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APPROVAL PAGE

Title of Document: Geophysical Investigation of the Flush Tank, 200-BP-1, 200 East Area

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GEOPHYSICAL INVESTIGATION OF THE FLUSH TANK, 200-BP-1 200 EAST AREA

1.0 INTRODUCTION/OBJECTIVES

This report contains the results of a geophysical investigation conducted to help delineate the Flush Tank in the 216-B-43/50 crib (Figure 1). The survey was located within the 200-BP-1 Operable Unit, 200-East Area.

The objective of the survey was to delineate the flush tank and possibly the associated piping and covered risers. Another goal was to detect any subsurface obstructions that might affect excavations over and around the tank.

2.0 METHODOLOGY

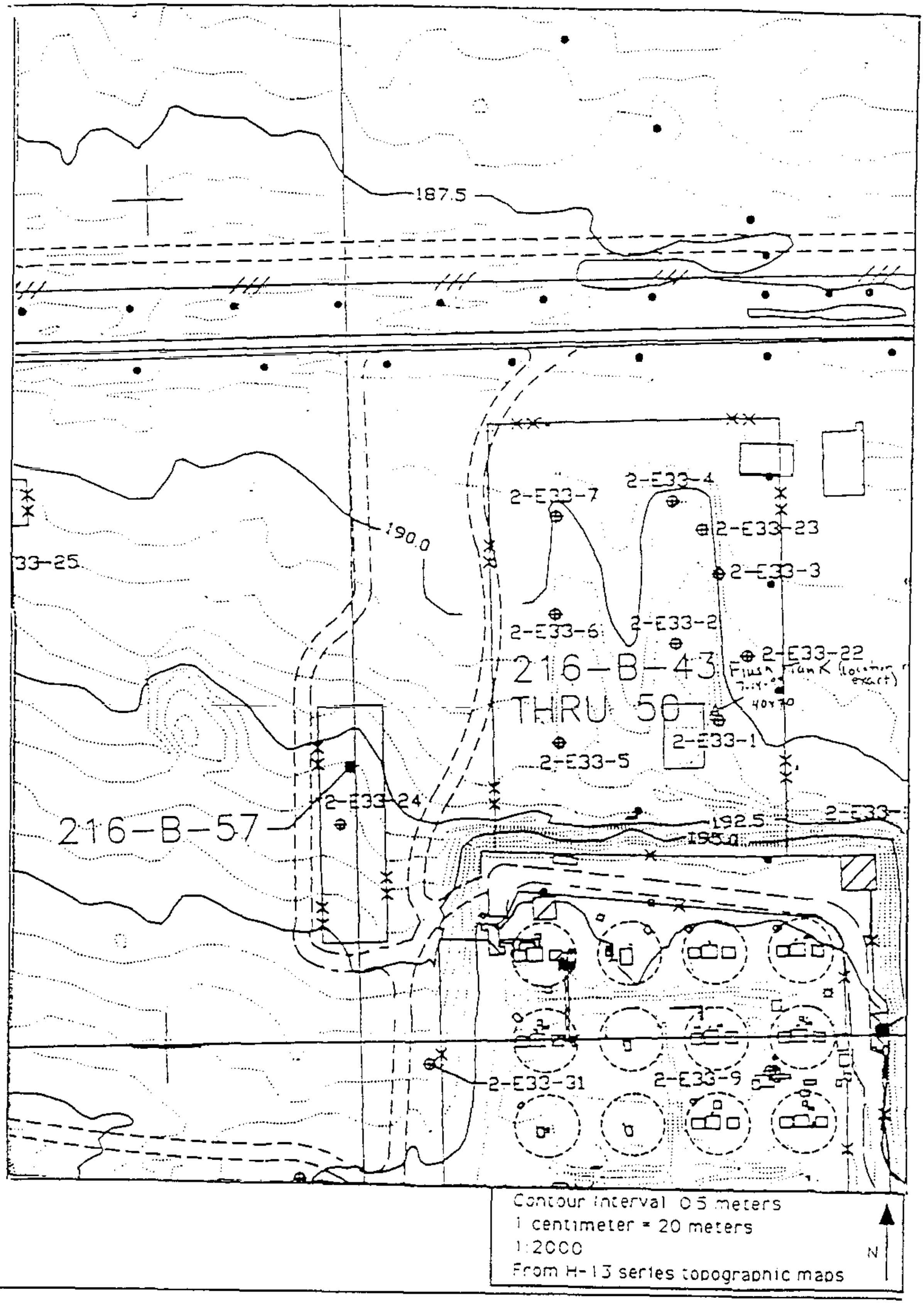
2.1 GROUND-PENETRATING RADAR

The Ground-Penetrating Radar (GPR) system used for this work utilized a 300-megahertz (MHz) transducer. The transducer transmits electromagnetic energy into the ground. Buried objects such as pipes, barrels, foundations, and buried wires can cause all, or a portion, of the transmitted energy to be reflected back towards a receiving antenna. Geologic features such as crossbedding, caliche horizons, paleosols, and clays can also cause reflections of the transmitted energy. The reflected energy provides the means for mapping the subsurface features of interest, whether man-made or geologic.

The maximum depth of investigation varies from site to site and is a function of the transmit power, receiver sensitivity, frequency of the antenna, and attenuation of the transmitted energy. The attenuation of the energy is primarily a function of the local soil conditions. Depth of investigation is also affected by highly conductive material, such as metal drums and pipes, which essentially reflect all the energy. The method cannot "see" directly below areas of highly reflective material since "all" of the energy is reflected. Maximum depths of penetration for these surveys was about 8 to 10 ft.

Display and interpretation of GPR data are similar to that of seismic reflection data (i.e. data displayed as horizontal distance vs. time depicting pseudo cross-sections of the earth). The approach to an interpretation is quite variable and influenced by the objectives of the survey and the experience of the interpreter. Also, numerous data processing techniques are available that may or may not aid in the interpretation process. In some areas, interpretation can be straight-forward, but often a highly variable subsurface yields complex data that are difficult to interpret. A common end product is a plan view map showing the locations and depths of the features that were detected within the survey area.

Figure 1. Location Map.



GPR data in these surveys were collected with a Geophysical Survey Systems Inc. (GSSI) Subsurface Interface Radar (SIR)™[1] 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.

2.2 ACCURACY/RELIABILITY OF THE RESULTS

GPR investigations are based on very accurate measurements. However, the results of an investigation are based on the interpretation of these data, which is a very subjective process. The only way to measure the accuracy of an interpretation is by ground-truthing (i.e. excavating the subsurface). A better way to assess interpretations is in terms of reliability. Reliability is defined here as the degree of confidence the interpreter(s) has in the interpretation of the data. Many factors affect the reliability of an interpretation. Two of the most important factors are the density of the data points/profiles, determined by the objectives of the survey, and the experience of the interpreter(s). Other factors that directly affect the reliability of an interpretation are soil conditions, topography, availability of accurate drawings and photographs, geologic knowledge, and the accessibility to the area which is to be investigated. The more direct control or knowledge the interpreter has over these factors, the more reliable the interpretation. To complicate matters, the control or knowledge of these factors may vary significantly within the area being investigated.

The only effective way to communicate the reliability of an interpretation is by constant and direct communication between the user and the interpreters. Reliability and accuracy of an interpretation should be discussed openly during the course of a project. An interpretation map should never be taken at face-value without communication with the interpreters.

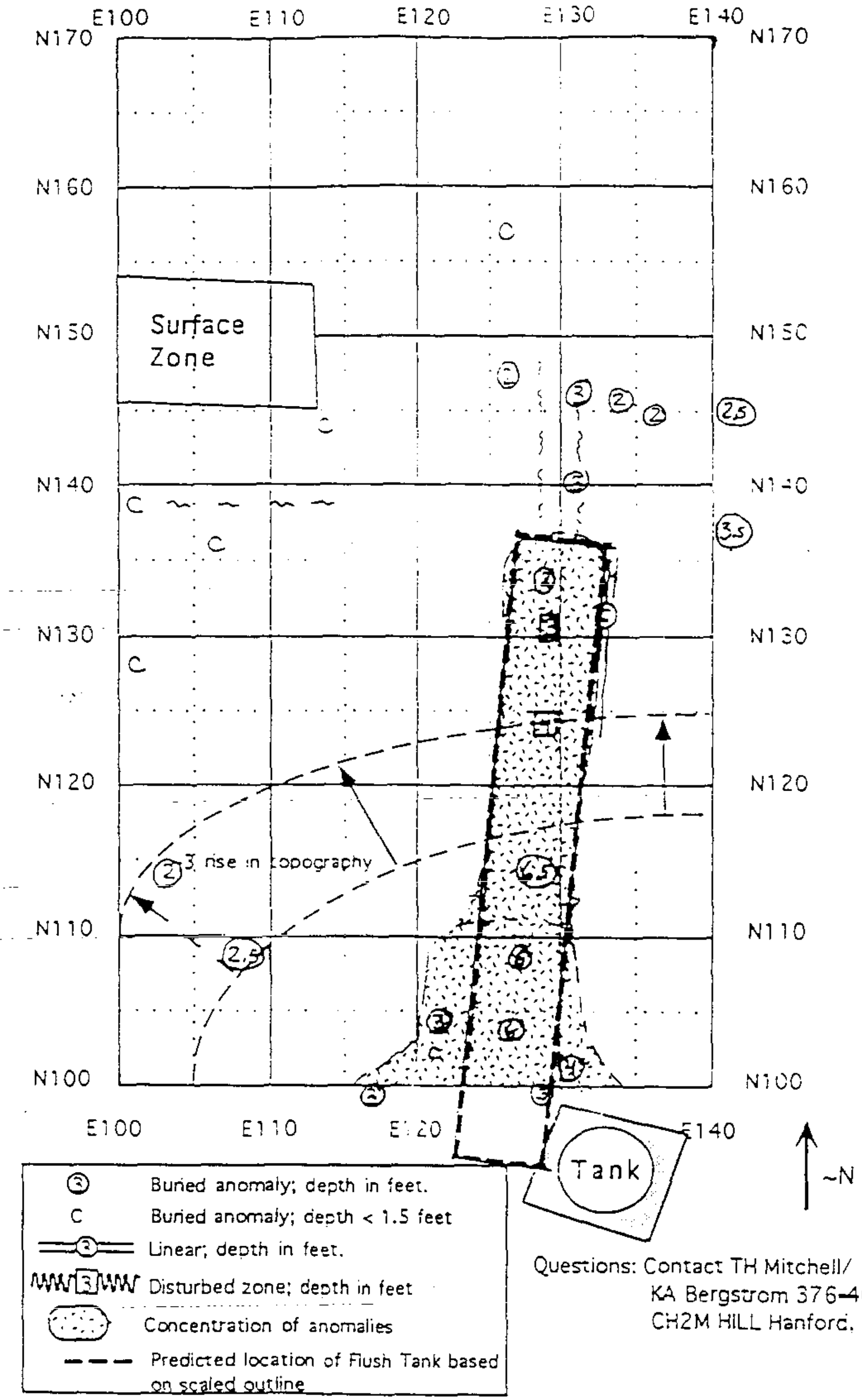
3.0 SURVEY GRID

The survey boundary is a rectangle measuring 40 ft by 70 ft (Figure 2). 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/N10 and serves as the "origin" for the survey locations. The letters "E" or "N" refer to a direction that trends generally east or north, 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 which were perpendicular to each other. Spacing between profiles was 5 ft.

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

Figure 2. Summary of Interpretation, 200 BP-1, Flush Tank GPR Survey.



Questions: Contact TH Mitchell/
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CH2M HILL Hanford, Inc.

4.0 QUALITY CONTROL

These data were collected using procedures in WHC-CM-7-7, EII 11.2, Rev. 3, *Environmental Investigations and Site Characterization Manual*, Westinghouse Hanford Company. The data and records are stored in the Geophysics files. Figure 3 summarizes survey parameters.

5.0 RESULTS

The dimensions of the interpreted flush tank boundary, shown on Figure 2, are the same as those indicated on engineering drawings #H-2-33950, sheets 1 and 2, and H-2-2604. The interpreted flush tank trends nearly north-south, adjacent to and extending from the exposed tank shown on Figure 2. The flush tank is about 3 ft below the surface on the north end and about 6 ft below the surface on the south end. The varying burial depths correlate closely with the changing relief of the ground surface over the tank.

Some isolated anomalies are shown on the interpretation map (Figure 2). Those over the interpreted tank location could be associated with the tank and might be risers out of the tank. A series of several anomalies, 2 to 3 ft below the surface, lie in an east-west orientation about 10 ft north of the interpreted tank boundary. These could be correlated into a linear.

It is recommended that the authors be contacted prior to any site-specific excavations, drillings, etc. for more detailed site-specific information that may be available.

Figure 3. GPR Parameters for Flush Tank Survey, 200-BP-1.

GROUND PENETRATING RADAR (GPR) SURVEY

Surface Geophysics, CH2MHILL Hanford Inc.

TITLE: Flush Tank	DATE: 7-14-94
LOCATION: 200-BP-1 Operable Unit	
CLIENT: John Lucas/Mark Buckmaster	DATA COLLECTED BY K.A. Bergstrom & T.H. Mitchell
EQUIPMENT USED: GSSI System 8, model 4800 Calibrator Model P731 Digital Tape Recoder DT6000A	ANTENNA(S) USED: 3105AP 100____ 300 XX 500 ____
	LOG BOOK: CH2MHILL Temp.#1
	TIME WINDOW (NS): 100
PROCEDURES FOLLOWED: WHC-CM-7-7 EII 11.2, REV. 3	
GRID: 40X70' PARAMETERS: Two sets of perpendicular profiles; Data collected on both sides of survey marks (two profiles every five feet)	
DATA TAPE NO.: 94-33	RECORDS LOCATION: Geophysical field files
TAPE ADDRESS: 0-15052	CALIBRATION ADDRESS: 14920-15052
INTERPRETED BY: K. A. Bergstrom	REVIEWED BY: J.P. Kiesler
OBJECTIVE(S): To delineate the flush tank.	
NOTES: Antenna pulled by hand at 1-2 mph. 30 meter cable.	

DISTRIBUTION

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