |
| OBJECTIVE(S): Locate utilities and buried debris. Locate excavation boundary for gas storage tank that had been removed from site.      |  |               |
| NOTES:<br>Pulled antenna on south and west side of survey markers. Proposed well at E125/N120. Also known as 176-D-17 Gas storage tank. |  |               |

Table D-7. Parameters for GPR Surveys 132-D-3 and 11-D-9.

|  |  |              |
|--|--|--------------|
| TITLE: 132-D-3 Effluent Pumping Station  |  | DATE: 1-7-92 |
| LOCATION: 100 D Area SEE FIGURE D-7.   |  |              |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                      | ANTENNA(S) USED:<br>100 <u>XX</u> 300 _____ 100 BISTATIC _____ |              |
|  | TIME WINDOW (NS): 120  |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |              |
| GRID : <u>60x40ft</u> NO. OF PROFILES: <u>22</u> TOTAL FOOTAGE COLLECTED: <u>~1100'</u>                                    |  |              |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |              |
| OBJECTIVE(S): Locate utilities and buried debris and site free of drilling obstructions.                                   |  |              |
| NOTES: Pulled antenna on south and west side of survey marks.<br>Proposed well site at N141/E121.                          |  |              |

|   |  |               |
|---|--|---------------|
| TITLE: 11-D-9   |  | DATE: 2-12-92 |
| LOCATION: 100 D Area SEE FIGURE D-7   |  |               |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                                 | ANTENNA(S) USED:<br>100 _____ 300 <u>XX</u> 100 BISTATIC _____ |               |
|   | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |               |
| GRID : <u>40x50ft</u> NO. OF PROFILES: <u>20</u> TOTAL FOOTAGE COLLECTED: <u>~900'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles.            |  |               |
| OBJECTIVE(S): Locate utilities and buried debris. Locate drilling site.   |  |               |
| NOTES:<br>Pulled antenna on south and west side of survey markers. Survey is western extension of site 132-D-3. Originally was a SCA. |  |               |

Table D-8. Parameters for GPR Surveys 116-D-2 and 1607-D4.

|   |  |              |
|---|--|--------------|
| TITLE: 116-D-2 Pluto Crib   |  | DATE: 1-7-92 |
| LOCATION: 100 D Area SEE FIGURE D-6.  |  |              |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                      |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A  | ANTENNA(S) USED:<br>100 <u>XX</u> 300 <u>XX</u> 100 BISTATIC <u>    </u> |              |
|   | TIME WINDOW (NS): 120  |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |              |
| GRID : <u>60x65ft</u> NO. OF PROFILES: <u>25</u> TOTAL FOOTAGE COLLECTED: <u>~1600'</u>   |  |              |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. Survey grid tied to grid used for 11-D-9 survey. |  |              |
| OBJECTIVE(S): Verify proposed borehole is located within suspected Pluto Crib. If not, locate the Pluto crib.   |  |              |
| NOTES: Pulled antenna on south and west side of survey marks.<br>Proposed well site at N48/E66.   |  |              |

|   |  |                        |
|---|--|------------------------|
| TITLE: 1607-D4 Septic system  |  | DATE: 1-28-92, 2-11-92 |
| LOCATION: 100 D Area SEE FIGURE D-6   |  |                        |
| CLIENT: Duane Jacques   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                        |                        |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A  | ANTENNA(S) USED:<br>100 <u>    </u> 300 <u>XX</u> 100 BISTATIC <u>    </u> |                        |
|   | TIME WINDOW (NS): 100  |                        |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |                        |
| GRID : <u>80x170ft</u> NO. OF PROFILES: <u>72,26</u> TOTAL FOOTAGE COLLECTED: <u>~9700/900</u>  |  |                        |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles.                            |  |                        |
| OBJECTIVE(S): Locate sites for soil gas probes that are free of underground obstructions.   |  |                        |
| NOTES:<br>Pulled antenna on south and west side of survey markers. Survey grid is linked to grid of 116-D-2 site. Original survey extended on 2-11-92 |  |                        |

Table D-9. Parameters for GPR Surveys D-5-17 and "Paint Shop."

|  |  |              |
|--|--|--------------|
| TITLE: D-5-17  |  | DATE: 1-3-92 |
| LOCATION: 100 D Area SEE FIGURE D-6.   |  |              |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                     | ANTENNA(S) USED:<br>100 <u>XX</u> 300 _____ 100 BISTATIC _____ |              |
|  | TIME WINDOW (NS): 90   |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |              |
| GRID : <u>60X65ft</u> NO. OF PROFILES: <u>25</u> TOTAL FOOTAGE COLLECTED: <u>~1600'</u>                                    |  |              |
| PARAMETERS: Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles. |  |              |
| OBJECTIVE(S):<br>Locate utilities and buried debris that may effect the drilling of proposed borehole.                     |  |              |
| NOTES: Pulled antenna on south and west side of survey marks.  |  |              |

|  |  |                        |
|--|--|------------------------|
| TITLE: Paint Shop  |  | DATE: 4-15-92 / 5-5-92 |
| LOCATION: 100 D Area SEE FIGURE D-7  |  |                        |
| CLIENT: Mike Stankovich  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell            |                        |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A   | ANTENNA(S) USED:<br>100 _____ 300 <u>XX</u> 100 BISTATIC _____ |                        |
|  | TIME WINDOW (NS): 90   |                        |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |                        |
| GRID : <u>110x140ft</u> NO. OF PROFILES: <u>50,29</u> TOTAL FOOTAGE COLLECTED: <u>~6200</u>  |  |                        |
| PARAMETERS: <u>50x85</u> Two sets of perpendicular profiles; 5 feet between north-south profiles and 5 feet between east-west profiles.                |  |                        |
| OBJECTIVE(S):<br>Locate buried remains of the paint solvent buildings and identify any excavations around the shop that may of been used for disposal. |  |                        |
| NOTES:<br>Pulled antenna on south and west side of survey markers. Original grid extended on 5-5-92.   |  |                        |

Table D-10. Parameters for GPR Survey 116-DR-1/DR-2.

|  |  |                |
|--|--|----------------|
| TITLE: 116-DR-1/116-DR-2   |  | DATE: 10-25-91 |
| LOCATION: 100 D Area SEE FIGURE D-8.   |  |                |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                        |                |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A   | ANTENNA(S) USED:<br>100 <u>XX</u> 300 <u>    </u> 100 BISTATIC <u>    </u> |                |
|  | TIME WINDOW (NS): 150  |                |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |                |
| GRID : <u>250X400ft</u> NO. OF PROFILES: <u>34</u> TOTAL FOOTAGE COLLECTED: <u>~9000'</u>  |  |                |
| PARAMETERS: Two sets of perpendicular profiles; 10 feet between north-south profiles and 10 feet between east-west profiles.                               |  |                |
| OBJECTIVE(S): Locate two sites for proposed boreholes free of buried obstructions.   |  |                |
| NOTES: Pulled antenna on south and west side of survey marks. Antenna pulled by ATV at 1-2 mph. Half of data collected with sled. A reconnaissance survey. |  |                |

Table D-10 Parameters for GPS Survey 18-DR-1/DR-2

|  |  |                |
|--|--|----------------|
| TITLE: 18-DR-1/DR-2  |  | DATE: 10-23-91 |
| LOCATION: 100 Davis Street, DE   |  |                |
| CLIENT: Tom Spent  | DATA COLLECTED BY: E.A. Bergman & T.H. Hight |                |
| EQUIPMENT USED:<br>GPS (Trimble 4700) Model 4710<br>Calculator Model 7331<br>Digital Tape Recorder DT8000A                             | ANTENNAS USED:<br>100 XL 300 100 ROTATE      |                |
|  | TIME WINDOW (HR): 120                        |                |
| PROCEDURE: FOLLOWED WISCONSIN 7-V ERT 11.3 REV. 3  |  |                |
| GRID: 180400R NO. OF POINTS: 14  | TOTAL FOOTAGE COLLECTED: 1000                |                |
| PARAMETERS: Two sets of geodetic control points in test bed and surrounding area. One set in test bed and surrounding area.            |  |                |
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| NOTES: Field notes on each sheet and on separate sheets. All points are in NAD 83. All points are in NAD 83. All points are in NAD 83. |  |                |

APPENDIX E

100 H

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Figure E-1. General Layout of the 100 H Area.

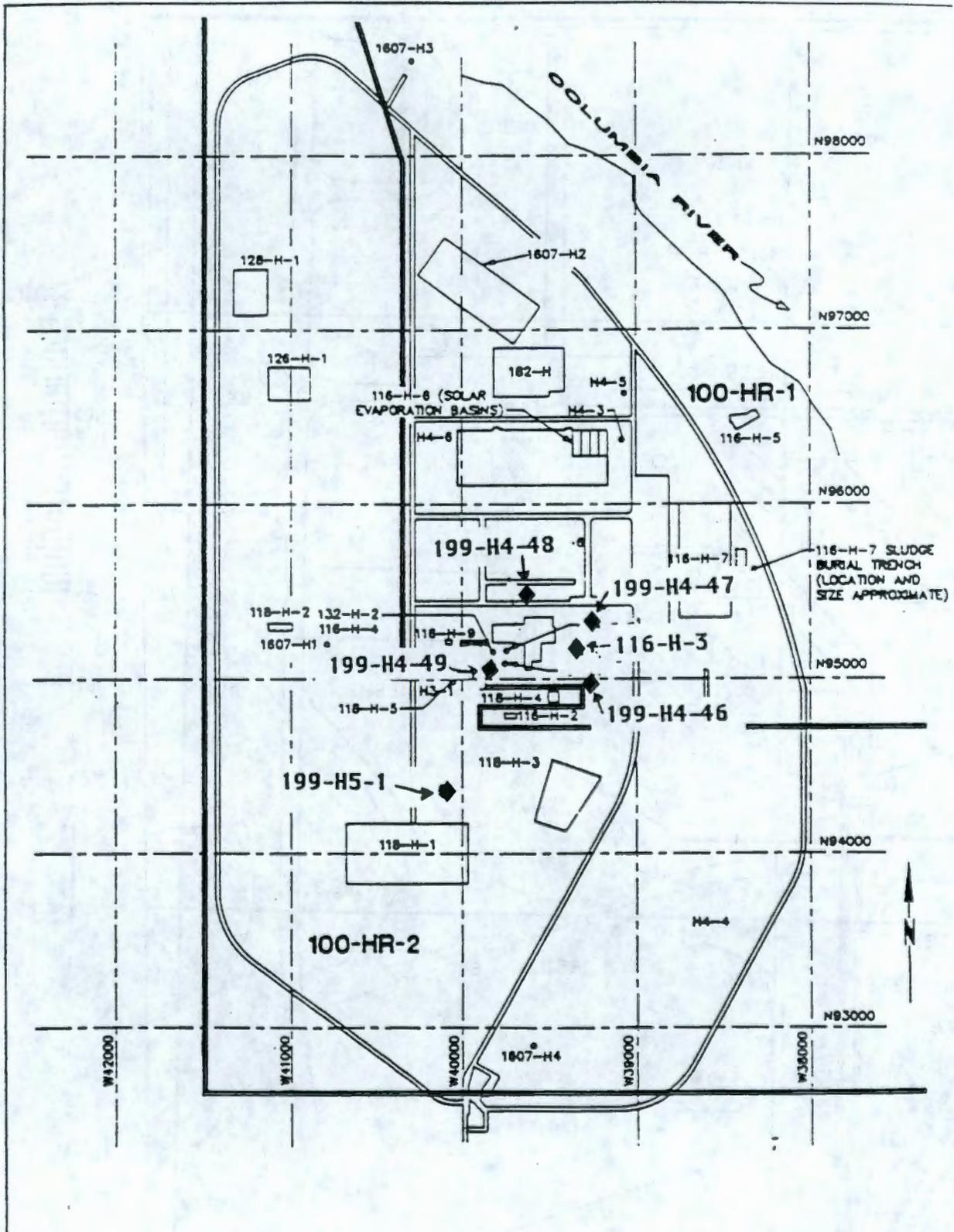


Figure E-2. Location Map of GPR Surveys 199-H4-46, 199-H4-47, 116-H-3, 199-H4-48.

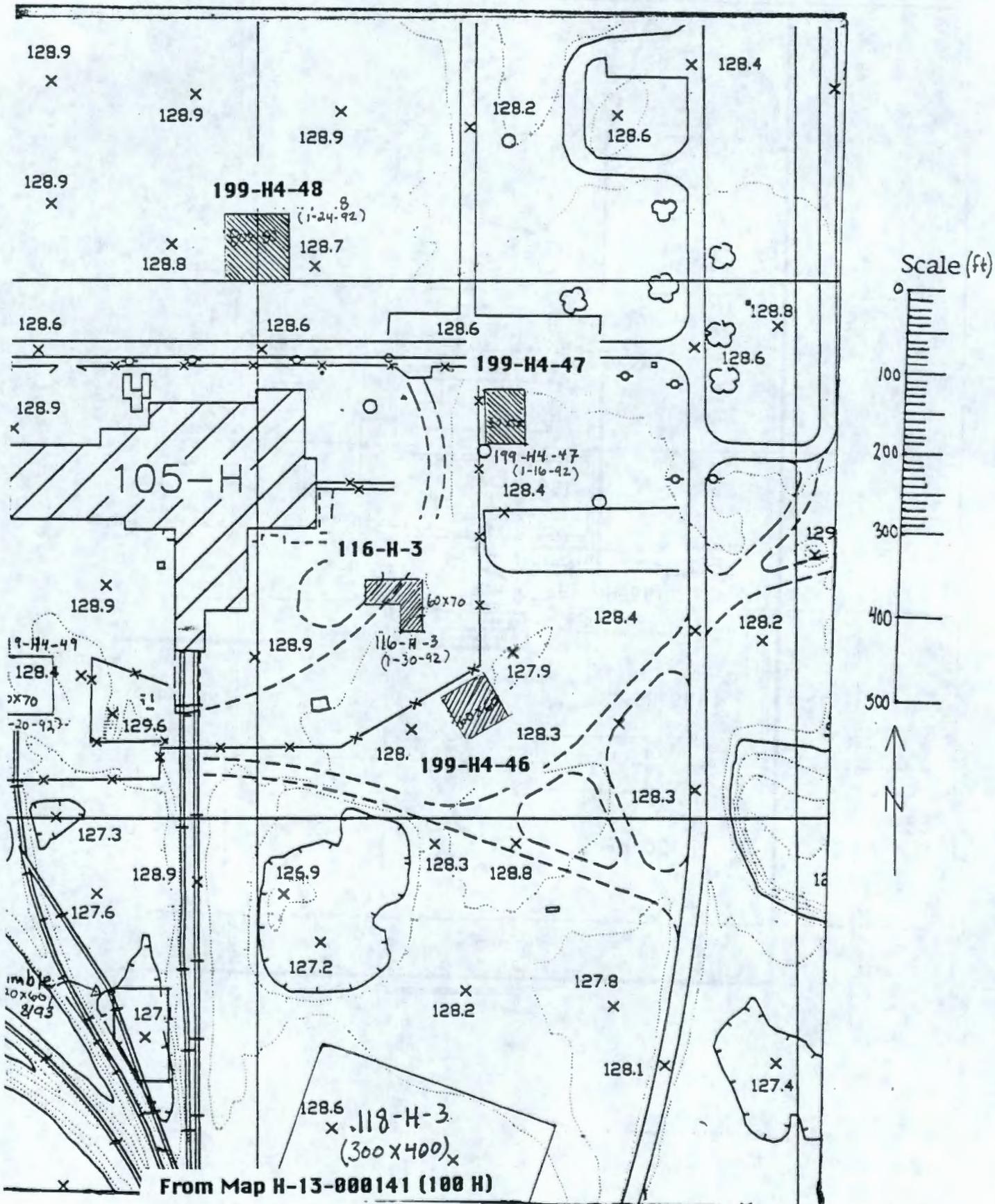


Figure E-3. Location Map of GPR Surveys 199-H4-49 and 199-H5-1.

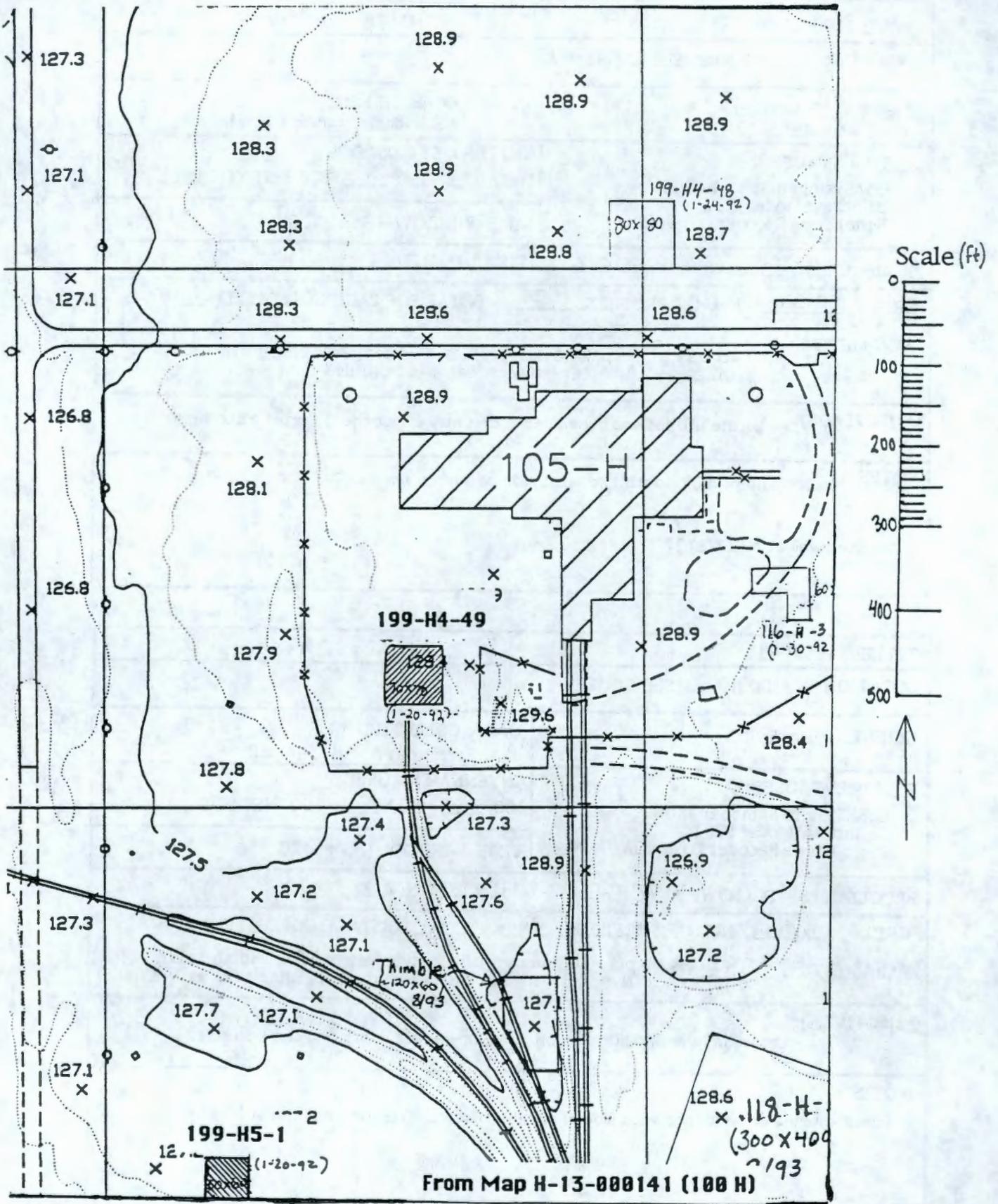


Table E-1. Parameters for GPR Surveys 199-H4-46 and 199-H4-47.

|  |  |               |
|--|--|---------------|
| TITLE: 199-H4-46   |  | DATE: 1-20-92 |
| LOCATION: 100 H Area SEE FIGURE E-2.   |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell        |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A                           | ANTENNA(S) USED:<br>100 ___ 300 <u>XX</u> 100 BISTATIC ___ |               |
|  | TIME WINDOW (NS): 120                                      |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>60x60ft</u> NO. OF PROFILES: <u>26</u> TOTAL FOOTAGE COLLECTED: <u>~1600'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.                                     |  |               |
| NOTES: Pulled antenna on south and west side of survey marks.  |  |               |
| Proposed well at N123/E137   |  |               |

|   |  |               |
|---|--|---------------|
| TITLE: 199-H4-47  |  | DATE: 1-19-92 |
| LOCATION: 100 H Area SEE FIGURE E-2   |  |               |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell        |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recorder DT6000A  | ANTENNA(S) USED:<br>100 ___ 300 <u>XX</u> 100 BISTATIC ___ |               |
|   | TIME WINDOW (NS): 120                                      |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |               |
| GRID : <u>50x70ft</u> NO. OF PROFILES: <u>26</u> TOTAL FOOTAGE COLLECTED: <u>~1500'</u>   |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. Same grid as K-35. |  |               |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.  |  |               |
| NOTES: Pulled antenna on south and west side of survey markers. Proposed well site at N153/E114.  |  |               |

Table E-2. Parameters for GPR Surveys 116-H-3 and 199-H4-48.

|  |  |               |
|--|--|---------------|
| TITLE: 199-H4-48   |  | DATE: 1-24-92 |
| LOCATION: 100 H Area SEE FIGURE E-2.   |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                      |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A  | ANTENNA(S) USED:<br>100 <u>XX</u> 300 <u>XX</u> 100 BISTATIC <u>    </u> |               |
|  | TIME WINDOW (NS): 100/120  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>80x80ft</u> NO. OF PROFILES: <u>34</u> TOTAL FOOTAGE COLLECTED: <u>~2700'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles.   |  |               |
| OBJECTIVE(S): Locate utilities and buried debris that may be effect the drilling of a borehole.  |  |               |
| NOTES: Pulled antenna on south and west side of survey marks. Entire site contains buried debris. Highly likely any borehole drilled at site will encounter buried debris. Grid tied to previous survey conducted 100-HR-1 WHC-MR-0263. Proposed well site at N120/E553. |  |               |

|  |  |               |
|--|--|---------------|
| TITLE: 116-H-3   |  | DATE: 1-30-92 |
| LOCATION: 100 H Area SEE FIGURE E-2  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                        |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                            | ANTENNA(S) USED:<br>100 <u>    </u> 300 <u>XX</u> 100 BISTATIC <u>    </u> |               |
|  | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>60x70ft</u> NO. OF PROFILES: <u>29</u> TOTAL FOOTAGE COLLECTED: <u>~1500'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |               |
| OBJECTIVE(S):<br>Locate utilities and buried debris that may effect the drilling of a borehole.                                  |  |               |
| NOTES:<br>Pulled antenna on south and west side of survey markers.   |  |               |

Table E-3. Parameters for GPR Surveys 199-H4-49 and 199-H5-1.

|  |  |               |
|--|--|---------------|
| TITLE: 199-H5-1  |  | DATE: 1-20-92 |
| LOCATION: 100 H Area SEE FIGURE E-3.   |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                      |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                            | ANTENNA(S) USED:<br>100 <u>XX</u> 300 <u>XX</u> 100 BISTATIC <u>    </u> |               |
|  | TIME WINDOW (NS): 120/150  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>60x50ft</u> NO. OF PROFILES: <u>24</u> TOTAL FOOTAGE COLLECTED: <u>~1300'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.                                     |  |               |
| NOTES: Pulled antenna on south and west side of survey marks.<br>Proposed well at N138/E136                                      |  |               |

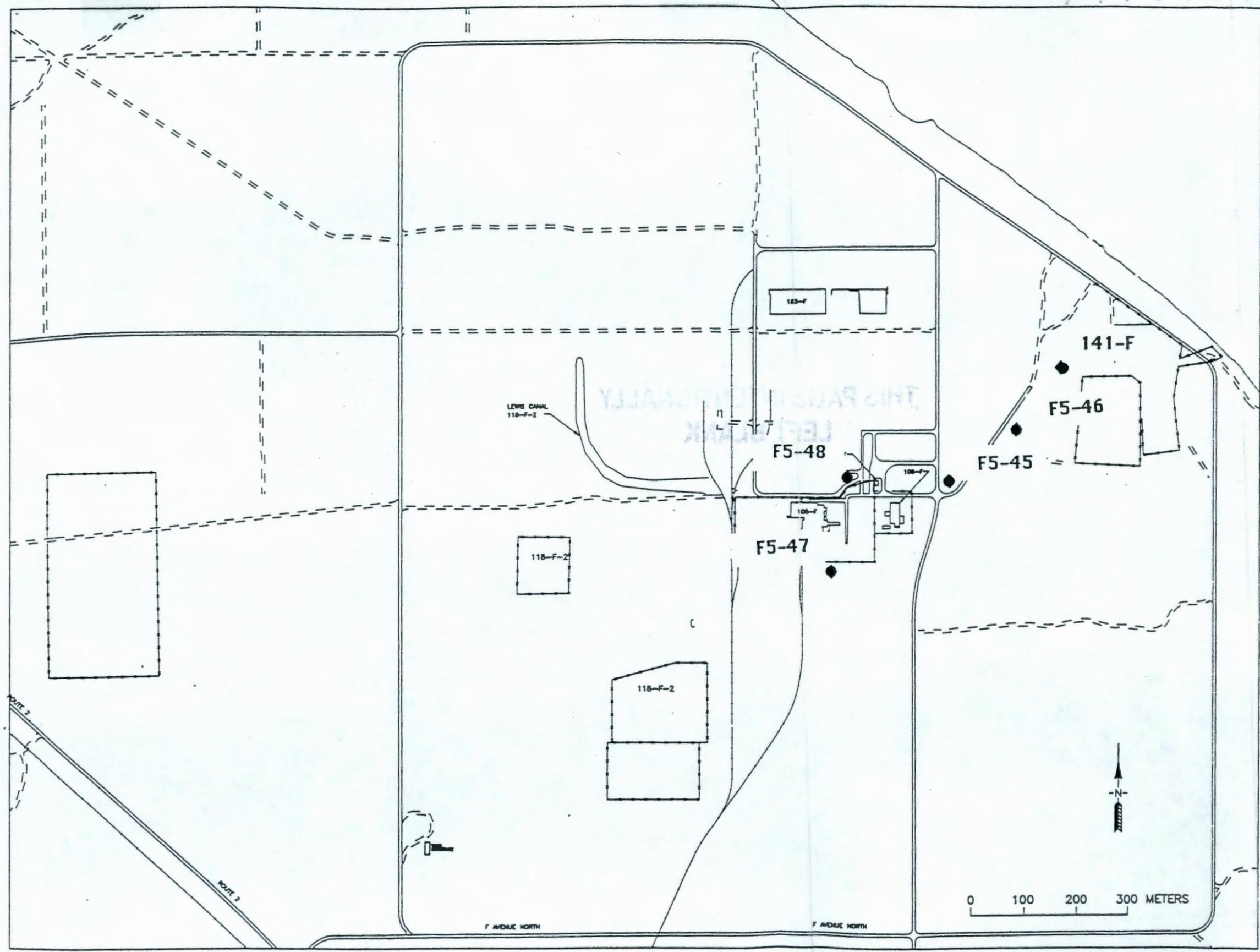
|  |  |               |
|--|--|---------------|
| TITLE: 199-H4-49   |  | DATE: 1-20-92 |
| LOCATION: 100 H Area SEE FIGURE E-3  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell                        |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                            | ANTENNA(S) USED:<br>100 <u>    </u> 300 <u>XX</u> 100 BISTATIC <u>    </u> |               |
|  | TIME WINDOW (NS): 120/150  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>70x70ft</u> NO. OF PROFILES: <u>29</u> TOTAL FOOTAGE COLLECTED: <u>~1900'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |               |
| OBJECTIVE(S): Locate utilities and buried debris that may effect the drilling of a borehole.                                     |  |               |
| NOTES: Pulled antenna on south and west side of survey markers. Proposed well location at N141/E135                              |  |               |



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Figure F-1. General Layout of the 100 F Area.



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Figure F-2. Location Map of GPR Survey 141-F.

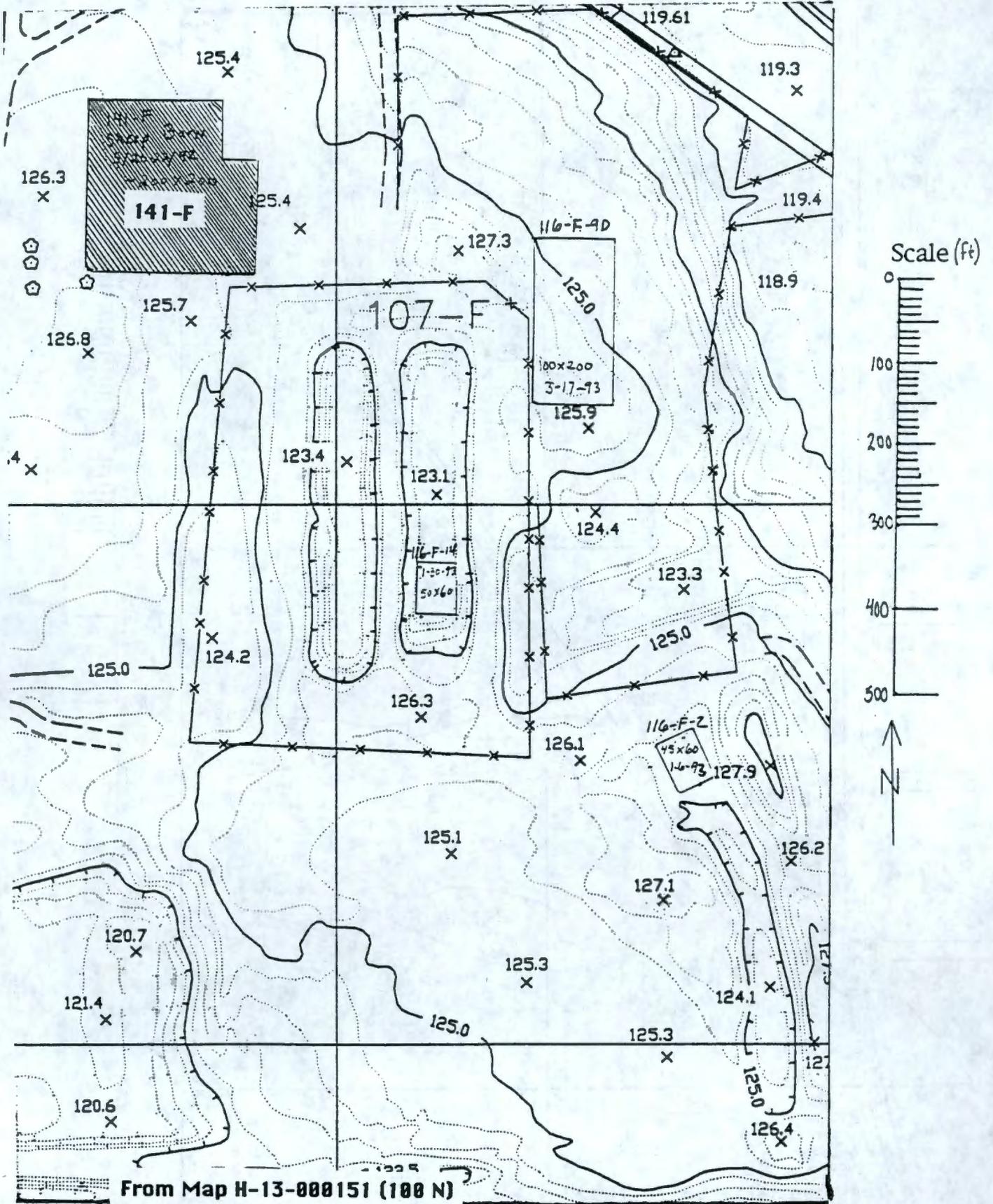


Figure F-3. Location Map of GPR Surveys F5-45 and F5-46.

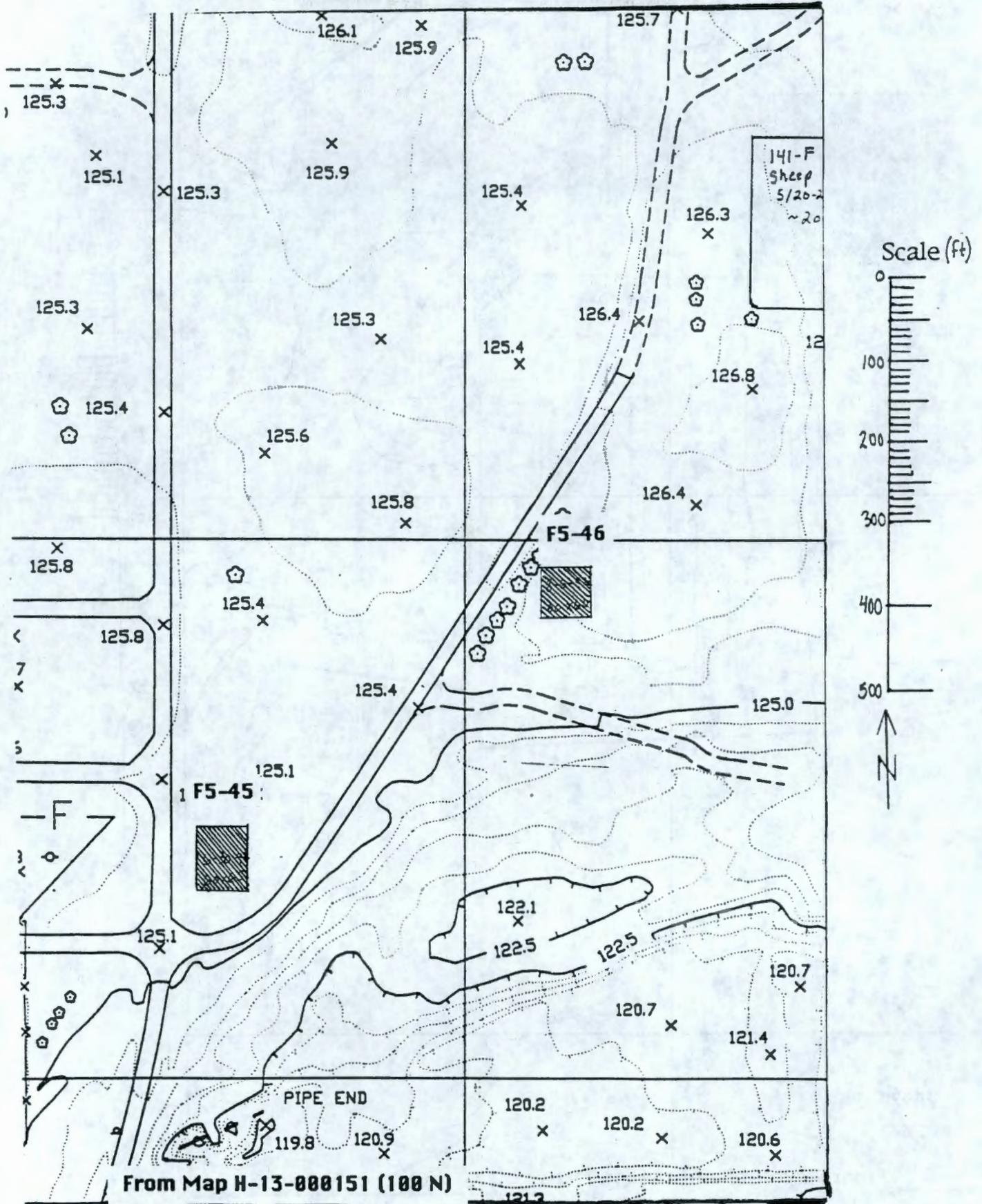


Figure F-4. Location Map of GPR Surveys F5-47 and F5-48.

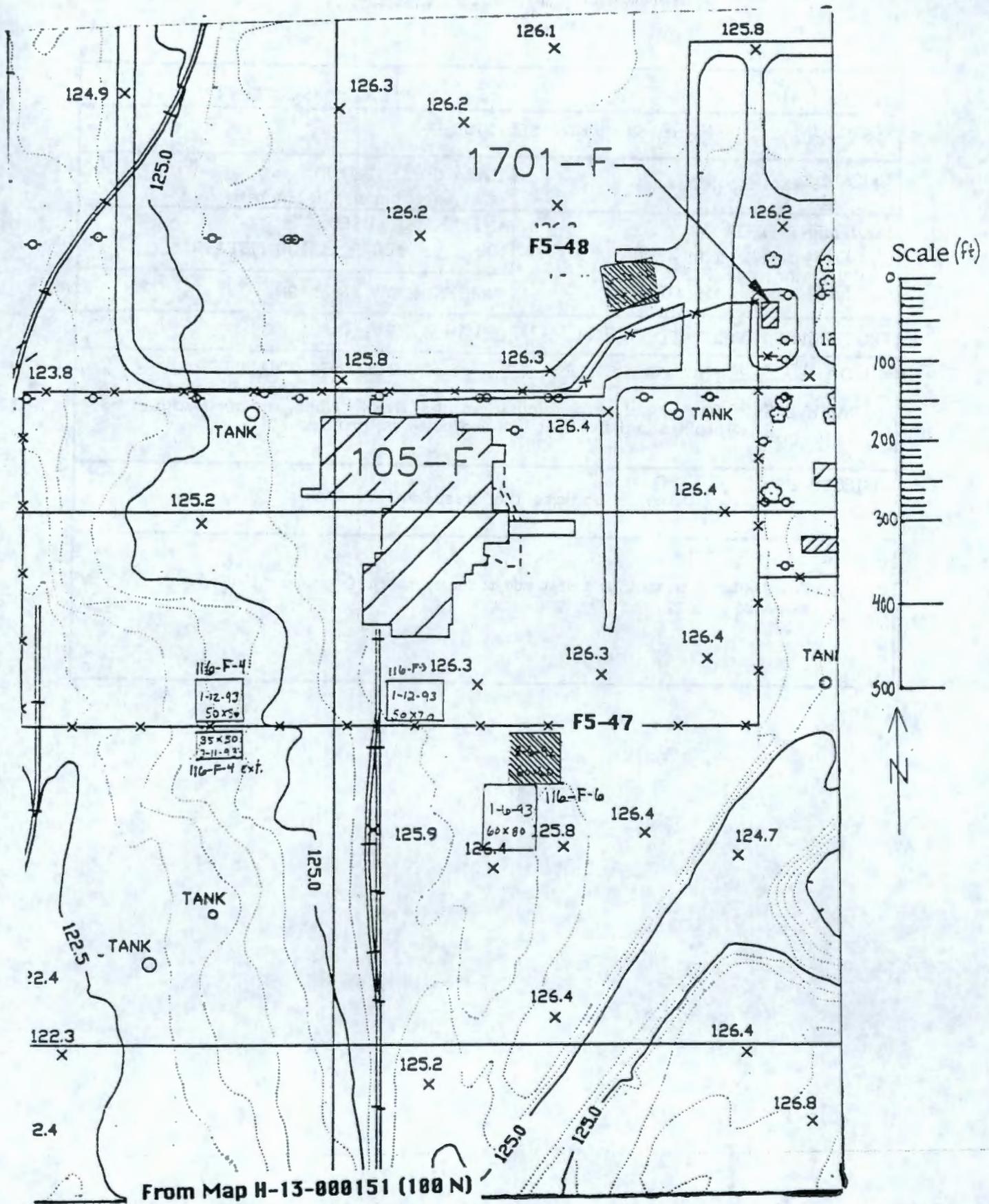


Table F-1. Parameters for GPR Survey 141-F.

|  |  |                  |
|--|--|------------------|
| TITLE: 141-F   |  | DATE: 5-20/22-92 |
| LOCATION: 100 F Area Sheep Barn SEE FIGURE F-2   |  |                  |
| CLIENT: Stankovich   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |                  |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                            | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |                  |
|  | TIME WINDOW (NS): 90   |                  |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |                  |
| GRID : <u>170'X195'</u> NO. OF PROFILES: <u>32</u> TOTAL FOOTAGE COLLECTED: <u>4950'</u>   |  |                  |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |                  |
| OBJECTIVE(S): Determine location of the "Sheep Barn" site.   |  |                  |
| NOTES:<br>Pulled antenna on south and west side of survey marks. Original grid in-filled and extended on 5-22-92.                |  |                  |

Table F-2. Parameters for GPR Surveys F5-46 and F5-45.

|  |  |               |
|--|--|---------------|
| TITLE: F5-45   |  | DATE: 6-30-92 |
| LOCATION: 100 F Area SEE FIGURE F-3  |  |               |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                                    | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |               |
|  | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |               |
| GRID : <u>65'X60'</u> NO. OF PROFILES: <u>27</u> TOTAL FOOTAGE COLLECTED: <u>~1700'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles.         |  |               |
| OBJECTIVE(S):<br>Locate possible underground utilities and subsurface debris that could be detrimental to drilling.                      |  |               |
| NOTES:<br>Pulled antenna on south and west side of survey marks. Yellow post a N100/E100 Fence at N132. Proposed well site at N144/E145. |  |               |

|  |  |              |
|--|--|--------------|
| TITLE: F5-46   |  | DATE: 8-6-92 |
| LOCATION: 100 F Area SEE FIGURE F-3  |  |              |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A                            | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |              |
|  | TIME WINDOW (NS): 90   |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |              |
| GRID : <u>60x60</u> NO. OF PROFILES: <u>26</u> TOTAL FOOTAGE COLLECTED: <u>1600'</u>   |  |              |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. |  |              |
| OBJECTIVE(S):<br>Locate possible underground utilities and subsurface debris that could be detrimental to drilling.              |  |              |
| NOTES:<br>Pulled antenna on south and west side of survey marks. Proposed well site at E128/N130.                                |  |              |

Table F-3. Parameters for GPR Surveys F5-48 and F5-47.

|   |  |               |
|---|--|---------------|
| TITLE: F5-48  |  | DATE: 6-30-92 |
| LOCATION: 100 F Area SEE FIGURE F-4   |  |               |
| CLIENT: Tom Spicer  | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |               |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A   | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |               |
|   | TIME WINDOW (NS): 100  |               |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3  |  |               |
| GRID : <u>60'X55'</u> NO. OF PROFILES: <u>25</u> TOTAL FOOTAGE COLLECTED: <u>1435'</u>  |  |               |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles. An asphalt road and sidewalk border and infringe upon the survey grid to the South and West. |  |               |
| OBJECTIVE(S): Locate possible underground utilities. Investigate the proposed drill site for subsurface anomalies that would be detrimental to the well.  |  |               |
| NOTES: Antenna pulled on south and west side of survey marks. Proposed well site is at N142/E116.   |  |               |

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|--|--|--------------|
| TITLE: F5-47   |  | DATE: 8-6-92 |
| LOCATION: 100 F Area SEE FIGURE F-4  |  |              |
| CLIENT: Tom Spicer   | DATA COLLECTED BY<br>K.A. Bergstrom & T.H. Mitchell          |              |
| EQUIPMENT USED:<br>GSSI System 8, model 4800<br>Calibrator Model P731<br>Digital Tape Recoder DT6000A  | ANTENNA(S) USED:<br>100 ____ 300 <u>XX</u> 100 BISTATIC ____ |              |
|  | TIME WINDOW (NS): 100  |              |
| PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3   |  |              |
| GRID : _____ NO. OF PROFILES: <u>27</u> TOTAL FOOTAGE COLLECTED: <u>1650'</u>  |  |              |
| PARAMETERS: Two sets of perpendicular profiles; five feet between north-south profiles and five feet between east-west profiles.                         |  |              |
| OBJECTIVE(S): Locate possible underground utilities. Investigate the proposed drill site for subsurface anomalies that would be detrimental to the well. |  |              |
| NOTES: Antenna pulled on south and west side of survey marks. Proposed well site is at N127/E133.  |  |              |