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ENGINEERING CHANGE NOTICE

Page 1 of 9

1. ECN 169871

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental [X]	C. D. Delaney, Geosciences Group, H6-06, 6-9235		11/16/92
Direct Revision [ ]	5. Project Title/No./Work Order No.	6. Bldg./Sys./Fac. No.	7. Impact Level
Change ECN [ ]	Work Plan for Characterizing the site for 200 Areas TEDB/AC2C1	600 Area	3Q
Temporary [ ]	8. Document Numbers Changed by this ECN (includes sheet no. and rev.)	9. Related ECN No(s).	10. Related PO No.
Standby [ ]	WHC-SD-W049H-WP-001, Rev. 1	NA	NA
Supersedure [ ]			
Cancel/Void [ ]			

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[ ] Yes (fill out Blk. 11b)	NA	NA	NA
[X] No (NA Blks. 11b, 11c, 11d)		Cog. Engineer Signature & Date	Cog. Engineer Signature & Date

12. Description of Change

This change to the Site Characterization Work Plan - 200 Areas Treated Effluent Disposal Basin, Project W-049H addresses a field permeability test to be conducted at the site proposed for the W-049H Treated Effluent Disposal Facility. A field permeability test will be conducted at the candidate site to obtain water infiltration rates of insitu sediments at the site.

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13a. Justification (mark one)							
Criteria Change	[ ]	Design Improvement	[ ]	Environmental	[X]		
As-Found	[ ]	Facilitate Const.	[ ]	Const. Error/Omission	[ ]	Design Error/Omission	[ ]

13b. Justification Details

See attached test.

14. Distribution (include name, MSIN, and no. of copies)

EXTERNAL LIMITS

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A-7900-013-2 (06/92) GEF095

A-7900-013-1 (11/88)

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15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]		[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
NA		

20. Approvals

Signature		Date	Signature	Date
OPERATIONS AND ENGINEERING			ARCHITECT-ENGINEER	
Cog Engineer C. D. Delaney	C.D. Delaney	11/16/92	PE	
Cog. Mgr. R. L. Jackson	R.L. Jackson	11/17/92	QA	
QA W. R. Thackaberry	W.R. Thackaberry	11-30-92	Safety	
Safety			Design	
Security			Environ.	
Environ.			Other	
Projects/Programs				
Tank Waste Remediation System				
Facilities Operations			DEPARTMENT OF ENERGY	
Restoration & Remediation			Signature or Letter No.	
Operations & Support Services				
IRM			ADDITIONAL	
Other J. D. Davis	J.D. Davis	11-23-92		
M. C. Carrigan	M.C. Carrigan	11/24/92		
J. E. Thrasher	J.E. Thrasher	11/30/92		

Date Received: 11/30/92	INFORMATION RELEASE REQUEST	Reference: WHC-CM-3-4

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- [ ] Other

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ECN 169871

List attachments.
NA

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Title: Site Characterization Work Plan - 200 Areas Treated Effluent Disposal Basin, Project W-049H

Unclassified Category: UC-

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Classification/Unclassified Controlled Nuclear Information	[ ]	[X]			
Patent - General Counsel	[X]	[ ]	Stan Berglin	B D Williamson	11/23/92
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Author/Requestor (Printed/Signature) Date
C. D. Delaney C.D. Delaney 11/16/92

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R. L. Jackson RL Jack 11/17/92

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Date Cancelled | Date Disapproved

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Lead Author	Phone	MSIN	Other Author(s) or Requestor
C. D. Delaney	6-9235	H4-06	J. D. Davis

Project or Program	Lead Org Code	Sponsor Agency (DOE, DOT, NRC, USGS, etc.)
200 Areas Treated Effluent Disposal Basin, W-049H	81235	DOE

Editor	Phone	MSIN	DOE/HQ Program (DP, EH, EM, NE, etc.)

Mandatory Comments (Only mandatory comments are to be documented. All other comments should be made on a copy of the information submitted for review and returned to the author.)	Reviewer Name & Signature	Date	Resolution	Reviewer Name & Signature	Date

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Responsible Manager (Printed/Signature) NOS

Additional Information

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FIELD PERMEABILITY TEST PLAN
--W-049H 200 AREAS TREATED EFFLUENT DISPOSAL FACILITY--

1.0 INTRODUCTION

Field permeability tests are to be conducted at the site proposed for construction of the Project W-049H Treated Effluent Disposal Facility (TEDF). The TEDF is an infiltration basin proposed for disposal of treated effluent from the 200 Areas of the Hanford Site. The candidate site is bounded by Hanford Site coordinates N40119, N41595, W35726, and W37202 (Figure 1). As previously reported and confirmed by subsurface characterization, the sediments underlying the candidate site have been determined to be free of contamination.

2.0 OBJECTIVE

The objective of this test plan is to specify the design and implementation requirements for conducting a (1) shallow-well pump-in test in a borehole to be drilled within the envisioned perimeter of the treated effluent disposal pond and (2) a percolation test in a trench excavated by backhoe in the bottom of the access road borrow pit (Figure 1).

The well pump-in technique will be used to measure the saturated hydraulic conductivity at depths of 15' and 55' in the vadose zone. This test is to measure the amount of water accepted by the sediments at the specified depths, through the open bottom of the cased hole. The trench percolation test is to measure the amount of water accepted by the sediments through the bottom of a 4-foot-deep trench in the bottom of the 9-foot-deep borrow pit.

The information provided by the two kinds of tests is needed to evaluate the suitability of the candidate site sediments and to facilitate design of the TEDF. The infiltration data obtained will be used to facilitate: (1) Title II design of the W-049H TEDF and (2) determination of hydraulic conductivity input parameters for computer simulation of groundwater flow and advective transport.

3.0 WELL PUMP-IN TEST

To conduct a well pump-in test (also termed the reverse auger-hole test method), a well is drilled to the specified depth using temporary casing (Bureau of Reclamation 1974). Prior to running the test, the borehole must be carefully cleaned out to the bottom of the casing. The cased borehole is then filled with water. Water is added to the hole to maintain this water depth, until the rate of outflow (Q) into the

sediment is nearly constant. When the rate of water flow into the sediments reaches a nearly constant value; i.e., a near steady-state condition is achieved, the inflow is measured again while the level of water in the well is kept constant. From this flow rate (Q), the saturated hydraulic conductivity (K_{sat}) of the wetted zone can be calculated.

3.1 Test Requirements

The location coordinates for the borehole to be drilled are: N40860 and W36892. The well number designated for the borehole is 699-41-37. The initial well pump-in test will be conducted through the open end of a 16"-diameter casing that has been installed to a depth of 15' in the Hanford formation. After the hole is cleaned out to the 15' depth, the test is begun by adding clean, raw water through a calibrated flow metering system. Water from the source (a water truck) is to be added to the well by gravity flow until a relatively constant head is obtained. If a constant head cannot be obtained by gravity flow, pressure will be applied to the water entering the hole by using a pump. The depth of the water in the casing must exceed 10 times the internal radius of the casing.

A constant head of 10'-14' is to be maintained within the casing and monitored by a pressure transducer installed in the borehole. Initially, the flow rate is expected to be relatively high (i.e., >10 gal/min), but should then become constant at a lower rate (e.g., 5 gal/min). Water may have to be added to the hole for a relatively long time (e.g., >4 hours) before Q approaches a constant value. Once the hydraulic head and flow rate have become constant, K_{sat} for the wetted zone can be calculated. After the test at a depth of 15' is successfully completed, the borehole is to be advanced and a second pump-in test performed at a depth of 55', where the Hanford formation has a higher silt content (Figure 2).

After the pump-in tests have been completed, the borehole is to be abandoned. All steel casing is to be removed from the hole and the hole is to be sealed to the depth and other specifications required by WAC-173-160 (Ecology 1989) and WHC-014, Rev. 7.

The construction of the well will follow drilling, cross contamination, and abandonment protocols as per WAC 173-160 and WHC-014-Rev. 7. The well pump-in test will comply with U. S. Bureau of Reclamation test procedures E-18 (1974).

3.2 Responsibilities and Instrumentation

All work of this test plan is to comply with the Westinghouse Hanford Company Environmental Investigations and Site Characterization Manual (EII) (WHC 1989). Responsibilities of test personnel are to be defined as per EII 10.1, "Aquifer Testing".

The flow meter is to be calibrated on site using a known volume of water and a measured interval of time.

4.0 TRENCH INFILTRATION TEST

A trench is to be excavated by backhoe to a depth of 4' in the bottom of the borrow pit at coordinates N40669 and W37118. The length and width dimensions of the trench are not to exceed what is needed to obtain the specified depth, and ideally are not to exceed 4'x4'. After the trench has been excavated to the required depth, the trench walls are either to be lined with an impermeable material (i.e., plastic) or an appropriate length of culvert is to be set vertically in the trench and the trench backfilled around the culvert. Before the trench or culvert is filled with water, a pressure transducer, protected by a vertically emplaced, open PVC pipe is to be lowered to the bottom of the trench. The PVC pipe is to be held in place at the mouth of the opening by tying it to a plank or second section of PVC pipe placed horizontally across the width of the opening.

Water from the source (a water truck) is to be added to the trench by gravity flow until a relatively constant head is obtained. If a constant head cannot be obtained by gravity flow, pressure will be applied to the water entering the hole by using a pump. Once the hydraulic head and flow rate have become constant, K_{sat} for the wetted zone can be calculated based on the surface area available for infiltration, the head of water in the trench, and the rate of water flow into the trench.

After the test is completed, the trench is to be backfilled to eliminate any hazard to site personnel or wildlife.

5.0 RECORDS MANAGEMENT

All records of the pump-in and trench infiltration tests are to be established and maintained in accordance with procedures defined by the Westinghouse Hanford Company Environmental Investigations and Site Characterization Manual (EII) (WHC 1989. Applicable procedures include EII 1.6, "Records Management", EII 6.1, "Activity Reports of Field Operations", and EII 9.1, "Geologic Logging".

6.0 DATA ANALYSIS

Measurements of constant differential head, constant rate of flow into the opening, internal radius of casing, elevations of the top and bottom of the casing, and areal dimensions of the trench are recorded. The K_{sat} from the pump-in test is

obtained from the following relation:

$$K = \frac{Q}{5.5rH}$$

where: K = hydraulic conductivity (function of horizontal and vertical flow (L/T)
Q = constant rate of flow into the hole (L^3/T)
r = internal radius of casing (L), and
H = total feet of differential head in casing (L).

The calculation of K_{sat} for the trench infiltration test is by an analogous means, with the surface available for infiltration substituted for the internal radius of the casing and the depth of the water in the trench substituted for the differential head in the casing.

7.0 ADVANTAGES AND DISADVANTAGES

The advantages of the test methods are:

(1) Well suited to measuring high hydraulic conductivities in sands and gravels (Daniel, 1989)

(2) Unsaturated conditions are taken into account

(3) Allows testing at the depths at which lithologic changes occur

(4) Data are from insitu, rather than from disturbed sediments

The disadvantages of the test methods are:

(1) The value of K_{sat} is a function of both horizontal and vertical flow (Bouwer 1978)

(2) Sealing and other disturbances of soil at the bottom of the hole or trench may result in underestimation of the true value of K_{sat}

(3) Water may have to be added to the hole or trench for a lengthy time before Q approaches a steady-state value

(4) The representativeness of the values obtained depends on the homogeneity of the sediments tested

(5) Measures only the initial (baseline) hydraulic conductivity; over time, K_{sat} values

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may be lowered by a factor of several times the baseline value, by the growth of algae or by siltation, based on Hanford Site experience.

8.0 REFERENCES

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Daniel, David E., 1989, In Situ Hydraulic Conductivity Tests for Compacted Clay, Journal of Geotechnical Engineering, Vol. 115, No. 9, September, 1989.

Ecology, 1989, Minimum Standards for Construction and Maintenance of Wells, Washington Administrative Code 173-160, Washington State Department of Ecology, Olympia, WA.

U. S. Department of the Interior, U. S. Bureau of Reclamation, 1974, Earth Manual, 2nd Edit., pp. 573-578.

WHC, 1989, Environmental Investigations and Site Characterization Manual, WHC-CM-7-7, Westinghouse Hanford Company, Richland, WA.

WHC, 1992, Generic Specification: Groundwater Monitoring Wells, WHC-014, Rev. 7, Westinghouse Hanford Company, Richland, WA.

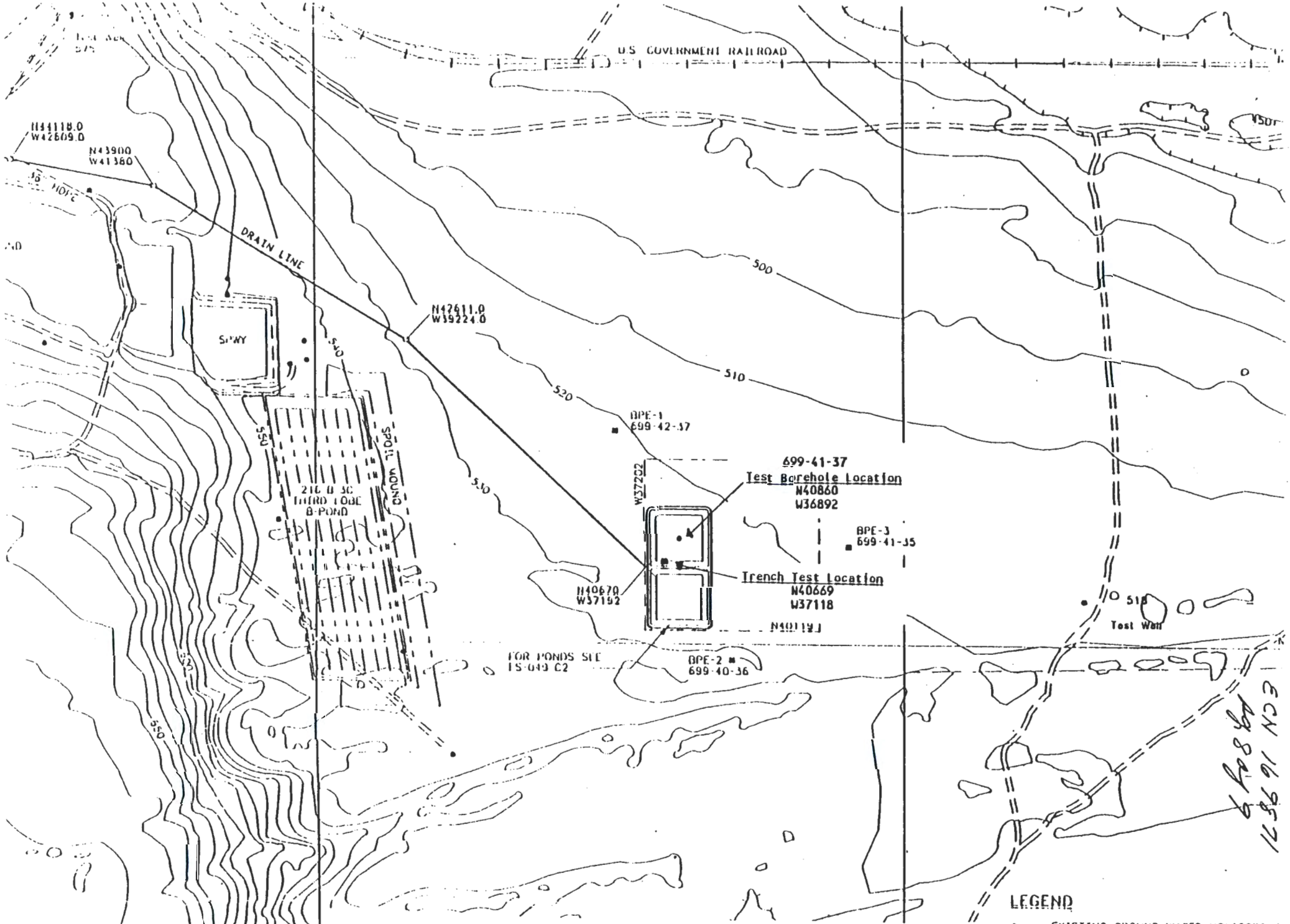

Figure 1. Field Permeability Borehole and Trench Test Locations

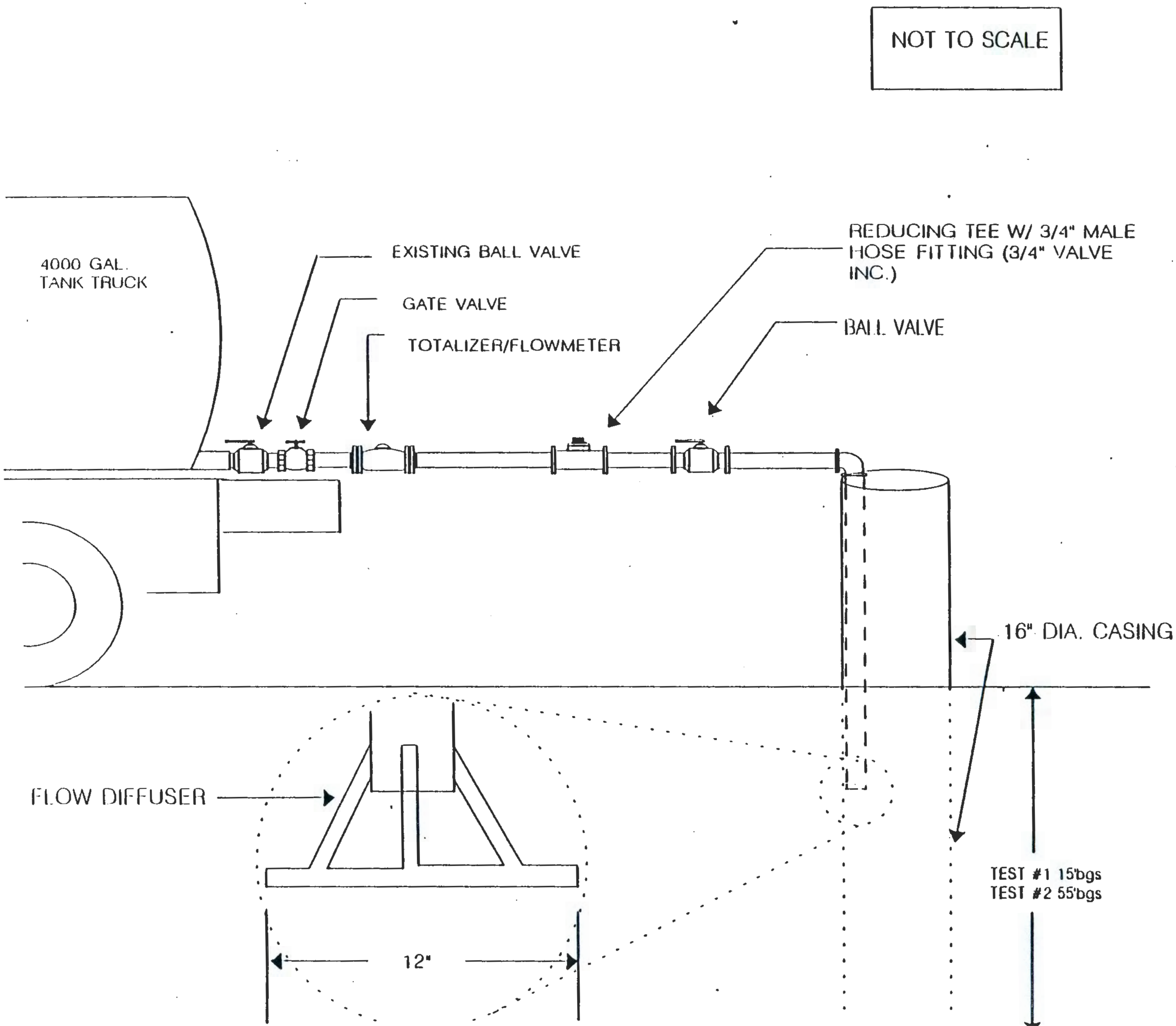

Figure 2. Equipment Set-up for Well Pump-In Test